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A
SYSTEM OF MEDICINE

BASED UPON THE

LAW OF HOMŒOPATHY.

EDITED BY

H. R. ARNDT, M.D.

IN THREE VOLUMES.

VOL. I.

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P R E F A C E.

IN presenting to the homœopathic branch of the medical profession the "SYSTEM OF MEDICINE, BASED UPON THE LAW OF HOMŒOPATHY," the general editor experiences an amount of trepidation which is quite as great as were the enthusiasm and confidence with which he, in the spring of 1882, commenced the task of preparing this work. After nearly three years of unceasing toil, of constant anxiety, and of endless correspondence, he at last submits the completed work to the criticism of his colleagues, trusting that the judgment to be passed upon it will be based not only upon justice but upon generosity also.

The editor possesses one great advantage over the majority of the progenitors of new books in that he needs not enlarge upon the *raison d'être* of this publication. The entire homœopathic school have, for years, experienced the want of a work on "Practice" which should take the place of the very excellent, but now old, treatises of Baehr, Kafka, and others. It was justly argued that none of these works are sufficiently comprehensive to serve our students as a satisfactory text-book, or our practitioners as a reliable guide for consultation and a safe authority in times of perplexity and doubt. In the course of time the matter was brought to the notice of the publishers and of medical men likely to be especially interested in an undertaking of this nature. To the general consciousness of a want which, it was evident, must be supplied soon, and to the agitations of medical gentlemen in various parts of our common country—among whom our friend, Dr. C. E. Fisher, of Texas, was particularly active—is due, in a large measure, the preparation of this work.

Since the general editor alone is responsible for the plan of this work, for the arrangement of its contents, for the limitation

of its scope, and for the character of its teaching, so far as it bears on homœopathic practice, whatever fault may be found with these must of necessity be laid at his door. Aside from these, each contributor is wholly responsible for the articles which constitute his contributions to this work.

The list of contributors embraces many of our ablest writers and teachers, and, in the aggregate, represents a very large amount of special study and valuable clinical experience. The desire to secure the active coöperation of physicians particularly qualified to speak with authority on the various topics of absorbing interest to the medical practitioner involved a laborious correspondence and a considerable delay in the appearance of this work. It is a source of the greatest satisfaction to know that this delay, however annoying in some respects, has made it possible for many of the over-worked men in the profession to contribute from the wealth of their large experience as general practitioners or specialists, an important feature of this work which under other circumstances could not have been maintained. To utilize fully the value of the clinical experience of each contributor, no restraint has been placed upon the members of the editorial corps outside of the observance of such general rules as were necessary to insure a desirable unity of the entire work. In each instance, then, the reader has placed before him the result of actual experience gained by observation at the bedside, a feature of the work which becomes of great importance in those portions which deal with the *treatment* of special pathological conditions.

After a careful examination of the various methods of arrangement of contents employed by different authors, the editor adopted the general grouping of Reynolds, subdividing, however, each section upon an anatomical basis. Thus, the section upon Diseases of the Organs of Digestion is divided into diseases of the mouth, œsophagus, stomach, intestines, peritoneum, liver, and pancreas; each of these is again similarly subdivided. Thus, the Diseases of the Mouth are treated in the following order: diseases of the gums, teeth, tongue, salivary glands, tonsils, uvula, mucous membrane of the mouth.

The treatment of each topic is based upon a desire to make every chapter of the greatest possible value to the reader. It has been the aim of contributors to give just enough space to ætiology, pathology, differential diagnosis, and so forth, to make the article complete, and to furnish a clear summing-up of the present status of pathological knowledge and of the subjects enumerated. The limited space, however, at our disposal, and the firm determination to avoid theoretical and speculative matter, have resulted in the comparative brevity of some chapters devoted to the discussion of subjects which are frequently considered at great length in similar works of the dominant school of medicine. No matter what criticism may be offered here, it is thought that this feature will, upon the whole, prove acceptable.

Particular pains have been taken with the "treatment" of the various diseases herein discussed. The remedies, in most cases, have been arranged not alphabetically, as has been the custom, but in the order of their clinical importance. This arrangement is not free from objection, because remedies which a writer deems of paramount importance in the treatment of some one disorder, may to the professional reader seem of little value in the same condition, and *vice versa*. Such result is unavoidable in a work of this kind, and readers may take consolation from the fact that the work has been done not only conscientiously but, in nearly all cases, by those abundantly qualified by extensive clinical experience to speak with authority.

The indications for remedies are of necessity given with reference only to symptoms which occur in direct connection with the disorders treated; concomitant symptoms usually are ignored, because a work like this cannot be made to take the place of a work on symptomatology. In order to further increase the usefulness of this work, the chapters on "treatment" were not limited in range to therapeutics, but were made to embrace extensive observations on hygiene, nursing, dietetics, the use of hot and cold baths, electro-therapeutics, and the various means and agencies with which the intelligent medical

man at this day combats disease and relieves suffering. The information thus furnished, and the directions here given, do not in the least compromise the dignity and the clinical value of the homœopathic law, but represent the homœopathic practice of to-day as it really exists, and will prove the means of saving our younger colleagues much anxiety and possible blundering; these considerations will more than outweigh any criticism which can be offered on this score.

When first outlining the plan for this work, it was intended to have appended to each chapter the full bibliography of the subject therein treated. As the work progressed, it became evident that space must be closely economized, and, although the original size of the work was enlarged by the addition of a third volume, it has been impossible to carry out a custom which, in more than one respect, commends itself to the readers of scientific works. For the same reason, the large number of illustrations generally, and often unnecessarily, introduced into works of this kind was limited to a few excellent cuts really indispensable to the understanding of the topic which they illustrate.

To the members of the editorial staff the general editor wishes to express his appreciation of the readiness and patience with which they have seconded his efforts to insure for this work a sphere of the largest possible usefulness; to their kindly support is due whatever success and friendly criticism these volumes may meet.

Fully aware of the unavoidable imperfections of this work, the general editor yet fondly hopes that the unceasing labor of three years has not been in vain, and that these clean new pages will, before long, show the marks of that wear and tear which are a practical proof of the real usefulness of a publication like this.

H. R. ARNDT.

GRAND RAPIDS, MICH., February 1st, 1885.

CONTENTS OF VOLUME I.

INTRODUCTORY CHAPTER. By the General Editor, page 17

CHAPTER ON PHYSICAL DIAGNOSIS. By Herbert C. Clapp, M.D., 44

REGIONS OF THE CHEST AND ABDOMEN, 45. PHYSICAL EXAMINATION OF THE LUNGS, 48 (inspection, 49; mensuration, 49; palpation, 50; succussion, 50; percussion, 51; percussion of the healthy chest, 51; percussion in disease, 52; auscultation, 53; respiration in health, 54; respiration in disease, 54; altered intensity, 54; altered rhythm, 55; altered quality and pitch, 55; dry râles, 56; moist râles, 57; pleuritic friction-sounds, 58; the voice in health, 58; the voice in disease, 58). PHYSICAL EXAMINATION OF THE HEART AND OF AORTIC ANEURISM, 60 (inspection, 60; palpation, 61; percussion, 61; auscultation, 61; murmurs or adventitious heart-sounds, 63; pericardial friction-sounds, 64; endocardial murmurs, 64; anæmic heart-murmurs, 64; organic heart-murmurs, 64). PHYSICAL EXAMINATION OF THE LARYNX, 67 (artificial illumination, 67; method of examination, 68; laryngeal image in health, 69; normal color of the parts, 70). PHYSICAL EXAMINATION OF THE NARES, 71 (the use of the mirror, 71; the use of the tongue-depressor, 72; anterior rhinoscopy, 72; exploration with finger and probes, 73). PHYSICAL EXAMINATION OF THE ABDOMEN, 73 (inspection, 74; mensuration and palpation, 76; palpation of the liver, 77; palpation of the gall-bladder, 77; palpation of the spleen and of the stomach, 78; palpation of the intestines, 79; palpation in ascites, 80; palpation of the kidneys, 81; palpation of the bladder and of the uterus, 82; palpation of the ovaries, 84; palpation of abdominal aneurism, 85; percussion of the abdomen and liver, 85; percussion of the spleen, 87; percussion of the stomach, 88; percussion of the intestines and of ascites, 89; percussion of the kidneys, bladder, uterus, 90; percussion of ovarian tumor, 91; auscultation of the abdomen, stomach, intestines, pregnant uterus, 91; foetal pulsation, 91; uterine souffle, 92; auscultation of abdominal aneurism, 93). PHYSICAL EXAMINATION OF THE URINE, 93 (quantity, color, reaction, 94; specific gravity, 95; urea and the urates, 96; phosphates, chlorides, albumen, 97; sugar in the urine, 98; blood in the urine, 99; mucus, pus, tube-casts, 100).

LOCAL DISEASES.

DISEASES OF THE RESPIRATORY ORGANS.

a. DISEASES OF THE NASAL CAVITY.

By LUCIUS D. MORSE, M.D.

Acute catarrh or coryza, 102; chronic catarrh, 110; ozæna, 120; syphilitic affections of the nasal cavity, 123; hay-fever, 124; epistaxis, 128; tumors of the nasal cavity, 132; abscess of the nasal cavity, 134; foreign bodies in the nasal cavity, 135.

b. DISEASES OF THE LARYNX.

By JOSEPH SIDNEY MITCHELL, M.D.

Acute catarrhal laryngitis, 135; œdema glottidis, 138; chronic laryngitis, 139; perichondritis laryngis, 142; laryngeal phthisis, 142; syphilitic laryngitis, 147; neuroses of the larynx, 147 (unilateral paralysis of the adductor of one vocal cord, 148; bilateral paralysis of the adductors of the vocal cords, 149; unilateral paralysis of the abductor of one cord, 149; bilateral paralysis of the abductors of the vocal cords, 150; paralysis of the thyroarytenoid muscles, 151; laryngismus stridulus, 152); diseases of the sensory system of the larynx, 154; tumors of the larynx, 155; croup, 159.

c. DISEASES OF THE TRACHEA AND BRONCHIA.

By JOSEPH SIDNEY MITCHELL, M.D.

Bronchitis, 173 (acute catarrhal, 173; capillary, 177; chronic, 185; dry catarrh, 186; bronchorrhœa, 186; fetid bronchitis, 187; croupous, 190); bronchial asthma, 192.

d. DISEASES OF THE PARENCHYMA OF THE LUNGS.

Pneumonia. By A. K. CRAWFORD, M.D., 202 (acute lobar, croupous, 204; lobular pneumonia, or broncho-pneumonia, 215). Phthisis pulmonalis. By HERBERT C. CLAPP, M.D., 220 (the contagiousness of consumption, 221; predisposition, 228; predisposing causes, 230; pathological anatomy, 233; caseous or catarrhal phthisis, 236; fibroid phthisis, 237; physical signs, 239; symptoms, 241; varieties, 249; differential diagnosis, 251 [from chronic bronchitis, 251; from chronic pleurisy, 251; from pneumonia, 252; from pulmonary cancer, 252; from pulmonary syphilis, 252; from pulmonary abscess, gangrene, bronchial dilatation, 253]; the diagnostic value of the bacilli tuberculosis, 254; methods used for the detection of the bacilli tuberculosis, 255; prognosis, 258; treatment, 260; prophylaxis, 262; hygienic treatment, 263; climatic treatment, 267; therapeutics, 274). Pulmonary congestion, œdema, hæmorrhage, and apoplexy. By A. K. CRAWFORD,

M.D., 278. Emphysema pulmonum. By A. K. CRAWFORD, M.D., 285. Apneumatosi, atelectasi pulmonum. By A. K. CRAWFORD, M.D., 290. Pulmonary gangrene. By A. K. CRAWFORD, M.D., 294. Syphilitic diseases of the lungs. By W. B. TRITES, M.D., 295. Cancer of the lungs. By H. R. ARNDT, M.D., 299. Asthma. By A. K. CRAWFORD, M.D., 306.

c. DISEASES OF THE PLEURA.

By A. K. CRAWFORD, M.D.

Pleurodynia, 316; pleurisy, 317; hydrothorax, 325; pneumothorax, 326; hæmothorax, 327; tuberculosis of the pleura, 328; carcinoma of the pleura, 329.

DISEASES OF THE ORGANS OF CIRCULATION.

a. THE HEART.

Introductory. By PEMBERTON DUDLEY, M.D., 330 (structure, etc., of the heart, 331; functions of the heart, 336; diseases of nutrition of the heart, 340; nervous relationship of the heart, 341).

b. DISEASES OF THE ENDOCARDIUM.

By E. M. HALE, M.D.

Endocarditis, 344 (simple endocarditis, 344; acute ulcerative endocarditis, 348). Valvular diseases of the heart, 355; general considerations, 355; lesions of the aortic valves, 361 [aortic stenosis, 361; aortic regurgitation, 362]; lesions of the mitral valve, 365 [mitral stenosis, 365; mitral insufficiency, 366]; diseases of the pulmonic and tricuspid valves, 367; treatment of valvular diseases of the heart, 368; heart-clots, 382; aneurism of the heart, 385.

c. DISEASES OF THE PERICARDIUM.

Pericarditis. By PEMBERTON DUDLEY, M.D., 386. The treatment of pericarditis. By E. M. HALE, M.D., 408. Hydropericardium. By PEMBERTON DUDLEY, M.D., 412. Hæmopericardium. By PEMBERTON DUDLEY, M.D., 415. Adhesions of the heart and pericardium. By E. M. HALE, M.D., 416. Tuberculosis of the heart. By E. M. HALE, M.D., 420. Cancerous deposits in the heart. By E. M. HALE, M.D., 421.

d. DISEASES OF THE HEART-MUSCLE.

Myocarditis. By E. M. HALE, M.D., 422. Atrophy of the heart. By E. M. HALE, M.D., 425. Hypertrophy and dilatation of the heart. By E. M. HALE, M.D., 427 (general considerations, 427; hypertrophy, 428; treatment of hypertrophy, 437; treatment of hypertrophy with dilatation, 438; dilatation, 440). Fatty overgrowth of the heart. By H. R. ARNDT, M.D., 449. Fatty degeneration of the heart. By H. R. ARNDT, M.D., 450. (Treatment. By E. M.

HALE, M.D., 458.) Adventitious products, cysts, etc. By E. M. HALE, M.D., 462. Rupture of the heart. By E. M. HALE, M.D., 463.

e. NEUROSES OF THE HEART.

By E. M. HALE, M.D.

Angina pectoris, 464; functional disorder of the heart, 474 (palpitation, irritability, intermittency, etc., 474); cardiasthenia, 479.

f. DISEASES OF THE GREAT BLOODVESSELS.

By A. R. THOMAS, M.D.

Diseases of the aorta, 481 (aortitis, 481; atheroma, 481; aneurism, 483; stenosis, 490; embolism, 491); diseases of the pulmonary artery, 491 (aneurism, 491; stenosis, 492; embolism and thrombosis, 491); diseases of the coronary arteries, 493; diseases of the great veins, 494 (phlebitis, 494; degeneration, 498; phlebolites, 499; varicosis, 499; thrombosis and embolism, 500; obstruction of vessels of the brain, 502; obstruction of the pulmonary arteries, 502; obstruction of the vessels of the extremities, 503).

DISEASES OF THE ORGANS OF DIGESTION.

a. DISEASES OF THE MOUTH.

DISEASES OF THE GUMS. By CLARENCE M. CONANT, M.D. Gum-boils, 505; epulis, 506; fungoid tumors of the gums, 507; salivary fistula, 507; dental fistula, 508. THE MORE COMMON AFFECTIONS OF THE TEETH. By CLARENCE M. CONANT, M.D. Odontalgia, 508; swelled face, 511; disorders of dentition, 512. DISEASES OF THE TONGUE. By CLARENCE M. CONANT, M.D. Paralysis of the tongue, 518; inflammation of the tongue, 519; cancer of the tongue, 521; simple ulceration of the tongue, 523. DISEASES OF THE SALIVARY GLANDS AND THEIR DUCTS. By CLARENCE M. CONANT, M.D. Ranula, 524. DISEASES OF THE TONSILS. By CLARENCE M. CONANT, M.D. Tonsillitis, 525; hypertrophy of the tonsils, 528. DISEASES OF THE PHARYNX. By W. T. LAIRD, M.D. Acute catarrhal sore throat, 529; chronic catarrhal sore throat, 535; chronic follicular sore throat, 537; ulcerated sore throat, 542; membranous sore throat, 545; gangrenous sore throat, 548; retropharyngeal abscess, 551; diffuse inflammation of the connective tissue of the neck, 555; DISEASES OF THE MUCOUS MEMBRANE OF THE MOUTH. By CLARENCE M. CONANT, M.D. Thrush, 558; stomatitis, 561; gangrene of the cheeks, 562.

b. DISEASES OF THE ŒSOPHAGUS.

By W. T. LAIRD, M.D.

Inflammation of the Œsophagus, 564; stricture of the Œsophagus, 567; dilatation of the Œsophagus, 570; perforation and rupture of the

œsophagus, 573; morbid growths of the œsophagus, 574; neuroses of the œsophagus, 577 (spasmodic stricture, 577; paralysis of the œsophagus, 582).

C. DISEASES OF THE STOMACH.

Introductory remarks. By H. R. ARNDT, M.D., 583 (food in relation to diseases of the stomach, 584; a general consideration of the subject of indigestion, 586; the secretions of the stomach in their relation to the health and disease of the organ, 588; vomiting, a symptom, its causes and treatment, 589). Atonic dyspepsia. By H. R. ARNDT, M.D., 593. Neuroses of the stomach. By H. R. ARNDT, M.D., 606. Acute gastric catarrh. By H. R. ARNDT, M.D., 616. Gastritis toxica. By H. R. ARNDT, M.D., 628. Chronic gastric catarrh. By H. R. ARNDT, M.D., 633. Penetrating ulcer of the stomach. By J. G. GILCHRIST, M.D., 641. Cancer of the stomach. By J. G. GILCHRIST, M.D., 657. Hæmatemesis. By H. R. ARNDT, M.D., 665. Stricture of the cardiac orifice of the stomach. By H. R. ARNDT, M.D., 669. Obstruction of the pyloric orifice of the stomach. By H. R. ARNDT, M.D., 671. Dilatation of the stomach. By H. R. ARNDT, M.D., 672. Hypertrophy of the walls of the stomach. By H. R. ARNDT, M.D., 675. Softening of the walls of the stomach. By H. R. ARNDT, M.D., 677. Remarks on diseases and abnormal conditions of the stomach which are of unfrequent occurrence. By H. R. ARNDT, M.D., 679 (contraction, 679; atrophy, 679; concretions and foreign bodies in the stomach, 680; perforation, 682; abscess in the walls, 682; rupture, 682; albuminoid disease, 683; tubercle, 683).

d. DISEASES OF THE INTESTINES.

Enteralgia. By A. C. COWPERTHWAITTE, M.D., 683. Enteritis. By A. C. COWPERTHWAITTE, M.D., 690. Duodenitis. By A. C. COWPERTHWAITTE, M.D., 701. Constipation. By A. C. COWPERTHWAITTE, M.D., 703. Intestinal hæmorrhage. By A. C. COWPERTHWAITTE, M.D., 709. Typhlitis. By A. C. COWPERTHWAITTE, M.D., 712. Colic. By A. C. COWPERTHWAITTE, M.D., 717. Colitis. By A. C. COWPERTHWAITTE, M.D., 720. Dysentery. By A. C. COWPERTHWAITTE, M.D., 721. Diarrhœa. By A. C. COWPERTHWAITTE, M.D., 729. Cholera morbus. By A. C. COWPERTHWAITTE, M.D., 734. Cholera infantum. By A. C. COWPERTHWAITTE, M.D., 737. Obstruction of the bowels. By J. G. GILCHRIST, M.D., 745. Hernia intestinalis. By J. G. GILCHRIST, M.D., 757. Ulceration of the bowels. By J. G. GILCHRIST, M.D., 770. Carcinoma of the intestines. By J. G. GILCHRIST, M.D., 777. Diseases of the rectum and anus. By J. G. GILCHRIST, M.D., 779 (congenital imperfections, 779; hæmorrhoids, 781; prolapsus recti, 788; ulcer and

fissure, 790 ; irritable sphincter, 792 ; tumors of the rectum, 793 ; fistula in ano, 793 ; stricture of the rectum, 796 ; cancer of the rectum, 799 ; anal tumors, 801 ; prurigo ani, 801). Proctitis. By A. C. COWPERTHWAITTE, M.D., 803. Intestinal worms. By A. C. COWPERTHWAITTE, M.D., 806 (taenia sol., 809 ; ascaris lumbricoid., 815 ; oxyuris verm., 818 ; trichocephalus dispar, 819 ; anchylostom. duoden., 820 ; trichina spiralis, 820).

e. DISEASES OF THE PERITONEUM.

Peritonitis. By A. C. COWPERTHWAITTE, M.D., 825. Tubercles of the peritoneum. By A. C. COWPERTHWAITTE, M.D., 840. Carcinoma of the peritoneum. By J. G. GILCHRIST, M.D., 845. Ascites. By E. U. JONES, M.D., 849.

f. DISEASES OF THE LIVER.

By W. H. DICKINSON, M.D.

Congestion of the liver, 859 ; icterus, 864 ; biliary calculi, 873 ; acute hepatitis, 885 ; acute atrophy of the liver, 894 ; chronic atrophy of the liver, 901 ; fatty liver, 911 ; cancer of the liver, 916 ; hydatid tumors of the liver, 922 ; waxy liver, 929 ; catarrh of the bile-ducts, 933 ; occlusion of the portal vein, 938 ; purulent inflammation of the portal vein, 941.

g. DISEASES OF THE PANCREAS.

Anatomy and physiology of the organ, 945 ; acute pancreatitis, 947 ; chronic pancreatitis, 951 ; fatty degeneration, 952 ; amyloid pancreas, 952 ; cancer of the pancreas, 953 ; tubercle of the pancreas, 955 ; concretions in the pancreas, 955 ; therapeutics of diseases of the pancreas, 956.

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A SYSTEM OF MEDICINE.

INTRODUCTORY CHAPTER.

BY THE GENERAL EDITOR.

As *health* may be said to exist when the various functions of the body are performed smoothly, harmoniously, and in order, and when the integrity of the various structures of the body is maintained, so *disease*, which is in itself merely a deviation from the standard of health, may be said to exist when the various functions of the body are appreciably disturbed, or when the structural integrity of any organ is impaired. Both terms are terms of convenience, and lack absolute correctness. Absolute health hardly exists. Disease, strictly speaking, is the universal heirloom of the human race, and holds supreme sway over all; but it attracts attention only when the disturbances which constitute it, or which mark its presence exist to a degree which causes discomfort.

It is the duty of the physician to care for the sick, to relieve their suffering, and to restore them to health; in a broader sense it is the duty of the physician to prevent the occurrence of sickness and the spread of disease by removing, modifying, or rendering harmless the causes, wherever found, which are likely to impair the health of an individual, of a community, or of a race. The various studies which teach us the nature of those vital phenomena which we call disease, the causes which are likely to produce them, the conditions under which certain of these phenomena are liable to occur, their perceptible expressions, their probable effect, immediate or remote, upon the individual affected, and the various means used to modify, control, or remove these manifestations of perverted vital force,—all these, collectively, constitute the *science of medicine*. The practical application of the science of medicine to the relief and cure of those actually sick, or to the prevention of disease, constitutes the *practice of medicine*.

The science of medicine, then, is simply the sum total of all we know of the essentials of disease, its causes, manifestations, and the means of prevention or cure at our disposal. It is not an absolute science, but, dealing largely with the wonderful mysteries of "life," of "force," of "vital phenomena," it is constantly changing its aspect,

and remodeling its teaching, as new means of observation and study throw a new and brighter light upon those various and intimately-connected matters which have for ages kept busy the finest intellects of the race. That which yesterday appeared dark and incomprehensible may to-day be clear and easily understood; that which to-day is accepted as a fixed fact, the labors of some patient workman in his laboratory or study may on the morrow prove an utter fallacy. With it all, incessant efforts made have perfected more and more our knowledge of medical science, and, judging from its present status, much may be hoped for the future. The science of medicine, at the present day, represents but the most recent in a long series of evolutions from the lower to the higher plane of intellectual activity and in the attainment of scientific knowledge. Each of these successive stages is characterized by its own blunders, credulities, and follies; but at all times the status of medical science has correctly represented the status of the contemporaneous intellectual life of the race, and each successive forward movement has been the result of rare patience, virtue, and unselfishness on the part of those who stood in the van of the army of progress, fully devoted to the work of lessening suffering and pain, and freely giving their all for humanity's sake. Medicine, as well as the church, has had its martyrs, and in their unselfish labors, devotion, and unrewarded toil, is written its history.

Disease depends upon derangement either of *structure* or of *function*.

The broad division thus made facilitates the study of disease, and to a comparatively recent date was presumed to be strictly correct. Of late, it is held that structural derangement is present whenever disturbance of function exists, and this position seems tenable. It must then be remembered that the term "functional" derangement practically means a condition in which disturbances of function are clearly perceptible to our senses, while with the means now at our disposal no characteristic structural changes in the organ or organs affected can be found, or a condition which gives us reason to presume that the structural derangement possibly existing is one not only of a temporary nature, but sure to be corrected by the physiological process of repair. It is a matter of fact that the class of diseases which come under the head of functional disturbances, and of which as yet no characteristic anatomical changes have been discovered, embrace a very large number of diseases which not only entail much suffering upon the patient, but are often exceedingly difficult of cure.

Pathology is a term used to express the study of disease as a distinct field of scientific investigation. Pathology is divided into *general* and *special* pathology. The former deals with those *general* facts and principles which pertain either to all the various forms of disease, or which, at least, apply to large groups; the latter embraces facts which refer to certain well-defined *special* conditions, to which, as a matter

of convenience, we give a certain name and a certain well-defined place in the catalogue of diseases. The subject of inflammation, for instance, belongs to *general pathology*, because inflammatory action, with all it means, is found under a great variety of conditions, and accompanies a large number of well-defined diseases, each of them differing from all others in many important respects. The same thing can be said of the condition called "fever." Such topics, on the other hand, which pertain to the study of one well-defined disease, or which are characteristic of it only, and cannot be found elsewhere, naturally come under the head of *special pathology*.

To facilitate the study of general pathology, it has been variously subdivided. Many of these subdivisions belong to both general and special pathology; for instance, *diagnosis* may be both general and special.

An important subject which meets the student at the very threshold of the study of general pathology, is that of the *nomenclature* of disease. Diseases, so called, are not well-defined crystallized material substances, but *conditions* which are never quite the same in different subjects, and which only resemble each other in certain respects; hence the impossibility of devising a nomenclature which shall be simple and easily understood, and shall, at the same time, meet those requirements which must be met to make it express the conditions sought to be covered. The instability of pathology alone is such, that terms which to-day might justly be considered peculiarly happy and full of meaning would become misleading through the acceptance of some new theory, followed, of necessity, by a complete change in the pathology of the morbid condition named, not to mention the, often, great difficulty of adapting language, with its many imperfections, to the peculiar needs of the case.

The use of certain suffices and prefaces in connection with the names of the affected organs constitutes one attempt to devise an efficient and unobjectionable nomenclature.* Thus, the suffix *itis* added to the anatomical name of the affected organ indicates an inflammation going on in the organ named (*pleuritis*, *cerebritis*, *gastritis*, etc., mean inflammation of the pleura, of the cerebrum, of the stomach, etc.); the suffix *rhagia* denotes a hæmorrhage from a mucous surface (*metrorrhagia*, hæmorrhage from the uterus); the suffix *œa* means a flux upon a mucous surface (*cystorrhœa*, a transudation upon the mucous surface of the bladder); the suffix *algia* signifies a non-inflammatory pain (*neuralgia*, a non-inflammatory pain affecting a nerve; *gastralgia*, a non-inflammatory pain affecting the gastric nerve); the suffix *œmia* indicates peculiar morbid conditions of the blood, and

* See "A Treatise on the Principles and Practice of Medicine." By Austin Flint, M.D. Philadelphia: Henry C. Lea. 1873.

uria a morbid condition of the urine (*uræmia*, morbid accumulation of urea in the blood; *hæmaturia*, the presence of blood in the urine). The prefix *hydro* indicates a dropsical affection of the part named, and *pneumo* the presence of air (for instance: *hydrocephalus*, a cerebral dropsy; *pneumothorax*, the presence of air in the chest).

The chief subdivisions of pathology deal with the causation of diseases (*ætiology*), the pathological changes brought about in the person of the patient by the morbid influence at work (*pathological anatomy*), the external symptoms which are exhibited by the patient when under the operation of certain morbid actions (*symptomatology* or *semiology*), the particular symptoms the presence of which enables the observant physician to recognize the nature of the morbid agent at work and to classify the disease (*diagnosis*), the probable termination and duration of a case (*prognosis*), and the means which are to be employed to restore health to the sick (*treatment*).

Ætiology is the "doctrine of the causes of disease." It is *general* or *specific*, as it deals with the causes of general or of specific diseases. The importance of a thorough acquaintance with ætiology cannot well be overestimated, since it practically forms the basis of all preventive, or prophylactic, treatment. Furthermore, a knowledge of the cause of disease is likely to be an important factor in shaping the treatment of each individual case, since a knowledge of the cause implies an attempt to secure its removal, a condition upon which only too often hangs the life of the individual patient, and of others yet to be under the influence of the same causative force.

The causes of disease vary greatly in their nature; consequently, the subdivisions of ætiology which suggest themselves are numerous and varied. Causes may be *internal* or *external*; overwork, worry, or fatigue render a person liable to certain diseases, and are classed with internal causes; malarial influence or sudden changes in atmospheric conditions produce sickness, and are external causes. Authors mention *traumatic* causes; *ordinary* or *specific* causes, *i. e.*, those to which all are exposed, and those which operate within certain limits, and produce certain unvarying effects, as the yellow-fever poison. When diseases occur without any appreciable or traceable cause, they are said to occur *spontaneously*, an expression which is only approximately correct. We hear also of *primary* and *secondary* causes, classing among the latter those "complications" in which one disease partially or wholly disappears, to be followed by another to which it stands in relation of cause to effect.

The most natural division of ætiology, and the one most satisfactory, is that which divides the causes of disease into: a, *predisposing*; b, *exciting*.

Predisposing Causes.—Among the predisposing causes, *constitutional* and *individual* peculiarities hold an important place. *Sex* de-

serves consideration, because it involves the exercise of certain functions and the performance of certain duties which, in various ways, may establish fixed tendencies to certain derangements, both functional and structural. Each sex possesses its own marked anatomical and physiological peculiarities, and the organs of generation may become the seat of morbid action. Moreover, the daily life of man and woman differ greatly, each being productive of results more or less exclusively its own, and having its own sources of danger to health. *Age* is an important factor, and one which deserves careful study. The different periods of life, and more especially the extremes of life, are liable to morbid conditions which are rarely, and sometimes never, found at any other period of life. We may here mention the derangements of the organs of digestion of young infants, with a whole train of secondary diseases; the diseases which depend upon, and follow in the wake of, dentition; the diseases of more advanced childhood, as measles, scarlet fever, diphtheria, rickets, intestinal worms; the disturbances which are likely to occur at the period of puberty, as chorea, epilepsy, hysteria; the rheumatic, paralytic, and other, affections which beset the downhill path of life, depending very largely upon the gradual but sure decay of the physical and mental vigor of the aged. Aside from this, experience has established certain general facts in connection with this subject, which prove what may be called a partial limitation of certain diseases to certain periods of life. We know, for instance, that persons who have passed the twentieth year of their life are comparatively free from danger of epilepsy, that gout rarely attacks young people, and that certain derangements of the urinary apparatus are almost limited to advanced age.

Individual Peculiarities.—Under this head we may consider occupation and position in life, the habits established, and temperament, as predisposing causes of disease. It is generally understood that position in life, and the occupation followed, have a bearing upon health. The laboring man is obliged to live frugally and to work hard in order to supply his family with the necessaries of life; he is often exposed to inclement weather; is insufficiently clothed, poorly fed, and many times at his task when physically unable to labor with comfort and safety to himself. Moreover, his home surroundings are quite apt to be at variance with sanitary laws; improper ventilation, badly arranged rooms, exposure to draughts from doors and windows which were carelessly built, owing to the necessity of building at the lowest rate of expense possible, overcrowding of rooms, and many causes due to poverty and, perhaps, to ignorance and carelessness, combine to render this class of people fit subjects for diseases caused by physical overwork, exposure, ill-feeding, and lack of proper sanitary surroundings. Fortunately, the regular hours necessitated by habits of constant employment, the absence of excitement, of great

disappointments and of crushed ambitions, compensate to a certain extent for the drawbacks of their position. The more favored classes, usually possessed of a liberal income, are not obliged to expose themselves to inclemency of weather, have healthful surroundings, and avoid, in the very nature of things, many of the causes of illness which are ever at work among the poor. They are exposed, however, to dangers peculiar to their position. The necessity of constantly providing large amounts of money is liable to necessitate intense application to business, and to produce an amount of anxiety which often results in serious bodily and mental mischief. Crushing disappointments; failure in business; high political, professional, and social aspirations; the exertion made to gratify ambition; liberal indulgence in social dissipation, and the keeping of irregular hours finally tell upon the most vigorous frame, and a broken-down nervous system, with the infinite variety of ailments which this term covers, belong largely to this class of persons.

OCCUPATION *per se* is to a certain extent a disease-producing factor. The pursuit of certain trades involves peculiar dangers; painters suffer from a characteristic affection of the wrist; composers are proverbially favored subjects of tubercular phthisis; occupations which involve close confinement predispose to constipation, and consequently to hæmorrhoidal troubles. Saleswomen are rarely without a lame back, and, like their sisters, the sewing girls, are subject to disorders of the pelvic organs. The Wall Street speculator is sure to suffer from nervous disorders, and not unfrequently becomes a victim of insanity.

Habits of Life have their influence upon health. The habitual use of alcoholic stimulants produces characteristic results; tobacco, too freely used, leaves its impression upon the system, and the "tobacco heart" is but one of the many disorders to which it may lead. Persistent violation of dietetic rules, as eating too often, too rapidly, too freely, predisposes and leads to derangements of digestion. Immoderate and unnatural gratification of the sexual instinct predisposes to certain morbid conditions by the immoderate "wear and tear" and by the excessive waste produced by such indulgence; disturbances of the nervous system—often very serious—are likely to result, and spinal irritation, paralytic affections, softening of the brain or spinal marrow, and insanity, have been traced directly to depravity of this sort.

Temperament needs to be considered here. For obvious reasons each temperament predisposes to a certain class of disorders. A *nervous* temperament means a tendency to nervous affections and mental disorders; a *sanguine* temperament involves a predisposition to morbid states characterized by inflammatory action; a *lymphatic* temperament, wanting in powers of resistance, tends to strumous affections, glandular, catarrhal, and dropsical difficulties; the *bilious* temperament tends to derangements of digestion, and is particularly liable, when partak-

ing of the nervous temperament, to moodiness, petulancy, irritability of temper, and to profound melancholy.

Intermarriage is classed by some authors among predisposing causes of disease. It is generally understood that children of parents who are near blood-relatives are almost sure to be invalids, to have a marked predisposition to tubercular diseases, to functional disturbances of the nervous system, or to be born monstrosities. It is a fact that children of such parents are quite likely to suffer from the afflictions pointed out. The question arises, however, how much blood-relationship on the part of parents has to do with it. We know that the same results may follow when parents who are not blood-relatives resemble each other closely or perfectly in temperament, or when both parents have inherited a tendency to the same morbid conditions. If both parents are of a marked lymphatic temperament, or possess a typical nervous temperament, no experienced medical man will expect the results of such a union to be perfect specimens of humanity; on the contrary, he will expect to find in their children the characteristic weak points of the lymphatic or of the nervous temperament, as the case may be, intensified to such a degree as to lessen greatly the usefulness, and to shorten materially the duration, of their life. Or if the parents are consumptives, it would be a most remarkable event were their children to escape an early death from consumption. Most likely, the unhappy results of intermarriage among near blood-relatives are due to the incidental factor that the parents, descending from the same stock, partake of the same temperament and of a tendency to the same class of diseases. The temperament and the diathesis peculiar to both, in case of the marriage of either with a person of an opposite temperament, and one capable of counteracting existing weak points by a needed supply of vigor, would probably be rendered comparatively harmless, and would generally not affect in a marked manner the offspring of such a union; in fact, nature thus endeavors to preserve and to increase the healthfulness and vitality of the human race. But if the existing evil is not thus corrected; if, on the contrary, inborn weaknesses are intensified by an illy-mated marriage, we must expect to see the children pay bitterly for the lack of judgment on the part of their parents. Intermarriage, then, we are led to maintain, is not of itself productive of harm if by such intermarriage no physiological laws are violated; such laws violated, the products of the marriage are bound to be frail and misshapen, whether the parents are first cousins, or quite without the ties of blood-relationship. This position is sustained by the fact that the reigning families of Europe have practiced intermarriage for an indefinite length of time, and that their members possess a full share of physical and mental vigor.

Inherited Tendency to certain diseases is one of the most important of predisposing causes of disease. Children, as has already been

stated, reflect largely the peculiar make-up of their parents, and very many persons have transmitted to them from their parents, and carry in them from the hour of their birth, the seeds of a disease which, no accident interfering or preventing, eventually becomes the cause of their death. The term *diathesis* is used to denote this inherited tendency to certain forms of disease; thus, we speak of a scrofulous, or cancerous, or tubercular diathesis, meaning that the person spoken of is, by inheritance, predisposed to scrofulosis, cancer, or tuberculosis. The term *diathesis* is exchanged for *cachexia* when the threatening disease has actually broken out, and has left its characteristic mark upon the countenance and physical organization of the patient; thus, a person is said to have a cancerous cachexia when the appearance of the countenance, and of the whole person, indicates to the observant physician that the patient is suffering from the ravages of cancer. This inherited tendency is by no means confined to syphilitic, scrofulous, tubercular, or cancerous diseases; nervous affections, catarrhal difficulties, rheumatic tendencies, in fact, a very large number of diseases, may thus be handed from generation to generation.

Previously existing Diseases may become an ætiological factor, either by leaving behind them a tendency to a repetition of the same disease (epilepsy, acute rheumatism, angina pectoris, and others), or by destroying more or less extensively the structural or functional integrity of an organ, thus lessening its powers of resistance to an invading morbid force. A person may have passed through an attack of pneumonia; before fully recovering he is exposed to a severe draught, and takes cold; the still sensitive condition of his lungs becomes a predisposing factor of disease, and he passes through a second attack of pneumonia, where, from the same exposure, no serious result would have occurred had perfect recovery from the first attack taken place; or, certain deposits, perhaps calcareous, remain imbedded in the lung tissues, the result of a disease apparently cured; the presence of this foreign substance under favorable conditions may give rise to phthisis. There is also held to exist a peculiar relationship, not yet understood, between certain diseases by which one is almost sure to predispose, whenever it occurs, to certain other diseases; such a relationship exists between chorea, rheumatism, and scarlet fever.

The bearing of *climate* and *temperature* must not be overlooked. We know that each climate has its own special scourge. The northern climate predisposes to rheumatic and catarrhal affections; the temperate zone is the home of tubercular phthisis; and malignant fevers and dysentery in its severest form prevail in the tropics. The *seasons of the year* are characterized by the prevalence of certain diseases. Affections of the respiratory organs occur chiefly in the cold seasons; fevers and diseases of the digestive apparatus prevail during the heated term.

Special Causes.—The ætiological factors which have been considered might appropriately be classed among the *general* predisposing causes of disease; the *special* causes embrace a series of conditions and phenomena of which we have as yet only a limited knowledge.

It has been observed that diseases occur which attack a large number of persons living within a certain well-defined territory, the territorial lines being sharply cut, and the diseases not spreading beyond these territorial limits. It is evident that such diseases are due to some force outside of the human body, to which all are exposed alike, and which does not exist beyond the limits defined. The conditions warrant our assuming that this disease-spreading force, called *miasm*, emanates from the soil; diseases thus produced, and limited to localities, are called *endemic*. Other forces are not limited by sectional boundaries, but the disease-breeding presence makes itself felt throughout large tracts of country, often devastating a vast extent of territory, travelling from continent to continent, spreading suffering and death wherever it goes. It is not always possible to determine the starting-point of this intangible, terrible something; we know that the air is its carrier, and that its migratory powers are almost unlimited. The class of diseases thus produced we call *epidemic*, and small-pox belongs to it.

Intimately connected with the subject of epidemic disease is that of *contagion* and *infection*. These terms are often used synonymously, and it is at times difficult to distinguish between them. It may be said that contagion, or contagium, involves the transmission of a disease from one animal or person to another, or from one part of the body to another, by contact, either direct or indirect; in fact, when the term is employed in its more correct and limited sense, it denotes the transmission of a disease from person to person without contact, mediate or intermediate, the infectious matter being conveyed in the atmosphere, and acting upon the infected person by being inhaled. The term infection is also employed to designate the morbid and specific changes obtained by the direct introduction of certain disease-products into a healthy body, producing in the latter characteristic changes by a multiplication of the specific matter introduced. In this sense the term infection is applied to the production of syphilis or cancer, meaning the direct introduction into the system of a healthy person of the specific poison of syphilis or cancer, or by injecting, for instance, into the capillary circulation or into the stomach of an animal, tubercular matter for the purpose of artificially producing tuberculosis. The accidental introduction of pus in this manner produces that long and serious train of secondary phenomena called pyæmia. The study of this entire subject is yet in its early infancy, and is surrounded on all sides by difficulties which seem almost insurmountable.

The importance of the study in its direct bearing upon the prevention of disease is so clear that it only needs to be pointed out.

It does not lie within the province of this work to enter upon a thorough discussion of this perplexing, yet fascinating, subject. So far as it has a practical bearing upon the special pathological conditions which are considered in these volumes, and as it affects the treatment of the diseases herein mentioned, it will receive due attention at the proper time and place. It suffices to state here that the contagia are generally and naturally divided into two classes, the *parasites* and the *true metabolic contagia*. The first class includes the various parasites which make their way into the living human organism, there to multiply indefinitely, either actually destroying the organism of which they have taken possession, or living a comparatively harmless existence, producing only such annoyances and symptoms as arise from their mechanical presence. The itch and trichinosis are diseases produced by this class of contagia. The true contagia embrace that vast variety of peculiar morbid agents whose disease-producing power depends upon their capacity for absolutely unlimited multiplication, and which always produces the same characteristic result upon the body by them attacked. Schwann was the first to introduce the term *metabolic* because their action depends upon the peculiar property exerted in certain living cells of changing in a characteristic, unvarying manner the character of the living substance with which they are brought into contact.

An important factor in connection with the practical effect of contagious substances upon the health of the human family is the *susceptibility* of the individual to the action of the contagion. As all seeds require for their growth and reproduction certain properties in the soil in which they are planted, and without which they cannot live, so the different contagia, to become operative, to take ground and to multiply, require on the part of persons exposed to their action certain, as yet unknown, peculiarities of constitution, and without the existence of these peculiarities the contagia remain inoperative. It is known that some persons are repeatedly exposed to small-pox, but do not take the disease; others require but the slightest exposure to fall ready victims to the contagium which produces the disease, and, in exceptional cases, the soil, *i. e.*, the particular organism, is so favorable to the reception of the contagium that the disease may be reproduced a second or a third time. We cannot tell wherein lies this peculiar susceptibility to these extraneous forces or substances; it is, however, safe to presume that large powers of resistance, in other words, an abundance of vitality, backed by habits of cleanliness and prudence, are of paramount importance in modifying and in successfully resisting the action of these potent agents.

The term *zymotic* diseases is often used in connection with that class

of disorders which has just been discussed. The term was introduced by Dr. William Farr, and implies the production of disease by a process analogous to fermentation; the agents capable of producing this process he calls *zymotic principles*, and he uses the terms *syphiline*, *varioline*, etc., to denote substances which have it in their power to produce syphilis, variola, and so forth. The term was originally used with considerable freedom and latitude, but is now almost wholly restricted to miasmatic diseases.

Exciting Causes.—In considering the exciting causes of disease we deal with a subject far more easily grasped than the one just discussed; they are merely, to use the language of Dr. Flint, Sen., “that which acts the part of the match when everything is ready for an explosion.” They may be of the nature of a mechanical obstruction in some duct, tube, or vessel, regardless of the origin of first cause; they may be surgical, often the result of violence. Cases of poisoning belong here, including not only malicious poisoning, but those due to accidental exposure, to the action of deleterious substances incidental to the pursuit of trades, not to forget the too free use of calomel, quinine, narcotics, and other active drugs, in the hands of reckless physicians. Exposure to cold, and, in fact, a large variety of agencies which, under other circumstances, deserve mention as predisposing causes, may, at certain times and under differing conditions, become important exciting causes.

Pathological Anatomy.—This subdivision of pathology deals with the morbid changes in the various structures, solids and fluids, of the body. Many of these changes may be recognized by the naked eye; a vast majority of them, however, are visible only under the microscope, and it is to the wonderful usefulness of this instrument that we owe nearly all that which makes pathological anatomy of practical value to the profession. The chief value of this branch of medical science lies in the fact that it furnishes certain positive and reliable data which explain much of the working of the sick-making agents with which the physician deals. In examining the changes wrought upon the tissues of the body, we practically read the traces left behind by the morbid agent which has been busy at its work of destruction, and we are thus enabled, in many cases, to understand the manner in which it accomplishes its mission. By putting together our knowledge of the functions of the body in a state of health, the manifold symptoms exhibited by the patient while ill, and the appearance of the structures after death has taken place, we can make a fairly correct estimate of the importance and the meaning of symptoms which would otherwise not be understood.

The thoughtful student of medicine will not overestimate the reliance to be placed upon pathological anatomy. We must not forget that the condition laid bare by the scalpel is almost always the *final*

result of the morbid process which existed before death, showing, at best, only the *very last* form or stage of destruction accomplished by the disease, and leaving us to draw our own conclusions concerning that long and important chain of events which led from a state of health to final dissolution. Furthermore, it is impossible to determine whether the changes observed at a post-mortem examination occurred before or after death, and this single consideration is quite enough to reflect seriously upon the judgment of those who expect the most wonderful and positive results from the testimony of organic matter which undergoes such rapid and inexplicable changes from the instant the life-giving principle departs from it.

Semeiology or Symptomatology.—Symptoms constitute the external or appreciable manifestations of the presence of a disease; semeiology is that branch of pathology which deals with symptoms.

Diseases cannot exist without producing symptoms, for each functional disturbance, and each structural change going on within the living body, is bound to produce effects of which the senses take prompt cognizance. The enumeration of all the symptoms observed during the existence of a certain disease in an individual, duly arranged in the order of their occurrence, and faithfully described, constitutes the *natural history* of the case.

When we wish to give the natural or clinical history of a disease as a type of morbid action, we carefully analyze the largest number of cases within our observation, record the symptoms observed in all, analyze their reliability and the frequency of their occurrence, expunge those which were found in exceptional cases only, and retain those which were observed to be generally or invariably present; we also note the progressive stages of development which occurred, and the course the disease ran. In treating of contagious diseases we note the time which elapsed from the time of reception of the contagion to the time when the first positive manifestations of its presence were observed; this period is named the *stage of incubation*. Nearly all diseases manifest their approach by certain signs, which experience has taught us to rightly interpret; the period during which these early symptoms occur is called the *prodromic stage* of a disease. It is also customary to include in this description, or natural history, of a disease those secondary affections which are likely to follow in their wake, and to which they hold the relation of predisposing and, at times, exciting causes; these are called the *sequelæ* of the disease. In connection, we also note the probable termination of the disease under certain described conditions. Symptoms are *subjective* or *objective*. Subjective symptoms are those which are experienced by the patient alone, and which can be had from no other source. Objective symptoms are the result of the physician's observation, and are wholly independent of anything the patient says or feels. As a matter of

course, the subjective symptoms reflect, to a large extent, the individuality of the patient, and must be carefully scrutinized before their acceptance as reliable. Children and idiotic persons can furnish no subjective symptoms, and in the treatment of their diseases the physician is thrown wholly upon his own resources. Imaginative and nervous persons are likely to exaggerate suffering; that which to people more self-contained is merely pain, is by them described as "terrible," "agonizing," and so forth. Lack of intelligence, or of experience, or of language, leads to the faulty use of terms, and may carry an impression not at all designed by the patient. Special reasons may induce patients to deny the existence of peculiar symptoms; thus, married men may deny the existence of a gonorrhoeal discharge, or, women, more particularly the unmarried, may suppress successfully outer manifestations of labor pains. On the other hand, persons may pretend to suffer from epilepsy, paralysis, or insanity, to escape rendering laborious service or punishment for crimes committed. It requires at such times no small amount of shrewdness, and an excellent knowledge of human nature, keen penetration, and an intimate acquaintance with medical science, especially with the symptoms which express the presence of morbid conditions, to correctly weigh the reliability and importance of subjective symptoms. Again, there exists danger of dismissing too summarily, and of treating as wholly unreliable, symptoms furnished us by patients. Many physicians of large experience have learned the necessity of carefully noting as important many subjective symptoms which to the mass of medical practitioners would seem far too trivial to deserve attention. Those physicians especially who have learned to prescribe in accordance with the homœopathic law, fully appreciate the correctness of this statement, and can bear ample testimony to the fact that in many cases subjective symptoms which, on their face, seemed utterly unworthy of even slight consideration—particularly those of the mind, and that class which are placed under "modalities,"—often furnish the key to the diagnosis and cure of obscure and unpromising cases.

Of the presence of objective symptoms the patient is frequently unconscious, and their recognition depends upon the keenness of observation and upon the thoroughness of the training of the physician. Distinguishing between the two classes of symptoms, basing the distinction upon their relative value, we frequently apply to the objective symptoms the term "sign," speaking of physical "signs," the result of physical examination of certain organs. In contradistinction, the term "symptom," or "vital symptom" is limited entirely to subjective symptoms.

Other classifications of symptoms are made. *Accidental* symptoms are those which occur by "accident," having no bearing upon, or direct connection with, the morbid condition which is presented, and

which we seek to cure. *Diagnostic* symptoms are those the occurrence of which is limited to a comparatively small number of diseases; their presence aids greatly in determining the character of a given disease, i. e., in making a diagnosis, and naturally they increase in value as their occurrence is limited to a small number of diseases. A very few symptoms occur only in one disease to the exclusion of all other morbid conditions, and their presence virtually determines the diagnosis. Such symptoms are called *pathognomonic*. A peculiar rust-colored expectoration is found in but one disease, pneumonia; hence, this symptom is pathognomonic of pneumonia; the crepitant r le, heard chiefly in pneumonia, if not absolutely pathognomonic, is a strongly diagnostic symptom.

The clinical importance of certain objective symptoms cannot be overestimated, and extended observation, based upon the use of appropriate instruments, has resulted in an accumulation of established facts which require more extended notice.

Clinical Thermometry.—The temperature of the body indicates the degree of fever present. An approximate knowledge of the temperature may be had by contact of the hand of the observer with the body of the patient; a positive knowledge can only be had by the use of the clinical thermometer. The temperature of the body in health, taken in the axilla or mouth, registers 37.0° C., or 98.0° F.; in the vagina or rectum it registers from one-fourth to one-half of one degree higher. Sex and occupation have no marked influence upon it; age, to a certain extent, affects it. Very young infants, during the first week, or so, of their life, have a temperature somewhat high, and aged people show a slight decrease. Both extremes of life are marked by susceptibility of their bodily temperature to outside influences. In persons in a normal state of health, each day is marked by a gradual rise and fall of the temperature; it is lowest between the hours of 2 A.M. and 6 A.M., and highest between 5 P.M. and 8 P.M. In the middle of the day there occurs frequently an interruption of the otherwise fairly continuous rise of temperature. This daily fluctuation of the heat of the body, usually not exceeding 2 $\frac{1}{10}$ ° F., is an item of importance, since it is well marked even in a state of sickness. Bodily exercise and eating cause a rise of temperature; tea increases heat; alcohol diminishes it.

The clinical thermometer is so generally known that a description of the instrument is not needed. The self-registering thermometer should always be used; its reliability should be tested by repeated comparison with a standard instrument, or by a series of tests made with it upon persons in a state of health. The scale in common use in this country and in England is that of Fahrenheit; in Germany and France that of Celsius is used by preference. The temperature of the body is obtained by placing the instrument within the closed

axilla, mouth, vagina, or rectum, and allowing it to remain until the mercury refuses to rise higher, or to sink lower; the time necessary to secure a correct register varies from twelve to fifteen minutes. The axilla is used by preference, and the following mode of using it is to be observed: "The bulb of the thermometer should be introduced beneath the border of the pectoralis major, the arm brought close to the side of the body, and the forearm across the breast; the patient then, with his other hand, either keeps the instrument in position, or supports the arm which is pressed against the chest. In the cases of children and weakly persons the attendants must look to the fixation of the instrument. The thermometer must remain in position 15 to 20 minutes before the mercury can be said to have reached its utmost height, as it is only when the arm is brought into contact with the side of the thorax that the axilla becomes a closed cavity; its temperature, therefore, rises slowly to that of the interior of the body. It thus serves no purpose to warm the instrument before using it; time may be economized, however, by causing the patient to close the axilla shortly before putting in the thermometer, 4 or 5 minutes being then sufficient for making an observation, which is nearly as rapidly as it can be done in the rectum or vagina. This shorter method may be conveniently employed when observations have to be frequently repeated, as, for instance, every three or four hours."—(Dr. Paul Guttman, in *Handbook of Physical Diagnosis*.)

Thermometrical observations should be made twice each day, in the morning and in the evening, as near as possible the hours when the extremes of the daily fluctuation are reached. Under circumstances of peculiar danger it may become necessary to repeat the observations more frequently.

Since this subject will receive constant attention in connection with special pathology, the enumeration in this place of a few general facts belonging to clinical thermometry will answer our present purpose. It is well to remember that a sudden rise or a sudden fall in temperature of the body during the progress of an illness should always excite our suspicions. A sudden rise, even if other symptoms are flattering, indicates danger of a relapse, or the occurrence of some unexpected complication; the same may be said when the high temperature continues in spite of an abatement of the severity of other symptoms. A progressive rise of temperature is decidedly unfavorable. A sudden fall usually means collapse, as from severe hæmorrhage in typhoid fever. On the other hand, a fall of the temperature while a disease is at its height, is a good symptom, and promises convalescence if it remains stationary at the point reached.

The following table, from Bæumler,* gives the clinical bearing of temperature:

* Quain's Medical Dictionary; article, "Temperature."

1. Temperature below the normal :
 - a. Temperature of collapse, below 97° F.
 - b. Sub-normal temperature, 97°–98° F.
2. Normal temperature, 98°–99.5° F.
3. Temperature above the normal :
 - a. Sub-febrile temperature, 99.5°–100.5° F.
 - b. Febrile temperature of moderate degree, 100.5°–102° F., morning; 102.2°–103° F., evening.
 - c. Febrile temperature of high degree, 102.5° F. and more in the morning; 105°–106° F. in the evening.
 - d. Hyperpyrexia, 105.8°–107.5° F. and more; extremely dangerous.

In a general way, a temperature approaching 104°–105° F. is found in serious illness; rising above 105° F. it means great danger to life, and touching 108° F. it means death. An exception to this rule is to be noted in favor of intermittent fever; during the progress of this disease the temperature often remains for several hours at a remarkably high point.

Depression of temperature is found during collapse in typhoid fever, acute peritonitis, cases of poisoning, and in profuse hæmorrhage. Wasting diseases, loss of vital fluids, and starvation lower the bodily temperature; the same applies to diseases of the brain and spinal cord, and to severe diseases of the upper spine; in the third stage of cholera the temperature often sinks as low as 94° F. Bæumler reports a case of carbolic-acid poisoning, which came under his observation, in which the temperature fell to 93.92° F. Chronic diseases, characterized by a waste of tissue and by dropsical effusions, are generally accompanied by depression of temperature.

Elevation of temperature accompanies the diseases ushered in by a rigor, that is, those of an inflammatory nature and of infectious origin; rigors, also, which are of an evanescent character are usually thus characterized; certain injuries to the brain and spinal cord are marked by a high temperature. Wunderlich records a case of tetanus in which he noted 112.55° F.

In *continued* fevers the temperature at first rises quickly, and, after reaching its maximum height, remains stationary for an indefinite period, returning gradually to the normal. If the temperature rises again during seeming convalescence, a relapse may be expected. The fluctuations are not marked with accustomed clearness. In many inflammatory diseases the temperature remains at its maximum height for several days, and then returns rapidly to the normal, or, for a brief period of time, to a point slightly below the normal, thus giving rise to a *crisis*. In another class of fevers, the maximum height of temperature is reached slowly, but, once reached, is stubbornly maintained for a great period of time, the daily fluctuations of temperature

becoming well-defined exacerbations and remissions. Recovery takes place with a very gradual return to the normal temperature, the evening exacerbations becoming gradually lighter or disappearing entirely, or both morning and evening temperature showing a gradual decline. The term *lysis* denotes this gradual return to the normal temperature in these *remittent* fevers.

The *intermittent* fevers are characterized by intense action throughout, the paroxysm coming on with peculiar violence, and the temperature running up to a point which, under other conditions, would be considered very dangerous; the return to the normal is as prompt. These attacks are repeated every second, third, or fourth day, the patient being free from rise of temperature during the intervals between the paroxysms.

The pre-mortal stage of inflammatory diseases is usually characterized by a steady increase of heat, the rise often continuing for some time after death; in other cases the temperature sinks as life ebbs away.

The Pulse.—From time immemorial medical men have understood the great value of the pulse as a reliable indicator of disturbance in almost any part of the body. Although often unable to account for the existence, under similar conditions, of certain peculiarities of the pulse-beat, ample observation established, during the very dawn of medical science, rules which are accepted as reliable and important clinical facts even at this day.

The pulse consists of the distension of the arterial system caused by the influx of blood into the aorta from the left ventricle of the heart; it is felt usually at the wrist, by making upon the artery gentle pressure with the finger; at times the pulse is more clearly perceptible in other localities, as at the temple, or at the femoral artery. The normal pulse in the adult man ranges from 70 to 80 beats in the minute, is even in force, and regular in rhythm. It is more frequent in women than in men, and in young children and aged people than in persons in the prime of life; in new-born infants it beats from 125 to 140 beats per minute, and gradually lessens in frequency as maturity is approached. It is at its lowest average when lying down, increases upon assuming the sitting posture, and still more upon rising. Its frequency is also increased by bodily exertion and mental excitement.

As a pathological symptom, an increased pulse-rate is commonly indicative of fever; an elevated temperature and a pulse-rate above the normal are present in all fevers. A pulse-rate of 100 per minute betrays slight fever; from 100 to 115 shows moderate fever; a pulse above 115 denotes active fever. There are exceptions to this rule; in many affections of the heart we find a low temperature and a high rate of pulse; again, the moribund state is often characterized by a high temperature of the body and a low rate of the pulse. Generally

speaking, the pulse is increased in *frequency* whenever there exists a rise in the temperature of the body; the study of special pathology will show the conditions under which such frequency exists independent of the bodily temperature. A lessening in the frequency of the pulse-beat is found in certain affections of the heart, notably in fatty degeneration, in various nervous affections, in relapsing fever, and, usually, in derangements which depend upon a vitiated state of the blood.

The *force* of the pulse depends upon the muscular force of the heart; it can be estimated by the force, on part of the finger pressed upon the artery, which is necessary to overcome it, and indicates chiefly the integrity of the heart-structure. The *rhythm* of the pulse also depends directly upon the rhythm of the heart's action. The variations from a normal standard are classed under the *intermittent* or under the *irregular* pulse, and may be said to arise from a derangement of innervation of the heart. A pulse is termed "intermittent" when a beat is omitted, either at regular intervals, as at every seventh or tenth beat, or without any regularity. Such a pulse, alone, is not positive evidence of disease; it occurs, however, in various cardiac affections, especially in the neuroses of the heart, in affections of the nervous system, and, proverbially, in gout. Nervous excitement, overwork, etc., also produce it, and tobacco-smokers are particularly subject to it. A markedly irregular pulse, both as to force and frequency, is found in diseases of the heart and in affections of the respiratory organs. The pulse may be even partially suppressed, in which case we must infer great cardiac weakness; mechanical obstruction in the shape of aneurism or thrombosis produce localized, or partial, suppression.

The invention of the sphygmograph has advanced our knowledge of the peculiarities of the pulse, because it increases our means for carefully observing it; this instrument is applied to the wrist, and leaves upon a slip of paper tracings which represent certain pulse-characteristics that are lost to the sense of touch. The delicacy of the instrument, however, stands in the way of its general adoption by the profession, and the scope of this chapter does not warrant a discussion of its merit and clinical value.

The ophthalmoscope, laryngoscope, and other instruments which, by the use of refracted light, expose to view different parts of the body not open to unaided vision, are most valuable aids not only in the hands of the specialist, for whose use most of them were primarily designed, but also in the daily work of the intelligent general practitioner. Repeated allusion will be made to them in the chapters on special pathology.

Diagnosis.—That part of medical science which enables us to recognize the existence of a certain disease, and to distinguish it from

all other diseases, is called *diagnosis*. Medical diagnosis is not a science; it is, to all intents and purposes, an art.*

The ability to correctly diagnosticate a given case is an accomplishment without the possession of which no medical man is qualified to practice the healing art. What are the chances for the recovery of a patient whose physician is not able to recognize the nature of the morbid force at work, the manner in which it accomplishes its mission of destruction, the probable termination of the disease, and the exigencies likely to arise during its progress?

In order to arrive at a correct diagnosis, we must, first of all, possess an accurate knowledge of the organs of the body in health, and of their physiological functions. Possessed of this knowledge, we can by comparison determine what organs are *not* in a state of health, and what functions are *not* performed physiologically.

It then becomes necessary to study the previous history of the case, in fact, everything which may have any bearing whatsoever on the case. A thorough inquiry into the early history of the patient, including his early habits, his early home-surroundings, the health of his parents, their age, if alive, and the cause of their death, if deceased, the diseases through which he has passed, and the degree of recovery from them, are to be looked after, and, in chronic cases, become of great importance, for they are likely to furnish us facts which hold a causative relation to existing disturbances. The present condition of the patient next demands our attention, and we seek to determine the exciting cause of the present illness. In this part of the examination we consider the surroundings of the patient, and their bearing upon his present condition. We ascertain possible exposure to inclemency of weather, or to contagion, or to other inimical influences. We then elicit the subjective symptoms of the case, carefully observing the precautions already pointed out; and at last, by the use of our senses and of such instrumental aid as is available, secure all the objective symptoms within reach. This done, we have gained the material with which to work. If among the symptoms obtained we have found a pathognomonic symptom, our task is easy; but such cases are rare. No pathognomonic or diagnostic symptom being present, we recall those diseases which are suggested by the symptoms obtained, and reduce their number by excluding from the list those whose causes and symptoms do not accord with the probable causes and with the presenting symptoms of the case before us. This process of "excluding" or of eliminating is by all means the most satisfactory, and usually leads to a solution of the problem before us. If it becomes difficult

* "That part of medicine whose object is the discrimination of diseases, and the knowledge of the pathognomonic signs of each" (Robley Dunglison).—"The art of recognizing the presence of a disease, and of distinguishing different diseases from each other. The term is also applied to the result obtained" (R. Quain).

to distinguish between two diseases, each of them presenting a certain number of symptoms found in the case before us, we must arrive at a final conclusion by carefully weighing the importance of the symptoms present or absent, and by a thorough study of all the pathological questions involved, not to forget a close search for symptoms of possible diagnostic value.

The above rules are those usually observed in making a diagnosis. Practical experience is an indispensable factor; patience, tact, thoroughness and keen powers of observation, however, are all important, to say nothing of that *intuition* by which the *born* diagnostician arrives quickly, and without apparent effort, at the solution of a problem which, to others, presents almost insurmountable difficulties.

Prognosis.—When the physician, carefully weighing the evidence in a case, forms an opinion concerning the probable course and termination of a disease, of its immediate effects, and of its more remote bearing upon the life or health of the patient, he *prognosticates*, and the opinion thus formed and delivered constitutes his *prognosis* of the case. A prognosis may be general or special; for instance, we know that the average case of intermittent fever is quite likely to recover, and that, on the other hand, a patient sick of malignant scarlet fever is more likely not to get well; hence, we say our prognosis in intermittent fever is favorable, while that in malignant scarlet fever is unfavorable; this is general prognosis. Applying the same principle to an individual case, we deal with special prognosis.

The correctness of a prognosis depends largely upon the possession of the same qualities which make the good diagnostician, namely, a thorough knowledge of the science of medicine, powers of close observation, and soundness of judgment. The experienced practitioner is fully aware of the mistake he is liable to make, and his candor will be tempered with caution.

To forecast the probable termination of a disease, it is, first of all, necessary to have a correct understanding of its nature and of its usual mode of termination; the latter may be complete recovery, partial recovery, or death. This general "drift" of the case depends largely upon the organs and structures which are involved in the morbid action.

The violence of the attack must next be taken into consideration, and the existence of certain important symptoms present in the individual case before us must receive our attention; for instance, a patient may be sick with a type of fever which we know tends to full recovery; in the particular case before us, however, the clinical thermometer may indicate the necessity of making a very guarded, and possibly unfavorable prognosis. The patient himself next claims our attention. We inquire into his age, and estimate carefully his powers of resistance and endurance; his surroundings are considered as well

as the care he is likely to receive, and the means at our disposal to meet those indications which will probably arise from time to time. In fact, in making a prognosis, we cannot be too painstaking in considering the bearing of many seemingly insignificant conditions which are readily overlooked, while they frequently decide between life and death.

Treatment.—The treatment of disease embraces the various agencies employed to remove, modify, and render harmless the causes of disease, and to restore health to the afflicted. The science and art of medicine finds its highest expression and chief aim in the prevention and cure of disease.

All physicians agree to the correctness of the proposition that "it is the first and sole duty of the physician to restore health to the sick."* Physicians differ, however, in their estimate of the efficacy of the various means at their disposal for bringing about this desirable object; this difference of opinion is shown particularly in that portion of this chapter which is devoted to therapeutics. Medical men who possess similarity of opinion on this point, collectively form what are called "schools" of medicine. Much of the advance made in medical science is due to the honorable rivalry existing between the schools in their praiseworthy attempts to discover new agents with which to relieve suffering.

It will answer the purpose of this chapter to consider the subject of "treatment" under two heads, the preventive treatment, and the direct treatment of disease.

The *preventive*, or *prophylactic*, treatment of disease is based upon our knowledge of the causes of disease, and consists of the removal of such causes as soon as found. It is seen at a glance that the subject is vast in extent, and of supreme importance in its bearing upon the general public health, as well as upon the health of the individual.

Of late years, the importance of a thorough knowledge of the ætiology of disease has become more and more fully understood, and the continued agitation of problems intimately connected with causation of disease, and of the public health, has resulted in organized and systematic efforts on a large scale, in many instances at the public expense and under governmental supervision, to study the causes of diseases, more particularly the nature of epidemics. The fruits of these researches have been made of the greatest possible practical value by disseminating among the masses a correct knowledge of the causes of the contagious, and other diseases, and the means by which their occurrence may be avoided, or their spread be prevented. Legislation has also been had, forcing the people to observe those laws of health and those precautions which are best calculated to improve the general health, and to lessen the danger of and from the occurrence of sweeping epidemics.

* *Organon of Medicine*, by Samuel Hahnemann, § 1.

The principal subjects with which preventive treatment deals are: the nature of contagion, and the means to prevent the occurrence and spread of diseases which are the result of its action upon the human body; personal hygiene in its relation to health and disease; climatology, and its bearing upon health and disease; and sanitary science proper, including a very large variety of special topics, such as sewage, ventilation, quarantine, and others.

The physician, upon recognizing the existence of what is, or what promises to become, a disease-making factor, promptly removes it, or, if this is impossible, lessens to the extent of his power the dangers arising from it. In case of a threatening epidemic, he has recourse to the best means at his disposal to narrow its field of operation. If a patient lives in a climate not suitable to him, and which thus is a standing menace to his health, he advises a change of climate; if a nervous patient is driven almost to madness by the existence of some annoyance which may be removed, the physician promptly insures its removal; if the drinking water of a family under his care is unfit for such purpose, he points out the danger, and insists upon having it removed; if a person inclined to tubercular disease is engaged in an occupation which in itself predisposes to the formation of tubercles, the physician sees that a change of occupation is had. These examples merely illustrate what constitutes preventive treatment, and their list might be carried much further.

Under *direct* treatment of disease we class everything the physician does to ameliorate the severity of a disease, and to cure it at the earliest moment possible. Direct treatment includes therapeutics and what, for the sake of convenience, may be termed auxiliary treatment; the latter embraces regimen, dietetics, the use of baths, and the thousand and one things which the careful physician and nurse find simply invaluable in the treatment of the sick.

Therapeutics.—The individuality of homœopathic practice rests upon the proposition that disease, so-called, is simply the appreciable effect of the action of an inimical or morbid force upon the vital principle, and that the disturbance thus caused must be corrected by the administration of a remedy which, by its action upon the vital force, yet unexplained, has the power to produce upon the healthy human organism a series of effects closely resembling the symptoms which in the sick constitute the disease. The homœopathic physician, then, in his search for the curative remedy in a given case, seeks, first of all, for the drug which has produced upon the healthy a series of symptoms which bear the closest possible similarity to the symptoms of the disease which he is called upon to remove. This remedy found, he administers of it just enough, and not more than enough, to remove the pathological or morbid symptoms which he desires to cure.

Hahnemann devotes to this subject considerable space, and most

painstakingly instructs his followers in the method he believes best adapted to the successful accomplishment of the object in view. The chief points to be observed are these: The physician first obtains all the information which the patient himself can furnish; he must use care and judgment in deciding what points are worthy of credence, and what symptoms, if any, are to be rejected; the value of symptoms thus obtained depends less upon the intelligence than upon the honesty of the patient. After eliciting from the patient these subjective symptoms, the physician, by a system of cross-examining the patient, supplements and corrects the information secured, taking care, however, not to throw aside lightly, on account of their seeming unimportance, any statements made by the patient in reference to purely subjective symptoms. This accomplished, the physician completes the "totality" of symptoms by a searching examination of every detail which has the slightest bearing upon the case, including the previous history of the patient, the probable causes of the disease, and all those points already discussed as possible ætiological factors. It must be borne in mind that the practitioner who is most skilful in thus examining a patient, and who fully understands the use of the clinical thermometer, of the stethoscope, and of other means of physical diagnosis, accumulates a wealth of facts which not only prove the means of making a correct diagnosis and prognosis, but which form equally reliable guides in the treatment of disease; for the "totality of symptoms," correctly speaking, means nothing short of the sum total of all discernible deviations from the standard of health.

The art of "taking a case" can be fully acquired only by practice, and to a large extent is a matter of tact, even of intuition. Thoroughness, however, is within the reach of all. The young practitioner will do well to go from organ to organ in regular order, to ascertain thus methodically existing organic lesions and functional derangements. His knowledge of the history and semeiology of disease must then be called into service to connect symptoms already discovered with morbid conditions with which such symptoms are known frequently to be associated; it needs only reference to the peculiar headaches in women which point almost unerringly to the existence of certain uterine difficulties, or to the connection which is known to exist between exophthalmic goitre and certain affections of the heart, to illustrate the importance of this latter point.

The selection of the homœopathic remedy follows next, and is the result of an intelligent comparison of the symptoms of the artificial or drug-disease with the symptoms found in the patient. The homœopathic relation between the two series of symptoms depends upon a correspondence, not only of superficial appearances, but extends to the structures affected, and even to a correspondence between the various stages of development of the drug-disease on one hand, and

of the existing pathological condition on the other. A number of remedies, acting in different ways and upon different structures, not infrequently present alike a certain important symptom; it is evident that the choice between them must depend upon a deeper-lying correspondence than can be ascertained from mere mechanical "symptom-covering," and that this choice cannot be made intelligently unless the prescriber takes into consideration the manner in which the drug-symptom is produced upon the healthy, and seeks to establish a similarity between this process and that which has given rise to the production of the same symptom in the sick.

The correct remedy found, it is to be given in a dose, or in doses, sufficiently powerful to fulfil its legitimate object of curing the patient. At the present stage of our therapeutic science, it is difficult to lay down fixed rules concerning the exact amount of medicine required to produce stated results. We can tell how large an amount of ipecacuanha will produce emesis, or how many grains of opium will produce fatal consequences; it is quite another thing to state how *small* a dose of ipecacuanha will cure Master B., aged six years, of a violent cough; or to explain why Miss D., also aged six, and closely resembling Master B., derives no benefit whatever from a dose of ipecacuanha which promptly cures Master B., while a dose of the same remedy much heavier, or infinitely smaller, as the case may be, promptly relieves her difficulties. It is, however, safe always to remember that a *very* small dose of the *right* remedy is sure to be followed by relief in all curable cases, and that the young physician will best serve his own interests, and those of his patients, by studiously avoiding practicing upon preconceived notions, so far as this concerns the exclusive use of any one set of attenuations of drugs. The vast amount of reliable clinical experience now at our disposal proves, most conclusively, the wonderful efficacy of minute doses of the properly selected remedy, and the drift of the entire medical world is now in the direction of the small doses, first indicated by Hahnemann. Doses are now given by physicians of the physiological schools of practice which, a very few years ago, would have subjected them to gross ridicule and to relentless persecution. It is not possible to determine, at this writing, where the limit of drug-attenuation really lies; and, while the administration of too large a dose of medicine is a thing to be avoided painstakingly, it is no less shortsighted to employ in the treatment of the sick a dose likely to be too small to accomplish its mission of mercy. In view of this atmosphere of uncertainty which hangs about the question of dose, no reference will be made to it in this work, save in a few isolated instances, in which it represents the personal experience of the respective contributors.

The repetition of dose, and the length of the intervals to be observed between the periodical administration of the prescribed remedy, has

also given rise to much useless controversy. Hahnemann teaches that the physician is to give but one dose of the indicated remedy, and must wait until improvement has ceased before considering whether to give a second dose of the same remedy or to select a new remedy. Many homœopathic physicians, especially the older members of the school, still follow this teaching, allowing hours, days, and, in chronic cases, many weeks to elapse before repeating the dose, or before changing the remedy. In the treatment of acute cases an overwhelming majority of homœopathic physicians now prefer to repeat the remedy at comparatively short intervals, lengthening these intervals as danger to the patient grows less. In the treatment of chronic diseases the medicine employed should always be given at intervals of considerable length.

The sum total, then, of homœopathic practice depends upon: *a*, the selection of the indicated remedy; *b*, the administration of this remedy in the smallest dose which, in the judgment of the prescriber, promises to cure the patient, and at such intervals as seem advisable to the attending physician.

Auxiliary Treatment.—One of the greatest of the many services done suffering humanity by Hahnemann, is his teaching concerning the use of powerful narcotics for the relief of pain, a symptom almost always present in disease. The use of narcotics and hypnotics for the relief of pain is of ancient origin, and constitutes an interesting chapter in the history of medicine. To the ancient physicians much of the knowledge of disease, now alike the property of the learned and of the masses, was practically unknown, and curative treatment in most instances was wholly out of the question. The relation, in most cases, between cause and effect, or between the disturbing force at work and the outer expression of the disturbance created, were considerations which received very little attention. It seemed natural to think that the suppression of pain constitutes the real treatment of disease. A person suffering intensely, put under the quieting influence of a powerful narcotic mixture, was presumed to have received the benefit of all medical skill can do. The same procedure was resorted to again and again, until the patient made either an accidental recovery, or died. Centuries of observation and study necessarily modified somewhat this pernicious practice, but up to the time of Hahnemann no energetic and systematic warfare had been waged against a practice then so universally employed in the treatment of the sick. Hahnemann insisted upon pointing out, on every possible occasion, the harm likely to result from the indiscriminate use of the narcotics, more especially of the preparations of opium. He emphasized the following facts: by the use of narcotics the physician deliberately suppresses the manifestation of important subjective symptoms; during the period of suspended consciousness the ravages of

the morbid force, not only go on without interruption, but their development cannot be watched by the attending physician, and no measures can be taken to meet them with that promptness upon which the very life of the patient may depend ; their use is very likely to lead to loss of valuable time, and, since they do not affect curatively the existing disease, recovery is retarded, and death may result when it could have been avoided by proper curative measures ; the use of narcotics is followed by the appearance of symptoms which are wholly due to their use and are characteristic of them. These drug-symptoms modify and blend with the symptoms caused by the disease, and thus greatly increase the difficulty of finding a curative remedy ; the physician, finding it easier to prescribe a narcotic than to search for the right remedy, is led to cultivate habits of idleness and of carelessness, to the great detriment of his patient ; the continued use of narcotics leads often to the formation of habits in the patient which are really more disastrous in their consequences than was the original disease.

These propositions practically embody the views of Hahnemann upon this important subject, and are upheld to-day by homœopathic physicians everywhere.

Leaders in all important movements necessarily occupy extreme positions, and Hahnemann was soon led to practically deny the necessity of *ever* having recourse to the use of narcotics for the relief of pain or for sleep-giving purposes. Homœopathic physicians, as a class, do not fully indorse this extreme position, but recognize the fact that purely palliative measures are at times indispensable. Whenever a patient suffers an unbearable amount of distress, the possible necessity of using narcotics for purely palliative purposes invariably arises. In cases which are not curable, the omission of such relief as can be given without endangering life, may become little less than a criminal neglect of duty. Recent investigations have fully demonstrated the fact that severe and long-continued pain acts as a potent factor in producing seated diseases, and must often be stopped at all hazards. The homœopathic physician, then, is presumed to fully realize the responsibility he assumes when suspending curative treatment for the employment of mere temporary make-shifts ; he is presumed to be patient and skilful in the use of the means which will permanently remove the *cause* of pain ; he is to be influenced not by the clamor of the patient, who refuses to bear pain, but by his own knowledge of the nature of diseases, and by a clear understanding of the reliability of the means at his disposal to combat the morbid force at work. On the other hand, he must ever remember that he is a physician in the broadest sense of the word, and that his knowledge of the noble profession he has chosen must be sufficiently broad to indicate when and where the question of affording immediate, though temporary, relief

of pain becomes one of paramount importance; and at such times no fear of unfriendly criticism dare stand in the way of a fearless and faithful discharge of his duty as a physician. The exercise of this duty requires much circumspection and soundness of judgment. Abundant testimony exists, drawn from the experience of our most successful practitioners, that the true homœopathic remedy relieves even intense pain with astonishing promptness, and that the use of opiates, and of other narcotics, rarely becomes a necessity in the practice of the intelligent and consistent homœopath.

Auxiliary treatment embraces not only the use of narcotics for the purpose of furnishing temporary relief from pain, and of giving sleep, but covers that infinite variety of measures which aid in securing the comfort of the patient, thus contributing to his favorable progress toward recovery. Mention may be made here of the important part played by the skilful nurse, and of all those various resources which are classed under *regimen*. The use of hot and cold water, of crude remedies employed for specific and usually temporary purposes (as the use of amyl nitrite in emergencies likely to arise in certain diseases of the heart), of stimulants, of electricity, and of many agents of minor importance,—all these must be familiar topics to the physician who desires to take to his couch, after the day's labor is completed, the consciousness that he has done his full duty by those who have intrusted to him their own life or the life of those dear to them.

PHYSICAL DIAGNOSIS.

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PHYSICAL diagnosis is the discrimination of diseases by means of the principles of physical science. In health there are certain physical conditions incident to the internal organs of the body, many of which can be recognized by our senses by the observation of certain phenomena which are called *physical signs*. Many changes which disease produces in these physical conditions can be recognized also by means of physical signs. The interpretation of the meaning of these signs is not to be arrived at by any theoretical *a priori* conceptions, but only by clinical observation confirmed by post-mortem examination.

There are six methods of physical exploration: *Inspection, Mensuration, Palpation, Succussion, Percussion* and *Auscultation*. The first and second depend on the sense of sight, the third on that of touch, and the fourth, fifth and sixth on that of hearing. The phenomena which these methods give us are called physical signs, in distinction from what are commonly called the symptoms of disease—the rational or vital symptoms, such as headache, sleeplessness, pains of various kinds, etc. The former are objective, the latter subjective. The former can be relied on to give accurate information, not only in the examination of intelligent and honest patients, but also in cases of idiocy, insanity, coma; in cases where the patient speaks a foreign language which can not be understood, or for other reasons has difficulty in expressing himself, or tries to deceive the physician; and also in dealing with young children; in all of which latter cases the subjective phenomena are not to be depended on. Where both are obtainable, physical signs and rational symptoms should always go together in forming a diagnosis. Neither should be relied on to the exclusion of the other, but they should be mutually supplementary. Likewise, the signs resulting from the different methods of physical exploration should always be compared, in order to ascertain to what extent they are confirmatory of each other. The conclusions derived from one method might mislead, but if all conspire to tell the same story, it can not be false.

It is unnecessary at the present day to uphold, by means of argument, the value of physical diagnosis. He who is thoroughly posted in it has an immense advantage over him who knows nothing about it. To become thoroughly posted, however, is the work of time. It requires not only a theoretical knowledge of facts which should be so familiar that they are constantly “at the fingers’ ends,” so to speak,

but also a practical knowledge of these facts which can only be obtained by the actual examination of patients; and after this knowledge has been obtained, it can only be preserved by a very frequent application of it. Therefore, the physician should constantly resort to these methods of examination in as many cases as possible, to prevent growing rusty.

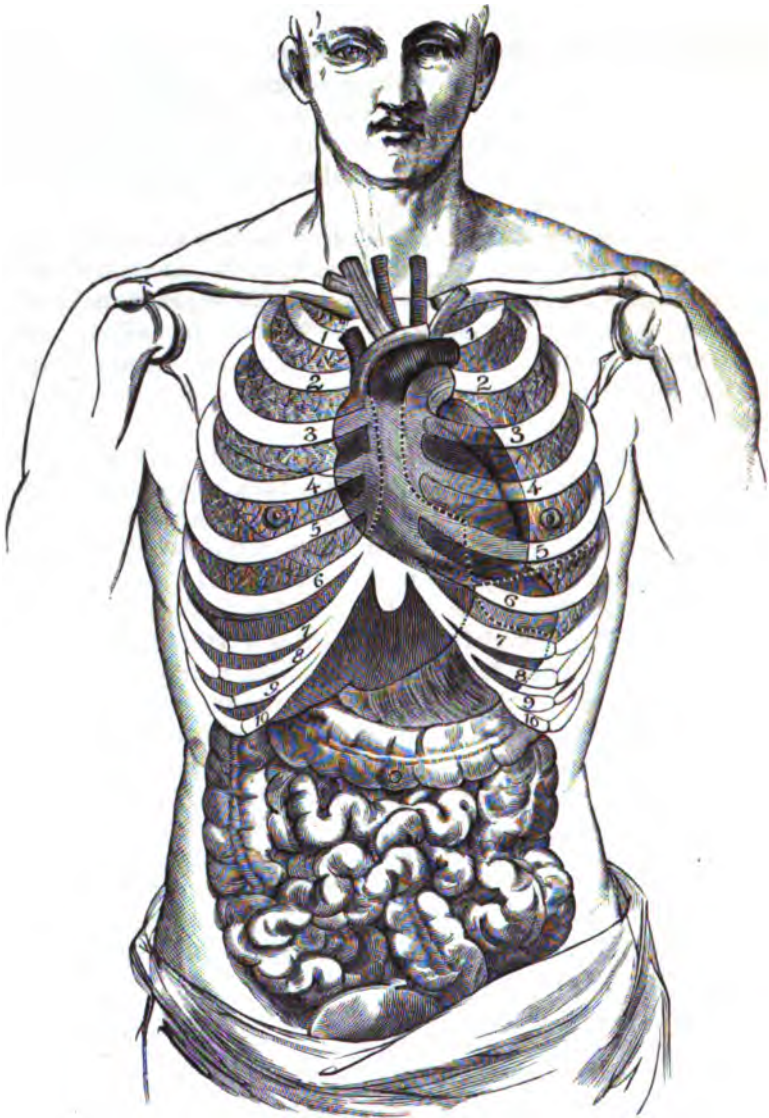
Regions of the Chest and Abdomen.—In order to describe clearly to others the location of physical signs, and also to aid one's own memory, it is convenient to divide the surface of the chest and abdomen into regions. Although such divisions are, to a great extent, arbitrary, yet the following are now almost universally accepted by physicians in all parts of the world.

Anteriorly, the divisions of the *chest* on each side are the supra-clavicular, the clavicular, the infra-clavicular, the mammary, and the infra-mammary regions. Between these are the supra-sternal and the upper and lower sternal regions. *Laterally*, come the axillary and the infra-axillary regions. *Posteriorly*, are the scapular, the infra-scapular and the inter-scapular regions. To designate the side, the term *right* or *left* must be prefixed.

The *supra-clavicular* region extends from half an inch to an inch and a half above the clavicle, and contains the apex of the lung. The *clavicular* region corresponds to the clavicle, and contains the apex of the lung. The *infra-clavicular* region extends from the clavicle to the third rib, and contains the upper part of the lung. The *mammary* region extends from the third to the sixth rib, and its contents on the right and left side differ materially. The right is mostly occupied by the right lung, the slanting lower border of which nearly corresponds to the lower boundary of this region, and covers the upper part of the liver, which pushes up behind it; it contains also parts of the right auricle and ventricle. The upper intercostal fissure begins at the fourth cartilage, and the lower not far beneath it. The left mammary region, besides containing the lung (the left intercostal fissure being near the fifth rib), contains the most important part of the præcordia. The *infra-mammary* region extends from the sixth rib to a curved line corresponding to the edges of the false ribs. On the right it contains the liver, with the lower part of the lung during a full inspiration; and on the left the lower part of the lung, with parts of the stomach, spleen and left lobe of the liver. The *supra-sternal* region is the space above the sternal notch, and contains chiefly the trachea. The *upper sternal* region extends to the third rib, and contains the bifurcation of the trachea at the second rib. Below this point the lungs come almost in contact. It also contains the ascending and transverse portions of the aorta, and a part of the pulmonary artery. The *lower sternal* region covers the sternum below the third rib, and contains the greater part of the right, and a portion of the left ventricle. The *axillary*

region lies above a horizontal prolongation of the lower boundary of the mammary region to the inferior angle of the scapula, and contains a portion of the upper lobe or lobes of the lung with main

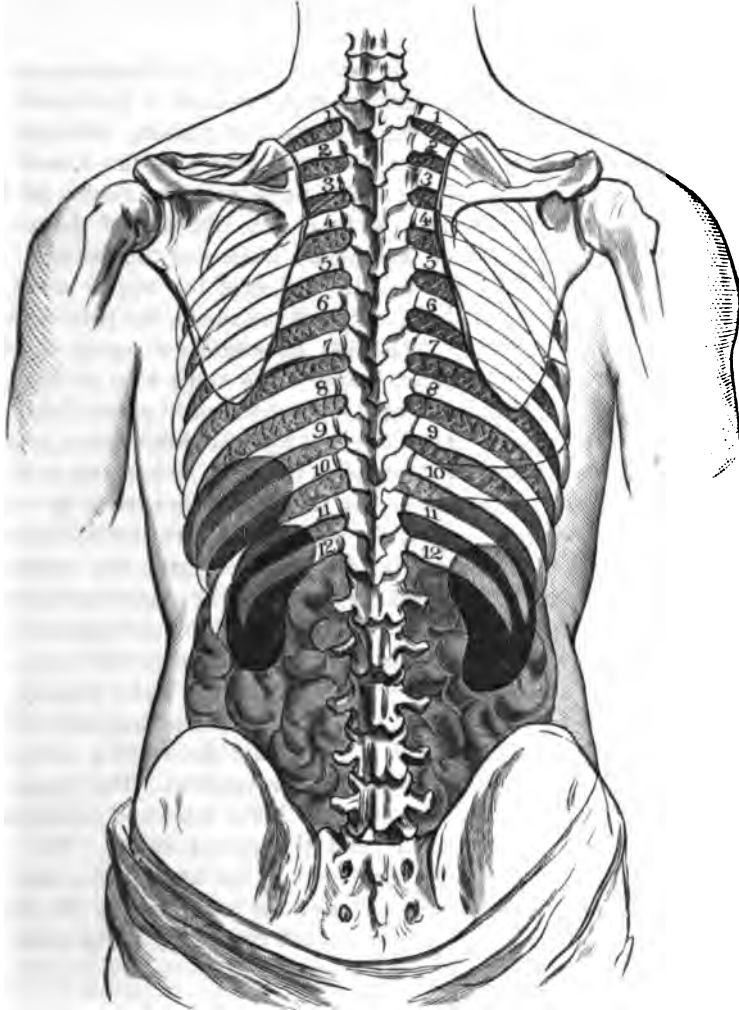
FIG. 1.



bronchi. The *infra-axillary* region extends below this to the edges of the false ribs, and contains the lower edge of the lung, and also the liver on the right side, and the stomach and spleen on the left. The

scapular region covers that bone, and contains parts of the upper and lower lobes of the lungs. The interlobar fissure ends at the upper part of the lower scapular space. The *infra-scapular* region extends to the twelfth rib from a horizontal line connecting the lower angle of the

FIG. 2.



scapula with the eighth dorsal vertebra, and contains the lungs to the eleventh ribs, and the upper parts of the kidneys (more of the left); and also on the right a part of the liver, and on the left a part of the intestines and spleen. The inter-scapular region extends from the inner margin of the scapula to the spinal column, and contains lung

substance and the main bronchi, the bifurcation of the trachea being opposite the third dorsal vertebra, below which is the descending aorta.

The *abdomen* is divided into regions which have also been pretty universally adopted. The upper regions, it will be seen, encroach more or less upon the lower divisions of the chest just given. It will be simplest to look at them as three general zones, each of which is again subdivided into three regions.

The upper zone extends from the curved line of the diaphragm above to a horizontal plane passing through the cartilages of the ninth rib; the middle zone from this plane to another passing through the anterior superior spinous processes of the ilia; and the lower zone beneath this. By drawing two parallel lines from the centre of Poupart's ligament to the cartilages of the eighth rib, each of these three zones is subdivided into three regions, a middle and two lateral.

The *epigastric* region is the middle region of the upper zone, and contains the middle and pyloric end of the stomach, the pancreas and parts of the liver and aorta. The *right hypochondriac* region is at the right end of the upper zone, and contains the right lobe of the liver, the gall-bladder, the hepatic flexure of the colon, and parts of the duodenum and of the right kidney. The *left hypochondriac* region is at the left end of the upper zone, and contains the large end of the stomach, the narrow extremity of the pancreas, the splenic flexure of the colon, the spleen and the upper half of the left kidney. The *umbilical* region is the central region of the middle zone, and contains the transverse colon, the lower part of the duodenum, part of the omentum and mesentery, a portion of the jejunum and ileum, and the abdominal aorta. The *right lumbar* region is at the right end of the middle zone, and contains the ascending colon, the lower part of the right kidney, and part of the duodenum and jejunum. The *left lumbar* region is at the left end of the middle zone, and contains the descending colon, the lower part of the left kidney, and part of the jejunum. The *hypogastric* or *pubic* region is the central region of the lower zone, and contains the ileum, the bladder (if distended), and the gravid uterus. The *right iliac* or *inguinal* region is at the right end of the lower zone, and contains the cæcum, the appendix cæci, and the lower end of the ileum. The *left iliac* or *inguinal* region is at the left end of the lower zone, and contains the sigmoid flexure of the colon.

PHYSICAL EXAMINATION OF THE LUNGS.

Each one of the six different methods of physical exploration is available for an examination of the lungs; but by far the most important of them are Auscultation and Percussion. The principal

information to be derived from each of these methods will be presented under its appropriate heading. In the narrow limits allotted to this chapter much condensation will be necessary, and only those points will be brought forward which are of the greatest practical interest.

Inspection.—Examination by the eye is generally the first method of physical exploration to be resorted to. By it we are able to determine facts of importance with regard to the form and size of the chest, and also with regard to the respiratory movements. The chest should either be divested entirely of clothing, or different parts may be uncovered in succession, if modesty demands it. The patient should, if possible, sit or stand erect in a good light. Strictly speaking, owing to slight spinal curvature, or other causes, the great majority of perfectly healthy chests are not absolutely symmetrical; still, for all practical purposes we may so regard them, and may generally attribute any marked deviation, on one side or the other, to intrathoracic disease.

The chest is *enlarged* in emphysema, pleuritic effusions, pneumo-hydrothorax, and pneumonia. In emphysema the enlargement occurs in the upper and middle portions, on one or both sides (if the latter, more on one than on the other). In pneumonia the side of the chest is enlarged only very slightly, and often not at all. The greatest change in this direction accompanies the accumulation of a large quantity of liquid, or air, or both, in the pleural cavity. In pleurisy the enlargement is most marked at the lower part of the chest, and the intercostal depressions are often effaced, sometimes, even, to bulging.

The chest is seen to be *contracted*, often to a very great extent, after recovery from chronic pleurisy, where the lung has been compressed for weeks and months, and also bound down by adhesions; both of which are great obstacles to its proper re-expansion. It may be slightly contracted after pneumonia. Partial contraction, in the neighborhood of the clavicle, is very often observed in phthisis, especially when far advanced.

The respiratory movement of the chest is almost abolished, on one side, over a large accumulation of fluid in the pleural cavity, but correspondingly increased on the other side. The same difference exists in spinal hemiplegia. In phthisis, we often notice a difference in the movement at the summit of the chest on the two sides. Some disease of the lungs is generally indicated when the respirations occur oftener than in the ratio of one to four beats of the heart.

Mensuration.—When it is desired to secure greater accuracy in defining the size and form of the chest, and its movements in respiration, the method of inspection is supplemented by that of mensuration, and for this purpose a great variety of instruments, more or less

ingenious, has been devised. The practiced eye, however, can obtain by inspection, in the great majority of cases, all the information which is necessary in this direction, and the only disease in which mensuration becomes of real value is that of pleurisy with effusion (serous or purulent). Here, the circular measurement of the chest at the level of the sixth costo-sternal articulation is to be taken, and, for this purpose, nothing is better than two simple tape-measures sewed together at the starting-point of graduation. This point is to be placed over the centre of the vertebral column, or over the mesial line in front, and the difference in size of the two sides at the end of an expiration, or the difference in the amount of their expansion, can be read off at a glance. It must be remembered that, in health, in both sexes, the right half of the chest in right-handed persons measures about half an inch more than the left, and a similar excess on the left side is to be noticed in left-handed individuals. In this way can the increase or diminution in the amount of fluid in the pleural cavity be accurately determined, from time to time. Spirometers have been invented to measure the "vital capacity" of the chest, or the amount of air which can be expelled by a single long expiration; but the physician who trusts to them will be sure to find that they far oftener deceive than aid him. Negatively, if a person can expel his full number of cubic inches of air, the presumption is that his lungs are healthy; but his failure to do so ought not to be taken as evidence of lung-disease, as it may depend upon general muscular weakness, or lack of practice in blowing, or upon other causes.

Palpation.—The most important information to be obtained by palpation, or the laying on of the hand, is the determination of the increase, diminution, or suppression of the vocal fremitus. If the palm of the hand is placed firmly on the chest of a healthy person while speaking, a distinct vibration or thrill will be felt, varying in intensity with the strength and lowness of pitch of the voice, and the amount of fat or muscle in the chest-walls. This thrill is the *normal vocal fremitus*, and is of much more service as a physical sign in men than in women or children. It is more marked on the right than on the left side. In disease, the vocal fremitus is increased in those affections where the lung-tissue is more or less solidified (the latter becoming thus a better sound-conductor), as in pneumonia, phthisis, compressed lung, etc., unless the larger inclosed bronchial tubes are obstructed. It is *diminished* or *suppressed* whenever the lung is separated from the chest-walls by accumulations of liquid, or gas, or solid lymph, in the pleural cavity, or by thickened pleuræ, and also by solid growths, such as cancer, whether in the lung or external to it.

Succussion.—This method, which is as old as Hippocrates, is only of service in the diagnosis of one disease—pneumo-hydrothorax. It is a splashing sound, caused by suddenly shaking the patient; is au-

dible to the applied ear, and sometimes may be heard at quite a distance. It requires for its production a cavity filled with both fluid and air, or gas. The sound can be imitated by shaking a bottle partially filled with water. It may sometimes be heard, under favorable conditions, in large cavities in the lungs. Being a very rough method of handling the patient, however, and its results being easily ascertainable in other ways, it is now almost never resorted to.

Percussion.—As the carpenter, by pounding on the plastered wall, tells where the beams are by the difference in sound, so can we, by percussing or striking on the chest, locate the intra-thoracic organs in health, and detect certain alterations in their structure when diseased. We never strike directly, but use certain media to receive the blow, as the finger of the left hand, or pleximeters made of gutta-percha, ivory, rubber, glass, or wood. Most physicians use the finger, with the palmar surface towards the chest; if, however, a pleximeter is desired, the best is one recently introduced, and not usually described in the books—a truncated cone, two inches long, with one small and one large end-piece. The smaller end fits very nicely into the intercostal depressions and the supra-clavicular hollow. The whole is held very easily, like a cigar, and is, in every way, very much more convenient than the old-fashioned flat pleximeters. With this a percussion hammer should be used; Wintrich's is the best. It should be rather heavy. If the left finger is used as a pleximeter, the tips of one or two fingers of the right hand should be used as a hammer. The percussing fingers should strike perpendicularly, and the whole movement should be from the wrist. More force should be used for deep-seated parts than for such as are superficial. The patient should stand or sit, if possible, and his body in any position should rest on the same plane. When examined in front, if sitting, his arms should hang down; when the side is examined, his arms should be crossed over his head; when it is the back, they should be crossed in front, and the body should be bent forwards. Care should be taken to compare exactly corresponding portions on the two sides, and percussion should be performed in the same stages of the respiratory act. The pressure of the left finger and the force of the blow should always be alike on the two sides.

Percussion of the Healthy Chest.—The sound varies considerably according to the part of the chest percussed. The typical pulmonary or *normal vesicular resonance* is found in the infra-clavicular region, and is produced by the vibration of the air in the subjacent lung tissue. It is almost as distinctly heard in the mammary and axillary regions, but in the scapular and inter-scapular regions it is greatly muffled by the layers of muscles and bone. Even in the same individual each region of the chest which bounds the lungs gives forth a different tone on percussion, and much more so in different individuals; so

that there is no uniform standard of pulmonary resonance, and we are not obliged to carry about with us a tuning-fork or other instrument of precision, with which to keep in mind the proper tone. It is only necessary in each case to compare carefully the resonance obtained at one point with that of the exactly corresponding point on the other side. It is a full, clear sound of low pitch, but no description of it is adequate. It must be heard on the healthy body to be appreciated. In some persons it is slightly less clear at the right than at the left apex. *Flatness* on percussion, on the contrary, is the complete absence of resonance, and may be obtained with typical distinctness over the centre of the liver. Here the sound is completely deadened. *Dulness*, or diminished resonance, is intermediate between the two preceding, the resonance being partially lost, and the pitch correspondingly raised. Naturally, of this there are all gradations. It is heard in health over the heart and spleen, over the mammary gland in women, and where the lungs overlap the liver and heart. Too much cannot be said by way of urging the student to spend a great deal of time in percussing all parts of the healthy chest, and thus gaining a practical acquaintance with them, before proceeding to the investigation of disease.

Percussion in Disease.—If, as a result of disease, the density of the lung texture is altered, the resonance will likewise be changed, and the percussion sound will pass through every gradation from marked resonance to flatness. These modifications are usually called dulness, flatness, tympanitic, vesiculo-tympanitic or exaggerated, amphoric, and cracked-metal resonance. The special characteristics of *dulness* and its extreme, *flatness*, have already been explained. In disease they are caused by serum or pus in the pleural sac, serum in the air-vesicles, partial or complete solidification of lung tissue, tumors, etc. Where heard they indicate, therefore, either pleuritic effusion, empyema, hydrothorax, pneumonia, phthisis, pulmonary œdema, compression or collapse of lung, cancer or aneurism. The type of *tympanitic* resonance can be heard by percussing the bowels and stomach. As its name implies, it is a drum-like sound, and has a much higher pitch than the vesicular resonance. It indicates a collection of air in the pleural sac, as in pneumothorax, or a large cavity in the lung, as in the last stage of phthisis. Contrary to what might be expected, it is sometimes heard over *partially* solidified lung. The character of the *exaggerated* or *vesiculo-tympanitic* resonance is expressed by its name. It is a combination, in varying proportions, of the vesicular and tympanitic resonance; the more of the latter quality existing, the higher being the pitch. The intensity is greater than normal. It is heard in emphysema on account of the distension of the air-cells, and also in the probably somewhat similar condition which temporarily exists in the upper part of the chest when there is a very moderate pleu-

ritic effusion or a hepatized lung in the lower part. *Amphoric* resonance usually indicates phthisical cavities, and sometimes pneumothorax. It resembles the sound produced by percussing an empty jar or by striking the cheek when the mouth is closed and fully, but not too tensely, inflated. It is heard over large superficial cavities with thin, tense walls, and with free communication with the bronchial tubes. *Cracked-metal*, or cracked-pot resonance is a short, hollow, metallic sound, accompanied with hissing. If the palms of the hands are put loosely together, and the contained air is suddenly expelled by striking the knee, not only a good imitation will be made, but also a fair illustration of its mode of production. It indicates mostly phthisical cavities.

Auscultation.—The art of auscultation has now been brought so near to perfection, that the physician of to-day who is thoroughly accomplished in it has, in the diagnosis of thoracic affections, a wonderful advantage over the most skilled diagnostician of the beginning of this century. An acquaintance with its theory and practice, therefore, cannot be too strongly urged. It is said to be *immediate* when the unassisted ear is applied to the chest of the patient, and *mediate* when an instrument, called a stethoscope, is used. Both methods are important, and both should be learned. He who seldom or never applies his ear directly to the chest becomes almost as helpless at the bedside, if he happen to have left his stethoscope at home, as the myope without his glasses; and, on the other hand, he who has not made himself really familiar with the use of a good stethoscope is often heard to declare that it is good for nothing, and that he can get along better without it. So can a man who has not learned to ride a bicycle get along better without such a vehicle; and yet bicycle-travelling is much more satisfactory than walking to one who knows how to ride. With Cammann's binaural stethoscope, which is by far the best instrument to have (the old-fashioned wooden or ivory single tubes being now in most places almost entirely antiquated), we have the great advantage of employing our double sense of hearing, which is by no means merely theoretical. With this instrument, also, we can keep a safe distance from uncleanly patients, and in other cases delicacy sometimes requires it. The stethoscope can easily be adjusted to points difficult to reach with the ear, and it circumscribes and intensifies sounds which we desire to get unmixed. Its rim should press firmly, equally, and evenly on the bare skin. Its ear-pieces should follow the direction of the auditory canal. One hand should support the instrument at the bulb, and the other should hold aside the clothing. A simple elastic, which can be replaced for two cents when worn out, regulates the pressure much better than any patent or fancy spring. The disagreeable humming or buzzing, which confuses the beginner, soon passes off with a little practice. If the unassisted ear is used, it is better to have some thin cov-

ering for the chest, like a soft towel or an undergarment, but certainly nothing that will rustle and add sounds of its own. The position of the patient should be the same as for percussion, and he should generally breathe harder than usual, preserving, however, the natural rhythm. Corresponding parts of the two sides of the chest should be constantly compared with each other.

Respiration in Health.—If the ear or stethoscope be applied to a healthy chest, with each inspiration will be heard a soft murmur, which is perfectly described by the word *breezy*, and is of low pitch. Its intensity varies in different persons, and in the same individual in different parts of the chest, and it even varies, also, at different times in the same part of the chest of the same person, according to the force and rapidity of the respiration. The accompanying expiration is not breezy, but feebly blowing, and when present at all is very much shorter, and its pitch a little lower, than the inspiration. In many cases it is absent, and when present it follows so closely that there is no interval. This respiration is called *vesicular*, and is heard to best advantage in the left infra-clavicular region. It should be remembered that in the right infra-clavicular region of some persons in health the quality of the inspiration may be a little less breezy and its pitch a little higher, and the expiration a little longer than in the corresponding region in the left side. Too much stress, however, should not be laid on this point, as the writer has frequently found from his experience in practical teaching, that the student is very apt to overestimate the amount of this difference, and thus to pass over as unimportant well-marked signs of disease on the right side. The vesicular respiration varies somewhat, also, according to age. In early childhood its intensity is increased, and it is then called *puerile*. In old age its intensity is diminished and its expiration prolonged. The *tracheal* or *laryngeal* respiration is that heard over the healthy trachea or larynx, and is entirely different from the vesicular. The inspiration is hollow or *tubular* in quality, of great intensity, and of very high pitch; the expiration which is always present is likewise tubular in quality, is even more intense, and still higher in pitch. The most prominent feature of all is that the expiration is as long as, and sometimes even longer than, the inspiration; and between the two there is a distinct interval.

Respiration in Disease.—It is of sufficient importance to bear repetition that the healthy signs derived from auscultation, like those of percussion, should be thoroughly mastered before proceeding to study those found in disease. The latter have been classified very conveniently under three heads—Intensity, Rhythm, and Quality and Pitch.

Altered Intensity.—Under this heading are found exaggerated, feeble, and suppressed respiration. We have already seen that the

vesicular respiration in children is precisely like that in adults, except that it is louder. *Exaggerated* respiration is identical with the healthy respiration of childhood. In disease its peculiarity is that it does not indicate trouble where it is heard, but where it is not. In pneumonia, for instance, if one lobe is solidified, the rest of the lung takes an increased action, to supply partially the deficiency. If one whole lung is thrown out of use, as in the case of a large pleuritic effusion, the other lung has to work harder, and over the latter we have exaggerated breathing. This sign is to be heard, therefore, in pneumonia, pleurisy, phthisis, emphysema, cancer of lung, etc. *Feeble* respiration, on the contrary, is the vesicular respiration lessened in intensity. It arises from any cause which interferes directly or indirectly with the full inflation of the lung. We find it, therefore, in pleurisy, paralysis, pleurodynia, croup, asthma, phthisis, tumors, and many other diseases. *Suppressed* respiration, as its name indicates, is the absence of sound, and most commonly occurs with large pleuritic effusions or pneumothorax, where the fluid or air in the pleura entirely prevents the expansion of the lung. It also occurs where there is very great obstruction in the larger bronchi to the entrance or exit of air.

Altered Rhythm.—In *jerking* respiration, the inspiration, or expiration, or both, are broken up into two or more puffs, instead of being continuous. It is caused by nervousness, or shrinking on account of the pain of pleurisy, or of intercostal neuralgia or rheumatism, in which cases it is diffused; or by some local obstacle to the passage of air, as in the case of tubercle or asthma, when it is limited to a part of the chest. *Prolonged expiration* is oftenest caused by the obstruction of tubercle, and sometimes by the lessened elasticity of the walls of the dilated air-cells in emphysema. In the former case the pitch is high, and in the latter it is low.

Altered Quality and Pitch.—One of the most important modifications of the breathing in disease is the *bronchial* or *tubular* respiration, which is identical except in intensity with the healthy tracheal or laryngeal respiration, the characteristics of which have already been described; and it can, therefore, be leisurely studied in the suprasternal region of any healthy person. It always indicates more or less complete solidification of the lung substance, either from deposits or from compression by growths or effusions, and may, therefore, be expected in pneumonia, phthisis, pleurisy with effusion, etc. In phthisis and pleurisy it is generally found in the upper part of the chest, and in pneumonia in the lower part.

The *broncho-vesicular* respiration is a combination in varied proportions of the bronchial and of the normal vesicular, one or the other element preponderating according to the amount of solidification. In the resolution of pneumonia we have an opportunity of studying this in all its different grades, from that which verges on the bronchial, in-

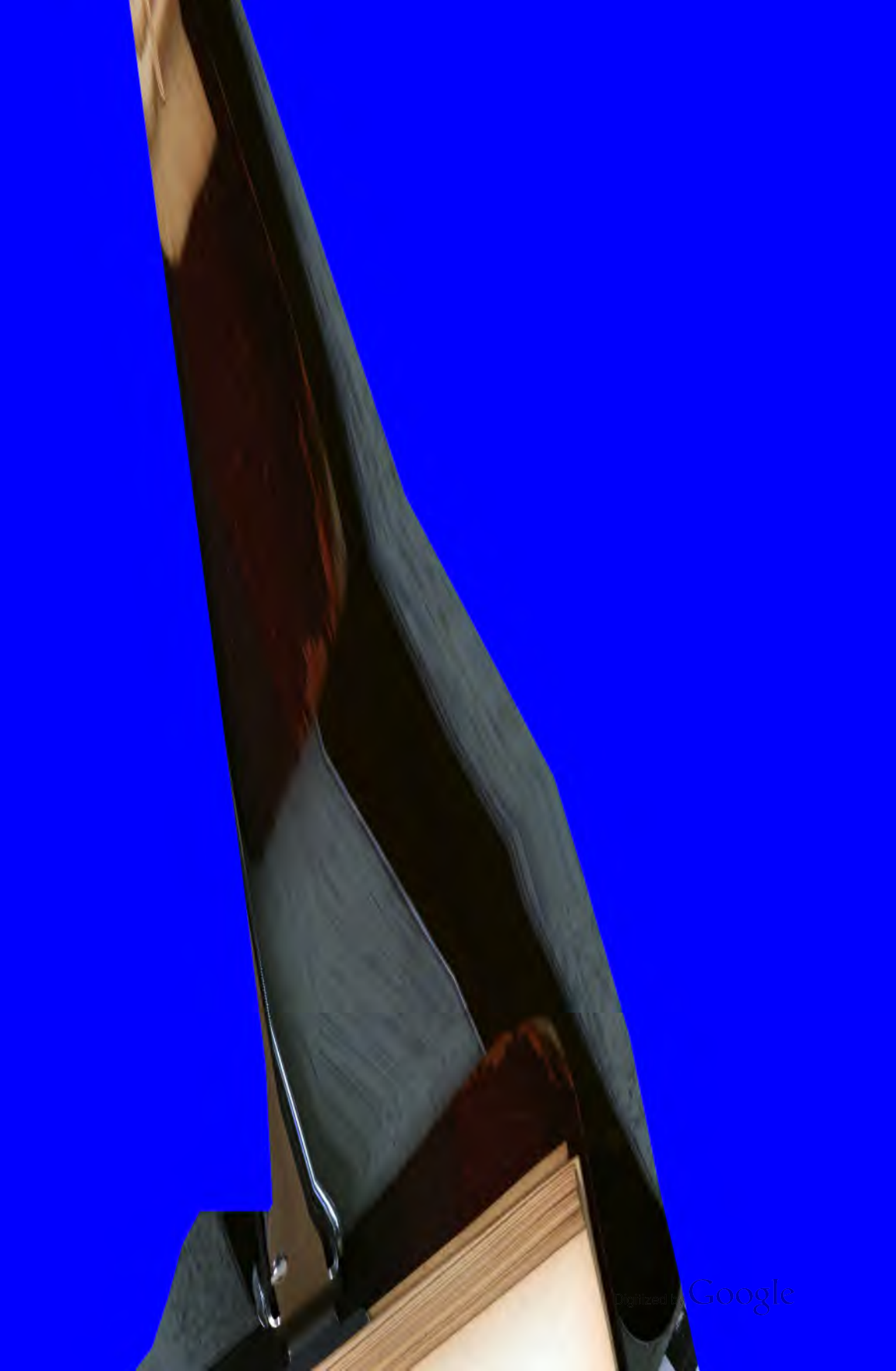
dicating complete solidification, to the vesicular, indicating healthy lung. It was formerly called rude or harsh respiration. It indicates partial solidification, and is, therefore, found in the same diseases as the preceding. *Cavernous* respiration is sometimes with difficulty distinguished both from bronchial and vesicular respiration; but is more hollow and lower in pitch than the former, and more blowing than the latter. The cavity which produces it must be more or less empty, and must have flaccid walls, and free communication with a bronchial tube. It is often mixed with gurgling, and is oftenest found in connection with the third stage of phthisis. *Amphoric* respiration has a musical intonation of low pitch and often a metallic quality, and can be imitated by blowing across the mouth of an empty bottle. It accompanies either inspiration or expiration, or both. The cavity which produces it must be large, must have rigid walls which do not collapse with expiration, and must communicate freely with a large bronchial tube. When met with, it almost always indicates pneumo-hydrothorax with pulmonary fistula, but sometimes a large cavity in phthisis.

Rales.—These are not modifications of the normal respiration, having no analogue in health, and are, therefore, new or adventitious sounds. They are heard accompanying the sounds of respiration, or else entirely supplanting them. *Râle* (pronounced rahl) is a French word meaning rattle, but as now used it includes other than merely rattling noises. It may be formed in the trachea and larynx, two familiar instances of which are the crowing of croup and the death-rattle in the moribund state; but it is generally applied to some noise made within the chest. Rales are divided for convenience into dry and moist, the latter conveying to the ear the sensation of the presence of liquid of some kind. Under dry rales we may classify the sonorous, sibilant, crepitant and crackling; and under moist, the gurgling, coarse bubbling, fine bubbling, and subcrepitant.

Dry Rales.—*Sonorous* rales are low-pitched, musical sounds resembling snoring, buzzing, the notes of a bass viol, etc., and are produced in the *large bronchi* when their calibre is irregularly narrowed, either by spasm or by swelled mucous membrane, or by the adhesion of mucus too thick to bubble, or by pressure of a tumor. They occur especially with expiration, but may come with inspiration. If more or less diffused all over the chest, they indicate bronchitis or asthma; if confined to one spot, circumscribed bronchitis secondary to phthisis or to pneumonia. *Sibilant* rales are high-pitched, whistling, squeaking or hissing sounds, occurring especially with inspiration, and produced in the same manner as the sonorous rales, but in the *smaller* bronchial tubes. They also indicate the same diseases, and show that they have extended to the smaller tubes. Both sibilant and sonorous rales are peculiarly liable to change their position. *Crepitant* rales are vesicular; that is, they are produced in, and indicate an affection of

the air-vesicles. At the end of each expiration in such affections a viscid secretion glues together the walls of the air-cells, and the air entering with the next inspiration causes a forcible separation which gives rise to the sound. They occur only with inspiration and near the end of it. They are very fine, quick, crackling sounds, like those produced by throwing fine salt on a fire or by rubbing a lock of hair between the fingers. To many the sound seems dry, although others classify them among the moist rales; really they are so small, that it is not easy to decide which they are. Crepitant rales occur in œdema and in collapse of the lungs, but they are especially characteristic of the much more common pneumonia, of which they are almost pathognomonic. If heard only at the apex of the lung, phthisis is indicated. *Crackling* rales, or clicking, bear some resemblance to the crepitant rales, but the explosions, so to speak, are very much fewer in number, often not exceeding one, two, or three, and are of larger size. They are heard near the apex of one lung, and indicate phthisis. Their mechanism is doubtful.

Moist Rales.—The loudest and most easy to distinguish are the *gurgling* rales, which indicate, and are produced in lung cavities partially filled with liquid, through which air from communicating bronchial tubes bubbles. The sounds are always liquid, are often very intense, and sometimes metallic or amphoric from reverberation in a large, hollow space, and are proportionate to the size of the cavity; if this is small, they may be not easily distinguished from coarse bubbling rales. They are heard with both respiratory acts, and although they may be produced in any lung cavity, yet in the vast majority of cases they indicate advanced phthisis. If the cavity becomes empty, they are replaced by cavernous respiration; if full, they are no longer produced. *Coarse* and *fine bubbling* rales are by many physicians still called "mucous" rales; but as they may be, and often are, produced by serum, blood, pus, or softened tubercular deposit, as well as by mucus, the term bubbling is very much more appropriate. They are liquid sounds caused by the bursting of bubbles of various sizes by the passage of air, during either inspiration or expiration, through liquids in the bronchial tubes. The coarse bubbling rales are formed in the larger bronchial tubes, and the fine in the smaller bronchial tubes; so that by the size of the bubbles we can judge of the size of the tubes affected. Coughing sometimes modifies or even entirely removes them, in the latter case often to reappear in another place. The sounds may be nicely imitated by moistening the insides of rubber tubes and gently blowing through them. If these rales are more or less diffused over the whole chest, they indicate bronchitis; if circumscribed, they indicate bronchitis secondary to phthisis or to pneumonia, or else softened tubercle, blood, etc., in the tubes. The *subcrepitant* rales are similarly formed in the very minute ramifications



there is no one standard for all parts of the chest. Corresponding points on the two sides must be constantly compared. *Diminished* and *suppressed vocal resonance* are simply less in intensity than the normal, or absent altogether, and are very valuable signs in connection with the different effusions into the pleural cavities, which partially or entirely deaden the vocal resonance by removing the lungs from the chest walls. They also occur if the bronchial tubes are obstructed by mucus or by the pressure of tumors, the circulation of air in them being thus prevented. *Increased vocal resonance* is simply a gain in intensity, and is generally associated with the broncho-vesicular respiration, and indicates the same condition of the lung—namely, a moderate solidification. Therefore it is heard over lung tissue compressed by a pleuritic effusion (if the latter is not too large), over collapsed pulmonary lobules, and over partially solidified lung in pneumonia; but it is of more importance in connection with phthisis. The *increased bronchial whisper*, which goes with it, denotes the same conditions. Its intensity and length are increased over the normal, its quality is more or less tubular, and it is higher in pitch. Probably the most important and best marked of all the vocal phenomena is *bronchophony*, which in its main characteristics bears a strong resemblance to the healthy tracheal voice. The intensity of the latter, however, is far greater on account of the superficial location and great size of the trachea. The key-notes to fix bronchophony in the memory are *concentration and nearness to the ear*. The pitch is higher than in the normal thoracic vocal resonance, and its intensity and fremitus are variable. It indicates more or less completely solidified lung substance, which is a much better sound-conductor than the healthy spongy tissue. It is heard to best advantage in pneumonia, and occurs also in phthisis, and over lung condensed by effusions into the pleural sac or by the pressure of a tumor, etc. *Whispering bronchophony*, which goes with it and indicates the same conditions, is the same as the expiratory sound in bronchial respiration—intensified, long, high-pitched and tubular. It is often more marked than bronchophony itself. In *pectoriloquy*, which is rare, the *articulations of words* are transmitted directly through the stethoscope into the ear. It thus comes even nearer to the tracheal voice than bronchophony, of which latter it seems sometimes to be only an exaggeration. It is chiefly heard in phthisis, and sometimes indicates solidification, but oftener cavities with smooth, sound-reflecting walls. *Ægophony*, which is likewise rare and not of much importance when heard, is a tremulous, bleating sound like the cry of a goat, from which it derives its name. Lænnec considered it a sign of a thin layer of pleuritic fluid over solidified lung. The *amphoric voice* and *whisper* are caused by reverberations in a large cavity with rigid walls, and are hollow, metallic sounds with a musical intonation, not distinctly articulated. The amphoric (or jar-like)

quality especially accompanies the whisper. They may be heard over large lung cavities, but more often denote pneumo-hydrothorax. The *cavernous whisper* is blowing, hollow and of low pitch, and indicates a lung cavity near the surface with flaccid walls. It is found, of course, oftenest in advanced phthisis.

From lack of space, in the above descriptions of physical signs only the most important outlines are given. For a fuller exposition, as well as for a complete tabular arrangement of these signs as grouped in their proper places under the headings of the different *diseases*, thus presenting, in a form very easy for comparison and for differentiation, the physical diagnosis of diseases of the lungs as well as of the heart, the reader is referred to the writer's work on *Auscultation and Percussion*.*

PHYSICAL EXAMINATION OF THE HEART AND OF AORTIC ANEURISM.

Inspection.—By this is determined the form of the cardiac space and the location of the visible impulse of the heart. In great hypertrophy and dilatation of this organ, especially in children, and in pericardial effusion, there may be a decided bulging in this region; and a corresponding depression may follow pericarditis or the contraction of neighboring lung cavities. Much more important, however, are the phenomena relating to the impulse or apex-beat, which is seen in health in the fifth intercostal space on a line a little inside of the nipple, occupying an area of perhaps an inch in diameter. This area may be increased considerably under excitement. In lean persons the impulse is very distinct, but in some it cannot be seen at all. Its position may be somewhat modified in health by the attitude assumed by distension of the stomach, and by the acts of respiration. In disease it may be displaced downwards by emphysema, aneurism or other tumors; to one side or the other by pleuritic effusion, by malignant disease or contraction of the lung; upwards by enlargement of the left lobe of the liver, by abdominal distension or by contraction of the lung, and by pericardial effusion. If the apex-beat is lowered and to the left, and none of these causes operate, enlargement of the heart by hypertrophy or dilatation must exist. In such cases the area of visible impulse is increased, sometimes extending over several intercostal spaces.

The pressure of an *aneurismal tumor* will often cause a bulging or even perforation of the ribs and sternum, which is clearly visible. Over this is seen an impulse coincident with the ventricular systole.

* A Tabular Handbook of Auscultation and Percussion; for Students and Physicians. Fifth edition. By Herbert C. Clapp, A.M., M.D. Boston: Houghton, Mifflin & Co.

The most common location of this bulging can be inferred from the fact that the aneurism oftenest starts from the ascending or first part of the transverse portion of the aorta, and extends to the right.

Palpation.—For obtaining information this method is far superior to inspection, since many an impulse which cannot be seen can yet be distinctly felt by the finger. Besides locating the apex-beat by it in such cases, we make use of it to determine the force, frequency and regularity of the heart's action. The cardiac impulse is diminished in force by dilatation, by pericardial effusion, by fatty degeneration, by an emphysematous lung, by a low state of the system, or by some diseases of the brain; it is increased in force by hypertrophy, by functional excitement, and by the early stages of endo- and pericarditis. In hypertrophy a powerful heaving movement is felt all over the præcordia, but in dilatation we find a weak, struggling, undulating motion. A fatty heart has a quiet, feeble, undemonstrative action, which often cannot be felt. A peculiar thrill can sometimes be perceived where a valvular lesion or a roughened pericardium exists. Over an *aneurism* of the aorta a purring thrill is often felt, and also an impulse synchronous with the heart's systole, which may be even stronger than the heart's beat itself.

Percussion.—By this means, which requires considerable skill, we can with more or less accuracy define the outline, and thus estimate the size of the heart. The superficial cardiac space, where the heart is uncovered by lung, about two inches in diameter, naturally gives a duller sound than the deep cardiac space, where the edges of the lung overlap, and where more forcible percussion is necessary to bring out the heart sound. Both areas will be traversed by percussing on a vertical line drawn from the second to the sixth rib, and on a horizontal line from half an inch to the right of the sternum to the left nipple. It should be remembered that the bony sound of the sternum will materially alter the dull sound of the heart underneath it. The apex can best be found by palpation or by auscultation. It is difficult to define the lower border of the heart from the upper border of the liver (whose dulness is more absolute, however), but fortunately this is not very important. The mammary gland in women, if well developed, renders percussion difficult, and in children this method of diagnosis is often very unsatisfactory. The area of præcordial dulness may be increased by cardiac hypertrophy, dilatation, pericardial effusion, or by retraction of the lung; it may be diminished by a full inspiration, by pulmonary emphysema, or by air in the pericardial sac. Dulness is found over a *thoracic aneurism* extending generally upwards and to the right. Over this too forcible percussion must not be practiced. If very large, such a tumor may compress neighboring lung tissue and cause still further extension of dulness.

Auscultation.—By this method, which is by far the most im-

portant means of diagnosis of heart affections, we decide whether there are present the natural heart sounds, or modifications of these natural sounds produced by disease, or certain adventitious sounds. Auscultation will help our diagnosis also by revealing the condition and position of the neighboring border of the lung. The stethoscope is peculiarly desirable for these examinations, even more so than in lung diseases, as it isolates so nicely the sound from each part of the heart, and as here a change of half an inch may make a considerable difference. When the sounds are not well heard, they are rendered more distinct (inasmuch as they are not then obscured by the respiration) if the patient is asked to stop breathing for awhile. Both sounds of the heart are audible over the whole præcordia, and often beyond, but not with the same distinctness. The first sound is best heard at the apex, and the second at the base. The first, or systolic, is complex, being caused by the simultaneous contraction of the muscular fibres of the ventricles, the closure of the mitral and tricuspid valves, the impulse of the apex against the chest-walls, and probably also from the friction of the blood against the walls of the ventricles. It is made up, therefore, both of a muscular and of a valvular element, each of which should be differentiated and carefully borne in mind for diagnostic purposes. It is accented, long, booming, and of low pitch at the apex, but at the base is much less prominent. The second sound, or diastolic, is produced by the sudden tense closure of the aortic and pulmonary valves by the reflux of blood on them, and is short and entirely valvular. If the first is called booming, the second may be called tapping. *Lub-b-b dup* is often quoted to express the difference. The first sound of the heart occupies four-tenths of the cycle, the succeeding silence one-tenth, the second sound two-tenths, and the long pause three-tenths. The student cannot be too strongly urged to make, in the most careful manner, repeated examinations of as many healthy hearts as possible, in order to become practically acquainted with many points which no books can adequately express, with the variations of the sounds as heard at different parts of the chest, and with all the shades of difference allowable within the limits of health, which might be easily mistaken for signs of disease. In fact, without an exact acquaintance with the healthy sounds, it is impossible to make the nice distinctions which are often required in the diagnosis of heart diseases. The muscular and the valvular elements of the first sound have been mentioned. When the former predominates, the sound is more dull and prolonged; when the latter is in excess, it is shorter, more sharp and slapping. In hypertrophy, with its thick, strong walls, we have an instance of the former; in dilatation, with its thin, weaker walls, the muscular tissue being impaired, we have an instance of the latter. In hypertrophy and dilatation combined in about equal proportions, we are apt to have a

ringing sound. On the other hand, if the auriculo-ventricular valves are thickened or contorted, and yet sufficient, the sound is less sharp and slapping than usual, the valvular element being less prominent. The muscular element is naturally diminished in fatty degeneration of the heart, general debility, anæmia, and wasting diseases, the ventricular walls being ill-nourished. The first sound of the heart is increased by excitement, by functional disorders of the organ, by passing through solidified lung, and in cases in which the lung is retracted so that more of the heart comes near the chest-wall. It is diminished when it has to pass through a pericardial effusion or a thick pad of emphysematous lung, or considerable fat or œdema in the walls of the chest. A tympanitic abdomen will sometimes give it a ringing, sonorous sound. The second sound of the heart, as can readily be imagined from its mode of production, is increased by increase of blood-pressure in the aorta and pulmonary artery. Hypertrophy of the left ventricle will, therefore, tend to intensify the aortic second sound, and hypertrophy of the right ventricle the pulmonary second sound. The obstructed circulation through the kidneys in chronic Bright's disease, with its consequent hypertrophy of the left ventricle, will naturally intensify the aortic second sound; and in a similar manner, the obstructed circulation through the lungs in mitral disease and in pulmonary emphysema, with its consequent hypertrophy of the right ventricle, will naturally intensify the pulmonary second sound. When the semilunar valves are thin, the second sound is shorter and more ringing; when they are thickened, it is duller. Anatomically, the valves of the heart are very near together, occupying an area of only about an inch in diameter; fortunately, however, the places of election for hearing their sounds to the best advantage are farther apart. The aortic second sound, which is naturally stronger than the pulmonary, is best heard in the second right intercostal space at the edge of the sternum. The pulmonary second sound is best heard in the second left intercostal space at the edge of the sternum. The mitral sound is heard just above the apex-beat, and the tricuspid just above the ensiform cartilage. The rhythm of the heart sounds may vary considerably. The beats may be exceedingly rapid, may be irregular in time and force, or intermittent. While these changes very often accompany organic disease of the heart, they do not necessarily indicate it, being frequently found in connection with functional disturbances. The curious reduplication, also, of the first or second sound, or of both, which is probably owing to want of synchronous action of the two sides of the heart, may occur temporarily in apparent health, but is oftener noticed where there is increased resistance either in the pulmonary or systemic circulation.

Murmurs or Adventitious Heart Sounds.—These are not modifications of the natural heart sounds, but are entirely foreign.

They may be divided into two general classes—pericardial, usually called friction sounds, and endocardial murmurs.

Pericardial friction sounds are caused by the rubbing together of the opposing surfaces of the pericardial serous membrane roughened by inflammation and its consequent fibrinous exudation. In health this perfectly smooth, well-lubricated membrane, like the pleura, prevents all noise, but in the first and third stages of pericarditis (and sometimes too in the second) we hear a grazing, crumpling, creaking or rasping sound, either feeble or loud, single or double, occurring with or following the heart sounds. It is best heard at the fourth rib at the left edge of the sternum, and is increased by bending forward, by firm pressure with the stethoscope, and by a full inspiration. It is superficial and usually restricted to the præcordia. At the beginning of pericarditis it lasts from a few hours to a few days; in the stage of effusion, it is generally lost (except sometimes at the base of the heart), owing to the separation of the roughened surfaces by the fluid; and during absorption it reappears and lasts a week or more. Occasionally a pleuritic friction sound is mistaken for it, which can be differentiated by asking the patient to stop breathing.

Endocardial murmurs are always blowing sounds, although they may differ greatly in character. They may be of low pitch, of high pitch, soft, harsh, or musical; but however interesting these variations may be, they have not as yet been proved to have any diagnostic significance. They are produced at the orifices or within the cavities of the heart, and represent morbid conditions either of the *blood* or, far more often, of the *heart* itself. This latter fact determines a very important subdivision into inorganic or anæmic murmurs, and organic (which are generally valvular) murmurs, which should be carefully differentiated.

Anæmic or hæmic heart murmurs are always coincident with the ventricular contractions (that is, they are systolic), and are almost always, if not always, formed at the base of the heart. They are soft and feeble, resembling the word *who* whispered, and are caused by changes in the quality of the blood, which is more watery than usual, and thus not adapted to the usual surfaces and passages. They are not constant, like organic murmurs, neither do they produce cardiac enlargement, and the aortic second sound is neither increased nor diminished. The general signs of anæmia are present, and in the jugular veins is produced a continuous hum, called *bruit de diable*, which is suspended by pressure with the finger. The *dynamic* murmur, of rare occurrence, is a temporary blowing sound, occasionally heard in a violently excited heart with no organic disease.

Organic heart murmurs are far more common, and are produced by some organic change at or near one of the orifices. This may be a contraction, usually called stenosis, or an excrescence or

vegetation, or calcareous deposit, which interposes more or less of a local obstruction to the flow of blood in its proper direction; or it may be a puckering or other injury of the valves, resulting from disease, rendering them incompetent to close completely the openings, and thus allowing regurgitation of blood through them. The intensity of the murmur is not a measure of the amount of damage done. Small vegetations on the valves, or irregular attachments of the tendinous cords thrown across the blood current, or mere roughness (as in some cases of endocarditis which recover without permanent injury) may occasion considerable noise, and yet be comparatively harmless in their consequences. The real test of the seriousness of a lesion occasioning a murmur is its effect after awhile on the heart-walls. The murmur may be so loud as completely to drown out the sound of the heart with which it comes, or, as is oftener the case, both may be heard distinctly together. Change of posture may sometimes make a murmur faint, or even disappear altogether.

After the murmur, by exclusion, has been proved to be endocardial and organic, the next step is to ascertain what lesion it indicates. For this purpose the *seat*, *rhythm*, and *diffusion* of the murmur are necessary. First, its *seat* must be located. The places of election for hearing to best advantage the sounds of the different valves of the heart have already been stated. The same places are to be selected for listening to the different valvular murmurs. Those indicating trouble with the aortic valves are heard at the second right intercostal space (or occasionally at the second or third left space) at the edge of the sternum; the pulmonary at the second left intercostal space at the edge of the sternum; the mitral at or near the apex; and the tricuspid just above the ensiform cartilage.

Having thus located the *valve* affected, the next step is to determine which one of the two diseases incident to each of the four valves of the heart the patient has; in other words, is the lesion occasioning the murmur obstructive or regurgitant? This depends entirely on the *rhythm* of the murmur, *i. e.*, whether it is systolic, diastolic, or presystolic. It is here taken for granted that so much of the physiological action of the heart as relates to the time and direction of the blood currents is perfectly fresh in the memory, for this is the groundwork of all knowledge of valvular lesions. It will be recalled that with the contraction of the left and right ventricles—the systole, the first sound of the heart—the blood is forced through the semilunar valves of the aorta and pulmonary artery respectively, which open to allow its passage, and the mitral and tricuspid valves are forcibly closed, to prevent the reflux of blood into the auricles, whence it recently came. With the diastole, the arterial coats of the aorta and pulmonary artery recoil on the recently introduced columns of blood which now fill them, and consequently, the semilunar valves on each

side close—with a noise which we call the second sound of the heart—and, fitting tightly, perfectly prevent the reflux of blood into the ventricles. In the last part of the diastole, and just before the systole—a space of time which is, therefore, appropriately called the presystole—the auricles contract, and the blood passes from them through the mitral and tricuspid valves into the left and right ventricles. If, now, either of the four great orifices of the heart is so narrowed by disease as to offer an obstruction to the free progress of blood when going in its proper direction, a murmur is produced which we naturally call obstructive, and the lesion indicated is *obstruction* or *stenosis*. If, on the other hand, one of the valves, which, in health, closes perfectly to prevent reflux or regurgitation of the blood into the cavity from which it had just come, is so perforated or puckered by disease as to be incompetent to fit tightly and to close entirely the opening which it ought to guard, more or less of the column of blood flowing backwards—in the wrong direction—it causes a murmur which we naturally call regurgitant, and the lesion indicated is *incompetency* or *insufficiency* of the valve. Thus, theoretically, we have eight different valvular diseases of the heart: aortic obstruction (or stenosis), aortic regurgitation (or insufficiency), mitral obstruction, mitral regurgitation, pulmonic obstruction, pulmonic regurgitation, tricuspid obstruction, and tricuspid regurgitation. Fortunately, however, for the brains of students and physicians, the diseases of the valves of the right side of the heart, with the exception of tricuspid regurgitation, are so exceedingly rare, that they demand very little, if any, attention. It will be noticed that mitral and tricuspid regurgitation are systolic, while aortic regurgitation is diastolic, and that aortic obstruction is systolic, while mitral obstruction is presystolic. The easiest and surest way to decide the rhythm of a murmur is to place one finger over the heart, and feel its impulse while the murmur is heard through the stethoscope. If that is impracticable, the radial or carotid pulse (better the latter, because nearer the heart) will do, making the proper allowance. As to the *diffusion* of murmurs, the aortic obstructive is apt to be transmitted upwards into the carotids; the aortic regurgitant downwards over the sternum and along the spine; the mitral regurgitant over the superficial cardiac space, and also to the left side and back near the angle of the scapula, if not too feeble; while the mitral obstructive and tricuspid regurgitant are confined to the superficial cardiac space. Whenever a murmur is heard, it should be followed up until its place of maximum intensity is reached. Two, or more, murmurs showing valvular trouble may coexist, and may be differentiated by rhythm, place of maximum intensity, quality and pitch. Valvular lesions sooner or later produce hypertrophy and dilatation, so that evidences of these conditions of the heart must always be sought for.

Thoracic Aneurism.—Over such a tumor a systolic murmur is frequently heard, soft or harsh or roaring, and of variable intensity. The blood passing out of the sac may also, but not nearly so often, cause a diastolic murmur. The heart sounds over an aneurism are more or less intense.

PHYSICAL EXAMINATION OF THE LARYNX (LARYNGOSCOPY).

This is the art of examining the interior of the larynx in the living human subject by means of an image reflected from a mirror introduced into the fauces. For this purpose sufficient illumination is necessary; the same little laryngeal mirror serving to throw the rays of light downwards into the larynx and also to bring back to the eye of the observer a clear picture of the vocal cords and their surroundings. The illumination may be accomplished by natural or by artificial light. Undoubtedly the rays of sunlight, either directly entering the mouth (not often possible) or reflected from a plane mirror, give the brightest and most satisfactory image; but as this source of light is only available for a part of each day, and is then constantly shifting, and is also frequently cut off by clouds, in actual practice it is not satisfactory. It is possible also to make use of diffuse daylight reflected by means of a large concave mirror, especially that from a northern sky on a bright day. In either case, the patient should sit with his back turned obliquely to the window and the observer opposite him, the light passing over the patient's shoulder to the reflector, from which it is projected on to the laryngeal mirror.

Practically, however, laryngoscopists almost invariably use some form of *artificial light*, because it is always available in any room by day or by night, is always constant and is easily managed. To be sure, the image, as seen with the usual gas or oil lights, appears redder or more yellowish than with natural light, but proper allowance can easily be made; more easily in fact than if sometimes one kind of light and sometimes another is employed. Artificial illumination may be used in two ways: either the light may be directly thrown into the patient's mouth or it may be reflected in. The former method is common in France, but the latter is greatly preferred in the United States, England, and Germany. For concentrating the rays of the direct artificial light a convex lens is interposed, and the lamp is placed on a narrow table between the patient and observer, the flame being, of course, on a level with the patient's mouth. Most of us, however, are more interested in the *reflected* artificial light. For this purpose almost any lamp giving a bright steady light will do, but the best is the common so-called German study lamp, which can be raised or lowered on

a rod at will, or an argand gas-burner constructed on the same principle. Dr. Mackenzie's rack-movement laryngoscopic lamp (with bull's-eye condenser), which readily admits of horizontal and perpendicular motion, is a very ingenious contrivance now much used. Of this there are different modifications for oil and gas. For strengthening the light, some form of concentrator with one or more convex lenses is generally used. Tobold's is perhaps the best. To this can be very readily attached by joints moving in all directions the reflector, which is a circular, concave mirror about three and a half inches in diameter, having a focal length of twelve inches or more. In the office this is by far the most convenient arrangement, but it is often desirable to attach the reflector by an elastic band to the operator's head, either on the forehead, or in front of the nose and mouth, or opposite one of the eyes (there being a hole bored through the centre)—in the latter case it being sometimes attached to a spectacle-frame. When used on the head a ball-and-socket joint is necessary. The laryngeal mirror (always plane) is round, oval or square in shape, a round mirror of about four-fifths of an inch in diameter being most useful, although the sizes run from a half inch to an inch, and a little more. It is mounted in a narrow metallic setting, and attached at an angle of 120° to a metallic stem, the other end of which is screwed into a wooden handle, the entire instrument being about eight inches long. When the tonsils are enlarged, a small circular or oval mirror will have to be used.

The *method of examination* is as follows: The patient, with his head slightly thrown back, should sit erect, opposite to the observer, and near enough to enable the latter to see distinctly the back of the throat. The lamp, with its light-concentrator, should be on the right of the patient, the flame being on a level with his ear. The reflector, whether attached to the lamp, to the concentrator, or to the observer's head, should now be brought forward into such a position that a disk of light will be thrown into the mouth, its centre corresponding with the base of the uvula. It is very important that this should be thoroughly accomplished before proceeding further. When it is satisfactory, the patient should be requested to open his mouth more widely, and to put out his tongue. This should in all cases be voluntarily protruded—not drawn out—and should be seized by the operator between the finger and thumb of the left hand, protected by a handkerchief, towel, or glove. The greatest gentleness should be used, and the tongue should not be pulled on too hard. The patient can often hold his own tongue—indeed this method is generally to be preferred—and sometimes it does not need to be held at all, if its back can be voluntarily lowered. The laryngeal mirror should now be warmed a little over the lamp (to prevent the condensation on it of the moisture of the patient's breath), and then tested on the back of the hand to make sure that it is not too warm for introduction. Held like a pen in the right

hand, it is now carried steadily backward, without touching the tongue or the hard palate, until its posterior surface rests slightly on the base of the uvula, which should be gently pushed upwards and backwards, the plane of the mirror forming an angle of about 45° with the horizon, and the little finger of the observer resting for support against the cheek or jaw of the patient. A part of the larynx will now probably come into view, but the mirror may have to be shifted a little to one side or the other, upwards or downwards, according to circumstances, without being moved, however, from its position against the uvula. A very good woodcut illustrating the different positions, manipulations, and instruments required may be found on page 710 of Helmuth's *Surgery*. Many persons bear the examination remarkably well, but others only with difficulty and after long practice. In most cases it is advisable to hold the mirror in the throat only for a minute or two at a time; and when there is much sensitiveness, it is far better to let it remain only for a few seconds, and subsequently to introduce it again, than to excite choking and retching by keeping it in longer, only to prevent further examination at the same sitting. Repeated manipulation, however, greatly lessens the sensitiveness of the parts. If the back of the tongue will not stay down, the patient should take several deep inspirations, or should make some vocal sound, such as "ah," "eh," "oh," etc. A tongue depressor is rarely needed, and should only be employed as a last resource. The tongue should not be pulled too far forward in such cases, and the patient should not strain. Excessive irritability of the fauces is very often caused by the clumsiness or inexperience of the practitioner. If not due to this cause, it may often be overcome by sucking small pieces of ice for fifteen or twenty minutes continuously, or by a strong effort of will on the part of the patient. If the epiglottis is unusually large or pendent, the patient should laugh or produce falsetto notes. If it is not then raised sufficiently, the mirror should be introduced lower in the fauces, and should be held more perpendicularly. A great deal of patience as well as aptitude is often required on the part of the examiner. For an explanation of the proper use of laryngeal forceps and other instruments, special monographs should be consulted.

The *laryngeal image* in health is well represented by the two accompanying woodcuts from Mackenzie. The first shows the vocal cords drawn widely apart, and the position of the various structures above and below the glottis during quiet inspiration; and the second shows the approximation of the vocal cords and the position of the various parts in the act of vocalization. In these figures *ge* represents the glosso-epiglottic folds, *u* the upper surface of the epiglottis, *l* its lip, *c* its cushion, *v* the ventricle of the larynx, *ae* the ary-epiglottic fold, *cW* the cartilage of Wrisberg, *cS* the capitulum of Santorini, *com* the arytenoid commissure, *vc* the vocal cord, *vb* the ventricular band or false

vocal cord, *pv* processus vocalis, *cr* cricoid cartilage, *t* the rings of the trachea, *fi* the fossa innominata, *hf* the hyoid fossa, *ch* the cornu of the hyoid bone, and *a* the arytenoid cartilages. In expiration, the vocal cords approach each other, but not so closely as in vocalization. It must be remembered that, owing to the reflection, there is an apparent inversion of parts, but this is only in the antero-posterior direction. As the mirror is usually held, the arytenoid cartilages, for instance, which are at the back of the larynx, are seen at the bottom of the mirror, while the epiglottis and base of the tongue are seen at the top of the mirror. The image appears in a plane nearly vertical, while the structures themselves are more nearly in planes horizontal to the vertical axis of the body, although not all on the same plane. When the image is transferred to paper, the antero-posterior inversion is more complete. Here the epiglottis and the anterior insertion of the

FIG. 3.

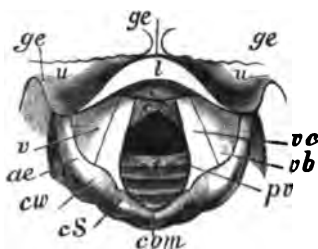


FIG. 4.



vocal cords, which in reality are nearest the observer, seem in the picture to be the farthest, and the arytenoid commissure, really farthest, seems nearest. There are no lateral or vertical inversions, however. The patient's right vocal cord is seen on the right side of the mirror, which, of course, corresponds with the left side of the observer. This is quickly comprehended by one who is used to the percussion and auscultation of the chest. Vertically, also, the epiglottis, which is really highest in the larynx, is highest in the mirror.

As to the normal *color* of the different parts, the upper surface of the epiglottis is of a dirty pink, its lip is yellow, and its cushion is always bright red; the ary-epiglottic folds are like the gums, and the cartilages of Santorini and of Wrisberg are of a somewhat brighter red; the ventricular bands, or false vocal cords, look like the lining of the lips; the cricoid cartilages and the tracheal rings are yellow, and the mucous membrane between them is bright red. The vocal cords, which are by far the most important objects to examine, are glistening and pearly white like a child's conjunctiva, at one point only, close to the arytenoid cartilages, presenting a yellowish spot as large as a pin's head.

It is very interesting to study the vibration of the vocal cords while

the patient sings, it being confined to their edges when the higher notes (especially falsetto) are sung, but extending over their whole surface when the lower notes are sounded. They are sometimes covered with clear mucus, which prevents a good view, but this may usually be expelled by a few slight coughs.

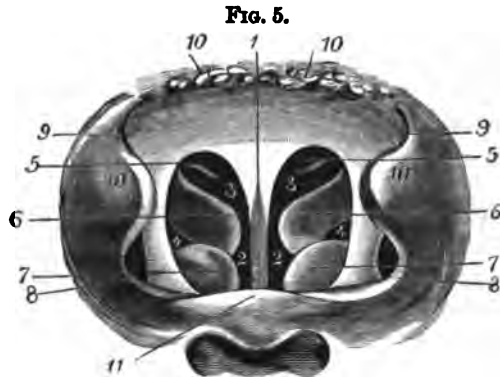
It is not until the observer has, by repeated examinations of the healthy larynx, acquired some dexterity in manipulation and a practical acquaintance with the shape, color, and movements of its parts, that he is fitted to recognize the abnormal modifications which occur in its various diseases. The principal of these modifications to be looked for are congestion, swelling, ulceration, and exudation, such as are found in inflammation, cedema, tubercular and syphilitic troubles, etc.; different forms of intra-laryngeal growths; paralytic or spasmodic affections of the vocal cords; and compression of the trachea by aneurisms or other tumors. These morbid appearances will be described in connection with the diseases mentioned.

PHYSICAL EXAMINATION OF THE NARES (RHINOSCOPY).

By this term is generally meant inspection of the **posterior nares** and adjacent parts by means of reflected light. The same apparatus as for laryngoscopy is required, and the same principles are involved. Here, however, the mouth-mirror, which is to be placed under, or behind, the soft palate and uvula, is to be directed forwards and upwards, and the maximum of illumination should be a little lower than for laryngoscopy. The manipulations are more difficult than in the latter, although in most cases with patience a satisfactory examination can be made. When about to introduce the mirror, the patient should be instructed to open his mouth and breathe through his nose exclusively. This secures more room by enabling the soft palate to hang free from the posterior wall of the pharynx. If the patient breathes through his mouth, as he is apt to do when it is open, the soft palate becomes more or less closely applied to the wall behind it and cuts off communication with the nasal passages. If he is unable to continue breathing in this way, it has been suggested that he repeat nasal sounds like the French *m*, which forces the palate forward and causes the velum to drop. In spite of both of these measures, no matter how intelligent the patient may be, he will sometimes have to be requested to practice alone before the looking-glass for a long time before he succeeds in letting the palate hang free. Dragging the palate forward forcibly by means of a broad and flat hook passed behind it has been resorted to, but is very unsatisfactory on account of the violent spasmodic action of the palatal muscles caused. A late device (*Lancet*, July 28th, 1883) is a piece of soft red rubber tubing, an eighth

of an inch in diameter, gently passed into one nostril till the tip end is just visible below the soft palate, when it is seized with forceps, drawn out through the mouth, and loosely tied over the upper lip to the end protruding from the nose. This loops the soft palate upwards and forwards, and draws it away from the pharyngeal wall. It may be done on one side only, or on both at the same time, and is said to cause very little annoyance to the patient.

The use of a tongue depressor is almost always required to gain additional room for observation and manipulation. A common laryngoscopic mouth-mirror (generally of the smaller sizes) is better for rhinoscopic examination than those sometimes recommended (and



Rhinoscopic Image.—1, nasal septum; 2, nasal passages; 3, superior meatus; 4, middle meatus; 5, superior turbinate bone; 6, middle turbinate bone; 7, inferior turbinate bone; 8, pharyngeal orifice of Eustachian tube; 9, fossa of Rosenmueller; 10, glandular tissue in vault of pharynx; 11, posterior surface of velum.

made on purpose), where the glass is attached to the stem at a right angle. By depressing or raising the handle a good view can be obtained of all parts. It is always necessary to remember that, owing to intervening structures, we never see the reflection when the mirror is exactly behind the nares in a vertical plane, and that the picture which we do see in the mirror is only an image in perspective. On this account it takes some time to get a true idea of the proper relation of the parts. When a large mirror cannot be used, a small one may be passed first on one side and then on the other, in order to view the parts successively. In a rhinoscopic mirror can be seen the posterior surface of the soft palate and uvula, the posterior and part of the lateral portions of the septum of the nose, the turbinate bones, the nasal meatuses, the roof of the pharynx and its walls, and the orifices of the Eustachian tubes.

Anterior rhinoscopy by means of the little mirror is possible, but the amount of reflecting surface is necessarily so small that it is unsatisfactory. The best method of examining the anterior nares is that of direct inspection when illuminated by daylight or by artificial

light thrown in by a concave reflector. To dilate the nostril, different forms of specula are used, such as the common ear specula, Thudichum's, Fraenkel's, Elsberg's trivalve, and Duplay's bivalve, the last looking like a vaginal speculum. A bent hairpin makes a very excellent retractor for pulling aside the nostril. The following parts can be seen: the whole anterior portion of the nasal cavity from the superior turbinated bone to its floor; the anterior parts of the middle and inferior turbinated bone; the surface of the septum; and generally the greater part of the inferior meatus of the nose. If the latter is large enough, the posterior wall of the pharynx may be seen through it. The turbinated bones, in health, are of a pale red color, and are usually covered with a mucous secretion, which may vary considerably, within normal limits, in amount and color. This may be washed away with a syringe, if abundant enough to interfere with the vision. The principal morbid appearances to be looked for in an anterior rhinoscopic examination are changes in color and in configuration, swellings or hypertrophies, an extra amount of secretions, ulcerations, etc.

Palpation, or exploration with the finger and probes, may be resorted to after the eye has seen what it can. The finger-nail should not be too long; and if, on the other hand, apprehension is felt that the patient may suddenly bite, the jaws may be kept open by a piece of wood between the back teeth. The forefinger should be carried into the mouth, palmar surface upward, until it reaches the soft palate, behind which it should be insinuated carefully. It should not be allowed to remain too long, as the feeling is very disagreeable and vomiting is easily induced. Repeated examinations, however, gradually deaden the sensibility. By passing in the finger with the palmar surface downwards, the epiglottis and the upper portion of the cavity of the larynx may be explored. Threatening spasm or vomiting should be a warning to desist immediately. Exploration of the nose in front or in back may also be made by blunt-pointed probes or sounds, suitably bent, under the guidance of sight, if possible. By oiling the little finger and passing it into the nostrils, the position of ulcers, tumors, and foreign bodies can sometimes be ascertained very accurately. The examiner must not forget the simple procedure of inducing the patient to close the mouth and one nostril and to blow through the other, in order, by the sound, to detect a possible narrowing of its calibre by some obstruction. The latter would be very apt, also, to alter the sound of the patient's voice.

PHYSICAL EXAMINATION OF THE ABDOMEN.

While it is undoubtedly true that the physical methods of exploration often afford us more help than symptomatology in the diagnosis of abdominal affections, yet, as a rule, we cannot here expect to attain

the same accuracy and to secure as perfect results with these methods as in the diagnosis of thoracic diseases. Some of the difficulties to be encountered are as follows: In diseases of the chest we have to examine only the heart, lungs, and the great bloodvessels; whereas, in diseases of the abdomen, we may be obliged to examine a dozen different organs before we can arrive at a decision. Again, in health the thoracic organs act in a rhythmical and regular manner, about the same amount of air entering the lungs and the same amount of blood entering the heart, other things being equal, from one minute to another; whereas the abdominal viscera often act in an irregular and intermittent manner, and their contents vary greatly from time to time. At one examination either the stomach, bowels, or bladder, for instance, may be full, and empty at another examination on the same day. Necessarily, the physical signs will differ. Again, the virgin uterus occupies a very small space and escapes detection either by percussion or by external palpation; but in the latter months of pregnancy the womb dwarfs into insignificance every other abdominal organ. Such circumstances always make a diagnosis of abdominal more doubtful than one of thoracic disease; in spite of these difficulties, however, much can be learned by a careful attention to the methods which will now be described. The different regions of the abdomen and their contents have already been explained on page 48, in connection with the regions of the chest. In thoracic disease, auscultation is by far the most important of the physical methods; in the diseases we are now to consider, it holds a low rank. Here percussion and palpation give us the most valuable assistance.

Inspection of the Abdomen.—By inspection we notice alterations in its shape and movements. The patient should lie on his back with his thighs slightly flexed. It is necessary to remember the variations which are possible in a normal state. In children, and often in old persons, the abdomen is larger in proportion to the size of the chest than in others, and it is more voluminous and broader inferiorly in women than in men. Besides this, we notice that people in health differ greatly from each other in the size of the abdomen. Where there is pathological change, however, in connection with change in size, other signs are very apt to attract our attention, such as emaciation elsewhere, alterations of the color of the skin, distension of the superficial abdominal veins, œdema of the feet and legs, etc.

In disease the abdomen may appear to the eye to be distended or retracted. If *distended*, the enlargement may be general or partial. It is general in cases of ascites; also from œdema of the abdominal walls, from gas in the intestines, or from large tumors which fill up the entire cavity. In ascites the smooth, uniform swelling of the abdomen, unless the tension is extremely great, will change somewhat with changes in the position of the patient, because fluid will seek its level.

If he lie on one side, it lessens in the upper flank and increases in the lower; if he stand, it is most apparent in the lower half of the abdomen; if he lie on his back, it projects less forward, but gains in breadth. If there is an accumulation of gas in the intestines or in the peritoneal cavity, no change is produced by change of posture. If the abdomen is very greatly distended from any cause, its skin looks shining, anæmic, and somewhat blue, and where the stretching is greatest, white lines are seen. These latter are oftenest exemplified in cases of pregnancy. The superficial abdominal veins are rendered prominent when the pressure interferes with the return of blood through the vena cava inferior, or else (as in cirrhosis of the liver) through the portal system. When the enlargement of the abdomen is partial, it is generally owing to increased size of its organs, such as the liver, spleen, uterus, or ovaries. If the liver is moderately enlarged, a prominence sometimes appears on the right side in such a way as to render some of its outlines easily distinguishable, especially if the skin is thin and the parts are viewed in profile. Sometimes, however, the enlargement is so enormous, as in certain cases of cancer, hydatid cysts and amyloid degeneration, that the whole or a greater part of the abdominal cavity is pretty uniformly filled up. If the spleen is much enlarged from intermittent fever, amyloid degeneration, or leukæmia, a prominence on the left side may indicate its position; but this organ, likewise, may be so enormously increased in size as to fill up the greater part of the abdominal cavity, and here, too, the enlargement therefore ceases to be partial and becomes general. If the stomach be dilated with gas, an oval-shaped swelling may appear in the epigastric region, extending a little towards the left. In rare cases the dilatation may be so excessive as to render the whole abdomen prominent. Cancer of the stomach, which oftenest affects the pyloric end, will sometimes appear as a circumscribed elevation in the epigastrium. A large fecal accumulation in the colon may show as an elongated and often movable tumor in the right or left iliac region. The peristaltic action of the bowels may be excited or increased by rubbing the surface of the abdomen, and will become visible if the patient is not fleshy. If there is a stricture of the intestines, this movement will be seen only above the contracted part. Tumors of the uterus, either pathological or physiological (pregnancy), if not too large, generally keep pretty near to the middle line of the abdomen. Tumors of the ovaries, on the other hand, until they acquire considerable size, appear either in the right or left groin; afterwards they may become large enough to fill up the whole of the abdomen and distend its walls uniformly, so that if not seen until late it may be impossible to tell from which side they originally sprang. Cancer of the kidneys and hydronephrosis, if seen at all (which is rare), first appear in the lumbar region, and afterwards, when large, extend to the front of the abdomen. It is some-

times possible, though very uncommon, to see the swelling produced by a movable kidney. The bladder, distended with urine, on the other hand, is easily recognized as an oval-shaped swelling above the pubes. Other causes also may produce partial and visible enlargement of the abdomen, such as swelling of the mesenteric glands, tumors of the omentum, and other tumors, hernias, crowding of the abdominal organs by some chest diseases, etc.

Retraction of the abdominal walls as a rule affects equally the whole surface, and is seen where the bowels are almost or entirely empty, as a result of stricture of the œsophagus, cancer of the pylorus, stenosis of the small intestines, or chronic diarrhœa and dysentery. It is also noticed in lead colic, and particularly in the tubercular meningitis of children, and in general emaciation from any cause.

The *movements* of the abdominal walls should also be inspected. They are greatly increased during respiration in pleurisy, pneumonia, pericarditis, etc., but greatly decreased where there is much abdominal pain, as in peritonitis. A distinct pulsation is often visible in the epigastric region which sometimes is, and at other times is often mistaken for, aneurism; and the heart's pulsations are sometimes communicated to large peritoneal effusions of fluid, appearing on the surface as distinct waves. The abdominal muscles, lastly, are often seen to contract and relax spasmodically. By means of the vaginal speculum very important information in regard to uterine diseases is obtained by inspection, and by the anal speculum in a similar manner diseases of the lower bowel are brought into view.

Mensuration of the Abdomen.—In this method a graduated tape is used. By it accurate records can be made, from time to time, of the amount of increase or decrease of abdominal dropsies, of ovarian or other tumors, accumulations of gases, etc.

Palpation of the Abdomen.—In making an examination of the abdomen this method becomes very important. By it we can determine the size, form, consistency, and position of the abdominal viscera, as well as of tumors or other abnormal substances; we can ascertain if what we feel is tender, whether it is movable, whether it has a motion of its own, whether it is smooth or nodulated, whether it fluctuates, etc. The patient should generally be placed on his back, with thighs flexed and head bent forward, so as to relax the abdominal muscles; sometimes, however, important information is gained by placing him on one side also, as, for instance, where we desire to discriminate between an aneurism and a tumor lying over the aorta. Besides an occasional thick layer of fat or œdema, the greatest obstacle to palpation is the resistance of the recti, which are more particularly excited to contract, if the patient is poked with the ends of the fingers. The whole hand, therefore, warmed, should be evenly applied to the skin, and the fingers then depressed in different directions. The contraction of the

recti sometimes causes what is called a phantom tumor, which disappears under ether. To prevent the fixation of the diaphragm, the patient should be induced to talk or to count as long as possible without taking a new inspiration. Palpation is naturally easiest in emaciated persons and women who have borne children. The pulsation of the abdominal aorta in them is very easily felt in the middle line.

Palpation of the Liver.—In health the presence of this organ under the margins of the ribs can be detected by the touch only with difficulty, and this merely during deep inspiration. Any enlargement, however, is easily felt (provided ascites is not present), its sharp edge, and sometimes also a considerable part of its surface, coming within reach. Not much more than an increased sense of resistance is felt with passive congestion, acute hepatitis, fatty infiltration, retention of bile, etc.; but with amyloid or waxy degeneration and hydatid cystic disease the enlarged outlines and surfaces are very easily grasped; and in cancer and leukæmia, these enlargements often filling up such a large proportion of the abdominal cavity, the fingers have free opportunity to explore. Pressure over the liver gives no pain in fatty liver, amyloid liver, and hydatid growths, but palpation in all inflammatory conditions is painful, and it is particularly so in cancer. The surface of the enlarged liver is smooth in hyperæmia, biliary engorgement, fatty and amyloid degeneration; but it is nodulated in cancer, save of the diffuse variety. In consistency, acute swellings are softer than chronic, and of the latter the fatty liver is softer than the amyloid. Cirrhosis, which is really the hardest of all, cannot be reached by the finger. In shape, the greatest deformity of the liver is caused by cancer and hydatid growths, the enlargement in other diseases being generally uniform. A tremulous sensation on rapping, called hepatic fremitus, has been described by some as characteristic of hydatid growths or echinococcus tumors, but the majority of those who have seen the disease fail to find it or confuse it with fluctuation. In this country the affection is so extremely rare that it need not give us much concern. Fluctuation can be felt over large hepatic abscesses, which, though rare in this climate, are far more common than hydatids. Ascites, causing fluctuation, may or may not accompany hepatic cancer. The liver may be displaced and pushed downwards by tight lacing, by pulmonary emphysema, by right pleural effusion or pneumothorax. In certain rare cases of relaxed ligaments also, it hangs down as a movable or "wandering" liver. In these cases the organ can be felt projecting from under the ribs as well as when it is enlarged. The differentiation is made by percussing its upper border, which is in its proper place in enlarged, but lowered in displaced liver.

Palpation of the Gall-bladder.—The gall-bladder, if fully distended with bile, but not otherwise, may often be felt as a moderately

elastic, rounded tumor, attached to the margin of the liver near the ninth costal cartilage, outside the edge of the right rectus muscle. Pressure, by expelling bile, may diminish the tumor. The gall-bladder may be dilated and sometimes enormously enlarged by an accumulation in it of pus or muco-serum. If this swelling is painful and tender on pressure, it may be discriminated from peritonitis by the unequal enlargement of the abdomen, and from ovarian disease by its being continuous with the liver and moving with it during forced inspiration and expiration.

Palpation of the Spleen.—In the great majority of cases the normal spleen cannot be reached with the finger; exceptionally, if the person is very thin and the skin is soft and yielding, and the patient lies on his right side, it may be felt at the end of a full inspiration deep in the left hypochondrium. Even in the lesser degrees of enlargement, however, it may usually be detected under these circumstances by an increased sense of resistance at least, although, even if it swell to twice its natural size, it seldom emerges from under the costal arch. Slight enlargements occur in typhus, typhoid and relapsing fever, pyæmia, small-pox, obstruction of the portal circulation (as in cirrhosis of the liver and mitral lesion), etc. In old intermittent fever and in amyloid degeneration the spleen may acquire a much greater size; but leukæmia is the disease which particularly augments its volume, it sometimes becoming here so enormous as to fill half or more of the abdominal cavity. In enlarging it always extends obliquely downwards and inwards toward the median line, generally preserving its original shape. The notches or depressions are deepened so much by the swelling that they serve for valuable diagnostic landmarks in excluding other tumors, being easily made out. In consistency acute swellings of the spleen are soft, but all the chronic and large swellings are hard. On palpation they are all smooth and painless. A movable or wandering spleen is occasionally met with, its dislocation being due to relaxation of its ligaments. It can be diagnosed by palpation, as it lies near the surface, its upper end being oftenest situated just under the border of the costal arch. The spleen may be pressed down also by pleuritic effusion, pneumothorax or emphysema. A splenic tumor is leukæmic, if under the microscope a large increase in the number of white blood-corpuscles appears; it is probably amyloid if the patient have a disease in which this degeneration is common, and malarial if intermittent fever has pre-existed. Hydatid disease and cancer are very rare.

Palpation of the Stomach.—Great tenderness on pressure over a circumscribed area occurs particularly in gastric ulcer and cancer, being almost uniformly present in them; but as it occurs in some degree also in most other affections of the stomach, too much stress should not be laid on it as a diagnostic point. The greatest aid ren-

dered by palpation in diseases of the stomach is the detection of a cancerous tumor, whose nature indeed only becomes certain by means of palpation in connection with the proper symptoms, and which, when far enough advanced and situated at the pylorus (as it usually is), can almost always be felt as a firm, smooth or nodulated, round, oval or irregular, fixed or movable lump, easily grasped and readily separated from the surrounding viscera. It is oftenest felt in the right epigastrium, one or two inches below the costal cartilages, but is sometimes dragged downwards by its weight and by the attending dilatation of the stomach, though not by a deep inspiration. Owing to the different degrees of distension of the stomach, it is more easily felt on some days than at others. Cancer of the cardiac end of the stomach or of the smaller curvature is too deeply seated to enable us to reach it with the finger. An epigastric tumor is not always cancerous, but may be exceptionally a myoma or sarcoma of the stomach. It must also be discriminated from cancer of the left lobe of the liver, aneurism of the abdominal aorta, fæcal accumulation in the transverse colon, and enlargement of the pancreas.

Palpation of the Intestines.—Light pressure is well borne in inflammation of the mucous membrane of the bowels, but the patient shrinks from strong pressure. On the contrary, very gentle pressure on the surface causes pain in hyperæsthesia, while deep pressure causes little inconvenience if the attention of the patient is distracted by conversation or otherwise. In peritonitis the pain is more in proportion to the force used, being appreciated with the slightest touch and becoming intolerable with firm pressure. Neuralgic or nervous pains, such as that of colic, unlike those connected with inflammation, are generally relieved instead of being increased by pressure. In typhoid fever, inflammation of the cæcum, and of its appendix, there is decided tenderness on palpation in the right iliac region, and in inflammation of the appendix cæci palpation sometimes discovers a semi-solid tumor formed from the exudation, perhaps almost as large as the fist, and sharply defined from the neighboring parts. In typhoid fever the splashing of fluid, which when heard is called gurgling, can be felt also in the same region; in Asiatic cholera, where the bowel frequently contains an enormous amount of fluid, and even in simple intestinal catarrh, the same sensations are felt all over the abdomen. Large, hard fæcal accumulations in the intestinal canal can be felt, and should not be confounded with enlargement of organs or with tumors. They are generally found on the right or left side of the abdomen, oftener on the left side in the descending colon, although they may sometimes occupy a good part of the ascending and transverse, as well as of the descending colon. In uncertain cases large injections given through a flexible tube, or saline purgatives will often remove the doubts and the fæcal tumors simultaneously, but some-

times these measures fail to dislodge them. On such occasions reliance must be placed on their peculiar feeling. They seem hard and resistant, but if one finger be steadily pressed on them for a few minutes, they will finally (if not enteroliths) indent like a hard snowball, the indentation being permanent. The masses themselves are irregular, movable, and not usually tender. Cancer in the duodenum cannot be differentiated from cancer of the stomach. Cancer of the rectum can be recognized by the finger introduced. Cancer of other parts of the intestines can be decided upon if, with the proper symptoms, a tumor be felt, which is tender, nodulated, and of irregular shape. This, in the small intestines and transverse colon, is movable, unless adhesions have followed peritonitis, but at the sigmoid flexure and cæcum it is fixed. At the latter place it may occasion obstruction, and fecal accumulation above the tumor will apparently add to its size. In such cases the peristaltic movements of the bowel can be felt above the stricture. Cancer of the peritoneum may be in the form of disseminated nodules and escape detection by palpation, or of one or more fixed or movable, nodulated tumors which can be grasped, or in the form of a large, sometimes immense, gelatinous or colloid tumor, filling much of the abdomen, and often coexisting with ascites. From ascities alone it is distinguished by the irregular form of abdominal enlargement, its feeling of resistance to pressure at points, and the limitation of fluctuation. The aspirator will help the diagnosis. Internal hæmorrhoids can be felt by the oiled finger passed into the rectum, and stricture of the latter can be discovered in the same way and by the feeling of the rectal bougie. Cancerous and other tumors of the omentum, either involving this structure alone or involving also neighboring structures, can be felt through the abdominal walls, but are exactly located with difficulty. Tumors of the pancreas, generally cancerous and secondary, can be felt deep in the epigastrium as hard and immovable bodies, but a confident diagnosis is impossible.

Palpation in Ascites.—This method of detecting fluid in the abdominal cavity is so often and so successfully resorted to, that it deserves special consideration. *Fluctuation*, as it is called, is obtained by placing one hand lightly on the abdomen and giving a smart rap with the fingers of the other hand, either near by, or on the other side; the patient being on his back or in an upright position. A wave of fluid is felt to roll against the applied hand, its force varying with the amount of fluid and the consequent tension of the abdominal walls. If the quantity is small and the walls flaccid, the patient should stand upright, so that the fluid may distend the lower part of the abdomen, and the hands should be used near each other. If the effusion is encysted, fluctuation is lessened; it is also obscured by œdema or fat in the abdominal walls. Sometimes, when the walls of the abdomen are

tense, without containing fluid, their vibration may be mistaken for fluctuation; but this fallacy may be prevented if the hand of a third person is applied edgewise on the abdomen between the physician's hands.

Palpation of the Kidneys.—As a rule, in health, the kidneys cannot be felt, especially in fat people. They lie near the spinal column, in the space corresponding to the two lower dorsal and the two upper lumbar vertebræ (the right being a little lower than the left), imbedded in fat and resting on the lumbar muscles. Above the right kidney is the liver, above the left the stomach, and above both the colon and intestines. To feel for the kidney, the patient being on his back with thighs flexed, the physician should stand on the side opposite the kidney to be examined, and should place one hand on the mid-flank behind and below the last rib, and the other over the proper part of the abdomen in front, trying to approximate them sufficiently to bring the kidney between, the patient, meanwhile, being instructed to take a deep expiration. Tenderness and enlargement can thus be detected. Decrease in size is beyond the reach of physical exploration to determine. The kidneys may be enlarged by hydronephrosis, pyonephrosis, renal and perinephritic abscess, hydatid and other cysts, cancer, tubercle, simple hypertrophy, etc. In hydronephrosis, where the pelvis of the kidney is dilated and filled with urine, whose outflow is prevented by some obstruction, a large, undulating, often fluctuating, lobulated mass is found in the lumbar region, not tender to the touch, extending upwards, downwards, and forwards, sometimes suddenly disappearing coincidentally with a large passage of urine. When existing on one side, as is usually the case, the tumor may grow very large; in one case reported it containing sixty pounds of fluid, and occupying the whole abdominal cavity. They can, of course, never attain great size when affecting both kidneys. The tumor of hydronephrosis may be confounded with an ovarian growth, ascites, hydatids of the kidney, or perinephritic abscess. In pyonephrosis the physical signs are about the same, except that there is tenderness on pressure. Both renal abscess and perinephritic abscess also form a painful tumor in the lumbar region on one side. Palpation is insufficient to differentiate them; the symptoms and the history of the case must be considered. Renal cysts in enlarged kidneys form soft, but not fluctuating, movable tumors, without pain or tenderness, in the lumbar region, extending also into the abdomen, if large enough, in persons over thirty years of age. Unlike hydronephrosis, the tumor does not suddenly change in size. It differs also in being almost always bilateral, although one kidney may be very much larger than the other. Dr. Roberts reports a case of this affection where one kidney weighed sixteen pounds, its length being fifteen and one-quarter inches, and its breadth nine and one-half inches.

Hydatid cysts, almost unheard of in this country, although common in Iceland, are unilateral. They cannot be differentiated by palpation from hydronephrosis. Tubercle rarely causes much enlargement of the kidney. Primary cancer of the kidney, generally encephaloid and unilateral, a rare disease, occurs mostly in children and very old people, often forming a large and sometimes an enormous tumor, filling the abdominal cavity. Roberts reports one weighing thirty-one pounds. The tumor extends towards the umbilicus, is oftener on the right than on the left side, is generally immovable from peritoneal adhesions, does not descend with inspiration, does not fluctuate, is not always tender, is irregular in surface, and is soft at some points and hard at others. On the right side it can be distinguished from enlarged liver by the possibility of pressing the fingers between them; and on the left from enlarged spleen, by its immobility and the absence of the distinctive notch of the latter. *Movable* or floating kidney, generally acquired, occurs oftener on the right side, and oftener, also, in women. If the abdominal walls are not too thick, it can generally be felt with ease, and often grasped in the hand. Coming so near the surface, its smoothness and peculiar bean-shape can be readily made out. When pressed upon, it often slips away from the finger on account of its mobility and smoothness. Its situation changes with the position of the body and with the acts of respiration. It is generally situated between the false ribs and the umbilicus, but it may be found in the iliac fossa. Generally, palpation gives no pain, but rough handling gives rise to uneasy sensations, nausea, and faintness. The diagnosis is not quite so easy when, as a result of inflammation, adhesions have been formed which bind the dislocated kidney down to surrounding parts, and thus interfere with its mobility.

Palpation of the Bladder.—When empty, the bladder cannot thus be recognized; but when distended, it is easily felt as a smooth, oval, tender, firm but elastic tumor, extending up in the median line from the pubes towards, or even beyond, the umbilicus. In infants less distension is required to enable it to be detected by palpation, as it lies less deep in the pelvis. It can easily be differentiated from pregnancy or a uterine tumor by catheterization.

Palpation of the Uterus.—When unimpregnated, the healthy uterus cannot be felt through the abdominal walls, but generally in the fourth and sometimes even in the third month of *pregnancy*, its fundus may be felt, especially in a thin woman, above the pubes, inclining a little to one or the other side, oftener to the right; the inclination being due to the projection of the sacro-vertebral promontory, and to the presence in the left side of the sigmoid flexure of the colon and the rectum. This inclination may give rise to a suspicion of ovarian disease. After the fifth month of gestation the pregnant uterus occupies

a central position. At the end of the fifth month the fundus is felt half-way between the symphysis pubis and the umbilicus; at the end of the sixth at the umbilicus; at the end of the seventh half-way between the umbilicus and the end of the sternum; at the end of the eighth, at the ensiform cartilage; and during the last week or two of pregnancy, it may fall so as to be felt lower. These are the common heights to which the uterus rises and can be felt during pregnancy, and yet there are exceptions. Some women may seem as large at five months as others at seven. The variations are owing to the height of the woman, the amount of intestinal inflation, of the prominence of the sacro-vertebral curve, the capacity of the pelvis, and the frequency of child-bearing. Of course, the abdomen will not increase, but rather diminish somewhat, if the foetus die, and is retained some months. During the fourth month, the uterus feels like a soft, though firm, fleshy tumor, of a uniform smooth surface, but afterwards loses something of this firmness, and becomes obscurely fluctuating on account of the liquor amnii. Soon the motion of the child becomes felt, and gradually its head, trunk, and limbs become distinct enough for recognition by the touch. If palpation is conducted per vaginam, the cervix, during the first four months, seems to have the same form and length as usual, but it is fuller, rounder, softer and more elastic. In the fifth month it is shorter, and swelled out towards its upper end, especially in front; and between this place and the symphysis pubis the enlarged uterus can plainly be discovered, where at other times nothing is felt. The finger now enters the os more easily, and the foetus can be detected by ballottement. In the sixth month the cervix is still more shortened, and during the rest of the pregnancy its obliteration continues to be gradually effected, so that near the end, in its place is felt at the upper part of the vagina the distended uterus like a globular tumor. The os at nine months is reached with great difficulty, and its margins are thin, soft, and relaxed sufficiently to admit the finger, which feels the membranes.

Fibroid tumors of the uterus give rise to enlargement of the organ, and are best detected by palpation. They vary in size from a millet seed to a mass weighing fifty pounds. They are generally divided, according to their location, into sub-peritoneal, on its outer surface, intra-mural, in its walls, and sub-mucous, projecting into its cavity like polypi. If large enough to be felt through the abdomen, they have generally a hard, firm feeling without any fluctuation, with a more or less rounded or lobular—generally unsymmetrical—outline, with nodules like hard balls varying in size and shape, seldom occurring singly and of slow growth. The connection of these tumors with the uterus is proved by means of the sound, as they move with it. If small, they may easily be confounded with flexions of the womb or hæmatocele, or the exudation of pelvic cellulitis. The sound (which

is a prolonged finger) is here a good adjunct. When there is a tumor, the sound generally passes more than the usual two and one-half inches, and the course which it takes does much to locate the tumor.

Fibro-cystic tumors may grow very large, and they resemble ovarian tumors so closely that the most experienced ovariologist may be deceived. They are partly solid, partly fluctuating (although not to the same extent, usually, as ovarian tumors). The uterine sound enters farther, and often shows them to move with the uterus. Still, neither palpation nor percussion can make the diagnosis positive. Atlee, with his great experience, in his work on ovarian tumors, claims that the fluid removed by tapping can alone decide this. It coagulates on exposure to the air, and shows under the microscope elongated fibre-cells like those of the uterus. For the diagnosis of uterine displacements, the reader is referred to the appropriate chapter.

Palpation of the Ovaries.—In health, an ovary, being only an inch and a quarter long, and hanging freely in the pelvis, cannot be recognized by the touch. To detect swelling and tenderness, pressure should be made backwards towards the brim of the pelvis, from a point a little above the curve of Poupart's ligament, while at the same time two fingers of the other hand should be introduced well into the vagina. It must be confessed, however, that it is very hard to get accurate information in this way, unless the swelling has reached some size, or, in other words, unless a distinct tumor has formed. Ovarian tumors are the commonest of all abdominal tumors. A patient is seldom conscious of the existence of one, until it can be felt above the brim of the pelvis. At this time its size usually varies from a hen's to a goose's egg, which it resembles in shape, and its position is in one or the other groin. It is circumscribed, generally elastic, movable, prominent, and not sensitive. As its size increases, it takes a more central position, and sometimes the patient may not even know of its existence until she finds a lump in the middle of the hypogastric region. One of the strongest diagnostic points in connection with these tumors is, that they start from one side. With increased size the tumor becomes less movable. If a unilocular cyst, there will be in it distinct fluctuation; if bilocular or trilocular, fluctuation will be less distinct; and if multilocular with very numerous cysts, fluctuation may be difficult to get, or it may be absent. Fluctuation also varies according to the consistency of the fluid, and the thickness of the walls of the cyst, and of the abdominal walls. Palpation also enables us to detect the presence of peritoneal fluid between the tumor and abdominal wall, to determine the density of the tumor, to detect smaller bodies in the walls of a large cyst, and often to trace the outlines of several cysts by the sulci which separate them. Semi-solid ovarian tumors are commoner than simple cysts; and solid tumors, although very rare, are sometimes met with in the form of fibroma or cancer. On palpation,

their firmer texture and the absence of fluctuation serve to distinguish them.

Palpation of Abdominal Aneurism.—Aneurisms of the aorta are referred to, since those of other vessels rarely attain to much size. They generally occur in men between twenty and forty years of age, and are oftenest located between the aortic opening in the diaphragm and the origin of the superior mesenteric artery; when below this point the diagnosis is easier. When not too high up, they can easily be felt, being from three to six inches in mean diameter, and often containing as much as ten pounds. Owing to the liver and diaphragm, they oftener develop downwards and to the left than upwards and to the right. The tumor is smooth and elastic, and is most usually felt to the left just above the navel. A deep inspiration does not depress it, nor is it moved laterally by the fingers. A strong, single pulsation is felt, synchronous with the radial pulse, and limited to the tumor. Sometimes, also, a vibration or thrill is perceived by the fingers, which is almost pathognomonic, when it exists. Pressure on the aorta below the tumor increases the impulse, and diminishes the collapse and also the thrill. A strong diagnostic point is the fact that the tumor expands in every direction during the impulse, particularly at its sides, and does not merely rise and fall like other tumors resting on an artery, such as cancer of the stomach or of the left lobe of the liver. In such cases, lifting the tumor from the artery or pushing it aside, or making the patient assume the knee and elbow position, will sometimes stop the pulsation. A *functional aortic pulsation* in the epigastrium is very often erroneously diagnosticated as aneurism. This may occur in dyspepsia, hysteria, uterine or intestinal irritation or copious hæmorrhage. But here the throbbing is not localized as in aneurism, but is propagated through the aorta and into the main arteries below, and no tumor is found.

Percussion of the Abdomen.—The patient should be placed in the same position for percussion of the abdomen as for palpation—on the back, with relaxed abdominal muscles. Generally in marked enlargement of the various organs this method is inferior to palpation; but in such cases as free ascites, intestinal meteorism, accumulation of gas in the peritoneal cavity, atrophies and dislocations of the liver, and in the lesser forms of enlargement of the liver and spleen, it is decidedly superior.

Percussion of the Liver.—A flat sound is heard over that portion of the liver which comes directly in contact with the thoracic and abdominal wall, from the fifth intercostal space on the right side in front to the margin of the arch of the ribs below. This is the region of hepatic flatness as distinguished from that of hepatic dulness, so-called, which extends above this line for an inch or so, where the liver is overlapped by lung tissue, which adds some resonance. forcible percussion is in the latter place necessary to bring out the proper sound

of the deep-lying organ ; but near the lower margin of the right lobe, and over the whole of the left lobe, on account of the thinness of both, their superficiality and the proximity of the intestines and stomach, light percussion is better adapted, in order to escape as much as possible the transmission of the tympanitic sound. The latter always accompanies the dulness over the whole hepatic area in children, even when the percussion is light. Owing to the movement of the liver with respiration, it should be percussed during the respiratory pause, and along at least four perpendicular lines, the axillary, mammary, parasternal and median. Beginning in the mammary line, for instance, above the right nipple, we notice the strong contrast of the pulmonary resonance, the gradual transition at the overlapping, the flatness of the body of the right lobe, the mixture of tympanitic quality at the inferior margin, and the strong contrast of the intestinal tympanitic sound below. In this way on the different lines we map out the upper and lower margins of the liver with great accuracy. In the mammary line the liver measures about four inches ; hepatic dulness begins at the fourth intercostal space, hepatic flatness at the fifth, and the lower border of the organ is reached at the edge of the arch of the ribs, seldom in health passing below. In the median line it measures about three inches ; flatness is reached at the base of the xiphoid process, and the lower border is found nearly halfway between this point and the umbilicus. In the parasternal line the boundaries are between those of the two latter. In the axillary line the liver measures about four and a half inches ; dulness is reached at the seventh rib, and flatness at the eighth. In the scapular line the lower dulness is at the eleventh rib. Near the vertebral column the upper boundary is near the tenth rib, but the lower boundary cannot be accurately determined, as the dulness here is continuous with that of the right kidney. The dulness of the left lobe, which reaches nearly two inches across the median line, also merges so closely into that of the heart that they cannot be distinguished ; which fact, however, is not of much practical importance. The liver may be dislocated by tight lacing. When it is dislocated downwards by emphysema or pneumothorax, percussion very readily traces its upper border and corrects the impression of its enlargement which palpation might give. If the dislocation is caused by right-sided pleuritic exudation, however, this method fails, as one dulness runs into the other. Dislocation upwards by pressure from below by abdominal tumors, meteorism, ascites, etc., very rarely exceeds one intercostal space. When the liver is enlarged too little to be recognized by palpation, the increase will give on percussion a dull, tympanitic sound. Even if the liver is decidedly enlarged, percussion may fail to outline it if there be a great amount of ascites or meteorism. In the first place, the two dull sounds are continuous ; and in the second, the gas-distended colon *may* come between

the liver and the abdominal wall and produce a tympanitic sound; an air-distended stomach may also mask an enlarged left lobe. Care must be taken not to mark as signs of enlarged hepatic area faecal masses in the transverse colon or tumors of the pylorus. Palpation or the rational symptoms may solve the problem. By waiting until another hour or day, changes will take place in the location of faecal matter, in the amount of food in the stomach, in the overlapping of the liver by coils of intestine, etc., which will clear up some difficulties in percussion. The area of hepatic dulness is diminished, as just stated, by the overlapping of coils of intestine, by the encroachment of an emphysematous lung covering the upper part of the liver, and by its crowding upwards by abdominal distension, its upper part being pushed more behind the lung. If these causes are absent, diminution of its area of dulness may be set down as indicating contraction, especially from cirrhosis or acute yellow atrophy. With the former ascites often coexists, and its withdrawal is first necessary, or else the patient when percussed must lie on the left side to allow the fluid to gravitate that way. In acute yellow atrophy the liver may shrivel up and sink back so much that its dulness may entirely disappear.

Percussion of the Spleen.—The spleen is only about four inches long and three wide, and runs parallel to and behind the ninth, tenth, and eleventh ribs, its upper end being close to the body of the tenth dorsal vertebra, and its lower end coming about to the middle axillary line. Being small and thin, and almost surrounded by air-containing organs, its sound is not nearly so dull as that of the liver; in children, as a rule, and sometimes even in adults, the tympanitic sound which prevails in its neighborhood being only slightly muffled over it. The percussion-stroke must, therefore, be gentle. The upper third of the spleen can never be recognized by percussion, being entirely covered by lung; and with a full inspiration so much of the lung comes down as sometimes even to cause the complete disappearance of the splenic dulness. Percussion should, therefore, be performed in the respiratory pause. A dilated stomach or a gas-distended colon will also encroach on the splenic dulness, and make it difficult to detect. The patient may either stand, sit, or lie on the right side, but the area of dulness will shift a little with the position of the patient. To outline the spleen, we percuss in a line from the axilla to the crest of the ilium. The upper limit of dulness is usually found at the ninth rib and the lower limit at the eleventh. On a horizontal line between these two we percuss from the median line to the left to find its anterior edge, which is near the middle axillary line. It is of little use to percuss behind, as the splenic dulness is continuous with that of the kidney. It is also difficult to distinguish the spleen when there is a left pleuritic effusion. If large, however, it brings it within the reach of palpation. In pulmonary emphysema, owing to the overlapping

of the lung, the area of dulness is greatly reduced or disappears. When the spleen is enlarged, its normal oval or rhomboidal outline is preserved. If moderate in amount, dulness extends downwards and backwards; if still greater, it also extends forwards, and when it is immense, it also pushes the diaphragm before it up into the thoracic cavity. The dulness of an enlarged spleen is always more intense, owing to the greater thickness of the organ. It is, therefore, far more easily recognized by percussion than a normal spleen, except when there is much meteorism or ascites present. After all, although percussion is confirmatory of a large splenic tumor, palpation affords much more trustworthy evidence.

Percussion of the Stomach.—Not all of the stomach can be traced by percussion, for the upper part to the right is covered by the liver, and to the left by the lung. The rest touches the wall of the abdomen. Its larger curvature crosses the epigastrium in a curved line about half-way between the point of the xiphoid process and the umbilicus, when moderately distended, and its left edge reaches a very little beyond the right edge of the spleen. The patient should lie on his back. The upper border of the superficial gastric area is found by percussing downwards from the overlapping lung, and noticing where the pulmonary resonance stops and the tympanitic begins, which is generally below the sixth rib. From the liver the transition is, of course, very abrupt; but the colon on the lower boundary sometimes sounds so nearly like the stomach, that it is almost impossible to define their boundaries. It generally, however, has a higher pitch, and is more purely tympanitic, the difference being noticeable to a practiced ear. Where it is hard to distinguish the two sounds, the patient may be requested to swallow a glass of water, and to stand up during percussion. The lower boundary of the stomach will then be indicated by a dull sound.

The sound of the stomach varies according as it is empty, partly filled, or fully distended by its contents. If empty, it gives out a clear tympanitic note of low pitch; if quite full of solids and fluids, the tympanitic element is more or less muffled, especially at the lower parts of the great curvature; if only moderately full, it is hollow, ringing, and tympanitic to a certain extent, yet not so much so as the intestine; and sometimes it is amphoric. If the stomach is greatly overloaded with food, the tympanitic area is extended in different directions, not only downwards but also to either side, masking some of the hepatic and splenic dulness. If greatly distended with gas, the percussion note is metallic as well as tympanitic. Artificial distension with gas is sometimes resorted to in order to mark out more clearly the outlines of the stomach. A solution of bicarbonate of soda is swallowed soon after a solution of tartaric acid.

The stomach may be dislocated downwards by a large pleuritic

effusion or by emphysema, and upwards by ascites or large abdominal tumors. Its resonant area may be diminished by large tumors of the liver or spleen; and increased by pathological dilatation, such as may occur with stricture of the pylorus, or in old gastric catarrh. In the latter cases, the gastric tympanitic sound may extend as far down as the umbilicus, beyond the median line to the right, and beyond the axillary line to the left.

Percussion of the Intestines.—In health the percussion sound of the intestines, both great and small, is always tympanitic. In intensity and pitch it varies greatly with the constantly varying gaseous, liquid and solid matters they contain; but although a greater proportion of solids and a less of gases will partially deaden the sound, yet it never becomes absolutely dull, no matter how large the fecal accumulation. The descending colon, especially in the left iliac region, is the part most apt to be filled with excreta. The tympanitic sound of the large intestines is lower in pitch, as a rule, than that of the small. The sound is best developed when the abdominal muscles are relaxed. When there is a very large accumulation of gas in the intestines, with great tension, the percussion sound is lower in pitch, but less truly tympanitic. The same quality of sound is heard when the accumulation of gas takes place in the peritoneal sac (generally from perforation of the intestines). Although the latter condition, on account of the violence of its symptoms, is not apt to be confounded with the former, yet there is this difference in physical signs: the gas, being unrestrained, bubbles up between the liver and the abdominal surface, so as to cause the disappearance of the hepatic dulness on both sides of the median line, which is not the case in meteorism.

Percussion of Ascites.—If the whole abdomen is filled with fluid, the percussion sound is everywhere dull; unless, as frequently happens, coils of intestine float upon the surface of the fluid, when the sound will be, in such places, clear tympanitic on gentle percussion, but dull tympanitic on forcible percussion with firm pressure. If the fluid is only sufficient to fill the pelvic cavity, it cannot be detected by percussion. A very important point to be remembered in connection with the recognition of ascitic fluid is the change of percussion sound with the change of position. Obeying the laws of gravity, the fluid seeks the lowest parts. If the patient stand, it settles to the inferior part of the abdomen. If he lie on his right side, it settles to the right; if on his left side, it settles to the left. In whatever direction it sinks, we find dulness, and, at the same time, a clear tympanitic sound in the uppermost parts; so that in one position the right side is dull and the left tympanitic, and, on turning over, the left side is dull and the right tympanitic. A very slight accumulation of fluid, too little to give rise to fluctuation, may be detected in this way, by a slight change in the resonance of the flanks on change of

position. Even if there is such an excess of fluid that the whole of it cannot leave one side for the other on change of position, yet the dulness at the upper part is rendered less intense, although it may not become clear. The extreme dulness found in the lower part of the abdomen when the patient stands, clears up considerably when he lies on his back, owing to the equalization of the fluid. It will readily be seen that by percussion we have a tolerably accurate method of determining the level of the effusion. Ascites may often be complicated by œdema of the abdominal walls, when percussion becomes more difficult. The change in percussion sound on change of position is generally sufficient to distinguish ascites from ovarian dropsy. Sometimes these two conditions coexist, when, unless the tumor is very large, both can be detected; the ascites by percussing in different positions, and the tumor by palpation. If the peritoneal effusion is encysted, there will be no change in percussion sound on change of posture.

Percussion of the Kidneys.—It is impossible to mark out the outlines of the kidneys by percussion, on account of the non-resonant textures which almost surround them. The liver above the right kidney, the spleen above the left, the transverse processes of the vertebræ between, and the coverings of their fatty capsules and the thick layer of back muscles, produce an indistinguishable and continuous dulness. The only places where a contrast can be found are the lower halves of their external convex borders and their lower ends; and near them the tympanitic sound of the colon comes out with more or less distinctness, especially when the patient lies on his abdomen, allowing any fluid to sink away and the intestines to rise. For these reasons, in practice percussion is of little avail, and is almost never resorted to except in cases of floating kidney, and large tumors, such as hydronephrosis. In the former, where a kidney has left its moorings, the absolutely dull sound is sometimes, but not always, replaced by a dull tympanitic sound. In the latter the area of dulness is quite extended.

Percussion of the Bladder.—When empty, the bladder is not recognizable by percussion; but when tensely distended, it gives forth a very decided dull sound in the hypogastric region, which does not change with change of position, but which entirely disappears after the introduction of the catheter. It very rarely happens that a coil of intestine, getting between the bladder and the abdominal wall, adds a tympanitic quality to the dulness.

Percussion of the Uterus.—Like the bladder, the uterus is recognized by percussion only after it leaves the pelvis. Then, whether enlarged by pregnancy or by pathological causes, it is absolutely dull in all places, unless, as very rarely happens, a coil of intestine, getting over it, adds a tympanitic sound to the dulness. In

the flanks the intestinal tympanitic note is heard, which still remains as a contrast in different positions of the patient.

Percussion of Ovarian Tumor.—This resembles closely the percussion of the pregnant uterus. Dulness is found, or, more strictly, perfect flatness, over the whole growth, while the intestinal tympanitic resonance is heard generally in the flanks.

Auscultation of the Abdomen is of very little practical advantage, except to determine the life or death of the foetus in cases of pregnancy. Outside of this, the sounds heard have reference mostly to the gastro-intestinal canal, and although they add little to our information about diseases of this tract derived from other sources, yet it is well to be acquainted with them in order to avoid mistaking them, as beginners frequently do, for physical signs produced within the lungs or heart.

Auscultation of the Stomach and Intestines.—If repeated and quick pressure is made on the abdomen, a loud, ringing metallic splashing or gurgling sound is sometimes heard, even at a distance from the patient. This is caused by the agitation of the contained fluid and air, and resembles the Hippocratic succussion sound, or the shaking of a bottle half full of water. Such noises may also sometimes originate spontaneously, without pressure, but are more feeble. In diarrhoea or cholera they may be heard over the whole of the abdomen, and in typhoid fever in the ileo-cæcal region. Either pressure or the peristaltic action may cause them, or the contraction of the abdominal muscles. Borborygmi are rumbling noises caused by the rapid passage of gas through the intestines, forced by their peristaltic action. Everyone is familiar with them, often coming when the stomach and bowel are empty, in diarrhoea, or in simple flatulence. All of these sounds have been mistaken for lung or heart signs, but are distinguished by their irregularity, by their having no connection with inspiration or expiration, or with the systole or diastole, and by their continuance even when respiration is suspended. When the bowel is perforated, murmurs of a blowing amphoric character may be developed, but the accompanying violent symptoms will readily point to their cause.

Auscultation of the Pregnant Uterus.—If with the stethoscope we listen over the uterus during and after the fifth month of pregnancy, the most important and positive of all the signs of that condition—the foetal pulsation—is heard. A murmur called the uterine souffle is also heard, even earlier than the foetal pulsation. Still another sound some have professed to hear—the funic souffle—produced in the umbilical cord; but it is so very uncertain, and also so unimportant, even if heard, that no further mention of it will here be made.

Foetal Pulsation.—Strange as it may appear, the sounds of the

heart of the fœtus in utero have been heard only for the last sixty or seventy years. They are double, naturally very small and weak, resemble the ticking of a watch wrapped in a napkin, vary in frequency, but range from 120 to 160. The movements of the fœtus increase their rapidity, but the mother's pulse does not affect them. They can only be mistaken for the latter when the mother is feverish or excited; and even then the finger on the mother's wrist, or the increased intensity of the beats as the mother's heart is approached with the stethoscope, will solve the problem. The foetal pulsations are often hard to find, being heard only over a limited area, which varies with the position and presentation of the child. Its back transmits them best, and, therefore, they are best heard at that part of the mother's abdomen which corresponds to it. The frequent change of the position of the fœtus before the seventh month thus explains the frequent change of position of the foetal pulsation before that time. During the last three months the child generally lies with the head downwards and the back forwards and to the left, the back thus coming in contact with the parietes a little to the left of the median line. This then is the place of election, so to speak, there being here continuity of tissue. Elsewhere the amniotic fluid cuts off the sound. In the second cranial position the sound will be heard at the right of the median line. In either case it is about half-way between the umbilicus and the symphysis pubis. In the common breech presentations it is heard as high as, or higher than, the umbilicus. Some positions, like the dorso-posterior, or a large amount of amniotic fluid, increase the difficulty; but as a rule, in any position, if the foetal heart is not heard somewhere after the fifth month, it goes far to prove that there is no pregnancy, or that the fœtus is dead. It has been claimed that the sex of the fœtus in utero can be told by the frequency of the beats, being male if below 130 or 135, and female if above. Without doubt, in a considerable majority of cases the male pulsations are less frequent than the female, and this method may be of assistance to us; but like all instances when an "average" number enters into a computation, the particular case in hand may be an exception to the rule, or in the minority, and, therefore, too confident a prediction must not be made. When twins lie in the womb, one on the right and one on the left, as they usually do, two pulsations may be heard, which, if not synchronous, will establish the dual pregnancy. Where the pulsations of a single fœtus are heard in two places, it is said that the maximum of intensity lies between them, which is not the case with twins. These points, however, are much easier to discuss than to put into practice.

The Uterine Souffle.—As to the mode of production of this murmur (called also, among other names, the placental souffle), there are many theories which need not here concern us. It is maternal,

not foetal, being coincident with the mother's heart beat, and is heard after the sixteenth week, when the uterus is accessible to the stethoscope. It is not always constant, sometimes disappearing to return again in a short time, and is heard all over the abdomen, or limited to a small place, usually in the groin; in advanced pregnancy over the lower part of the uterus only, as a rule. It varies greatly in quality and pitch, resembling all kinds of cardiac murmurs. During a labor pain the sound first becomes louder, even musical, and then disappears at the height of the pain, reappearing in the same order inverted as the pain passes off. Its location affords no evidence of the situation of the placenta. Unlike most arterial sounds, it persists in every posture and has no impulse with it. Being heard also sometimes in connection with pathological uterine tumors, it must not be taken as a certain sign of pregnancy.

Auscultation of Abdominal Aneurism.—When the patient is lying down, a bellows murmur is almost always heard in front over the aneurism, and is almost invariably single, blowing (though sometimes musical), prolonged, post-systolic, and not transmitted into the vessel beyond. If the patient stands erect, the murmur is usually suspended. A sound without a murmur, usually double, is generally heard behind (rarely in front), at a point corresponding to the tumor. A murmur, resembling that of aneurism, may sometimes be produced by pressure with the stethoscope on the abdominal aorta, but this disappears when the pressure ceases. A non-aneurismal tumor may also by its pressure produce a murmur, but this will disappear when the hand and knee position is assumed, the weight of the tumor being thus removed.

PHYSICAL EXAMINATION OF THE URINE.

It would be out of place to attempt to give here anything like a full exposition of the methods and results of the physical, chemical and microscopical examination of the urine. Only such parts of it will be selected as have the most important bearing on the physical diagnosis of disease. In any case where the symptoms furnish the least suspicion of renal disease, the urine must be examined as a matter of course. Moreover, owing to the insidiousness of the approach of such troubles, and their frequent connection with other diseases which, having more marked symptoms, often mask their own, its examination is frequently called for, as a precautionary measure, when no kidney trouble is suspected, and the examiner is often rewarded for his care by a flood of light in a doubtful case. In such examinations, our inquiries should be particularly directed to the quantity of the urine, its color, reaction, specific gravity, the amount of its urea, urates,

phosphates and chlorides, and the presence of abnormal constituents, such as albumen, sugar, pus, blood, etc.

The **quantity** of urine passed in twenty-four hours varies in health between thirty and sixty ounces, or even more, according to the amount of fluid drank, the perspiration, etc., perhaps averaging about fifty ounces. When accuracy is required, the whole amount passed in twenty-four hours should be collected, measured and averaged for two or three successive days, as transient variations will usually equalize themselves in that time. Anything that raises the arterial tension, like cold or nervous excitement, will increase the flow. More is passed when one is awake than when asleep, and the very fact that one has to rise during sleep excites a suspicion of disease. It is not always safe to trust the statements of patients as to the quantity passed, and frequent micturition, being so much a matter of habit, cannot be taken as an index. The urine is persistently *increased* in diabetes mellitus and diabetes insipidus to three, four, or even eight times its proper bulk, and also somewhat in waxy and granular kidney. In the first there is sugar, in the second neither sugar nor albumen, in waxy kidney much albumen, and in granular kidney little albumen. Hysterical fits often end with a great flow of urine. The urine is *diminished* in all febrile affections, even when the patient is drinking freely and not sweating excessively; in the stage of failure of compensation in diseases of the heart, with low tension in the arteries and full veins; in acute nephritis; in granular kidney shortly before death; and in some nervous disorders.

In **color** normal urine varies from a very pale, almost imperceptible yellow to an amber or yellowish-red, according to the amount of pigment or the degree of concentration. In febrile diseases or in chronic affections, when the volume of urine is greatly diminished, the color becomes red or reddish-yellow. It is pale in granular kidney, anæmia, chlorosis, diabetes mellitus and insipidus, and after a fit of hysteria or asthma. The presence of bile gives to the urine various shades of brown or green. It may be detected by dropping a little impure nitric acid (containing nitrous acid) on some of the urine poured over a white plate, or soaked into a piece of white blotting paper; a series of beautiful rings of green, blue and violet will be formed when the two fluids meet. Blood in urine in small quantity gives it a smoky look, and in greater amount a blood-red or coffee color. If long diffused in it, it may give it even an inky blackness. The corpuscles can be recognized by the microscope. The constant use of carbolic acid or creasote may make the urine black. In melanotic cancer the urine, although of natural color when passed, may turn brown or black after long contact with the air, or on the addition of nitric acid.

In **reaction** fresh normal urine is generally acid, turning blue litmus paper red, but not affecting red litmus paper. After exposure to the

air for some time it becomes alkaline, owing to the decomposition of its urea and its conversion into carbonate of ammonia. Such urine has a strong ammoniacal smell, colors red litmus paper blue, and gives a white vapor of chloride of ammonium when a glass rod dipped in hydrochloric acid is held over it. The acidity of fresh urine is diminished by vegetable diet and by alkalis, but increased by a flesh or milk diet, by acids, by muscular exercise, by diabetes, and by febrile diseases, especially rheumatic fever. The urine is often alkaline in diseases of the stomach, in pyelitis or cystitis (when it is loaded with pus), and when it is inoculated inside the bladder by a dirty catheter. Urine which is alkaline when passed is always turbid from precipitation of the phosphates.

The **specific gravity** is most easily taken by means of the urinometer, and varies in health from 1015 to 1025, distilled water being 1000. If there is not enough urine to take the specific gravity in the usual way, it may be diluted with one, two or more volumes of water and the urinometer then used, the decimal figures thus found being multiplied by the number of times the urine has been diluted. The specific gravity, depending on the amount of solids excreted, to be of value, must necessarily be considered in connection with the quantity of urine passed. It is diminished by any cause which increases the flow of water, such as copious draughts, diuretics, etc.; and is increased by profuse perspiration, by long retention in the bladder, etc. These changes usually balance themselves in the twenty-four hours, and the whole amount passed in that time may be collected, mixed and tested. This, however, is not generally necessary. The fairest sample is that passed just before breakfast.

The specific gravity of the urine is somewhat increased in febrile diseases, owing chiefly to increased excretion of urea, and diminution of water. It here rarely exceeds 1030. It is also increased by the presence of albumen or blood, if the urea is normal in amount. The reason why albuminous urine is generally of low specific gravity is that with albuminuria the urea is often greatly deficient. If the density ranges persistently from 1030 to 1040, or 1050, or even higher, although the quantity of urine is increased, diabetes mellitus is indicated, and the sugar can be detected by chemical examination. In diabetes insipidus the density is naturally diminished, and it is often low in anæmia and hysteria. In contracted or amyloid kidney the specific gravity may fall to 1005. The most important solids of the urine are inorganic salts (the principal of which is common salt) and urea, the quantitative estimation of the latter being of the greatest importance, in view of the seriousness of its retention in the blood and causing uræmia. A rough estimate of the amount of solids in the urine can be obtained by multiplying the last two figures of the specific

gravity by 2. This will give the number of grains of solid matter to 1000 grains of urine.

The **amount of urea** in healthy urine varies considerably, but averages about 500 grains a day. It represents the waste product of the nitrogenous elements of the body and of the nitrogenous food taken into it, and is therefore increased by very active exercise and by animal diet. An exact quantitative analysis is not necessary for clinical purposes. Its amount may be roughly estimated by the addition of strong nitric acid to an equal amount of urine in a test-tube which is placed in cold water. If the urea is in excess, crystals of nitrate of urea readily make their appearance, but do not form in normal urine until it is concentrated by heat. The amount of concentration necessary to their formation therefore becomes a measure of the deficiency of urea. By a simple expedient, the crystals may be seen to form themselves under the microscope. One end of a thread being in a drop of urine on the slide and covered by a thin covering-glass, the other end is wet with nitric acid. If the urea is in excess, the hexagonal plates of its nitrate soon show themselves. Practically, however, the commonest and perhaps the easiest way to estimate the quantity of urea in the urine of persons for whom we fear uræmic poisoning, is to take the specific gravity of such urine, at the same time bearing in mind its quantity. A low specific gravity with a small quantity of urine indicates a deficiency of urea; but a low specific gravity, if the urine is more plentiful, or a high specific gravity with a small quantity of urine, need give us no apprehensions of uræmia. The specific gravity alone, therefore, is no guide; it must always be interpreted in the light of the quantity of the urine.

The **urates** are deposited as a sediment only after the urine has cooled, as they are soluble in water at the temperature of the body. Unlike the phosphates, therefore, they are redissolved when warmed, the muddy look clearing up. Their color is usually that of brick dust, although it may vary from white to red. When their bases are deficient, or the acid is in excess, the red, pepper-like particles of uric acid may be deposited. Although the deep and positive color of the incrustation of uric acid and the urates on the chamber vessel is apt to alarm many persons, yet they may not be connected with any disturbance of health whatever, coming on frequently after violent exercise or perspiration. They may result from errors in eating and drinking, or indicate local irritation of the kidneys or bladder. They are found in excess in heart and lung diseases, when oxidation of the blood is deficient, in organic diseases of the liver, in most febrile diseases, and sometimes in diabetes, chorea and certain skin diseases. They are deficient or absent in advanced kidney diseases, in lead poisoning, in general anæmia, in some exhausting non-febrile diseases, and in chronic gout. In acute gout they are at first diminished, but

reappear when the attack passes off. The liability to the formation of calculi must be remembered.

The **phosphates** of lime and triple phosphate are deposited when the urine becomes alkaline, and are readily redissolved by the addition of acid, but not by heat. They may cause turbidity in the fresh urine of persons working their brains unduly at the expense of their bodies, not on account of their excess, but because of the diminished acidity of the urine. They are deposited in acute and chronic brain troubles and towards the close of pleurisy, pneumonia and rheumatic fever. If the cause of the alkalinity of the urine which continually or frequently deposits them is soda or potash, a grave disorder is indicated, marked by debility, anæmia, and nervous dyspepsia, and representing an altered condition of blood and nutrition. If the carbonate of ammonia is the cause, lowered vitality from age, spinal injury or disease is indicated. Provided there be a nucleus for them to form on in the bladder, they readily and rapidly grow into calculi, sometimes of enormous size. Whenever the freshly voided urine contains them for a long period, calculi are to be feared.

The **chlorides** in the urine depend principally on the amount of salt eaten. In all acute febrile diseases, especially if accompanied by an exudation, as pneumonia, acute articular rheumatism, pleuritis, pericarditis, etc., the chlorides are diminished to a remarkable degree, or even are completely suppressed. In such cases their reappearance and steady increase indicates an amelioration of the disease. The usual test for the chlorides is the striking and beautiful precipitate by the nitrate of silver solution.

Albumen (sometimes spelled *-min*) is by far the most important of the abnormal constituents of the urine. Its presence in greater or less quantities is to be determined by the conjoined nitric acid and heat tests, which can be found fully explained in so many books, that their repetition here is not necessary. The student should keep constantly in mind, however, the fallacies incident to the employment of either test alone, and should invariably correct one by the other. Many more tests have been devised, some of which are more delicate, but these are the most common and convenient, and are very satisfactory.

For some time after Bright made his famous discovery, the whole profession regarded albuminuria as synonymous with Bright's disease; and even now the number of physicians who prognosticate life or death solely from the action of the contents of a test-tube with heat and nitric acid is surprisingly large. It is exceedingly important to have correct ideas on this subject. The fact ought to be strongly impressed on us that any considerable and persistent amount of albumen in the urine indicates either primary or secondary kidney trouble, and gives good cause for anxiety; and yet if we should condemn to death every patient whose urine is albuminous, we should commit the most egregious blunders. Not only may albuminuria exist without renal dis-

ease, but also even renal disease may exist (though rarely) without albuminuria. In one of the worst forms of all, the contracted or granular kidney, albumen is only fitfully present, and is often absent for long intervals.

If the urine contains pus or blood, it will be slightly albuminous. If a healthy person eat moderately of eggs or other largely albuminous articles of food, they will probably be perfectly digested; but if more be eaten than can be thoroughly assimilated, especially if this is the exclusive diet, albumen may temporarily appear in the urine. After very violent exercise or excitement (as with Weston after his famous long walk), a little albumen may appear in the urine of apparently healthy persons; but this will occur in a tolerably small proportion of cases. Albumen, however, is not properly a constituent of healthy urine even in small quantities, and some who have showed this symptom in apparent health, have afterwards succumbed to kidney disease. One of the best authorities, William Roberts, says that: "The pathological states in which albumen appears constantly or occasionally in the urine may be arranged in the following group: 1. Acute and chronic Bright's disease of the kidneys. 2. Pregnancy and the puerperal state. 3. Febrile and inflammatory diseases. (Zymotic diseases, such as scarlet fever, measles, small-pox, typhoid, cholera, yellow fever, ague, diphtheria, etc.; inflammatory diseases, such as pneumonia, peritonitis, traumatic fever, acute articular rheumatism, etc.). 4. Impediments to the circulation of the blood, causing venous congestion of the renal veins (as in emphysema, heart disease, abdominal tumors, cirrhosis, etc.). 5. A hydræmic or dissolved state of the blood and atony of the tissues (purpura, scurvy, pyæmia, hospital gangrene); also hæmaturia. 6. Saturnine intoxication. 7. Neurotic albuminuria (nervous disturbance)."

Thus it is seen that a great variety of conditions of the system may produce albuminuria. *If, however, the albumen is persistent, if it is found in large quantities (one-half of the test-tube and upwards, almost invariably indicating acute or chronic nephritis), if it is associated with other symptoms of kidney disease, and if other diseases which might cause it are absent, the conclusion of Bright's disease is irresistible.*

Sugar in the urine (as well as albumen) generally frightens the physician, and well it may in most cases. Still, it should be remembered that while it often heralds disaster, it does not always indicate the classical diabetes, so-called, which is so notoriously fatal. For it may sometimes (though not often) occur in the merest trace in apparently perfect health, especially if more sugar or starch is eaten than can be properly assimilated. It may sometimes also occur after the administration of chloroform, after paroxysms of whooping-cough, asthma or epilepsy, in recovery from cholera, in measles, pneumonia, erysipelas, and in some brain and spinal troubles. Thus, we see that glycosuria is not always diabetes. Further, diabetes is not invariably (although

it is too often) the hopeless disease with persistent and intense glycosuria, and greatly increased flow of urine, with thirst, debility, emaciation, etc. "There are," Roberts says, "less serious types in which sugar is present in the urine, sometimes abundantly, sometimes scantily, sometimes persistently, sometimes intermittently, always with a weakly condition of health, but without thirst or conspicuous emaciation, often indeed with corpulence; without any or only slight increase in the quantity of urine, and without that fixed tendency to death, which stamps the other cases; occurring also generally in advanced years, or at least beyond the time of early manhood."

Diabetic urine, as already stated, has a high specific gravity, notwithstanding that it is generally passed in great quantity; it quickly ferments, develops torulæ, and rotates the plane of polarization to the right. Of the many tests for detecting sugar, the best is that of Trommer, with sulphate of copper and liquor potassæ, which is in constant use among physicians.

Blood in the urine can usually be recognized by the naked eye, by its smoky, pink, red, brown or black color, and its globules can be seen under the microscope. It may be furnished in greatly varying quantities by any part of the urinary tract from the kidney downwards, and looks more natural the lower down its origin. When it comes from the urethra from local inflammation or rupture of vessels, it is not apt to be passed directly with the urine, or is not intimately mixed with it, and comes pure in somewhat large quantities. When it comes from the bladder, also, from inflammation, ulceration, malignant disease or stone, or fevers of a low type, it is not very intimately mixed, if in large quantities, being mostly in clots, and soon separates on standing; or it does not pass until near the end of micturition. When it comes from the ureters, as, for instance, from calculi, long, thread-like coagula are passed, looking something like lumbricoid worms, and causing colic during their passage through the ureters. These casts may also be formed in the ureters from a copious renal hæmorrhage. When it comes from the kidneys, and does not thus coagulate, it is intimately mixed with the urine, and does not very readily precipitate; after awhile, however, more or less of a coffee-ground sediment appearing. When coming from the kidney, it may indicate either injury from a blow or strain, congestion, inflammation, cancer, calculi, hydatid disease, nephritic colic or pyelitis. Blood-casts of the uriferous tubes are frequently seen under the microscope. Hæmorrhage from the kidney is particularly characteristic of the advanced stage of the contracted or cirrhotic kidney. It may also come from large doses of turpentine and cantharides, from purpura hæmorrhagica, scurvy and small-pox, scarlet fever, and other eruptive or continued fevers. When there is blood in the urine, its albumen can be recognized by the usual tests. Sometimes the coloring matter alone (hæmatin, hæmaglobin) is found (and may be detected by the spectroscope or

guaiacum test), the corpuscles having undergone disintegration, as in paroxysmal hæmaturia.

Mucus in healthy urine exists in mere traces, and imparts a slight cloudiness after standing for awhile. It is derived mostly from the urethra, and in women also from the vagina, and often contains epithelium. In catarrh of the bladder it is found in abundance as a viscid stringy cloud, floating about for a long time, and finally settling to the bottom. This rapidly promotes the decomposition of urea, and the urine consequently becoming ammoniacal, deposits phosphates, and still further irritates the mucous membrane. Other parts of the uro-pœtic system, even up to the kidney, may be involved, as well as the bladder, in a local trouble, or the increased quantity of mucus may be due to typhus, pneumonia, etc.

Pus in the urine makes it turbid, and after awhile settles as a whitish deposit. If the urine is not ammoniacal enough to destroy them, the pus-corpuscles may be seen with the microscope. Ammoniacal urine, or that to which an alkali has been added, makes the purulent deposit gelatinous or stringy. Pus in urine always causes it to be somewhat albuminous. If the pus can be squeezed out of the urethra without urination, it comes from the urethral canal. If it comes from the inflamed bladder, or vagina, or prostate gland, or ureters, there are generally other symptoms enough to indicate its source. In most cases, when it comes from the kidney, the disease is pyelitis resulting from renal calculi, and is accompanied by attacks of colic. It may sometimes come from abscess of the kidney, and then appears in the urine suddenly.

Casts of the uriniferous tubes are exceedingly important from a diagnostic point of view. They are to be sought for with a microscope magnifying about 300 diameters or less, in the sediment or in the lower layers of a considerable quantity of urine, which has been allowed to stand for some hours. Several examinations should be made before concluding that they are absent. A few years ago, even after the modification of the common views at first entertained as to the universally dangerous import of albuminuria, casts were considered as invariably the precursors of death. Although, in the light of further experience, such extreme views are not tenable, yet it must be admitted that in the great majority of cases in which they are apt to be looked for, they indicate a very serious and possibly, if not probably, fatal disease. When they are found, before we are too confident as to their significance, frequent examinations at intervals should be made. They not only give us valuable information as to the existence of kidney disease, but also as to its kind and stage. Where two or more varieties of casts are seen in the same specimen of urine, as is frequently the case, the determination of their significance is facilitated by noticing carefully which variety preponderates. No one variety indicates exclusively any particular disease. The number of casts is not always

to be relied on as an index. In chronic nephritis, to be sure, they are apt to be proportionate to the severity and stage of the disease; but in granular kidney they may be very few, and, on the other hand, in the convalescence from acute nephritis they may be quite numerous.

The most common varieties of casts are epithelial, granular, hyaline or waxy, fatty, bloody and purulent. *Epithelial* casts are found more particularly in the early stage of acute desquamative nephritis. *Granular* casts differ much in their nature and significance. They oftenest indicate chronic nephritis, the granulations coming from disintegrated epithelium. In granular or contracted kidney they are large, dark and coarse. When coexisting with blood-casts, with broken-down corpuscles, or with fatty casts resulting from the degeneration of inflammatory products, they may indicate approaching recovery from acute nephritis. *Hyaline* casts, which, on account of their transparency, sometimes escape detection, are found more frequently than the other varieties, and may occur in all forms of Bright's disease, acute as well as chronic, but particularly in the amyloid or waxy kidney. Cutting off a part of the light from the object-glass, or staining with carmine will render them more visible. When $\frac{1}{8}$ of an inch in diameter, they are called large, and when $\frac{1}{16}$, small. The large mean more mischief than the small, being formed in tubules denuded of their epithelium, or dilated by intertubular contraction, and, as a rule, chiefly occur in chronic nephritis. Very exceptionally they are found in acute cases. Small hyaline casts occur in both the acute and chronic forms, and therefore their interpretation should be in the light of the history of the case, etc. They are sometimes found in cases of simple congestion of the kidney, and in diabetes, jaundice, and diphtheria. *Fatty* casts, studded with oil-globules, must be interpreted with much caution in the light of other facts, occurring, as they do, in such various conditions. If abundant and full of oil-drops, they denote fatty degeneration, and are, of course, of the gravest import; but they may also be found in the later stages of acute nephritis during convalescence. Hyaline or granular casts frequently contain oil-globules. *Blood-casts*, made up mostly of blood-corpuscles, or else having the latter adherent, especially characterize the early stage of acute desquamative nephritis. They result from intense arterial hyperæmia or venous congestion. *Purulent* casts are rare, and indicate the bursting of a renal abscess.

Hyaline casts have sometimes been found in non-albuminous urine; and on the other hand, kidney disease may exist (although it must be very rare), without casts. A few casts may occasionally be found in heart disease, fevers, or in any condition which may cause sufficient congestion of the kidneys to make the urine albuminous, and it is not an unheard-of thing to find a cast now and then in the urine of a person in health. Still, on the whole, it is not strange that physicians in general look with considerable trepidation on casts in the urine of their patients.

DISEASES OF THE RESPIRATORY ORGANS.

A. DISEASES OF THE NASAL CAVITY.

BY LUCIUS D. MORSE, M.D.

ACUTE CATARRH OR CORYZA.

Synonyms.—(Greek) *καταρροος*; (Latin) *Catarrhus nasalis*, *Stillicidium narium*; (Scientific) *Gravedo*, *Rhinitis*, *Blennorrhœa nasalis*; (French) *Catarrhe nasal*, *Rhume de cerveau*, *Enchiffrement*; (German) *Schnupfen*; (Italian) *Catarro*; (Vulgar) in old English, *Pose* or *mur*, whence *murrin* or *murrain*; modern English, *running at the nose*, *cold in the head*, *snuffles*, etc.

Definition.—An acute inflammation of the pituitary membrane, attended by an increase of the habitual secretion, which is more or less changed in character.

The term *catarrh* is derived from the Greek words *κατα*, down or downwards, and *ρῆω*, I flow, and is applied to a discharge of fluid from any mucous membrane.

In America and England, the tendency of medical authors is to restrict its use to inflammation of the air-passages alone; while the French extend it to that of all mucous membranes, attended by increase in the habitual secretion.

In the word *catarrh* are embalmed the notions of the old pathologists who regarded *catarrhs* as a flux of humors, which, falling down from the head, escaped through the mucous membranes. Popularly, but, as we have seen, without precision, the term *catarrh* is applied, unqualifiedly, to an inflammation of the membrane lining the nose. If the word *nasal*, however, be prefixed, we have in *nasal catarrh* a perfectly unambiguous expression.

The word *coryza*, from the Greek *κορυς*, the head, and *ζεω*, to boil, taking cognizance of that peculiar boiling, stewing sensation in the nose and frontal regions with which many victims of the complaint under discussion are painfully familiar, has been preferred by some writers to the terms just mentioned.

On the score of exclusiveness and restricted application, the choice is, perhaps, a good one; but, certainly nothing is gained when it comes to etymological signification.

In a *brochure* on *catarrhal affections of the nose*, published some years ago, the writer restricted his employment of the word *coryza* to acute cases, or those which would fall under the popular designation of

"cold in the head." This nomenclature has its advantages, and is certainly justified by the derivation of the word. We shall adhere to it in this article, understanding, of course, that coryza may supervene at any time in the progress of a chronic catarrh.

History.—Catarrhal affections can claim an antiquity as great as that of the human race itself; indeed, they were coëval with the first mucous membrane. Most other diseases are *parvenu* by the side of these great, original ailments, planted, as it were, in the very nature of the tissues which they affect.

The old pathologists thought that the discharge in catarrh came from the brain, and they actually named a glandlike body occupying the *sella turcica* of the sphenoid bone the pituitary gland, believing that it was responsible, in a great measure, for the deluging defluxions which poured from the nose. It was not until the middle of the seventeenth century that Schneider exposed the fallacies of the old doctrine, and cleared the subject of much of the doubt and uncertainty which had hitherto shrouded it.

Catarrh figures quite extensively in the medical works of a few generations ago, but it is, usually, considered in a general way, much stress being laid upon the constitutional symptoms, and very little upon the local phenomena manifested.

Ætiology.—The causes of acute nasal catarrh are innumerable. Some children are even born with coryza, and many develop it in the first hours of post-natal life.

The mucous membrane of the nose is, in the very nature of things, more exposed to external influences than any other similar tissue of the body. It seems to be correspondingly more liable to disease. Sudden changes of temperature, either from hot to cold, or the reverse; inhalations of dust and of irritating vapors, as in manufactories and laboratories; sudden arrest of the perspiration by exposure to a draft; and getting the feet wet, may be mentioned among the most frequent causes. Many persons are so constituted that going with cold, damp feet, for even a few minutes, will originate a vigorous coryza. Others can never stand at an open window, or go bareheaded to the street-door through a cold breezy hall, without suffering an acute attack of catarrh.

There is good reason to believe that the suppression of chronic eruptions by means of washes and salves is also, frequently, productive of catarrhal troubles. The eruptive fevers—small-pox, scarlet-fever, and, notably, measles—are frequently attended by inflammation of the various mucous membranes, producing, now and then, aggravated catarrhal affections of the stomach, throat, nose, and ears. Often, too, the origin of a catarrh must be sought for in remote organs of the body. Perhaps, the great emunctories, the skin, the liver, or the kidneys, fail to perform their functions properly, leaving effete matter to

be thrown out through the mucous membranes, thus giving rise to persistent defluxions.

Full, or even medium, doses of mercury, arsenic, potassium, and iodine, will, very often, occasion severe and persistent discharges from throat and nose.

There are strong grounds, likewise, for believing that malaria is also one of the active predisposing causes of catarrhal affections. It exercises a powerful influence upon many constitutions, bringing about, not infrequently, organic changes in various organs of the body, and stimulating the mucous membranes to abnormal secretion.

It has been claimed that simple catarrh, or coryza, is contagious; but efforts which have been made to originate an acute coryza in a healthy person by applying the morbid products of catarrhal inflammation to an unaffected pituitary membrane, have notably failed. The adherents of the infection-theory point to the fact that the products of catarrhal inflammation in mucous membranes, other than the pituitary, especially that of the genital organs, are highly contagious.

The artificial surroundings of modern civilized life are, doubtless, in their general action predisposing of catarrhal affections.

Anatomy and Pathology.—The anterior nares communicate directly with the nasal fossæ, two irregular cavities situated in the middle line of the face, extending from the base of the cranium to the roof of the mouth, and separated from each other by a thin vertical partition called the septum. They communicate with the pharynx, or upper part of the throat, by two large apertures, the posterior nares. The internal structure of the nose is exceedingly delicate. Each fossa is supplied with three lamellæ of bone, curved and twisted, known, technically, as the turbinated bones. These twisted plates, with their two sides free and covered with delicate mucous membrane, add vastly to the area of surface contained in the two nasal cavities.

At the upper part of the nasal fossæ the membrane is very thick, soft, spongy, and vascular, and is supplied with numerous mucous follicles, which exude a secretion by which the surface is protected and kept in a moist and sensitive condition. It is only this portion of the mucous membrane which is supplied with filaments of the olfactory nerve, and which is capable of receiving the impressions of smell. It is designated specially as the olfactory membrane. Elsewhere, the nasal passages are lined with a mucous membrane which is less vascular and spongy in structure, and which is called the Schneiderian, or pituitary, membrane.

Four sinuses communicate with the nasal fossæ, viz.: the frontal, sphenoidal, maxillary, and ethmoidal.

These cavities are lined with mucous membrane, continuous and identical with that of the pituitary, and, we may add, are frequently affected, likewise, with catarrhal inflammation.

What are the pathological changes which take place during an attack of coryza or acute catarrh? The pituitary membrane shows symptoms of congestion and incipient inflammation, with well-marked dryness; then, swelling takes place, and the hydrostatic pressure in the parts renders the dilated capillaries unable to perform their functions; the serum of the blood exudes through the distended capillary walls and adds to the swelling of the adjacent tissues. The epithelial cells of the distended membrane become infiltrated and undergo a series of changes; they take on a distended globular form, entangling granulations of mucin; they are then thrown off, and constitute with mucous globules and half-formed epithelium the semi-transparent, gelatinous, bluish-gray discharge. Corpuscles of pus are usually mixed with this mucus, and give it, according to their number, a more or less opaque, yellowish color.

Examination of the nasal cavities, by means of the speculum, shows a remarkable thickening of the soft tissues which cover the inferior turbinated bone, so that not infrequently it rests upon the floor of the cavity, at the same time pressing heavily upon the septum. The membranes are spongy and usually coated with the catarrhal discharge. Owing to the swollen condition of the adjacent parts, the middle turbinated bone is frequently hidden entirely from view, while, at other times, only the extreme anterior end is visible.

With the rhinoscope great changes can be detected at the posterior nares. The turbinated bones are seen to be hypertrophied—sometimes their convolutions are entirely obliterated—of a grayish color, not infrequently tinged with red. The lining of the post-nasal cavity is usually in the same inflamed and swollen condition.

As the inflammation gradually subsides, the swelling decreases; the discharge becomes thicker and more pus-like. This continues for a short time after resolution has been well established; it then gradually assumes a lighter color, becomes more gelatinous and less copious, to finally disappear entirely in cases which terminate favorably. The average duration of such an attack is from ten to twelve days.

Symptomatology.—An acute catarrh or coryza is ushered in by feelings of dryness and fulness in the nose. This fulness spreads upward to the forehead, producing a dull, frontal headache. Irritation of the mucous membrane now manifests itself. There are itching and tingling sensations in the nose, frequently attended by spells of sneezing. The tumefaction often becomes so great that the nose is hermetically sealed (stenosis) on one or both sides, obliging the patient to breathe in whole or in part through the mouth, and giving rise to the familiar nasal twang of speech. Rigors and slight fever, with loss of appetite, not infrequently accompany the symptoms described, the

severity of the constitutional disturbances varying with the intensity of the local inflammation.

Owing to the stoppage of the nose, the sense of smell is more or less completely lost, and sympathizing with this condition, the gustatory sense likewise becomes obtuse. Many patients complain, consequently, that everything tastes alike to them. The first stage of dryness, irritation and tumefaction of the nasal cavities is of short duration.

The second stage is attended by a more or less free discharge of thin, serous, acrid fluid which frequently irritates, by contact, the nostrils and the lip over which it flows.

The patient is tormented by the constant "dripping," and has frequent recourse to blowing of the nose, which often aggravates the general condition of malaise, and produces a discharge of blood from the inflamed and sensitive membranes.

The discharge of mucus undoubtedly proceeds from the entire pituitary membrane, and not from the glands, as was taught by the older pathologists. The quantity is sometimes astonishing; but it must be remembered that the secreting surface is much more extensive than appears at first thought, owing to the height of the nasal cavity, of the adjacent sinuses, and to the extensive convolutions of the turbinated bones.

The frontal headache of catarrh is occasioned by the swelling and turgescence of the pituitary membrane lining the frontal sinus, the ethmoid and the sphenoid cavities, which closes the openings into the nasal cavity, and thus, penning up the secretions, produces pressure upon the nerves, and consequently pain. Sometimes an excruciating neuralgia supervenes, which tortures the patient almost beyond the point of endurance. Occasionally, too, the inflammation spreads from the post-nasal cavity into the Eustachian tubes, producing hardness of hearing and very disagreeable sensations in the ears. The eyes frequently sympathize with the general irritation, and become red and watery, the patient complaining of burning and stinging sensations in them.

As the case progresses, the discharge from the nose becomes thicker and less copious, the secretions frequently dry up in the nasal cavities, producing large crusts which are often dislodged with considerable difficulty. Sometimes the discharge at this period is of a greenish color and exceedingly offensive, through long retention in the nose.

The "snuffles," or coryza of infancy, is a complaint which now and then becomes exceedingly threatening to the welfare of young and delicate infants. Owing to the swelling in the narrow nasal fossæ, these passages become hermetically sealed, so that the child is compelled to breathe entirely through the mouth. In such cases a feeling of suffocation causes the little sufferer to relinquish the breast or the nursing-bottle with cries of distress, almost as soon as it has been

placed to its mouth. The nurse often attributes this action to soreness of the throat and difficulty of swallowing, when the seat of the trouble is entirely in the nose. If this condition is not soon relieved, the child, although hungry and eager to nurse, will become discouraged by its frequent but ineffectual attempts to secure nourishment, and begin to manifest a growing irritability and petulancy. Flesh and strength disappear rapidly under such circumstances, and instances of a fatal termination have been recorded.

Diagnosis and Prognosis.—The phenomena attending acute catarrh or coryza are so pronounced and unmistakable, when the affection has become well established, that there is little chance of either the patient or the physician committing an error regarding the nature of the trouble.

A recognition of the complaint in its earliest stages may be, at times, somewhat difficult; but usually, the swollen appearance of the face, the heaviness of the eyes, the already developing huskiness of voice, and the nasal twang of speech, with the accompanying lassitude and general feeling of discomfort, leave no room for doubt.

Usually speaking, this complaint is attended with very little danger. In very severe cases, however, particularly when improperly managed, or aggravated by repeated applications of cold, it sometimes passes into a pneumonia attended by grave symptoms.

It must be allowed, too, that, in cases where the Eustachian tubes have become affected, the danger to the hearing apparatus is often considerable.

Instances of catarrhal ophthalmia, occasioned by extension of the morbid process from the nasal cavities to the eyes, are of frequent occurrence. It is to be remembered, likewise, that repeated attacks of acute catarrh predispose the patient to chronic disease of the parts affected, and that the prognosis becomes more serious with each recurring attack.

Preventive Treatment.—The susceptibility of some persons to colds must be overcome by building-up their general health and by paying close attention to their dress. The latter should be warm (woollen is preferable, except in hot weather) to protect the body and to secure an equal circulation. Each individual must be a law unto himself. What would prove too much covering for one person would not be sufficient for another. However, a moderate excess of clothing is far from being as objectionable as a deficiency, especially in case of the old and feeble. Let the exercise be vigorous enough to keep up a good circulation and a pleasant feeling of warmth.

The feet, by all means, should be kept warm and dry. When mud and slush are to be encountered, gum overshoes should always be worn. The neck should not be bundled up with "comfort" or fur collar, which induce perspiration, almost certain to be checked when

the wrapping is thrown off upon entering a room, thereby opening the way for the induction of cold.

A morning sponge-bath in cold water, followed by vigorous rubbing, is an excellent means of invigorating the circulation, and rendering the body less susceptible to the influence of the cold air during the day. If the full sponge-bath proves too severe, and the system does not react well, the half sponge-bath, from the neck to the waist, may be substituted,—always followed by vigorous rubbing. The sleeping-room should be well ventilated, with studious exclusion of drafts of air. An open grate with a little fire makes a superb ventilation.

Persons who are susceptible to cold need to watch carefully the digestive functions; indigestion greatly increases the liability to take cold. A nourishing and generous diet is always to be recommended, but overloading the stomach should be scrupulously avoided.

Homœopathic remedies frequently aid in breaking up a constitutional tendency to take cold, especially when supported by a faithful compliance with the hygienic recommendations made. We append the indications for a few sterling remedies in the way of prophylaxis.

Alumina.—This remedy is of particular efficacy in case of old people who take cold from the least exposure to a draft of cold air. Such patients are frequently afflicted with obstinate constipation.

Calcarea carb.—Useful in persons of leucophlegmatic temperament, who are liable to take cold at every change in the weather. Especially indicated in case of teething children, who are subject to colds in the head, attended by oppressed breathing. Infants who do not assimilate their food well, and have swelling of the glands of the neck; adults who suffer much from cold, damp feet.

Nux vomica.—Useful in overcoming extreme susceptibility to cold in persons who are subject to frontal headaches and attacks of vertigo, occasioned by deranged stomach. Likewise, in persons whose catarrhal attacks are fluent during the day and dry at night; the symptoms are worse in the morning, and the patients are troubled with constipation. Always useful where the patient has taken freely of so-called tonics, or has employed drastic medicines.

Pulsatilla should be considered in case of persons of a mild disposition and phlegmatic constitution. It is especially indicated as a prophylactic of taking cold where the catarrhal attacks are attended with pronounced derangement of the digestive functions; also when the eyes and ears are prominently affected.

Sulphur.—Suitable in persons who suffer from an unhealthy condition of the skin, shown by roughness, cracking or a scaling of the cuticle, chilblains, nettle-rash, etc.; often, in cases where Sulphur will prove of service, there is an herpetic saddle across the nose, or the patient complains of a congested condition of the nose, with a tendency to bleed.

Curative Treatment.—Our ingenious brethren of the old school admit that a coryza or acute catarrh, which has been thoroughly established, must run its course. With homœopathic treatment, however, such cases may be cut short and their severity greatly ameliorated at any stage. At the very outset of an acute catarrh or coryza, while the chilling depression and languor, which are generally the precursors of cold, are still present, CAMPHOR is the remedy, *par excellence*, and will often abort the whole trouble. From one to three drops of the strong

tincture, according to age, should be given on a lump of sugar, every quarter of an hour until reaction sets in and the patient experiences a comfortable degree of warmth. If, however, this preliminary stage has already passed, Camphor affords no help, and the selection of some other remedy must be made.

Aconite.—Feverishness, swelling and congestion of the Schneiderian membrane; a painful sensation of heat and smarting is felt in the affected parts; short, dry cough from tickling in the larynx; later, profuse lachrymation; eyes feel as if full of sand. Attacks experienced in dry, cold weather.

Allium cepa.—Lachrymation, profuse watery discharge from the nose, with sneezing; acrid, burning discharge, excoriating the upper lip; cough when inhaling cold air; great irritation and tickling in the larynx; dull headache, worse in the evening, better in the open air.

Arsenicum.—Great chilliness and prostration, patient wants to be by the fire all the time; stoppage of the nose, with a copious discharge of acrid watery mucus, accompanied by burning of the nose internally and externally; intense thirst, drinking little and often; restlessness at night; catarrh complicated with asthmatic dyspnoea.

Calcarea carb.—Useful in the *gravedo neonatorum* or coryza of young infants, especially in cases where the leucophlegmatic temperament is pronounced; flabby and ill-nourished children with large heads.

Chamomilla.—Acrid coryza, from checked perspiration; chapped lips with redness of the nostrils, and excoriation or soreness under the nose; chilliness with feverish heat; hoarseness and cough, with rattling of mucus in the chest; snuffles of infants; children very irritable, want to be carried all the time.

Euphrasia.—Excessive discharge of watery mucus from the nose; confusion in the head, with redness of the eyes and eyelids, and copious secretion of burning tears; photophobia; profuse fluent coryza, with cough and expectoration only in the morning; eruptions in the wings of the nose.

Gelsemium.—Bland, watery discharge from the nose, with tingling in the nasal passages; incipient cold with chills; undeveloped or suppressed catarrh; fever without thirst; soreness in the throat and chest. Epidemic influenzas, with some fever. Liability to take cold with every change in the weather.

Hepar sulphur.—Swelling of the nose, which is painful like a boil. Nasal discharge is thick and pus-like, sometimes tinged with blood. Catarrh confined to one nostril. Every exposure to cold causes a fresh attack. Roughness and scraping in the throat. Hoarse, croupy cough with loose, choking phlegm. Headache, aggravated by the slightest motion.

Hydrastis canadensis.—The remedy for fluent coryza with free watery discharge from the posterior nares and post-nasal cavity into the throat; useful in cases where *Sanguinaria* seems indicated, but fails to relieve.

Pulsatilla.—Thick yellow or greenish mucus from the nose; mucus mixed with clots of blood; sneezing; loss of taste and smell; chilly feelings toward evening. Patient wants to be in the open air, feels worse in a warm room; loose cough, with expectoration of yellow phlegm. Persons of mild, tearful disposition, especially women.

Kali bichr.—Fluent coryza with swelling of the nose and nostrils, and discharge of tough, stringy mucus. Pressure at the root of the nose; closing stage of catarrh, when there is discharge of tough elastic plugs from the nose, with headache, alternating with fluent coryza; cough, with expectoration of tough phlegm, which can be drawn into long strings; derangement of digestion.

Kali hydriod.—Fluent coryza with very copious discharge from the nose, at first very thin, watery, and scalding, then thicker; frontal pressure and headache with lachrymation more or less profuse, and sometimes irritation of the throat; red nose.

Mercurius viv.—Profuse discharge with excoriation, swelling or redness of the nose; night-sweats, with feverish heat; chronic inflammation of the throat and tonsils; aphthae; fetid odor from the mouth; pyalism; catarrh with salty-tasting expectoration or with mucous diarrhoea.

Nux vomica.—Fluent coryza in the daytime, with stoppage of the nose at night. Heat in the head and face, with creeping chills, even when seated by the fire; inflammation in the frontal cavities, with severe headache; excessive itching in the

nose, with expulsion of bloody mucus. Dry coryza of infants. Catarrhal headaches; constipation with urging to stool; symptoms worse in the morning.

Sambucus nigra.—Suffocative catarrh of infants; nose obstructed by a thick mucus; child can hardly nurse, and starts frequently from sleep; hoarseness, with much tough phlegm in the larynx; attacks of suffocative coughs in children, worse after midnight.

Sanguinaria.—Profuse watery coryza; the nose continually dripping, attended often by spasms of sneezing, with sensations of painful rawness; stinging and excoriation in the nasal passages and throat.

Sticta pulmon.—Severe coryza; sneezing, headache, and conjunctivitis, with burning in the eyes. Primary discharge a hot, irritating, watery mucus, which often changes to a thick, greenish or bloody matter. Dryness of the throat with painful deglutition; aggravation at night.

Sulphur.—Coryza with discharge of clear water in the open air, and obstruction in the room; loss of taste and smell; red blotches on the face; dry scabs in the nose, with tendency to bleeding when they are removed; lips dry and cracked, with excoriation of upper lip, and herpes at the corners of the mouth. Extreme liability to take cold.

Remedies to be Consulted.—Consider also the following remedies, with especial reference to complications: Bell., Merc. jod., Phytolacca, when the throat is prominently affected. Graph. when the inflammation extends into the Eustachian tubes. Argentum nitricum, Euphrasia, Bell., Ignatia, if the eyes are prominently affected. Plant-major, should there be severe toothache with the catarrhal trouble. Bell., Phos., Spongia, in case the larynx is involved.

In cases of acute catarrh refer also to *Æsculus hip.*, *Ammonia*, *Cimicifuga*, *Dulcamara*, *Ipecac.*, *Lachesis*, *Lycopodium*, *Natrum mur.*, *Rumex*.

CHRONIC CATARRH.

Synonyms.—*Rhinangia*, *Chronic rhinorrhœa*, *Coryza chronica*, *Ozæna benigna*; (German) *Stockschnupfen*; (French) *Catarrhe nasal chronique*.

Definition.—A chronic inflammation of the Schneiderian membrane with increase or decrease in the habitual secretions, accompanied, likewise, by changes in their normal physical characteristics. It is nearly always attended by hypertrophy of the mucous tissues in the nasal fossæ and narrowing, with more or less obstruction, in the nasal passages. When the obstruction is pronounced, it gives rise to the well-known nasal speech.

Ætiology.—Repeated attacks of acute catarrh weaken the mucous membrane and render it liable to chronic inflammation, especially in a changeable climate. The inhalation of the dust-laden atmosphere of many manufactories is powerfully conducive to chronic catarrh, as is also the breathing of the vitiated atmosphere of badly ventilated rooms. The heating of houses by means of furnaces, instead of open grates or stoves, has frequently produced nasal, laryngeal and bronchial troubles in those who were previously exempt. The excessive use of stimulants and tobacco, also a rich and highly seasoned dietary, are responsible for many obstinate catarrhal cases. Venereal excesses

and dissipation, in general, add to the number. Indeed, the luxuries and vices of modern civilized life are, in the end, responsible for the vast increase in the number of those afflicted with the complaint in question. Among our forefathers, with their simpler ways, chronic nasal catarrh was little known.

It must not be forgotten that in a great many instances the catarrhal trouble is purely symptomatic, being occasioned by disturbance in some of the great vital organs, or occurring as one of the exponents of a deranged and vitiated condition of the system generally; syphilitic and scrofulous taints, often, exhibit their activity in connection with nasal troubles, especially in children.

Pathology.—An examination of the posterior nares and vault of the pharynx, by means of the mouth mirror, shows these parts deeply reddened in spots, and covered with the products of catarrhal inflammation which is frequently hardened and inspissated. A microscopic examination of epithelial cells from the inflamed surface reveals a notable absence of cilia. This is significant, showing that degenerative changes in the membrane are so rapid as to prevent a healthy organization and development of the tissues.

Inspection of the nasal cavities anteriorly exhibits the covering of the turbinated bones thickened and congested. Not infrequently it is discovered that there is perforation of the cartilaginous septum of the nose, caused by the patient's persistent efforts to clear from the walls of the partition the dry scabs and scales which as persistently reform. Usually, the nasal floor is found to be in a healthy condition.

Symptoms.—An acute catarrh or coryza may become chronic, in any stage of its progress, and continue so for an indefinite period. This is a point which the practitioner must bear in mind. A great majority of cases of chronic catarrh, however, manifest the symptoms which are found in the second and third stages of the acute variety. The discharge is generally quite thick and yellowish, though sometimes the color is greenish. In some cases the secretion will be free for a few days, followed by a period of dryness, when plugs and scabs are formed in the nasal cavities, their expulsion requiring considerable exertion. Dull, frontal headache is often present, and the patient's bowels are generally constipated, though sometimes the reverse condition obtains. Dizziness is a frequent symptom, and sneezing, especially in the morning, is complained of bitterly by some patients, while in others this form of irritation is entirely absent. There is, in many cases, great dryness of the nostrils—the secretion seeming to form far back in the nasal fossæ; especially does this occur in instances where the catarrhal inflammation has invaded the vault of the pharynx, giving rise to the highly unpleasant symptom of mucus dropping down into the throat. In such cases patients often suffer with sick stomach, caused by the tenacious discharge sticking in the

pharynx and bringing about retching and vomiting through mechanical irritation. Sleep is often disturbed by the mucus dropping into the throat and causing a choking sensation. The clearing out of the nares, every morning, by blowing of the nose, hawking and coughing, is a task of considerable magnitude. If the calibre of the nose is large, a considerable amount of swelling will be tolerated without giving rise to nasal speech. Occasionally, patients are tormented by a sensation of pungent smell in the nose, disagreeable or otherwise. This is a pretty sure sign of sharp irritation in the olfactory portion of the Schneiderian membrane. Often, these smells are experienced by patients whose olfactory sense is very much blunted.

Complications.—Sometimes, in acute and, likewise, in chronic catarrh, the inflammation spreads from the throat along the Eustachian tubes into the middle ear, producing much pain and discomfort, and now and then interfering materially with the sense of hearing. In fact, throat deafness is far more common than the uninformed would suspect.

The same tendency to spread, which carries the inflammation into the Eustachian tubes and thence into the middle ear, often causes an invasion of the lachrymal ducts and inflammation of the eyes. As we have seen, the frontal and maxillary sinuses are often involved.

It has already been remarked that the post-nasal cavity is, frequently, affected, and as we have many times observed in practice, the morbid action frequently abandons the nose to locate itself in the vault of the pharynx, whence it is likely to spread, leisurely, downward. There is some authority for believing that chronic nasal catarrh predisposes to frequent attacks of erysipelas of the face in those who incline to this species of inflammation.

Diagnosis.—A careful inspection of the nose should be made before pronouncing upon a case. Use the speculum and mouth mirror having previously cleaned out the pharyngeal vault and, if necessary, the nasal fossæ by the use of the post-nasal syringe with warm salt water. After the use of the syringe, the patient should blow the nose thoroughly, so as to dislodge any concretions or tenacious shreds of mucus which may still cling to the parts. If polypi, or ulcerations, or hypertrophy of the turbinated bones are present, these affections can readily be detected in the majority of cases. The bearing of the strumous and syphilitic diathesis should be constantly borne in mind in the examination of catarrhal patients. The personal appearance of the sufferer, and the concomitant symptoms, together with a history of the progress of each case, will throw much light upon the probable cause. The character and copiousness of the discharge should, likewise, be carefully ascertained, as this furnishes a valuable means of learning the stage of the disease and the extent of the inflammation; in many cases, too, the nature of the discharge will decide the remedy.

Prognosis.—Physicians of large experience in the treatment of chronic nasal catarrh soon learn to become guarded in their prognosis. Often, severe cases yield much more readily than others which are apparently milder. In cases which have run for years, and in which the nasal symptoms proper are attended by concomitant symptoms showing marked disturbance of the general system, a long course of treatment is, frequently, necessary to obtain permanent relief. In cases in which loss of smell and impairment of sight and hearing are threatened by extension of the disease, the prognosis must be guarded. Generally speaking, the success of the treatment depends largely upon the common sense used by the patient. A reckless and thoughtless person can easily undo, in a few hours, the good derived from weeks of the most skillful and judicious treatment.

Preventive Treatment.—Everything mentioned under this head when considering the prophylaxis of acute catarrh, might be repeated here with increased emphasis. It must be remembered that a vital interest centres in this branch of the subject, from the fact that catarrh of the nasal cavities and vault of the pharynx has proven to be in very many cases the *avant courier* of laryngeal and pulmonary phthisis; the patient had best be informed of this fact, if he proves at all refractory.

A nutritious diet; the careful avoiding of pastry and highly-seasoned dishes; woollen clothing in cold weather; ample protection to the feet at all seasons and, especially, against wet weather; the sponge-bath in cool water, followed by vigorous rubbing; abstinence from stimulants; control of the sexual passion; ample ventilation of the sleeping-room; plenty of outdoor exercise, and a well-regulated life, will fortify the system against the invasion of chronic catarrh. The question of diet and of dress will, in many instances, tax to the utmost the ingenuity and the judgment of the physician. At one time the writer made a practice of recommending to all his catarrhal patients, indiscriminately, the use of milk, oatmeal, and cracked wheat as chief items in the diet list. To his surprise, he found that these articles, so nutritious and wholesome, in theory, proved quite the reverse in a great many instances, when put to the test. It was not long before he made the discovery that oatmeal and cracked wheat, especially when cooked on the American plan, require a vigor and staying power, so to speak, in the digestive functions, which many of his patients were far from possessing or, indeed, ever acquiring.

As to milk, it was forced upon his consciousness at last that to many stomachs it is a veritable poison. Tea or coffee, if used at all, should be taken in moderation. I believe that their wholesale condemnation answers no good purpose. A wide latitude in diet must be allowed, encouraging the patient to adhere to the use of those articles of food which he finds are assimilated kindly by the stomach, and to aban-

don those which occasion symptoms of indigestion; it is well, as the general health improves, to test the strength of the stomach from time to time by a return to hearty food. By this course the digestive powers may be strengthened, as a muscle is strengthened through exercise. As a rule, the adult who takes three regular full meals a day, unless he be employed in severe manual labor, eats a larger amount than is required.

So, too, when we come to give directions regarding the dress of the patient, it will be found that what one person can wear with comfort, another finds extremely obnoxious, if not positively injurious. Occasionally, flannel worn next to the skin produces an almost intolerable irritation and discomfort. In such cases, cotton gauze underwear may be placed between the skin and the woollen clothing.

For observations concerning the use of remedies as prophylactics, the reader is referred to the preceding article on acute catarrh.

Treatment.—The old method of treating chronic nasal catarrh almost exclusively by local applications is open to grave objections. Such treatment does not cure the diseased condition. Then, too, the use of the douche, the syringe, and the inhaler, often does more harm than good by irritating adjacent healthy tissues, while the affected parts are left in *statu quo*, or made a great deal worse.

Concerning the nasal douche, too much can hardly be said in its condemnation. The liquid employed with this apparatus frequently passes into the Eustachian tubes, giving rise to trouble in the ear, including deafness. The original notion that the stream of medicated water which passes in at one nostril and flows out at the other, cleanses the nasal cavities, and at the same time brings the medicament in the lotion into contact with the diseased tissues, is erroneous in point of fact. The stream simply passes along the floor of the nasal cavities, and does not penetrate into the upper portion of the fossæ.

The post-nasal syringe, in the hands of a skillful operator, is of much more utility when it is desired to cleanse the obstructed cavities, and, used in conjunction with a good spraying-apparatus, enables the practitioner to remove quite satisfactorily the secretions which would, otherwise, prevent a thorough examination of the affected parts. As to the therapeutic advantages of these appliances, together with snuffs, inhalants, etc., the writer's experience has been such as to discourage their employment. The spraying-apparatus is, perhaps, the least objectionable of all the various means for applying local treatment, and its moral effect on the patient, in the way of inspiring him with hope, through the tangible efforts which are being made for his relief, may frequently justify the physician in its use. For this purpose a medicated lotion may be prepared by adding to an ounce, or two, of warm, soft water three or four drops of the fluid-extract of *hydrastis canadensis* or of *sanguinaria*, or of ten to twenty drops of a dilution of the

homœopathic remedy which is being administered internally. This sort of local treatment is, at least, harmless.

In the treatment of chronic nasal catarrh the physician must remember that he is confronted by the local manifestations of a constitutional disturbance. Each case should be most carefully investigated, and all the idiosyncrasies of the individual patient unearthed.

This done, the course of treatment decided upon must be followed patiently, day after day, and week after week, unless some exigency arises which calls for a change.

The patient should be encouraged by all legitimate means, but, at the same time, patience and pluck should be instilled at every opportunity.

The frequent change of remedies is not to be encouraged. If, however, careful inquiry fails to elicit acknowledgment of improvement in some of the symptoms after the use of any given remedies for ten or twelve days, a revision of the case should be undertaken, and other remedies prescribed.

At the beginning of treatment, it has been my habit to give from three to four doses of medicine each day, say, an hour before each meal and at bedtime. I sometimes give a single remedy, and sometimes alternate two remedies. Alternation seems to work satisfactorily in those cases in which there is much headache, or in which constipation and hæmorrhoids are present, or pronounced skin-disease is discovered. I would further remark that, for a number of years past, I have administered to my catarrhal patients, almost exclusively, the low potencies, ranging from the 1st to the 6th.

The question of a change of climate in stubborn cases of catarrh often forces itself upon the practitioner.

Such a change is sometimes advisable. People who live in the interior are often improved wonderfully, even to the disappearance of all catarrhal symptoms, by their removal to the sea-coast, and those who have dwelt on the plain often receive much benefit by a sojourn in the mountains, and *vice versa*. In most cases, however, nothing short of a permanency of residence will yield permanently beneficial results. A return to the old habitat is likely to be followed, in a short time, by a development of the former catarrhal trouble, and in its former degree of severity.

The same applies to visits to mineral springs. I have known many cases where a chronic catarrh has disappeared, as if by magic, under the use of the thermal waters of Arkansas, only to return as soon as the patient had reached home. Some patients are, undoubtedly, permanently benefited by these changes, but they are rare, and instances are not wanting in which change of climate decidedly aggravated the disease.

Therapeutics.—Alumina.—This remedy has proven efficacious in combating scrofulous taint, coupled with nasal or aural discharges, and in modifying the results of an inherited predisposition to catarrh.

Its prominent symptoms are great irritation of the Schneiderian membrane, with discharge of thick yellowish mucus, or expulsion of yellowish-green scabs; stoppage of the nose; snapping in the ears when chewing or swallowing, caused by partial occlusion of the Eustachian tubes.

Pain in the root of the nose, chronic inflammation of the fauces, with accumulation of tenacious mucus in the throat.

Alumina is a valuable remedy for old people, and should be considered in all cases of catarrh where there is obstinate constipation from atony of the bowels, so that even soft stools are passed with difficulty; useful in catarrhal affections occurring among painters and workers in lead.

Alumina patients are generally better in the open air, but take cold from the slightest exposure.

This remedy makes a powerful and long-lasting impression upon the mucous membranes of the entire body. Its effect is very marked upon the female organization, especially in case of uterine derangements and leucorrhœal discharges which alternate with catarrh of the nose and throat.

Argentum nitricum.—Violent itching in the nose; ulcers in the nose which become covered with yellow crusts. Scuffs in the nose which excite pain, and are followed by slight bleeding when detached; stoppage of the nose at night, with much itching. Bloody and purulent mucus discharged from the nose. Dulness of the sense of smell. Coryza with constant chilliness; lachrymation, sneezing, and violent stupefying headache.

Argentum is a good remedy in both acute and chronic catarrh of the nasal passages. The pharynx, larynx, and EYES will nearly always be found more or less affected when this remedy is indicated.

Arsenicum.—Discharge of a burning, acrid character, causing a biting sensation and soreness in the nose.

There is frequent stoppage of the nasal passages, accompanied by a stinging, burning sensation, and succeeded by a fluent coryza. There is, usually, great restlessness and chilliness, even in the chronic cases; the sufferer hugs the fire, and is better in a warm room, and worse in the open air and at night. Sleeplessness with beating in the forehead and, sometimes, nausea; no thirst, or desire to drink often, but little at a time. The ears are sometimes affected, and one or both become closed during deglutition.

The catarrhal symptoms often affect the eyes, producing a discharge of excoriating tears. This drug is especially valuable in cases of thin and illy-nourished subjects, and in those who have been long subjected to malarial influences.

Arsenicum iodatum.—The Iodide of arsenic is applicable in case of persons with pale, delicate skin, enlarged tonsils, defective assimilation; tendency to passive œdema, shown by puffiness of the eyelids. It is, also, strongly indicated in the tuberculous diathesis, upon which has been grafted a nasal or laryngeal catarrh. The discharge in these cases is generally copious and thin, but sometimes scanty and thick; now and then tenacious and frothy.

Discharge of very irritating and corrosive watery mucus which burns the nostrils and lips, attended often with alternate chills and heat. Epidemic influenza.

Otorrhœa complicated with catarrh, with fetid and corrosive discharge. A burning sensation in the nose and throat is quite characteristic.

The Iodide of arsenic possesses a very considerable range of action, and is a valuable remedy in many cases in which there exists enlargement of the tonsils and a tendency to induration of the glands. I have also found it of wonderful efficiency in catarrhal affections grafted upon a phlegmatic temperament, where the constitution has received a profound malarial impression. In the treatment of chronic catarrh it is far more useful than the simple Arsenic.

Aurum.—This remedy is indicated in caries of the bones of the nose, with fetid discharge of greenish or yellow pus. Salty-tasting, watery discharge through the posterior nares. Nostrils closed with hardened scabs. Loss of smell and frequent discharge of blood from the nose; swelling of the nose after walking in the open air; nasal bones are painful to the touch; fetid otorrhœa with catarrh; coryza sometimes violent and profuse; habitual nasal tone of voice; drinks flow back again through the nose.

It is one of the first remedies to be considered after the abuse of mercury in syphil-

itic o \ddot{z} ena, and in catarrhs which appear only in winter. The mental symptoms are characteristic. There is great depression of mind; the patient constantly bemoans his condition, and thinks everybody knows his complaint; he shuns society on account of the disagreeable odor from the nose. When the scrofulous diathesis is marked, the Muriate of gold is preferable to the metal. The settled melancholy, hopelessness, and loathing of life are very characteristic indications for the use of this remedy. The mental symptoms of Nitric acid are somewhat similar to those of Aurum, but fall short of the intensity possessed by the latter.

Calcareo carbonica.—A most useful remedy in combating profoundly-seated constitutional taints. It should always be carefully considered in cases of children of a scrofulous diathesis and of phlegmatic temperament, with affections of the glands and a chronic discharge from the ears or nose. The symptoms are usually of a sub-acute character. Dampness and coldness of the feet, and a feeling as though the stockings were always wet, are prominent. The nasal discharge is usually thick and pus-like, but sometimes thin and watery. There is frequently dryness of the nose at night, with moisture during the day. Often the catarrhal symptoms are not confined to the nose, but the pharynx and larynx are also involved, and there is present a peculiar raw feeling in the vocal organs, accompanied, not unfrequently, by chronic hoarseness. Inflammation, swelling, and redness of the anterior portion of the nose; eruption on the nose; sore, ulcerated nostrils; very bad smell in the nose; itching of the eyes, with lachrymation.

Calcareo is exceedingly useful in women of a leucophlegmatic temperament, when catarrh exists in connection with leucorrhœa or menstrual irregularities. It is also a great corrector of malnutrition, manifested either by emaciation or excessive obesity. The pale, wrinkled face in the one case, and the colorless, bloated visage in the other, are equally characteristic of this remedy. The leucophlegmatic temperament is, however, the touchstone of its applicability. Where this temperament is pronounced, long-lasting catarrhal troubles of nearly every species fall within its province. Children with chronic discharges, either from the nose or the ear, present evidence of a constitutional hereditary taint which must be combated. Here, Calcareo becomes the foremost remedy, although Sulphur, Silicea, Kali bichrom., and Mercurius will frequently come into play.

When there is enlargement or induration of the glands, especially about the head and neck, discharge copious, of a light straw color or even yellow, Mercurius will prove of great benefit. When there is periodical ejection of plugs of yellow, sticky mucus, Kali-bichrom. generally is most effective. In treating children who are subject to boils and eruptions, with skin of a dirty, unhealthy appearance, the writer has invariably begun treatment with Sulphur, regardless of other symptoms.

Graphites.—Catarrh, accompanied with inflammation of the fauces and stoppage of the Eustachian tubes, producing constant desire to clear the nose and throat.

Roaring in the ears and crackling, when swallowing; catarrh of the middle ear. Bloody mucus from the nose, alternating with expulsion of dry scurfs; also discharge of thick, fetid mucus. The aural symptoms are quite characteristic in this remedy, and are nearly always produced by stoppage of the Eustachian tubes.

Its curative action is prompt in individuals who are subject to any eruption exuding from a raw surface, a thin, glutinous, transparent, watery fluid. Graphites has many symptoms in common with Calcareo carb., Hepar, Silicea, and Sulphur, and should be carefully studied in those cases where the organism fails to respond to these remedies. It often follows admirably after Mercurius, and should be carefully considered in cases of women with tendency to unhealthy corpulence, and in those suffering with menstrual troubles.

Hepar sulphur.—Swelling of the nose, which is painful like a boil, accompanied by catarrh and smarting roughness in the fauces. The bones of the nose are painful to the touch. The nasal discharge is thick and pus-like, sometimes tinged with blood. Headache, worse from motion. Catarrh confined to one nostril; every exposure to cold causes a new attack; cases of ordinary catarrh where Mercurius has afforded partial relief, and improvement has ceased. Especially useful where the patient has at some period in life had the itch, or other cutaneous disease, which was repelled by external applications, such as ointments and washes. Also useful when there is great sensitiveness; patient is chilled by the slightest draft of air; the least injury causes ulceration; swollen, indurated tonsils, and hard glandular swellings about the neck. Useful antidote to abuse of mercury, when characteristic symptoms are present.

Hydrastis canadensis.—Dropping down of mucus from the posterior nares

into the throat. Raw, excoriated feeling in both nares; constant inclination to blow the nose. The fauces feel raw and inflamed. Hacking up of tough yellow or whitish mucus; tenacious, stringy discharge. Ulceration of the membranes of the nose; scrofulous ozena. Aphthous sore mouth; excessive secretion of tenacious mucus from the mouth; profuse lachrymation. The dropping down of mucus from the posterior nares into the throat is exceedingly characteristic of this remedy. If constipation of the bowels and general atony of the system accompany the above symptoms, it will seldom fail to effect a cure, or at least to produce a favorable change, thus paving the way for the successful employment of some other remedy. In cases in which the stomach lacks vigor, the bowels are inactive, and the nose is dripping as if from simple hydrostatic pressure, its administration will produce strikingly beneficial results. It is useful in those cases in which apparent ulceration exists with muco-purulent discharge. It is a rival of Kali bichrom. when the discharge is tenacious and stringy, but has not the virulence nor the persistency of action manifested by the latter remedy. It acts vigorously upon the posterior nares and post-nasal cavity, and should be considered when the catarrhal inflammation has involved the Eustachian tubes, and even the middle ear. It is to be considered when the eyes are involved in the general catarrhal condition, and in old cases, with torpidity of the liver and a general atonic condition of the digestive organs.

Kali bichrom.—This remedy is exceedingly useful when the nose, pharynx, and larynx are involved. It is one of the few drugs which are beneficial in caries of the bones of the nose, and in combating the constitutional effects of syphilis when complicated with catarrhal affections of the nose and throat. It is especially suitable for fat, light-haired people. The symptoms calling for its administration are: Yellow discharge from the nose, internal excoriation; severe pain across the bridge of the nose; periodical discharge of tough plugs from the nose, tinged sometimes with blood; discharge of tough, stringy mucus; destruction of nasal septum; chronic cold in the head and catarrhal inflammation of the fauces, with chronic hoarseness, loss of smell, fetid smell before the nose, headache from suppressed ozena; catarrh, which is worse in warm weather, or which involves the mucous membrane of the stomach; loss of appetite, with nausea on moving about, relieved by lying down.

Mercurius iodatus.—Catarrhal affections of the nose, extending into the throat. The nasal discharge consists of a tough, white, or yellowish mucus, which forms chiefly about the posterior nares and in the post-nasal cavity. It is also useful in those profuse, acrid, long-lasting discharges which excoriate the nostrils and upper lip. The constitutional symptoms are characteristic, viz.: Tonsils subject to inflammation and ulceration; induration and swelling of the glands; torpidity of liver and enlargement of the spleen. I have used the *Mercurius iodatus* with great benefit in cases in which inflammation of the nasal mucous membrane extended into the lachrymal duct and sac. It seems peculiarly adapted to such cases occurring among children. I have occasionally used it as low as the 1st dec. trit., with prompt relief in cases where the catarrhal inflammation of the posterior nares ran high, sometimes involving the entire pharynx.

Mercurius vivus.—Nasal discharge profuse and watery; also, discharge of greenish, fetid pus from the nose. Liquids which the patient attempts to swallow pass back into the posterior nares. Chronic inflammation of the throat and tonsils. In acute attacks, copious discharge of watery saliva, swelling, redness, and soreness of the nose; night-sweats and feverish heat; symptoms aggravated by warmth or cold; pains in the limbs; bleeding from the nose during sleep or on coughing; aphthæ; fetid odor from the mouth; ptyalism; catarrh, with cough and salty-tasting expectoration, or with mucous diarrhœa. The roof of the mouth is often dry, and there is constant inclination to swallow. Catarrh of the Eustachian tubes. Hardness of hearing; crackling and roaring in the ears, with periodical stoppage of one or both ears. Swelling and induration of the liver; torpidity of the liver, and heavy, sluggish feeling of the entire body; patient worse at night and in a warm room; experiences little relief from perspiration.

Nitric acid.—Useful in persons who have taken a great deal of Mercury. The discharge is yellow and fetid; often accompanied by swelling of the nose and violent itching in the parts; sometimes, an ichorous discharge is present. Violent coryza, with lacerating pain in all the limbs, redness of the tip of the nose. Great sensitiveness to the open air; excessive thinness and emaciation of the whole body. It is of importance in cases in which there are much heart-burn, acid eructations, and other symptoms of dyspepsia, especially in persons subject to aphthous ulcers in the mouth.

Nux vomica.—Heat in the head and face, with creeping chills, even when

seated by a warm fire; fluent coryza in the daytime, with stoppage of the nose at night; premonitory symptoms of catarrh; inflammation in the frontal cavities, with severe headache; expulsion of bloody mucus from the nose; excessive itching of the nose; severe pains in the face; frequently useful where Arsenicum fails to relieve. Dry coryza of infants.—The writer has found this drug almost specific in many of those distressing frontal headaches which accompany nasal catarrh. The bowels are constipated, and the patient feels worse in the morning. It acts, also, to a certain extent, as an antidote to the injurious effects of the douche and strong medications.

Phosphorus.—Especially suitable to persons of phthisical constitution, who are subject to catarrhal affections. The particular symptoms indicating its use are: Swelling of the nose; frequent discharge of blood from the nose (very characteristic); green-yellow discharge from the nose, with great dullness of the head; catarrh, with inflammation of the throat and hoarseness. The discharge from the nose is nearly always tough or thick, and unaccompanied by coryza; weakness of the lungs; frequent hoarseness; tickling cough, brought on by reading aloud, laughing or singing; cough, with salty expectoration; loss of the sense of smell; fetid smell from the nose; discharge of burning and smarting fluid from the eyes, especially in the open air. The patient, nearly always, feels worse when abroad on windy days, and is very sensitive to cold weather. This remedy is particularly useful in cases where there is neuralgia of the head and face, headache, worse from stooping.

Pulsatilla.—Loss of appetite; loss of taste and smell; photophobia; feeling of dullness and heaviness in the head, especially in a warm room, with obstruction of the nose. The patient is better in the open air; chilliness with absence of thirst; alternate stoppage and running of the nose. Applicable in cases of green, fetid discharge from the nose, accompanied with hardness of hearing, as though the ears were stopped up; affection of the frontal sinuses; bad smell from the nose; pressure at the root of the nose. More often indicated in women than in men. The mental symptoms are characteristic; the patient is easily moved to laughter or tears; is of a susceptible temperament. Characteristic derangement of the stomach, with occasional obstinate constipation. Huskiness of the voice, early in the morning, which passes away after slight cough and expectoration. Best suited to flabby subjects of light complexion, with irritable eye-lids and aphthous ulcers in the mouth. Aversion to meats or greasy food. Useful in catarrhal troubles following measles or other acute diseases.

Sanguinaria.—Severe, burning heat and redness of the face; much sneezing; fluent coryza; watery, acrid coryza; catarrhal ophthalmia, with copious watering of the eyes; beating and humming in the ears; feeling of dryness in the chest, not diminished by drinking; sensation as if the throat were swollen up; pain in the breast, cough, and finally diarrhoea; cold and languid circulation, with great sensitiveness to atmospheric changes.—This powerful drug has a marked effect upon the mucous membranes of the body, particularly of the respiratory tract. It has been used most successfully in affections of the nose and throat, when there has been present a sensation of stinging and tickling, accompanied by irritative swelling of the parts, either with or without free discharge. It is very useful in cases of torpidity of the liver, accompanied by catarrh, especially in persons subject to violent sick-headache or vertigo. The Eustachian tubes and inner ear fall within its sphere of action, and when deafness has been caused by catarrhal troubles of the throat it deserves consideration. In some points it resembles Phosphorus, or Arsenicum, and, remotely, Hydrastis.

Sepia.—Swollen, inflamed nose, with sore and ulcerated nostrils; painful eruption on the tip of the nose; feeling of dryness in the nose and fauces; obstruction of the nose; violent, dry coryza, with roaring in the head and ears. This remedy is prominently indicated in cases where there is a discharge of green, bloody mucus from the nose, especially when accompanied by external inflammation of the nose. It is curative, too, in cases where there is ulceration high up in the nasal fossæ, accompanied by loss of smell. It acts well in dark-haired, pale-faced women, sometimes presenting a yellow discoloration of the skin across the nose, resembling very much a saddle. In women with uterine weakness and menstrual derangements, Sepia is often highly useful.

Silicea.—Painful, chronic dryness of the nose, or inveterate ulceration of the Schneiderian membrane, producing an acrid, corroding discharge. Herpetic eruption about the nostrils, or on the lips. Silicea acts slowly but profoundly, and is adapted to the scrofulous diathesis, especially when there is induration and suppuration of the glands or lymphatics in any part of the system. Like Aurum, it reaches those deep-seated morbid processes which, sometimes, actually destroy the bony structures of the nose.

Sulphur.—Chronic obstruction of the nose, attended by formation of hard, dry scabs; frequent bleeding of the nose; external inflammation; illusions of smell; catarrh with itching eruptions on the skin; excoriation and ulcerations of the nostrils; profuse secretion of thick, yellowish, and puriform mucus; boils and eruptions on the nose; stoppage of the nose, sometimes only one-sided; aphthæ; ptyalism; great susceptibility to taking cold; great heat of the feet, at night, with burning and itching. One of the prominent indications for this remedy is an unhealthy condition of the skin, every little injury suppurating and healing slowly. Like Hepar sulphur., it is to be considered in obstinate cases, based upon a scrofulous or so-called psoric taint, upon repelled itch; the patient is or has been subject to outbreaks of nettle-rash; after the excessive use of Mercury.

Consult likewise the following remedies: Amm. brom., Asa fœtida, Cyclamen, Iodine, Kali hydriod., Lachesis, Lycopodium, Mercurius biniod., Natrum carb., Natrum mur., Sticta pulmon.

OZÆNA.

Synonyms.—(Greek) *οζαινα*; (Latin) *Ulcus narium fœteus*, *Rhinitis ulcerosa*, *Pyorrhœa nasalis*, *Coryza entonica seu purulenta*; (French) *Ozène*, *Punaisie*; (German) *Stinknase*.

Definition.—An affection of the pituitary membrane which occasions a very disagreeable breath, the smell being, in many cases, similar to that of a crushed bed-bug.

History.—The exact seat and precise nature of the complaint have not been definitely settled by pathological investigators. The greater number of medical writers who mention this distressing ailment, speak of it as being coupled with ulceration of the Schneiderian membrane. The nomenclature of this disease shows conclusively the views entertained on this score by those who have written upon it. Recently, Dr. Carl Michel, of Cologne, has denied the existence of ulceration of the nasal mucous membrane in cases of true ozæna, claiming that the greenish scales, which nearly always in ozæna coat the lining of the nasal cavity, had been often mistaken for ulcers. He teaches that ozæna consists in purulent inflammation of the cavities of the septum and of the sphenoid bone. His reasons for this belief he sums up as follows: Lack of pathological proof in the nasal cavity; the fact that the morbid secretion appears in the posterior part of the fossæ and on the roof of the pharynx, even when the nasal membrane is in a healthy condition; the pungent, cadaverous odor of the semi-fluid secretion, proving that it must have been retained in a cavity until decomposition had set in, mucus secreted from an open surface never giving a bad odor; the intractableness of the complaint, which continues even after any co-existing disease of the nasal cavity proper has been cured.

This view of the subject is certainly plausible, and based upon careful clinical investigation.

Ætiology.—The causes of simple ozæna (for we are not now considering that of syphilitic origin, which will be mentioned under another head) are exceedingly obscure. The scrofulous diathesis is, doubtless, often responsible, but the teaching of some writers, that it is nearly always of such origin, must be taken with some grains of al-

lowance. We have seen quite a number of victims who were the very picture of health, and in whose families no evidence of scrofulosis existed, not even a case of chronic catarrh. My own view is that, in the majority of cases, ozæna is the result of frequent attacks of acute catarrh. Catarrh, sooner or later, from some obscure constitutional bias, gives rise to an obstinate inflammation in one or more of the side cavities of the nasal fossæ. The catarrh proper of the nose may disappear, but there remains the smouldering fires of a once general conflagration, which continues unobserved its work of destruction. It is a suggestive fact, too, that the great majority of sufferers from this malady are attacked when quite young, usually in childhood. Voltolini taught that sex is an important ætiological factor, and that ozæna is almost entirely confined to women. Other observers, however, have noted its more frequent occurrence in the masculine sex. Nearly all the patients who have consulted the writer have been women and girls; he hazards the opinion that sex has little or nothing to do with the genesis of the disease, but that women, being more sensitive to its unpleasant features than men are, apply more readily for treatment.

Symptomatology and Pathology.—The secretion in ozæna is generally of a yellowish or greenish appearance, though, sometimes, it is of a peculiar ashy-gray color. Plugs and clinkers of rank smell are frequently expelled from the nasal fossæ, but, strange as it may seem, these passages are seldom obstructed; indeed, they appear, in the majority of cases, more than ordinarily open and free. There is often much dryness of the throat, and patients frequently complain of nausea and retching, occasioned by the sticky discharge which adheres tenaciously to the posterior part of the soft palate and to the vault of the pharynx. Sometimes, patients will eat a hearty meal and then, in the effort to expel from the throat the tenacious mucus loosened by the act of mastication, vomit it all up. Frontal headache with loss of smell is a common concomitant symptom. Taste and hearing seem little affected. The cartilaginous part of the nose is often swollen, and patients who have suffered for a long time have usually a yellow, bilious look which is suggestive of ill health. It must, however, not be forgotten that some patients appear to be robust and vigorous, while the exhalations from the nostrils are suggestive of necrosis of the bone, and sloughing of the parts. The mental condition of patients affected with ozæna is almost invariably depressed and melancholy, largely due to the consciousness that their presence is a source of annoyance to others. The passage of decomposed secretions from the throat into the stomach exercises a deleterious influence upon that organ, while the constant breathing of infected air would suggest a likelihood of constitutional disturbance of some sort, sooner or later.

The question as to whether, or not, absorption of pus ever occurs from the over-flowing side cavities of the nasal fossæ, has often forced itself upon my consideration. I see no reason why, in certain condi-

tions, it may not take place in such degree as to exercise a depressing influence upon the general system.

Prognosis.—All authorities, I believe, agree as to the intractableness of this distressing ailment. Still, it is amenable to treatment, and there are few cases which cannot be benefited by a judicious course of medication and by a proper attention to hygiene. The complete eradication of the disease, it must be confessed, is a result not to be expected in the great majority of instances, even under the most favorable auspices; and only too often patients become tired of treatment or discouraged long before the physician has made a thorough trial of remedies. I have had a number of very severe cases under my care for from ten to twelve months, and the results attained in that time were exceedingly encouraging. One patient, in particular, I call to mind with much satisfaction, a beautiful young lady of eighteen or nineteen years, with a clear complexion and fresh, rosy cheeks. The stench of her breath was something horrible. Her presence in the course of a few minutes would infect the air of a large room. She was morbidly sensitive regarding her infirmity, and kept herself secluded as much as possible. Homœopathic treatment did so much for her, that after three or four months of medication she was able to go into society without fear of sickening those who might come into proximity with her. At the end of a year the smell had ceased to be obnoxious, and was only slightly noticeable for a few days after the contraction of a severe cold. This, it seems to me, was the best that could be expected, and treatment was accordingly suspended. A few months subsequently, she married a very deserving gentleman, and has now been for several years a happy wife and mother. Her old complaint has never returned to any annoying degree.

Treatment.—The hygienic hints, regarding bathing, diet, exercise, and dress, etc., given in the preceding sections on acute and chronic catarrh, should be closely followed by the victims of ozæna. Everything should be done to bring the general health of the patient up to the highest standard of excellence. An abundance of outdoor exercise and judicious bathing I believe to be absolutely essential to this end. Travelling, sea-air, and sea-bathing might be recommended as adjuncts to regular treatment, if the patient is able to enjoy these luxuries. In treating the case of the young lady cited above, the following remedies were employed at different times: Aurum, Kali bichrom., Pulsatilla, and Merc. iod. I have used both the Aurum fol. and the Aurum muriat., and of the two preparations the latter is certainly preferable on the score of solubility. In addition to the remedies mentioned above, the following deserve especial attention: Arsenicum, Calcareo carb., Graphites, Hepar sulph., Hydrastis canad., Mercurius viv., Nitric acid, Pulsatilla, Sanguinaria, Sepia, Silicea, Sulphur. I have never seen any good derived from the use of *Asa*

foetida, which has been often mentioned in connection with ozæna and severe catarrhal affections. In case of scrofulous individuals, I have found Calcareæ, Nitric acid, Mercurius, and Sepia very appropriate remedies.

Where the skin of the patient is unhealthy, Arsenicum, Hepar sulph., Rhus tox., and Sulphur, are often indicated. Close attention should be paid to the concomitant symptoms, as they frequently furnish the surest indications of the correct remedy. Consult the indications given under the head of chronic catarrh.

The Spray.—For the purpose of removing the foul-smelling secretions from the nasal cavity, the spraying apparatus is invaluable. A solution of Chlorate of potassium may be employed, of the strength of one tablespoonful of the chlorate to two (2) pints of warm water. It can be employed advantageously twice a day—say, morning and evening. This application will disinfect the patient's breath and render it comparatively sweet, a point of very considerable importance both to the sufferer and to those who come in contact with him, or her. Potassium permangan., likewise Hydrastis and Carbolic acid, have each been strongly recommended for clearing-out and irrigating the nasal cavity, but they possess no advantages over the simple chlorate. As soon as the nose improves, the spray should be used but once a day, or every other day; it is best to dispense with it altogether if the disagreeable smell can otherwise be held in check.

SYPHILITIC AFFECTIONS OF THE NASAL CAVITY.

Years after the general symptoms of syphilis have been subdued, a relapse may occur, affecting exclusively the nose. It is quite important to be able to determine, at an early moment, the real nature of the trouble, as delay in proper treatment, through an error in diagnosis, is disastrous in its results. The first symptoms frequently develop slowly, and are well calculated to throw both the patient and the physician off their guard. At first the trouble is generally thought to be of a catarrhal nature, and some time may elapse before the appearance of unequivocal indications which denote the specific nature of the complaint.

Symptomatology.—A severe coryza may be the first symptom which calls special attention to the nose, or there may have been formation of crusts and scabs. Usually, this last condition has been preceded by more or less malaise and discomfort about the posterior nares and post-nasal cavity—a dryness and irritation which cause more or less hawking and spitting.

The discharge at first is generally watery and copious; but after a time, swelling comes on, which interferes materially with the passage of air through the nares, and may close one or both completely. In such cases the nasal voice is heard in perfection. In many cases

plugs and scabs now form in the nose, which are removed with considerable difficulty. As the disease becomes more pronounced, the nasal symptoms change. The discharge becomes reddened with blood, which oozes from the highly inflamed and frequently ulcerated surface. Pain and external swelling rise more and more into prominence as features of the case. The discharge becomes offensive and still more profuse as the morbid process spreads. Finally, the bones and cartilages of the nose are attacked, unless, meanwhile, intelligent medical aid has succeeded in arresting the march of the horrible destroyer. Fortunately, these cases are usually attended by concomitant symptoms which render the diagnosis comparatively easy, although I have seen a very few instances in which the specific poison seemed to have concentrated itself for the time being upon the nose, and the closest scrutiny failed to unearth concomitant symptoms. It is well to remember a remark of Dr. Carl Michel to the effect that, in his experience, ulceration of the Schneiderian membrane points unerringly to syphilis. As soon as the ulcerative process attacks the deeper tissues of the nose, pain becomes one of the most prominent symptoms. It is more severe during the night than during the day, a symptom of universal occurrence in all syphilitic conditions. The suffering is so great that the patient begs for opiates to afford him some rest at night. The pain of simple catarrh, involving the frontal sinuses, is never so intense, persistent, and deep-seated as in specific cases.

When the syphilitic invasion of the nasal cavity is extensive, involving the adjacent sinuses, the discharge is frequently retained for a considerable time, undergoing, meanwhile, putrefactive changes which give rise to a horrible smell. This is syphilitic ozæna.

Treatment.—It does not fall within the writer's province to enter into a discussion of the treatment of syphilis. No matter in what portion of the body symptoms of the disease manifest themselves, they must be promptly met by judicious and patient constitutional treatment. It may not be out of place to remark that Aurum, Nitric acid, Mercurius, and the Iodide of potassium are the most efficacious remedies in the treatment of syphilitic affections of the nasal cavity. When the discharge is very offensive, or when positive ozæna exists, the parts affected should be kept as clean as possible by means of the spray and the post-nasal syringe, used once or twice a day. The patient should be taught to perform this sanitary office for himself, and, both for his own comfort and for the comfort of those about him, it should be done most thoroughly.

HAY FEVER, OR ROSE COLD.

Synonyms.—Catarrhus æstivus, Hay cold, Peach cold, Yearly cold; Hay asthma; (German) Früh-Sommer Katarrh.

Definition.—A catarrhal affection of the eyes and of the mucous membrane of the respiratory tract, attended, frequently, by asthmatic paroxysms and more or less fever, which attacks numbers of people in the latter part of spring or in the summer, and which seems to be caused by the volatile emanations from certain grasses, plants, and shrubs, particularly during the season of flowering. It is peculiar in its return every year at almost precisely the same time, varying in individual cases; and it appears to attack more readily those who enjoy exemption from catarrhal troubles during winter. The disease depends evidently upon idiosyncrasy.

History.—No mention is made of hay fever until the beginning of the present century. At that time Heberden made some remarks which show that he had recognized the affection as distinct from the usual catarrhal and asthmatic troubles, and unique in its annual recurrence; but he ventured no opinion concerning the causes which produce it. Some years later, in 1819, Dr. Bostick, of England, described the disorder at considerable length, giving attention to the special symptoms which distinguish it from similar complaints. He called it *catarrhus æstivus*, or summer catarrh; and being himself a sufferer from it, his statements possess the advantage of remarkable minuteness and accuracy. Other investigators speedily turned their attention to this field of research, and summer catarrh was henceforth regarded as a disorder distinct in its origin and manifestations from analogous affections.

Ætiology.—Notwithstanding the fact that the great mass of the population are alike exposed to the peculiar conditions which produce hay fever, only a remarkably small number of persons are affected. Hence it is inferred that a peculiar sensitiveness to the active cause and a predisposition to a development of the disease are necessary ætiological factors. It has been stated that persons of the nervous and sanguine temperaments are more frequently attacked than others. The effect of hereditary tendency is frequently seen, and the children of persons who are subject to this complaint, are themselves very likely to be affected. Symptoms of the affection sometimes occur in childhood and youth; again they do not appear until adult life has been reached. Many observers have noted the fact that the poor are less likely to be affected than the well-to-do. Dr. Elliottson, of England, speaks of hay fever as an aristocratic disease.

The exciting cause of the affection seems to lie in the emanations or effluvia from certain grasses, shrubs, and flowers, especially at the season of the blossoming. The popular terms, "hay fever" and "hay asthma," show that many persons experience an attack at the hay-making season, which occurs about the time the grasses are in flower. Roses, lilacs, lilies, and some other flowers, are credited with strongly affecting many people who suffer with summer catarrh.

Symptomatology.—An attack of summer catarrh is, generally, ushered in by feelings of languor and weakness, coupled with derangement of the digestive functions. Presently, disagreeable sensations appear in the throat, eyes, and nose, with sneezing and a discharge of watery fluid. The eyes and nose are the parts earliest affected; occasionally, the symptoms seem even to be confined to them. Very frequently, however, the larynx is invaded, and ultimately the bronchial tubes become affected. At times the chest symptoms are more prominent than those which attend the morbid influence on the upper air-passages. If such is the case, asthma is generally the result. The irritation and congestion in the lungs may be so violent that hæmorrhage is produced, which may result seriously in persons otherwise predisposed to affections of the lungs. Sometimes the larynx is prominently affected, producing tickling in the throat, hoarseness, and cough. If the nose and eyes are chiefly involved, the lachrymation and fluent coryza are often astonishingly severe. The ordinary handkerchief is of little utility in cases of these deluging defluxions; a large towel is saturated in a very short time. The discharge at first is very watery and acrid, excoriating the cheeks, the ælæ of the nose, and the upper lip, with which parts it frequently comes in contact. Later, the secretion becomes thicker and more like the mucus discharged under the influence of a common cold. Constant and violent sneezing is one of the most distressing symptoms from which the patient suffers. Paroxysm follows paroxysm, alternating with itching and burning in the nasal cavity, sometimes confined to a very circumscribed space.

The time when the affection prevails varies with the latitude of the place. People of southern climates are affected much earlier than those of the north. In the southern portion of the United States the attacks usually appear during the month of April; in the north they are most likely to occur during May and June. Not infrequently, in the Northern States, according to Dr. Morrill Wyman, the summer catarrh appears in August and continues into the latter part of September or October. This type, which Dr. Wyman calls *catarrhus autumnalis*, seems never to persist beyond the appearance of a black frost.

The duration of an attack varies according to place and individual peculiarity, from four weeks to three months, or even longer in extreme cases. In the young and robust it continues longer and rages with more severity than in the old. Persons who have pulmonary weakness or bronchial affections, however, are apt to experience with advancing age an increase in the acuteness of the symptoms rather than an amelioration.

Diagnosis and Prognosis.—Hay fever may be mistaken for cold in the head, influenza, ophthalmia, asthma and bronchitis, according to the prominence and severity of certain symptoms. In differentiat-

ing between them, we are to bear in mind that hay fever is of yearly recurrence, that it comes with the season of flowering grasses, shrubs and plants, that it is of long duration and great persistency, that it occurs in persons of peculiar susceptibility, and that its visitations are out of the season of ordinary colds, catarrhs, and influenzas. The prognosis is favorable to ultimate recovery; no matter how severe the case may be, the symptoms finally disappear in all but rare cases, and the patient recovers health and courage during the months of perfect immunity. The existence of great debility, of pulmonary or bronchial affections, and of other, and grave, constitutional difficulties modifies the prognosis.

Preventive Treatment.—It is claimed by a number of observers, especially by Dr. George Moore, of England, that the system may be fortified against an attack by especial care in diet, bathing, sleep, etc.; in short, by a regimen which will bring the bodily powers up to their strongest tension of resistance. If an attack of the disease is not actually prevented, a modification of the severity of the symptoms is said to result. The writer's success with preventive treatment has not been very encouraging. However, only good can result to the patient by the adoption of any means which have the effect of improving the bodily health and strength. Instruction to get beyond the reach of the exciting causes must always be forced upon the attention of the sufferer. If the patient dwell in the rural regions, a sojourn in a large city, selecting a quarter as remote from vegetation as possible, or a trip to the sea-side, or a sea voyage, or an extended trip on the great lakes, or a visit to some mountain region, almost to any point a thousand feet above the level of the sea, may be urged with great promise of at least temporary relief. Persons who suffer severely in one region of country, may derive great benefit from a change of residence; the proper locality can only be determined by making the actual experiment. If a change of residence is impracticable, perfect quiet in a cool room during the heat of the day, with such remoteness from hay fields and flower gardens as can be secured, is the next best thing.

Curative Treatment.—Arsenicum.—The discharge is thin and acrid; eyes red, watery, and smarting; breath short from asthmatic trouble. The lower preparations are recommended.

Arsenicum iod. is said to act more beneficially than the Arsenicum album when the acidity of the nasal secretion is very pronounced.

Euphrasia.—Applicable when the eyes are particularly affected; photophobia and profuse lachrymation.

Ipecac.—In hay asthma; the chest symptoms are most prominent.

Kali chloricum.—In gouty and hæmorrhoidal subjects.

Kali hydriodicum.—According to Hughes, this remedy is pointedly homœopathic to cases of summer catarrh in which the eyes and nose are prominently affected.

Sticta has been pronounced an almost specific when the larynx or bronchial tubes are prominently affected, and when there is much cough.

Sabadilla.—Great irritation and itching of the Schneiderian membrane, with violent paroxysms of sneezing

Quinia.—The use of an injection or spray into the nostrils, three or four times each day, of a solution of quinine in water, one grain to the ounce, has been highly recommended. This lotion is said to check the discharge and to lessen the violence of the spasmodic symptoms.

In 1869 it was announced that Prof. Helmholtz, who was himself a sufferer from hay fever, had discovered in the nasal mucus at the period of his attacks certain lively vibron-like organisms whose motion was quieted by the local use of quinine.

Consult also Arum triph., Euphorbium, Grindelia rob., Lobelia infl., Moschus.

EPISTAXIS.

Synonyms.—Hæmorrhinia, Hæmorrhinorrhagia, Rhinorrhagia, Sanguinis naribus, Bleeding at the nose, Nosebleed; (French) Hémorrhagie nasale, Saignement du nez; (German) Nasébluten; (Italian) Sanguinare dal naso.

Definition.—The word Epistaxis (from the Greek *επι* and *σταξω*, I flow by drops) is applied to any discharge of blood from the pituitary membrane, whether such discharge be *guttatim* (by drops) or in a continuous stream. This is the most frequent of all varieties of hæmorrhage, and occurs in both sexes and at all ages.

History.—The phenomenon of bleeding from the nose, in its relation to health and disease, was carefully observed and commented upon by Hippocrates, the father of medicine. He has left a number of aphorisms which bear on this subject, especially with reference to his theory of so-called critical discharges and critical days.

To the medical practitioners of past generations, hæmorrhage from the nose seems to have been of far more significance than to physicians of the present day. We cannot doubt that in earlier times epistaxis was far more prevalent than it now is. The habitual practice of phlebotomy, in almost every case of disease, must have powerfully stimulated the blood-forming functions in those subjected to this form of heroic treatment, until a general tendency to plethora became one of the striking characteristics of past generations; and where plethora exists, epistaxis is likely to occur.

Medical literature contains some notable references to this species of hæmorrhage. Perhaps the most remarkable is found in the writings of Morgagni, who states that in the year 1200 there was experienced an epidemic of epistaxis in Etruria, which carried off a large number of people in the course of a few days, an attack generally being fatal within twenty-four hours.

Ætiology.—Violent exercise; sudden changes of temperature, especially from cold to warm; variations in atmospheric pressure; hot drinks; a stimulating diet; suppressed discharges; irritation of the Schneiderian membrane from coryza; polypi; febrile complaints; diseases of the heart, kidneys and liver, may be mentioned as causes of epistaxis. In some persons there exists either casually or habitually an extraordinary delicacy of the nasal mucous membrane, which

renders its vessels peculiarly liable to laceration. A vigorous blowing of the nose in such subjects will frequently bring about copious bleeding. It must be remembered that the pituitary membrane is densely crowded with bloodvessels, and that their support and protection are very slight indeed. The hot stage of intermittent fever is, very often, accompanied by hæmorrhage from the nose; and typhoid fever, in its various stages, is frequently characterized by the same symptom.

Varieties.—There are two forms of epistaxis, the idiopathic and the symptomatic. The first is sometimes termed entonic or active, and the latter, in contradistinction, atonic or passive. An epistaxis is termed idiopathic when no change can be discovered in the tissues of the affected part or in any remote organs. The young and robust are subject to this species of hæmorrhage. The blood is arterial, and its loss is frequently salutary, this being nature's method of relieving pressure in the cerebral system. The bleeding in this instance usually ceases promptly when the equilibrium of the circulation is restored, and medical treatment is seldom required. Symptomatic, or atonic, epistaxis is observed in low and cachectic conditions of the system. It is associated with, and dependent upon, changes in some one or more of the great organs of the body—as, for instance, the heart, liver, or kidneys. The blood in these cases is usually venous, and its exhalation is passive. In advanced life the appearance of epistaxis in persons who have previously been free from it may be considered salutary, yet denoting a threatening condition of the system. It is, often, the forerunner of cerebral impairment resulting in palsies, apoplexies, and epilepsies. Hepatic disorders, with jaundice, are often accompanied by epistaxis of the most inveterate sort. In the entonic or active hæmorrhage from the nose the extreme vessels are ruptured by the increased pressure and activity of the circulation, while in the atonic form there is a giving way of the walls of the capillaries from debility.

Owing to their greater activity of life and the exposure incident to the same, males are more subject to epistaxis than females. Women are, frequently, subject to epistaxis which depends upon a suppression of the menstrual flux. The hæmorrhage from the nose, in these cases, appears periodically, and is usually attended with the general symptoms noticeable at the menstrual period.

It has been observed that the condition of the atmosphere has a powerful influence upon the expansibility of the blood. Suddenly entering a warm room from the cold air will often bring on hæmorrhage from the nose. A reduction of atmospheric pressure is even more potent than heat in predisposing to hæmorrhage.

Mountain climbers and aéronauts are subject to epistaxis which, if they continue to ascend, is followed by bleeding from the eyes, ears, and lungs, attended by other distressing symptoms.

In the advanced stage of small-pox, scarlatina, typhoid fever, and

yellow fever, passive epistaxis often takes place, and must always be considered as a symptom of grave import. It is sometimes critical, marking the advent of improvement in the case, but oftener the forerunner of speedy dissolution.

Epistaxis is hereditary in some families, and is then found in connection with the so-called hæmorrhagic diathesis.

Symptomatology.—Nosebleed generally takes place from one nostril at a time. The quantity of blood lost varies from a few drops to several pounds; an instance is recorded where twelve pounds escaped in less than three days. The duration is variable, ranging from a few seconds to many hours. The loss of blood from injury to the nose is not likely to be very great, unless a vessel of considerable size is freely opened. Coagula sometimes form in the nose and protrude from the nostril. If the bleeding is very free, the naso-pharyngeal space may be filled, and blood be discharged from the pharynx and from the unaffected nostril. Occasionally, a hæmorrhage occurs at night, a part of the blood passing into the throat and, being coughed up in the morning, causes much anxiety by creating the impression that there has been a bleeding of the lungs.

Many persons experience premonitory symptoms of an epistaxis. These symptoms consist of heaviness and pressure about the head, redness of the cheeks, and a fulness and itching sensation about the nose.

If the hæmorrhage continue for some time, and the flow be rapid, symptoms of faintness may appear, with roaring in the ears, weak pulse, sighing respiration, and pallor of the face. A fainting fit during a free epistaxis is somewhat dangerous, from the fact that the blood may pass through the posterior nares and, flowing down the trachea, produce asphyxia.

Diagnosis.—The recognition of an epistaxis is, usually, an easy matter; still, when hæmorrhage of the lungs or stomach exists, blood may sometimes be vomited up and discharged through the nose. So, too, a hæmorrhage in the post-nasal cavity may cause a discharge of blood from the nostrils. An examination of the throat will, generally, clear up all doubts concerning the source of the bleeding. It is, however, necessary to take careful cognizance of all the concomitant symptoms.

Prognosis.—The great majority of cases of epistaxis have a favorable termination and require no treatment. Life is rarely endangered through loss of blood on any one occasion, but a frequent repetition of the hæmorrhage, even if the quantity of blood lost at one time be comparatively insignificant, may result in an anæmic condition, constituting a source of danger to the welfare, and even life, of the patient.

As already stated, epistaxis frequently occurs in the last stages of

low forms of disease, and, in such cases, may prove sufficiently exhausting to lead to a fatal termination of the case.

Treatment.—Aconite.—In plethoric subjects; prolonged and violent arterial hæmorrhage, with more or less fever; great restlessness, and, frequently, fear of death; pulsation of the arteries of the neck and temples, and general fulness about the vessels of the head; hæmorrhage caused by a fit of passion.

Arnica.—Bleeding is caused by a blow upon, or an injury to, the nose; also, after great physical exertion; the hæmorrhage is preceded by itching in the nose.

Belladonna.—Free nasal hæmorrhage; great cerebral congestion; bleeding at night, which awakens the patient from sleep; epistaxis from being overheated or exposed to the sun; worse from motion; ringing in the ears; fainting.

Bryonia.—Bleeding comes on in the morning, after rising; vicarious menstruation; or bleeding from being overheated in sultry weather; irritable disposition.

China.—In the anæmic state; also, at the conclusion of a hæmorrhage, if the patient be very weak.

Ferrum.—Excellent in epistaxis occurring in debilitated subjects when there is great pallor of the face.

Hamamelis.—Useful in the hæmorrhagic diathesis; dark, venous blood; epistaxis in combination with hæmoptysis; venous hæmorrhage from suppressed menstruation.

Ipecac.—Nausea and vomiting; coryza, with stoppage of the nose; quick, anxious breathing, with suffocative attacks; pale face, with blue margin around the eyes.

Nux Vomica.—Constipation, or suppressed hæmorrhoidal flow; pain in the forehead; after drinking wine; in the case of habitual drunkards.

Phosphorus.—Profuse bleeding, recurring frequently; ecchymoses on the body; hæmorrhagic diathesis; bleeding, especially when at stool.

Pulsatilla.—Discharge of blood every afternoon or evening, especially in case of women who have suppressed or scanty menstruation.

Secale.—Splendid in anæmic cases, whether from exhaustive depletion, or from long-continued diseases; blueness of the skin.

Accessory Measures.—Application of cold water to the nose and forehead and back of the neck is classical in its antiquity. The patient should be kept perfectly quiet if the bleeding is considerable. Much benefit may be derived from firm pressure of the ala of the affected side upon the septum, thus closing the nostril and the anterior portion of the cavity, the object being to bring about coagulation of the blood, and occlusion of the open vessels. The sitting posture, with the head bent slightly forward, is to be recommended. The clothing should be loosened about the throat, so as not to interfere with the return of the blood from the head. A pledget of lint, or charpie, fastened together with a thread, may be used as a tampon for the anterior portion of the nasal cavity. This should be removed as soon as it becomes offensive, usually at the end of twenty-four hours. Authors recommend the use of astringents, as tannin, chloride of zinc, nitrate of silver, alcohol, vinegar, solutions of the chloride of iron, etc. These, properly diluted, may be injected into the cavity, or the tampon may be saturated with the same. Snuffing powdered Matico-leaf into the nostril frequently stops bleeding. Dr. Negrier recommends that one or both arms be raised above the head, and held in that position for some length of time; he states that this simple procedure seldom fails to

arrest an epistaxis. Plugging the posterior nares has been recommended, and an instrument, called Bellocq's canula, has been designed to facilitate the operation. A description of the method of procedure will be found in any work on *surgery*. Should the patient faint from exhaustion, turn him on his face, so that the blood will not run backward into the throat and produce asphyxia.

Resuscitation can, generally, be brought about promptly by a weak stimulant, such as a little camphor, or a few teaspoonfuls of brandy.

TUMORS OF THE NASAL CAVITY.

The term polypus is usually, though inaccurately, applied to every tumor existing in the nasal cavity. Whether the method of attachment of the majority of these tumors or their color led to the adoption of the name of the zoöphyte polypus, after which they are called, is a mooted point. We shall confine our remarks here to polypoid growths proper; a consideration of other benign and malignant tumors which sometimes infest the nasal cavities falls properly within the domain of surgery.

Ætiology.—It is generally believed that nasal polypi originate upon a mucous membrane weakened or altered by chronic catarrh. Persons of a strumous or sycotic diathesis are most frequently afflicted with these growths.

Varieties.—There are several kinds of these tumors found in the nasal cavities. The most common are the mucous and the fibrous. The former are the more frequent. They are very soft and vascular, sometimes of almost gelatinous consistency. They bleed frequently, and possess the attribute of absorbing moisture from the atmosphere, thus increasing in size. They seldom exist singly, but generally infect both nostrils, from three to ten being sometimes found in each passage. They differ greatly in size, and are usually of a pinkish color, shaped like a pear, and attached by a pedicle to the mucous membrane of the cavity. The middle turbinated bone is a favorite seat for these growths, which are seldom found attached to the roof of the nasal cavity or to the wall of the septum.

The fibrous polypi are much lighter in color, and much firmer and more elastic in structure than the mucous variety. They also are pear-shaped and attached by a pedicle. They do not often bleed, nor do they absorb moisture from the atmosphere. They usually appear singly, and are ordinarily of slower growth than the first-mentioned variety.

Symptoms.—There is usually a yellow mucous discharge from the nose and the pharyngeal vault. Stenosis of one or both nostrils, compelling the patient to breathe through the mouth, and producing the well-known nasal speech, is a pretty constant symptom. Occasionally, when the passages are wide and capacious, tumors may exist for some

time in the cavities without shutting off the current of air. Tumors which possess the quality of absorbing moisture in damp weather necessarily increase the obstruction.

If tumors exist at the posterior nares, and drop back into the pharyngeal cavity, the patient may inspire air through the nose without being able to expel it by that channel—the tumors acting as a valve, and closing the passages. Bleeding from the nose is frequently observed. The blood may come from the highly vascular tumor itself, or from the adjacent mucous membrane, which is congested and irritated by pressure of the morbid growth. In emaciated persons the discharge of mucus is very slight. Some patients complain of frontal headache and vertigo, while others aver that the existence of the growths in the nose is responsible for a certain amount of intellectual impairment. The tumors themselves seem to arise without pain, and may grow to very considerable size before the patient's attention is called to their existence. The disturbances experienced are frequently attributed to the existence of simple catarrh.

Diagnosis.—Inspection of the nasal cavities with a good light and with the use of speculum and probe will, generally, enable the practitioner to detect the existence of these morbid growths.

Polypi in some cases are of the color of the adjacent mucous membrane; in others, they are more transparent, and of lighter color. When a polypus is attached to the posterior portion of the cavity, it may be brought forward by forcibly blowing through the affected nostril; this method is particularly successful if the growth be pedunculated. When both nostrils are closed by polypi, the sufferer is compelled to breathe through the mouth, and, usually, a peculiar rattling is noticeable; this symptom is diagnostic.

Treatment.—Cases of *polypus narium* have been frequently reported cured by the use of internal remedies. The remedies which seem to have been most successful are Calcareo, Phosphorus, Staphisagria, Teucrium, Sepia, Silicea, Sanguinaria, and Thuja. Jahr has been most successful with Calcareo and Sanguinaria; he speaks slightly of Teucrium. Fibrous polypi, he thinks, fall especially within the province of Calcareo, aided by a preparatory course of Sulphur. Where polypi bleed easily, he believes the proper remedy to be Phosphorus. Dr. Richard Hughes refers to several cases cured by the use of Calcareo and Teucrium, and he gives to Thuja a more than passing notice. We possess considerable evidence confirming the therapeutic value of Teucrium, used both internally and as a topical application. In numerous instances surgical aid had been repeatedly invoked, but the growths returned until finally and permanently cured by the administration of this remedy.

Sanguinaria, used internally and locally, is credited with the cure

of numerous cases of polypi since its mention by Jahr. Calcareæ phosphor. has also been given with fair success in a number of cases.

Accessory Measures.—Where nasal polypi refuse to yield to internal medication, they may be removed by the galvano-cautery. A loop of platinum wire is passed around the pedicle of the polypus, and is then raised to a white heat by the passage through it of a current of electricity. By this method hæmorrhage seldom occurs, as the vessels are occluded as soon as they are severed. The galvano-puncture is also employed in the removal of tumors of the nasal cavity. The chemical action of electricity is made use of in this method to destroy the vitality of the morbid growth and to stimulate its rapid absorption. The operation is not at all difficult, consisting in the passage of a gold or silver needle into the body of the polypus, attaching said needle to one of the poles of a battery, while the other pole is held in contact with the skin near the seat of the tumor. A single-cell battery is sufficient for small tumors, and an average of six sittings is required for the removal of the ordinary mucous polypus. Full directions for the use of the galvano-cautery and the galvano-puncture may be found in the latest works on special surgery of the larynx and nasal cavity.

ABSCESS OF THE NASAL CAVITY.

The anterior portion of the nasal cavity, near the nostril, is often the seat of circumscribed inflammation which ends in an abscess. These furuncles generally attack one nasal passage at a time, and, though comparatively insignificant, are apt to cause a very considerable amount of pain and disturbance. They are sometimes attended by pronounced fever and, now and then, by brain symptoms. Frequently a sort of habit seems to exist tending to the production of abscesses in the nose; and no sooner does one furuncle disappear from the affected nostril before another appears on the opposite side, to continue in alternation for an indefinite period of time.

An abscess in the nasal cavity usually matures rapidly, and, as soon as the products of inflammation are discharged, either spontaneously or through surgical aid, the pain and œdema disappear.

Treatment.—Remedies which are homœopathic to boils in other parts of the body are generally applicable here. An effort should be made to destroy the tendency to a recurrence of these annoyances. The classical course of Sulphur may be all that is required to consummate this end. During the active stage of the abscess recourse may be had to one of the following remedies, which should be selected to meet the individual condition: Arsenicum, Arnica, Belladonna, Hepar sulphur., Calcareæ, Nitric acid, Nux vomica, Mercurius, Phosphorus, Phytolacca, Sulphur.

Accessory Measures.—If the pain and œdema are very great, palliation may generally be obtained by the application of a hot compress, or by the inhalation of vapor of water.

The writer has seen great benefit arise from the use of a pledget of cotton or wool, saturated with olive oil, and passed into the affected nostril, so as to keep the inflamed surface thoroughly moistened with the oil. The pledget may be introduced at night and allowed to remain until morning. It need exert only sufficient pressure to keep it in place at the vestibule of the nasal passage.

FOREIGN BODIES IN THE NASAL CAVITY.

It very frequently happens, especially in case of young children, that foreign bodies, either by accident or design, are forced into the nasal passages. A list of articles actually reported as having been removed from the nose would present an astonishing variety. Grains of corn, pumpkin and melon seeds, beans and peas, glass beads, marbles and pebbles, seem to be most in favor with the little people. Cases have been reported in which the seeds and grains which have found a lodgment in the nose have germinated, producing sprouts of considerable length. The inflammation produced in the nose by the pressure of a foreign body is frequently very pronounced, and chronic rhinitis, with *ozæna*, may result from it. Threatening brain symptoms have been known to originate under such circumstances, which were promptly relieved by the removal of the foreign substance. The presence of foreign bodies in the nose gives rise to symptoms which closely simulate ordinary catarrh and *ozæna*. Examination of the nasal cavity by means of the speculum and the probe will generally determine the diagnosis of these cases. The offending substance is usually found covered with a secretion which must be removed before the nature of the body can be determined. A portion of denuded bone is about the only thing which could be mistaken for a foreign body in the nasal cavity.

Treatment.—Effort should be made at once to remove the intruding substance. A fit of sneezing, excited by a pinch of snuff, may answer the purpose; if this fail, a spoon-shaped instrument or a pair of delicate fenestrated forceps should be employed.

B. DISEASES OF THE LARYNX.

BY JOSEPH SIDNEY MITCHELL, M.D.

ACUTE CATARRHAL LARYNGITIS.

Synonyms.—Simple and acute laryngitis; Cynanche laryngia; Angina laryngia; Inflammation of larynx; (French) Catarrhe laryngien; (German) Katarrhalische Kehlkopfentzündung.

Definition.—It is a simple inflammation of the mucous membrane of the larynx, sometimes involving the sub-mucous tissues, occurring

idiopathically or in connection with the exanthems, or during chronic laryngitis, being grafted upon it, usually terminating in resolution, but occasionally causing severe or even fatal œdema glottidis.

Ætiology.—The predisposing causes are sedentary, indoors life, and previous inflammation of the larynx. Males are more prone to it than females, and adults more than children. The greatest fatality occurs in youth. Four-fifths of all the mortality from acute laryngitis occurs in children before the tenth year.

Exciting Causes.—These are exposure to cold, especially cold and dampness applied to the back, neck and feet. Direct irritants, as dust, fumes of acids, vapors of iodine, bromine and chlorine; chemicals, as alcohol, spices, tobacco; swallowing hot water or caustic solutions. Mechanical irritants; shouting by sailors, military men, and others in command. State of the atmosphere; undoubtedly there are certain atmospheric conditions obtaining in the spring and fall which specially induce attacks of this form of catarrh. When an epidemic of influenza is prevalent, there is some unknown specific exciting cause. Why the laryngeal mucous membrane should be selected during one epidemic is a mystery. At the present time there is an epidemic of influenza raging in Chicago which has a special predilection for the larynx. Scarcely a case attacked fails to present the characteristic symptoms, in greater or less degree, of this affection. No inconsiderable number of cases occur from the use of too strong local applications. The laryngeal mucous membrane is richly endowed with sensitive nerves, and should be treated gently. It seems to be the idea of some laryngoscopists that strong applications can be made with impunity.

Pathology.—In mild cases we have a fiery red appearance of the whole mucous membrane, or the congestion may be confined to the epiglottis, ary-epiglottic folds, ventricular bands, inter-arytenoid space and the arytenoids, and particularly the posterior ends of the vocal cords. The vocal cords may be affected, though more rarely. Sometimes there are spots of ecchymosis. The rosy hue may not be seen after death, because the laryngeal mucous membrane is rich in elastic fibres, and the blood may be pressed out by their contraction. If there is no swelling of the mucous membrane, there is no impediment to deglutition or respiration, but we may have pain, hoarse voice, and hoarse cough. Infiltration may involve the mucous membrane, particularly in the congested regions, and it accordingly increases in volume, is moister and more flabby. It may affect the glottis and cause dyspnoea. If the sub-mucous tissue is involved we have greater swelling and œdema glottidis more marked, which condition we shall later consider. The epithelium is altered, the cells are not all well formed, and there is partial destruction, all these low forms stopping short, however, of ulceration. The secretion is changed. At first it is

clear and sticky, then tenacious, later muco-purulent, and, may be, purulent. Abscesses may occur during the stage of acute inflammation, but they are rare.

Symptoms.—An attack usually begins with rigors, slight or quite pronounced, followed by a distinct febrile movement. The patient then complains of sore throat, feeling of soreness in the larynx, burning, tickling, sensation of constriction as of a foreign body present. Speaking or coughing is at times very painful. In one instance, under my observation, of severe acute laryngitis in an adult, the pain was so intense on coughing that he felt as though one more paroxysm would kill him. Sensitiveness to external pressure is often present, though not always. The cough is hoarse, barking, and generally occurs in severe paroxysms, though in some exceptional instances it is only moderate. If the vocal cords are thickened, bulge forward, and are thrown into strong tension, we have the sound of a bark. The voice is hoarse, deep, cracked, and there may be complete aphonia. Two patients lately treated presented the latter symptom with laryngeal catarrh of slight degree. This symptom may be due to the swelling of the vocal cords, thus preventing vibrations, or to a swelling of the ventricular bands which press upon the vocal cords and thus interfere with their tension. Cracking of the voice is due to approximation of the swollen vocal cords covered at points with mucus. The expectoration is scanty at first, only, we presume, because the amount of mucous membrane involved is small. It is about the same in quantity according to the surface affected as in other inflammations of the mucous membrane. In the early stage it is clear and glassy; later, from mingling of epithelial cells and mucous corpuscles, thicker and more turbid; still later, as pus-cells are more abundant, it is yellow and purulent. If there is considerable swelling of the mucous membrane, dyspnoea may exist, and, if the sub-mucous tissue is much involved, it may become urgent, and threaten suffocation.

Course and Termination.—It lasts from several hours to five days, generally terminating in recovery, rarely going on to œdema inducing collapse and death. There is a form of sub-acute laryngitis with congestion which merely gives rise to a slight cough and hoarseness, soon passing away.

Therapeutics.—**Aconite**, earliest stage, particularly in children; fever, dry skin, roughness of the throat; hoarseness, sensitiveness to air; expectoration slight, thin and frothy; often the only remedy needed.

Belladonna.—Flushed face, aphonia, perspiration, sleeplessness, dry cough before midnight; much vivid redness; sensation as of dust in the larynx, or of constriction; painful deglutition.

Hepar sulph.—Hoarse cough, rattling of mucus in the larynx, muco-purulent secretion, dyspnoea, tickling; useful often after Spongia.

Lachesis.—Purplish mucous membrane, dry violent cough.

Phosphorus.—Dry spasmodic cough, scanty, blood-streaked expectoration, aggravated by speaking.

Spongia.—Cough barking, hoarse, hollow, and dry; wheezing inspiration without expectoration or with tenacious mucus, yellow and lumpy; aggravation before midnight.

Tartar emetic.—Dyspnoea, pallor of countenance, rattling cough, accumulation and rattling of mucus in the throat.

Accessory Remedies.—Hyoscyamus, Ipecac., Nitric acid, Sanguinaria canadensis, Stannum.

Prophylactics.—Bathing the throat and back of neck every morning with cold salt water freely, tends to lessen the frequency of the attacks. Those subject to this affection should accustom themselves to but little covering about the throat.

Adjuvants.—Inhalation of hot water with a steam-atomizer is often very serviceable. Scarification will only need to be resorted to in case of œdema glottidis, which will rarely occur after use of the above-mentioned remedies.

ŒDEMA GLOTTIDIS.

This disease should be more accurately termed œdema laryngis. It is an inflammation attended with marked infiltration, notably of the arytenoids, epiglottis and the glottis, with a serous or sero-purulent fluid. There is a form described by Dr. Green called sub-glottic, in which the infiltration is beneath the vocal cords.

Ætiology.—It occurs during attacks of acute laryngitis and pharyngitis; traumatically, from the deglutition of hot and caustic liquids. Secondly, it follows scarlatina, measles, typhoid fever, Bright's disease, and any disease resulting in anasarca. Also, it arises in the chronic laryngitis of syphilis or tuberculosis and carcinoma of contiguous parts. Tumors of the cervical region, wounds of the throat and neighboring parts have induced it. It is more frequent in "alcooli-ques," and in men than women, and generally in those of broken-down constitutions. Its exciting causes are exposure to cold and moisture.

Pathology.—We have an inflammation of the mucous membrane which only differs from that of acute laryngitis by a more marked serous effusion and a less degree of hyperæmia. Inspection shows the enlarged epiglottis projecting like a bladder. With the act of retching the ary-epiglottic folds may be seen bulging into the larynx. The ary-epiglottic folds and ventricular bands may be swollen into one mass, leaving only a chink for the passage of air. Palpation may detect them. The narrow chink is rendered smaller during inspection, as the swollen parts are thus pressed together.

Symptoms.—There is tenderness and pain on pressure, a sensation of constriction, dyspnoea, and a whistling, stridulous sound, increasing to impending suffocation, with great lividity of countenance. There is cough, not always attended with expectoration, and difficulty of swallowing, feebleness of voice, hoarseness, aphonia. The patient is obliged to exercise great care during the act of respiration and also in attempt-

ing to swallow, as fatal results have quickly occurred during the effort to take food. The suffocative attacks tend to recur, and in one of these the patient may die. In the latter stages of the disease inspiration and expiration are both affected; in the subglottic variety the breathing is more stridulous.

Therapeutics.—**Aconite** controls the active hyperæmia so often present.

Arsenicum is the remedy, par excellence, for this affection; it especially covers the low tone of the organism which is incident, and it directly affects the œdema; it promotes the absorption by restoration of tissue-force, and its action is generally prompt.

Aplis.—Not as useful in my hands in controlling œdema of the larynx as the above, but effective when there is soreness and stinging, and when the parts are not only puffy but glossy.

Lachesis.—Livid mucous membrane, and suffocative attacks very urgent.

Accessory Remedies.—Iodine, China, Rhus, Stramonium.

Scarification will be necessary in case there is suffocation, and fatal collapse is impending. It may be accomplished with a curved bistoury, wound to within one-third of an inch of the end; guided by the finger, it may be passed to the swollen upper portions of the larynx. A number of incisions should be made. Some relief may be obtained by scarifying freely the posterior wall of the pharynx. Buck has devised a laryngeal knife especially adapted to this purpose. If care is exercised, no harm can be done with the scarifier. It is, of course, needless to say that particular attention should be paid to avoiding the vocal cords. There is usually no great hæmorrhage; if there is, ice and external pressure may be required.

CHRONIC LARYNGITIS.

Definition.—It is a chronic inflammation of the mucous membrane of the larynx, with hoarseness and cough, often spasmodic in character.

Ætiology.—It rarely follows acute cases. It may arise from extension of inflammation from chronic pharyngitis. Its slow development sometimes occurs after comparatively insignificant acute attacks. During the course of phthisis and syphilis it is of frequent occurrence.

Symptoms.—**Subjective.**—The most common is the hacking or hemming induced by a desire to clear the throat. There may be tickling, pricking, stinging or burning, and feeling of fulness and tension.

Objective Symptoms.—There is alteration of the voice, from hoarseness to complete aphonia. The hoarseness is very apparent after rising, and improved by the use of the voice. If the vocal cords do not approximate well, the voice is strong when first used, and grows weak. Tenor voices show this most prominently. The tenor robusto will sing strongly to the end of the opera, while the feeble tenor voice will begin to weaken long before the close.

Laryngoscopic Appearances.—Hyperæmia may be observed, which may be partial or complete. The order in which the mucous membrane in different parts of the larynx is involved by this hyperæmia is: 1st. The cartilages of Santorini. 2d. The ventricular bands. 3d. The epiglottis. 4th. The ary-epiglottic folds. The injection is generally arborescent when the epiglottis is involved, and linear if the vocal cords are implicated. One vocal cord may be bright red, while the other is white. A mucous secretion adheres to different parts of the larynx. In old cases the larynx may look dilated, and the mucous membrane is bathed with considerable secretion, or it may be dry and shining, giving us the atrophic form of catarrh. The vocal cords may not approximate, since the thickened mucous membrane prevents the proper action of the muscles. The nature of the expectoration varies with the stage. Its quantity is usually said to be small, but probably equally extensive with that from other inflammations of other mucous membranes. It should be remembered that there is only a small quantity of mucous membrane involved in the inflammatory process. In bronchial inflammations, on the contrary, a very large mucous surface may be attacked.

Course and Termination.—The development of the disease is usually slow, and being once established it remains permanently, or the inflammation may subside, and another attack recur. It is specially prone to be recurrent. CEdema may set in, but this is of rare occurrence. In many cases it is the forerunner of phthisis. Phthisis does not result from it, that is, it is not the originator of the disease; the laryngeal congestion is part of the tuberculous diathesis. All cases of chronic laryngitis should be carefully watched for symptoms of pulmonary phthisis. In a great proportion of cases of persistent or recurrent chronic laryngitis, sooner or later the history shows that phthisis will obtain. The treatment, therefore, is of unusual interest, since through the careful watching of the case we may be put upon the track of the earliest manifestations of phthisical inflammation in the lungs.

Diagnosis.—The hyperæmia with masses of mucus upon the membrane should be carefully observed. The tumefaction generally is not considerable. It differs from œdema glottidis, which has a bright color and transparent appearance.

In laryngeal phthisis there is a dull or anæmic appearance and thickening of the parts. An examination of the lungs usually enables us to make the diagnosis.

Prognosis.—This affection is not fatal in itself, but may be the initial stage of phthisis; the swelling over the capitulum Santorini is an early sign of this disease.

Therapeutics.—The *treatment* for the acute grades is the same as that already given in acute laryngitis.

Hepar sulph. has done so much for me that I consider it the most effective of all remedies. Its use in cases occurring in professional singers has been attended with such success that I do not hesitate, on taking the case, to express the belief that not only the laryngeal inflammation will be relieved, but that a manifest improvement will be apparent in the quality of the voice.

Causiticum is of service for the paralytic weakness which sometimes remains after the mucous membrane has been restored to its normal condition. It is not a centric paralysis, but simply due to the irritated condition of the muscles remaining after they had been rendered somewhat sodden by the inflammatory process.

Arsenicum, useful for nervous, irritable subjects, with burning in the larynx, cough occurring in paroxysms, expectoration scanty, lumps of gray mucus in the morning.

Iodine is peculiarly adapted to catarrhal subjects, and is specially indicated when the larynx is sore in one spot, in follicular inflammation; expectoration sticky and scanty.

Iodide of potassium.—Dryness, burning, irritation, feeling of a lump; expectoration free.

Nitric acid, in violent paroxysmal cough with rattling of mucus, difficult to expectorate.

Sanguinaria, tough, thick, offensive blood, streaked sputa, cough at night, abundant expectoration of white mucus, bad smelling, sometimes blood-tinged.

Tartar emetic, pallor, abundant expectoration, whitish and thick, does not expectorate as easily as its sound would indicate.

Selenium and the Seleniate of soda are recommended by Meyhoffer in cases of follicular laryngitis. My own experience has proved the value of these preparations.

Phosphorus, when the voice tires easily after using it; dry cough; blood-streaked yellow expectoration from pus-corpuscles. In the catarrh of phthisical persons it is exceedingly serviceable.

Local Applications.—Inhalations are useful as palliatives. Glycerinated water, one part of glycerine to four of water, is excellent in cases of atrophic catarrh characterized by lack of secretion, when the mucous membrane is not over-susceptible to this substance. Hot water affords relief in the more acute grades. Chloride of potassium, 5 grains to the ounce of water, has an excellent effect as a stimulant; also, Chloride of sodium, 5 to 20 grains to the ounce of water. Saline inhalations exercise a tonic power over the mucous membrane. Persons accustomed to bathing at the seashore can testify to the rapidity with which the action of the sea-water cures stubborn cases of nasopharyngeal or pharyngeal catarrh; its effect is equally efficacious upon the laryngeal mucous membrane. Carbolic acid, 2 grains to the ounce, when there is a high degree of irritation with dry mucous membrane, may prove of value.

Argentum nitricum should be used in follicular laryngitis, in a preparation of $\frac{1}{2}$ grain to one grain to the ounce of water. Iodine, a single drop in an ounce of water, as an inhalation, and three drops to one drachm of glycerinated water to be applied locally with a brush, is also of service in the follicular variety. The use of local applications is not frequently required when the homœopathic remedies are administered internally, but their excellent palliative effect, at times, cannot be denied.

The above solutions may be inhaled from the steam atomizer for five minutes twice daily. I believe, notwithstanding the doubt recently expressed, that this method will effect a saturation of the parts to the necessary degree.

PERICHONDRITIS LARYNGIS.

Definition.—An inflammation of the perichondrium of the larynx, followed sometimes by chronic inflammation and caries of the cartilage.

Ætiology.—It is very rarely a primary disease, but follows usually tuberculosis, syphilis, and typhoid fever.

Pathology.—The mucous membrane is infiltrated over the affected parts, the cartilage thickens, a grayish abscess may form, and the whole cartilage slough. The cricoid and arytenoid cartilages are the most frequently affected; the thyroid may also be involved.

Typhoid ulceration follows usually the inter-arytenoid fold, and the ulceration may become rodent and thus affect the cartilage. When an abscess forms, the pus may escape into the trachea, find its way externally, or cause death, if confined, with same symptoms resembling those of a fatal attack of œdema glottidis. Laryngoscopy shows inflammation, tumefaction, ulceration, and loss of substance. The seat of the attack may be detected, also the seat of the abscess, if one has formed. If the abscess involves the thyroid, it will be below the vocal cords; if it involves the cricoids, just under; if the arytenoid, it will be above the glottis.

Symptoms.—The pain is characteristic, dull, aching in character, at times burning or boring. There is dysphagia which may become extreme in case of the formation of an abscess. Hoarseness, proceeding to complete aphonia, may obtain. Dyspnoea may be present, and in the graver pathological conditions become very serious. The formation of the abscess gives rise to the characteristic pain upon pressure, external swelling and tenderness. The diagnosis is rendered easy by laryngoscopy; the enlargement of the cartilage is significant. There may be extensive hyperæmia, or it may be very moderate, save over the affected part. The ulcers, or abscess, if present, are apparent.

Treatment.—Support the general system with milk, beef tea, or other easily assimilated nourishment. Arsenicum meets the debilitated condition which is incident to the affection, and is also specially indicated when there is burning pain, sense of soreness, and disposition to œdema.

Silicea is of service when the ulcerative process has been established.

Sulphur is indicated when there is purulent expectoration, pain on deglutition.

Locally, Fowler's solution, 18 drops to 6 ounces of water, inhaled four or five minutes, two or three times a day, is beneficial.

LARYNGEAL PHTHISIS.

Synonyms.—Tuberculous laryngitis; Helicosis laryngis; Phtthisis laryngie; Kehlkopftuberculose.

Definition.—A chronic inflammation of the larynx with thicken-

ing and ulceration of the laryngeal tissues, attended with chronic hoarseness or aphonia, dysphagia, and the symptoms of phthisis.

Ætiology.—The chief predisposing cause is the tubercular diathesis. The view of Niemeyer and of his followers, that there is a catarrhal inflammation which gives origin to some forms of phthisis which are not tubercular, has many adherents. At one time this seemed satisfactory to my own mind, but experience leads me to take a step backward, as it seems, to the old view of Laennec, which is that all these old forms of interstitial inflammation are really the result of a specific diathesis, and different modifications of the inflammation are merely the results of individual tendencies influenced by hygienic surroundings and other modified circumstances. All debilitating influences hasten the outbreak. Exposure to cold acts as an exciting cause, and so do irritants. The person with latent disposition may escape the influence of an exciting cause, but usually does not, as the tendency is so strong that an insignificant cause determines the attack. Hence, whole families may succumb. Generally, the lung complication precedes, but exceptionally the laryngeal phthisis is the forerunner of the general disease. In one instance which came under my observation, the patient had been in former years affected with chronic laryngitis, hoarseness, and feeble voice. Finally laryngeal phthisis supervened, afterwards pulmonary phthisis, and death. Having had an opportunity to follow this case for some twenty-five years, I was enabled to notice the unerring sequence of events. Mackenzie has had cases of laryngeal phthisis which did not show pulmonary trouble after careful physical examination, but he has only been present at three autopsies of laryngeal phthisis where no sign of pulmonary involvement was present.

Pathology.—First, anæmia is early noticed, and when not dependent upon any other known cause, it is particularly significant. Second, the hyperæmia is not so extensive as in chronic laryngitis, but is more pronounced. Third, thickenings occur usually by serous infiltration, involving the ary-epiglottic folds and ventricular bands. The infiltration of the epiglottis and ventricular bands is at times semi-solid. Fourth, ulcers may form; these are at first small, but join and produce larger. The racemose glands of the under surface of the epiglottis and ventricular bands are early involved. The processi vocalis are also involved through mechanical irritation. The ulcers are at first of the size of a pin-head, and may increase to that of a shilling. The worm-eaten appearance which has been described is due to numerous pin-head ulcers. The destruction of tissue is not often great, but the ulceration may be rodent, attacking the muscles, fibrous tissues, and, extending to the cartilage, form an abscess. Caries of the cartilage is more common from laryngeal phthisis than from all other causes combined. According to Mackenzie, necrosis of cartilage is due to inflammation of the perichondrium, which may be separated from the cartilage by

pus. Ossification precedes necrosis, and the cartilage may be left dark gray or black; it may be increased in size, or atrophied. The relative infrequency of graver pathological lesions under homœopathic treatment cannot be too strongly insisted upon; that many of these lesions are due to the destructive influence of tissue-destroying drugs, like Mercury and Iodide of potassium, seems probable. Rarely do we encounter in our cases the gravest phenomena so often referred to by classic writers. Only once in twenty years' experience in private hospital and dispensary practice have I had a patient suffering with severe dysphagia during the existence of laryngeal phthisis. The presence of true tubercle is rare. Rokitansky states that it is deposited in the form of gray granules in the sub-mucous areolar tissue, or infiltrated as yellow caseous matter beneath the mucous membrane, usually over the arytenoid muscles and arytenoid cartilages. Louis did not consider that tubercle was deposited in laryngeal phthisis, but found ulceration in one-fourth of the cases examined. Mackenzie has never seen the gray granules referred to by Rokitansky, but thinks the deposits consist of serous fluid, etc., and a few compound granule cells with molecular and granular matter. Meyhoffer says the secretion of pus takes place after the epithelium is destroyed; denuded patches appear, studded with small granules, out of which pus oozes freely. These granules are only mucous follicles, but these follicles are the seat of destructive inflammation. The ducts are not obstructed as in follicular inflammation, but are dilated and yield pus freely on pressure. Before long, complete destruction is the result of this diathetic inflammation. A deep cup-shaped ulceration is formed, which extends to the deeper structures of the mucous lining, and soon involves the subjacent and adjacent parts in the same destructive process, leaving nothing but one deep ulceration filled with pus. This seems the clearest statement of the origin and course of the ulceration with its pathological features.

Laryngoscopic Appearances.—In addition to what may obviously be seen, as just described, it should be again noted that the anæmia is characteristic; this anæmic appearance is also observed in the pharynx. Large, pale pyriform tumors formed by œdematous swelling of the ary-epiglottic folds and interarytenoid folds are observed. Sometimes only one side is affected. The cartilages of Santorini and Wrisberg may interfere, at first, with the pyriform shape, but later are involved in the general swelling. The diagnosis of the disease may certainly be made when these are seen. Mackenzie says, when these tumors are once established, this disease is as certain to terminate fatally as a case of tubercles or of encephaloid cancer. The epiglottis is often thickened, and its turban-shape is characteristic. Its enlargement may prevent the inspection of the parts below, and it may be rolled back upon

itself. The ulceration noted may be distinctly seen, unless some obstruction to the laryngeal image exists.

Symptoms.—The *subjective* symptoms of chronic laryngitis are generally present; burning, smarting, or sensitiveness to pressure. There is hyperæsthesia both of larynx and pharynx. It is usually extreme, but there are wide differences which may be noticed. Some cases of phthisis laryngis are easily examined. Others present such a high degree of hyperæsthesia that the operation is difficult, even after the use of remedies to control this symptom. Any one who has had experience in laryngoscopy will readily recognize the difficulty in some instances of securing a good inspection of the larynx, owing to the rapid gagging which at once occurs on the first effort to introduce the mirror into the fauces. Dysphagia is a later symptom, and is sometimes marked. Ordinarily, as above noted, we are able to control this symptom by the use of our remedies. When present, it is due to a thickening of the epiglottis, but may exist when the ary-epiglottic folds or interarytenoid folds are affected. There are cases where the dysphagia is so extreme that the patient would die of starvation rather than eat, unless the suffering is relieved by a strong application of morphia.

Objective Symptoms.—Hoarseness is one of the most prominent symptoms; when it develops in a case of pulmonary tuberculosis and continues for some little time, we may at once suspect the existence of laryngeal phthisis. If the lesion existed only on the posterior wall of the larynx, there might be no hoarseness, but this implication, with no other part affected, is rare. Aphonia comes still later and varies in degree. It is due to structural lesion, or may result from functional causes. The cough may be tickling, dry, violent or spasmodic in the advanced stages; Trousseau termed it a belching cough. Patients with laryngeal phthisis vary very much as regards the amount of cough, according to their physical sensitiveness. The expectoration has no special characteristic. It is generally muco-purulent; sometimes scanty, at other times quite profuse. In the well-established cases it is similar to the expectoration of pulmonary phthisis.

Treatment.—**Arsenicum.**—Mouth dry, red tongue, dry cough, scanty blood-streaked sputa; œdema, burning pain, flat bluish or red ulcers, separated laterally. There is emaciation and marked weakness. The recent testimonials of old-school authorities to the value of Arsenicum in wasting diseases is significant.

Belladonna is useful for the acute aggravations which occur.

Calcarea carb.—Marked scrofulous diathesis, gluey putrid sputa, perspiration, affecting hands and feet.

Iodum.—Ulceration, tightness and constriction, soreness of larynx referred to one spot, constant hemming, irritation, muco-purulent expectoration. It has a special affinity for this disease, and may be found useful in all stages.

Kali bichrom.—Loose croupy cough; excoriating pain, great hoarseness, yellow oval corroding ulceration; stringy expectoration with masses of tough muco-purulent sputa. It controls the cough in cases where it is indicated, and exercises a salutary effect upon the debilitated mucous membrane.

Merc. iod.—Increased secretion, especially in the morning; viscid saliva; hy-

peritrophic catarrh; parts swollen dark red. It controls the ulceration with abundant secretion better than any remedy.

Nitric acid.—Great irritation; redness or anæmia; violent dry cough: spasmodic, choking, and exhausting.

It will furnish, in some of the severe laryngeal coughs, brilliant results, relieving the attacks promptly and for a considerable period.

Seleniate of soda.—I have confirmed Meyhoffer's statement of its value, particularly in those cases which are characterized by the expectoration of small lumps of bloody mucus, and show a tendency to hoarseness. The remedy is best suited to the earlier stages of the disease.

Consult also Causticum, Drosera, Hepar sulph., Kali iod., and Sulphur.

Local Treatment.—Fowler's solution, fifteen drops to six ounces of water, a teaspoonful in an atomizing-cupful of water; inhale for five minutes, three times a day. This is specially useful in ulcerations. Under its use we see healthier granules spring up, and a more rapid healing; if the case is not too far advanced, the ulcerations may heal entirely. Glycerinated water, one part of glycerine to four parts of water, with the tincture of iodine, two to five drops to an ounce, may be used when the muco-purulent secretion is excessive. It not only reduces the amount of secretion, but exercises a beneficial effect upon the mucous membrane. Glycerine is exceedingly irritating to some throats; in such cases, its use is contra-indicated. Tannin, five grains to the ounce, also tends to diminish secretion. Carbolic acid, five to ten grains to the ounce, may be used as an antiseptic. Argentum nitricum, one to two grains to the ounce, as a stimulant. Mercurius cor., one grain, first decimal trituration, to an ounce of water. In the treatment by local applications, great care should be used that they are sufficiently mild. No good can be accomplished by irritating the larynx; if it is left sore and smarting for some hours after the use of a solution, injury is certainly done. The strength of the solution should be determined according to the irritability of each larynx treated. It is preferable to use the solutions with the atomizer than with a laryngeal brush, unless the operator is exceedingly skillful, and can apply the brush carefully only to the part which he desires to be touched. If the dysphagia is extreme, morphia, four grains to an ounce of water, should be used to allay the irritability. It may be applied with a brush to the posterior wall of the pharynx, to the glosso-epiglottic folds, and the epiglottis. Freely applied in this way, just before eating, it will afford the most marked relief and enable the patient to take many a comfortable meal which he would otherwise lose. It obviates the necessity in nearly every case of the use of the œsophageal tube or of nutrient enemata.

Diagnosis.—It is difficult at times to diagnose this disease from syphilis if we are not sure of the history; but if the ulcerations have an inflamed areola, are located in the pharynx and upper larynx, and tend to heal under treatment, not specially painful and of a more active grade, they are syphilitic. The swelling of the arytenoids, before mentioned, is diagnostic, as is also the anæmia. If the ulcera-

tions have a white base, and the mucous membrane surrounding them is pale, that is, if there is not much inflammatory process, and the ulceration exists in the lower portion of the larynx, at first, it is tubercular. It may be mistaken for follicular laryngitis, but these smaller ulcerations do not tend to separate, and there is more inflammation about the mucous membrane when they exist.

SYPHILITIC LARYNGITIS.

Syphilis of the larynx will never be encountered after judicious homœopathic treatment. This disease naturally does not extend beyond the tonsils and soft palate. If the larynx is involved, it is usually in the upper part, namely, the epiglottis and the interarytenoid commissure. The mucous membrane is congested, and ulcerations form which are superficial in the second stage. In the tertiary, they are deep, excoriating, with ragged edges and grayish base; they tend to heal in one place, while spreading in another, as does syphilitic ulceration generally. They may destroy extensively the mucous and submucous tissue, perichondrium, and the cartilage. The epiglottis is specially prone to be involved, and the destructive ulceration causes extreme dysphagia. Condylomata may occur, although authorities vary as to their relative frequency. There are jagged or smooth, whitish elevations, usually on the vocal cords, interarytenoid folds, or where there is mechanical irritation in the larynx. Gummata afford further evidence of tertiary syphilis; they are generally yellow projections, multiple, and followed by excessive ulceration.

Symptoms.—They are such as are common to any form of ulceration; the pain is not marked, as it so often is in phthisis laryngis. The offensive sputum is characteristic. Offensiveness seems to be the brand of Cain set upon all syphilitic exudations. The voice is altered and out of proportion to the lesion. Considerable contraction may follow the healing of the ulceration.

Treatment.—**Mercurius cor.**, 6th decimal trituration. This remedy promptly effects the healing of secondary ulcers, especially when attended with considerable secretion and an inflammatory areola about the ulcer, secretion of offensive sputa.

Kali iod.—Tertiary ulceration, particularly with tendency to rapid destruction of tissue. Special symptoms are: a dry cough, with burning sensation in the larynx.

Nitric acid.—Great soreness, bleeding, and marked irritability. The remedies recommended in laryngeal phthisis may be consulted also.

Bichloride of mercury, 1 grain to 2 ounces of water, by inhalation, will be found serviceable.

NEUROSES OF THE LARYNX.

These are, first, diseases of the motor system, and second, diseases of the sensory system. The first division includes paralysis of the muscles of the vocal cords and, second, spasms of the muscles of the vocal cords.

Paralysis may affect one of the vocal cords, causing what is termed unilateral paralysis, or both may be affected, giving rise to bilateral paralysis. The different forms result from implication of the various muscles of the larynx.

UNILATERAL PARALYSIS OF THE ADDUCTOR OF ONE VOCAL CORD.

Definition.—A condition in which one of the vocal cords not being drawn to the median line, an attempted phonation produces partial aphonia. Aphonia may also be induced by various inflammatory affections, as we have already seen, and by mechanical impediments to approximation of the vocal cords, namely, cicatrization or pressure of tumors,—indeed, there may be some change in the voice in nearly all diseases of the larynx. Aphonia may result from certain forms of cerebral disease, mild poisoning, etc., involving the spinal accessory nerve and the recurrent laryngeal fibres.

Ætiology.—It may result from simple inflammation, but more frequently from diphtheria than any other cause, though it may be the result of poisoning by lead or arsenic. It also may be due to cerebral disease, when it is associated with paralysis of the same side of the tongue or palate, or result from pressure on the pneumogastric or the recurrent laryngeal nerves. It may be due to pressure on the recurrent laryngeal by tumors. The laryngoscope shows that one vocal cord remains at the side of the larynx, and that the other is drawn to the median line. The mucous membrane of the affected cord is generally hyperæmic; there are no constitutional symptoms; aphonia is present, and also dyspnoea. There is slight loss of voice, and sometimes complete aphonia. Coughing, laughing, singing, and sneezing sounds are always altered in their character.

Pathology.—There may be atrophy of the crico-arytenoideus lateralis. Inflammatory exudations into the substance of the muscle may induce this form of paralysis. In one case, that of a choir singer, which followed a severe attack of laryngitis contracted in the winter, it was several months before the partial aphonia, which was most manifest in singing the lowest of a few notes, disappeared. No danger attends the condition, the amount of dyspnoea as a rule being slight; but when there are indications, such as paralysis of other organs, that the disease results from cerebral lesion, the prognosis is very grave.

Treatment.—*Nux vomica* and *Gelsemium* are very useful in this affection. The application of the laryngeal electrode of Mackenzie, by means of which one pole can be passed into the larynx and the other into the hyoid fossa, so that the current passes through the crico-arytenoideus lateralis, is advised. The patient's general health should be improved by the use of constitutional remedies.

BILATERAL PARALYSIS OF THE ADDUCTORS OF THE VOCAL CORDS.

This condition results in producing partial or complete loss of voice from non-approximation of the vocal cords on attempted phonation; there is dyspnœa which may be associated with paralysis of the posterior crico-arytenoid.

Ætiology.—Hysteria furnishes the largest contingent of cases; the condition results also from general debility. Cases of hyperæmia induce this form of paralysis, which obtains long after the congestion has subsided. Cases have been noted of intermittent aphonia said to be due to malarial effects. Mackenzie reports having seen it induced by cerebral lesions and from a tumor at the base of the brain. It may also follow the excessive use of the voice by professional singers or elocutionists.

Symptoms.—This condition also is plainly manifest on laryngoscopic examination. Direct the patient to phonate "ah" or "e," and it will be seen that the vocal cords do not move, or approach only moderately; in all instances there is a marked space between them. Since the vocal cords are fixed at the sides of the larynx, the condition may be termed bilateral paralysis with lateral fixture. The voice is partially aphonic; the cough is also without sound. In many cases coughing and sneezing are attended with some sound, showing that movements of a forcible character suffice to approximate the cords, but in laughing, when, it is well known, the expirations are feebler, there is no sound; the patient simply smiles. Generally the laryngeal mucous membrane is somewhat anæmic.

Pathology.—This disease is due to deficient nerve force in addition to the paralysis of the crico-arytenoidei lateralis; the arytenoides postici may be involved.

Prognosis.—It is generally favorable. In cases dependent upon cerebral lesion it is necessarily very grave.

Treatment.—Belladonna, Nux vomica, Gelsemium, and Causticum may be indicated. Faradization is recommended by Mackenzie; one pole should be applied over the thyroid and cricoid externally, and the other to the vocal cords. In this way Mackenzie has cured aphonia of eight or nine years standing.

UNILATERAL PARALYSIS OF THE ABDUCTOR OF ONE CORD.

In this condition one vocal cord is not drawn aside, but remains near the median line; upon inspiration, dyspnœa and stridulous breathing result; there is only slight alteration of the voice.

Ætiology.—Lesions which affect the pneumogastric or recurrent nerves may induce this form of paralysis; exophthalmic goitre, from pressure of the enlarged thyroid gland, also produces it. Enlarged bronchial and cervical glands may induce it in children. Carcinoma

of the œsophagus may also affect the recurrents. It is frequently caused by central lesions of the nervous system. Inflammatory conditions, giving rise to degeneration of the muscles, or to infiltration of them, may likewise act as a cause; also aneurism of the arch of the aorta and of the right carotid or of the carotids.

Symptoms.—This condition is also plainly observed by laryngoscopic examination. When the patient attempts to inspire, the affected vocal cord is not drawn to the side, as is normal, though its inner edge does not remain exactly in the median line. The cords are often hyperæmic. The exact condition may be described as unilateral paralysis with central fixture. Dyspnœa occurs on the slightest exertion, as may be expected from the mechanical condition, but there is not as much dyspnœa or stridulous breathing when one cord is affected as when both are involved. There may be, owing to the marked influence upon respiration in this form of paralysis, signs of constitutional disturbance, such as irritative fever.

Pathology.—Post-mortem examination shows that the muscle on the affected side is wasted, while its fellow on the opposite side is healthy and well nourished. In tumors, the affected laryngeal nerve has been found to be thoroughly incorporated with its mass, so that it was impossible to trace its course.

Prognosis.—The condition is exceedingly grave, as may be understood from a consideration of its ætiology, and an unfavorable opinion should usually be given. There is some hope that relief may be obtained through Faradism or Galvanism, either the electrodes of Mackenzie or those of Ziemssen being employed. If symptoms of suffocation are urgent, tracheotomy may be required. This condition may also be favorably affected by Belladonna, Nux vomica, or Gelsemium.

BILATERAL PARALYSIS OF THE ABDUCTORS OF THE VOCAL CORDS.

In this condition both vocal cords remain fixed at the median line; there is great dyspnœa and stridor on inspiration, attended with slight aphonia.

Ætiology.—The causes of this condition correspond with those which lead to paralysis of a single abductor; fortunately it is a very rare affection, the conditions which give rise to it being likely to more readily affect a single cord than both. It may result from a catarrhal inflammation, giving rise to infiltration of the muscle, or from syphilis inducing a degeneration of the muscular structure, or it may be the result of hysteria.

Symptoms.—Laryngoscopic examination shows that the vocal cords are not separated during inspiration. Bilateral paralysis with central fixture is the real condition. There is a slight space between the cords which is not generally changed except in forced expiration, when there is complete approximation of the cords. The cords are

usually slightly hyperæmic; the voice is natural, or it may be harsh. When the patient remains at rest, respiration is not seriously affected; a slight effort, however, induces dyspnoea and stridulous breathing with a croupy cough. Suffocative paroxysms occur, and in children we have the symptoms of laryngismus stridulus. Constitutional symptoms appear, namely, febrile movement and wasting; in speaking, the cords are not separated except to the measurement of one or two lines, and the lips of the glottis are drawn downward below their natural plane.

Pathology.—The condition is due to loss of power of the arytenoidei postici, and primarily results from deficient nerve force in the pneumogastric and recurrent laryngeal. The muscles are found atrophied after death, and there exists generally atrophy of the nerve structure.

Diagnosis.—Laryngoscopic examination enables us to diagnosticate the condition with certainty. The approximation of the cords during inspiration, with a narrow chink only one or two lines in width, is manifest, and their forcible opening upwards during expiration is also significant. The continued inspiratory stridor also renders the diagnosis easy.

Prognosis.—This is grave, not only from the danger of suffocative paroxysms, but from the fact that it results from serious lesions in other parts. In children or in adults, when inflammatory action supervenes, the danger from œdema glottidis becomes very great.

Treatment.—In cases resulting from hysteria, Ignatia may be of benefit; if we have a sodden condition of the muscles from catarrhal inflammation, Arsenicum and Nux are to be considered. If it results from syphilis, Mercurius sol. or the Iodide of potassium may be useful. Electricity, as before directed in other paralytic conditions, may be employed, but it is not generally effective. Tracheotomy must be resorted to if the suffocation becomes extreme.

PARALYSIS OF THE THYRO-ARYTENOID MUSCLES.

This lesion is either unilateral or bilateral, and is not uncommon, being found associated with paralysis of the crico-thyroid muscles and of the abductors of the cords.

Ætiology.—It may occur from violent exercise of the voice, particularly when there is inflammation of the larynx, or when the voice is changing.

Symptoms.—We have a coarse voice, its pitch is high, and there are pain and fatigue on talking. When it occurs with paralysis of the muscles above mentioned, partial or complete aphonia may obtain, or the voice be feeble. On laryngoscopic inspection the vocal cords are separated on phonation throughout their whole extent; in unilateral paralysis there is, of course, less gaping.

Treatment.—Nux vomica and Gelsemium act well in this condition. The Del Sartian or some other good method of exercising the voice should be employed; the use of the Faradic current has been followed by good results.

LARYNGISMUS STRIDULUS.

The most interesting of all the neuroses of the larynx is what is termed laryngismus stridulus, which is a spasm of the vocal cords, consisting of a sudden, temporary, and partial or complete closure of the glottis, with dyspnoea, stridulous breathing, and cessation of respiratory movements.

Synonyms.—Spasm of glottis, Millar's asthma, Asthma thymicum, False croup, Child-crowing; Laryngite striduleuse; Kehlkopf Krampf.

Ætiology.—The same uncertainty still exists concerning this part of the subject that has always attended it. Once it was regarded as exclusively of cerebral origin. Many cases are now known to arise from reflex irritation, and a strumous diathesis is undoubtedly a predisposing cause. Slight exciting causes in cases ripe for the disease suffice to induce an outbreak. The irritation of teething, indigestible food or parasites in the bowels do not sensibly affect healthy children, while a current of cool air over the surface will induce a laryngeal spasm in a proper subject. A rachitic state of the cranial bones has been noted in those who are subject to this affection. It may be central, that is, there may be hyperæmia or a serous exudation near the origin of the pneumogastric nerve. Disease of the cervical portion of the spinal cord is regarded by Marshall Hall as occasioning it. Hydrocephalus, in some cases, and mental emotions, terror, anger, etc., have induced a spasm.

Symptoms.—The attacks are minor or major. The child may be slightly peevish for two or three days previous to the attack; in minor cases it awakens suddenly with dyspnoea, and there is a crowing inspiration, similar to croup. These recur on succeeding nights or at other times. Under the influence of treatment, or because the child is especially vigorous, they may cease and there be no further trouble. If, however, the child is delicate or of markedly strumous diathesis, the lighter attacks increase in severity, or from the first the paroxysm may be violent. In the major cases, dyspnoea suddenly becomes very urgent, the inspiration is prolonged and has the characteristic long-drawn whoop, the eyeballs roll, the veins of the neck are turgid; carpopedal spasms occur; sometimes there is simply the flexing of the thumb; again, both hands and feet may be drawn. Rarely a general convulsion occurs. All sound of the voice may cease. There is complete closure of the glottis, and respiration is temporarily suspended; the bluish countenance gives way to pallor and then to lividity; for a few seconds the child is apparently dead, then, under the action of

stimulants, it resumes a few times, to resume again the stridulous breathing; there is now no spasm present. The child is weak and debilitated, but soon breathes as before. Several hours or days may elapse between the spasms, but they are prone to return. In case remedies do not control them, death may occur in one of the most severe attacks. There is no febrile movement.

The **Diagnosis** is easy. It only resembles croup, which has marked inflammatory action, and has not the entire absence of symptoms between the paroxysms.

The **Prognosis** is grave in cases dependent upon central origin; when due to reflex irritation it is much more favorable. The danger will, however, depend largely upon the child's dyscrasia; if it is markedly scrofulous, the case may be regarded as serious from the start. From my own experience I am not inclined to take so gloomy a view as some of laryngismus stridulus, though I confess to noting even the lighter symptoms with a considerable degree of anxiety. Thus far, in an experience of twenty years, I have only had one case die, and that was during a severe spasm which occurred in my absence. I had warned the attendants carefully how to proceed, as I had before done with success, but they failed to relieve the spasm.

Treatment.—The first object is to relieve the spasm of the glottis, which is done as follows: Quickly strip the child and place it in a hot bath, being careful that the water is not too hot; then pour cold water upon the head and chest. This simple expedient, promptly carried out, has never failed in my hands to bring a child at once out of a spasm. The inhalation of chloroform, so useful in many forms of spasm, may be of advantage, but its action is not generally prompt enough. If there is no relief to the apnoea, and the child is sinking fast, tracheotomy must be performed. In reflex cases, if the child is teething, the gums should be promptly lanced; if the stomach is loaded with indigestible food, an emetic should be administered; if there is preputial disease, a surgical operation should be performed at once. The spasms having been relieved, it is then of paramount importance for us to prevent their recurrence, which may be effected with remedies.

gelsemium is of great value. It approaches more nearly to a specific than any remedy we have. I rarely find it necessary to use any other. Four cases lately treated have confirmed my idea of its efficacy. I have used it in all forms of the disease. Its special indication is said to be a long inspiration with a short, sudden, violent expiration.

sambucus.—In cases when the patient awakes with a sudden attack, attended with marked dyspnoea, which usually occurs from midnight until morning. Alternation of perspiration and dry heat. Inspiration more labored than expiration, and cough not frequent.

chlorine.—In cases when the expiration is greatly impeded. Excitable children. The child is cyanotic and partially unconscious.

Consult also Aconite, Arsenicum, Belladonna, Iodine, Moschus, Ignatia, Cuprum, Nux vomica, Lachesis.

Varieties.—There is occasionally a serious form of spasm of the glottis attacking adults. The affection is of a hysterical nature.

DISEASES OF THE SENSORY SYSTEM OF THE LARYNX.

These are hyperæsthesia and anæsthesia.

Hyperæsthesia.—This is an affection very rarely met with. It manifests itself in an increased sensibility of the larynx, which is not dependent upon any inflammatory disease or organic change in its tissues. It occurs either as an intermittent disease or without periodicity. It manifests itself by a disposition to violent spasmodic cough. It is unattended with febrile movement or with any indications that it has resulted from exposure to cold. These attacks are not like those which occur in laryngismus stridulus, being merely violent paroxysms with the usual laryngeal characteristics.

I was called in consultation to see such a case more than six years since. The parents feared that the child was going into consumption, so constant and violent was the cough. There was no evidence, however, of its being of other than neurotic origin, and it yielded after a time to remedies based upon this theory.

Some cases are characterized by severe neuralgic pain, referable to the larynx. There is extreme sensitiveness to pressure, and an exaggerated sense of constriction; a feeling of a feather in the parts, or of some other foreign body, burning or scraping; in fine, merely an exaggeration of the sensations which are common to laryngeal affections.

Consult Aconite, Cuprum, Opium, Belladonna, Gelsemium, Lachesis, Ignatia. Locally: Inhalations of hot steam and a solution of morphia, four grains to the ounce, may be of service.

Anæsthesia occurs very rarely as a distinct disease. If the pneumogastric nerves or their laryngeal branches are diseased at their origin, or anywhere in their trunks, we may have a diminished sensibility of the larynx. If the nerve supply has been entirely cut off, either from pressure of a tumor or from destructive diseases, the sensibility may be entirely destroyed.

Romberg noticed that in cholera there is impaired sensibility of the larynx, and Mackenzie (*Reynolds*, vol. ii., p. 36) states that some morbid phenomena of a functional character, such as a vocalist's inability to produce certain notes which previously could be easily formed, are probably, in some cases where the larynx appears healthy, due to impaired muscular sensibility.

Treatment.—If the nerve supply has been cut off, it is, of course, impossible to right this affection. If it be due to debility resulting from cholera or from any severe acute disease, such as typhoid fever, the building up of the general health will be likely to restore the functional power of the larynx. As internal remedies, Gelsemium, Nux,

and Arsenicum will be likely to furnish relief, but the main reliance must be placed upon increasing the tone of the general system.

TUMORS OF THE LARYNX.

Definition.—These are new growths, either simple or malignant, existing as distinct tumors which project from the mucous membrane of the larynx. They are neoplasms, with a well-marked lining of demarcation from the subjacent tissues.

Synonyms.—(Latin) Polypus laryngis; (French) Polypes du larynx; (German) Kehlkopfpolyphen, Neubildungen im Kehlkopfe; (English) Polypus of the larynx, warts, neoplasms, excrescences and cancerous growths.

Ætiology.—While benign growths of the larynx have as their immediate exciting cause a local hyperæmia, resulting from chronic inflammation of low degree but persistent, we are of the view that there is a predisposition to their development which must be considered as resulting from another condition. While such eminent authorities as Mackenzie believe that neither syphilis nor phthisis predisposes, the opinion of other authorities differs.

Mackenzie states neither syphilis nor phthisis, nor any constitutional condition, appears to favor the growth of these morbid inflammations; indeed, both these diatheses appear to exercise an influence decidedly antagonistic to the development of new formations.

Solis Cohen mentions 66 cases of morbid growths, of which 31 occurred without apparent constitutional disturbance, 22 were associated with phthisis, and 8 with syphilis. The cases which have come under my own observation in the Central Homœopathic Dispensary have originated either from a phthisical or syphilitic basis. The persistent hyperæmia which results from syphilitic congestion would certainly favor the proliferation of connective tissue which lies at the foundation of these growths. The same natural formation of a soil favorable to neoplasms exists in phthisis. Dr. Mackenzie admits that laryngeal growths may occur in syphilitic persons as they do in health, but that syphilis does not appear to be a factor in their production. It is apparently true that tumors of the larynx occur less frequently in the special practice of homœopathists who treat the throat, which would argue that they are less common where milder applications are made to the larynx. The irritation induced by severe local treatment may, in my judgment, result at times in the development of these neoplasms. We cannot always ascertain the origin of these growths. When the predisposition exists, undoubtedly a local catarrh acts as an immediate exciting cause. They occur at all ages, being either congenital or found in those of eighty years, or more, most frequently in the male; from twenty to forty-five is the age at which they are most

common. Carcinomatous growths of the larynx result from peculiar states of the tissue which at present are not fully understood.

Symptoms.—Many of the symptoms which belong to tumors of the larynx are similar to those of chronic laryngitis, so it is not always easy from the subjective symptoms to be certain of the existence of a tumor; but there is, as Cohen says, a characteristic dull timbre to the intonation which is suggestive of mechanical obstruction, and differentiates it at once from the hoarseness and dysphonia of other cases. There is a sensation as of a foreign body in the larynx, which some patients observe; but with others there is no feeling of fulness or oppression in the parts. Most cases are not characterized by any pain. In some instances the presence of a tumor is not suspected at all from any subjective symptoms. A cough may occur, though it is not common, except in cases where the tumor is near the glottis, or when it is vascular and excites cough from hæmorrhage. In large tumors the cough resembles croup. We may have a dry, hacking cough, or moist, and attended with expectoration of considerable mucus, with the voice often changed, since tumors of the larynx most frequently originate from the vocal cords; growths which do not interfere with their vibration do not affect the voice. When they are situated between or underneath the cords, even though they are of small size, marked hoarseness results; if the growths do not project within the chink of the glottis, or impede vibration by pressure, there is no serious interference with the voice. The alteration of the voice is sometimes intermittent, occurring only when the phonation of the cord is temporarily interfered with. Complete aphonia is rare, and only occurs when a large growth fills up the rima glottidis. Dysphagia is common only in those cases in which the growth is large, and particularly affects the parts concerned in deglutition, or extends towards the œsophagus. Dyspnoea is present if the tumor is sufficiently large to materially interfere with the rima glottidis, or if its pressure impairs the action of the laryngeal muscle. Stridulous breathing exists in such cases. The expectoration is usually increased, and sometimes, in cases of morbid growths, particles of the tumor may be found in the expectoration. The dyspnoea will vary from slight impairment of breathing to threatened asphyxia.

Physical Signs.—On inspection, the external configuration of the larynx is found to be changed. If the tumor is large, there is a marked bulging of the external parts.

Laryngoscopic Appearances.—We have no difficulty in distinguishing by laryngoscopy the presence of a tumor, as well as the variety to which it belongs. The most common forms are termed *papilloma*. They are usually whitish in color, sometimes pink or deep-red. They vary in size from a grain of mustard to a grape; usually they are about the size of a split pea. Their development is most fre-

quently from the vocal cords, and they are generally mammillated, lobulated, or like a cauliflower excrescence, and are sessile and multiple.

Fibromata are generally larger, and occur less frequently. Their size is from that of a split-pea to a grape; about half the cases spring from the vocal cords; they are single and pedunculated.

Fibro-cellular tumors are more rare, and, according to Mackenzie, represent only about 5 per cent. of the laryngeal growths. They are sometimes of the size of a grape, but usually smaller; they are always pedunculated, and of a pale pinkish color.

Cystic tumors exist as round, egg-like projections of a white or reddish color, and with an area of congested mucous membrane around them. Their development is from the laryngeal surface of the epiglottis, or from the ventricles; they are filled with sebaceous matter.

Myxomata, *carcinomata*, *adenomata*, *lipomata* and *angiomata* are all exceedingly rare.

Carcinomatous growths are very irregular in form, and marked by the tendency to destructive ulceration or to thickening of the tissues. The most frequent sites from which carcinoma develops are the epiglottis and ventricular bands. According to the extent of the growth, there may be displacement of parts. The epiglottis may be pushed to one side, and the laryngeal folds may be swollen to such an extent as to obstruct the view of all the parts below.

Course and Termination.—The benign tumors are of slow development, and may not change their size, sometimes, for years. Undoubtedly, cases exist which afford so little trouble to the patients that their presence is never known; when, however, their condition becomes specially inflammatory, they are a source of great irritation, and tend to produce suffocation.

Epithelial cancer may exist without much pain, but usually deglutition is exceedingly painful and difficult; it is attended with expectoration and some dyspnoea.

Encephaloid cancer progresses rapidly, and the constitutional symptoms are grave. The difficulty of deglutition produces waste and prostration, and the tendency is eventually toward suffocation.

Pathology.—It is impossible to understand the tissue condition which gives rise to one form of morbid growth rather than another. In a general way we are able to assume that they are the result of some perversion of the nutritive process. Their basis is a local hyperæmia, but in view of the many cases which we have, in which local hyperæmia, even very persistent, does not result in the formation of any neoplasm, we are led at once to the belief that there is a special tissue-dyscrasia which influences their early formation and growth. In the order of frequency the growths are papillomata, fibromata, fibro-cellular tumors, cystic tumors, carcinomata, and lipomata. Three-fourths of all the laryngeal growths of a benign nature are papillomata.

Paget, describing these neoplasms, says: "In their general form and arrangement they have many points of resemblance, but on an enlarged scale, to the papillæ which, in various localities, constitute natural projections from free surfaces, more especially from the skin and mucous membrane. Their substance is formed of connective tissue, which is continuous with that which normally exists in the part, whilst the free surface is covered by the epithelium which may vary in thickness and its number of layers, according to the seat of the tumor. Blood-vessels and even nerves enter into the interior of the papillæ." From this description we are led to the belief that they are actual enlargements of the papillæ rather than conditions resulting from some perversion of the nutrition of these parts as they normally exist.

Cohen relates "in addition to these tumors, a curious form of morbid growth, consisting of bands of membrane stretching from one vocal cord to another." Microscopic examination of papillomata demonstrates that they consist of more or less perfect connective tissue clothed with layers of epithelium. Hydatids, cartilaginous tumors, and erectile growths are seen occasionally.

Diagnosis.—This is readily made by means of laryngoscopic examination. We generally distinguish the benign tumors from the fact that they are much more markedly defined, and rarely are found ulcerated, while the malignant growths are irregular, and attended with great thickening of tissue and, often, ulceration.

Syphilitic condylomata are irregular white elevations situated on the congested mucous membrane, and are not very marked as tumors. The history of the case, as well as the ease with which they disappear under anti-syphilitic treatment, aids in diagnosis.

Laryngeal phthisis is usually diagnosed from the co-existence of pulmonic lesion, and from a peculiar pallor and disposition to œdema. Abrasion of the ventricle is sometimes seen, but it occurs so rarely that there is little likelihood of an error of diagnosis in this regard. Ulceration of the larynx sometimes presents fungus-growths, but they have not the definite appearance of tumors.

Prognosis.—This depends entirely upon the form of tumor. The benign tumors are susceptible of removal, but carcinoma of either form always proves fatal.

Treatment.—Some of these tumors, particularly the papillomata, undoubtedly will disappear under the use of internal remedies. They should be faithfully tried when the case is not urgent. Calcareæ carb., Teucrium, Graphites may be employed against papillomata; Conium and Silicea against fibromata; Acetic acid for fibro-cellular, Apis and Arsenicum for cystic tumors; Arsenicum, Acetic acid, Aurum, Carbolic acid, Conium, Hydrastis, Lachesis, Kali hyd., Phos., Zincum against carcinoma.

The removal of the neoplasms is possible when the physician is an

expert in the use of the various instruments which have been devised by Mackenzie, Storck, Ziemssen, and others.

The treatment of these growths is especially difficult to one at all accustomed to the use of the laryngoscope and the introduction of instruments within the larynx. The majority of cases are undoubtedly removed, but their destruction is the result of crushing, which produces an atrophy of the growth. It is best to accomplish their removal with the tube-forceps or the *écraseur*. They may also be snipped off with the laryngeal scissors.

The galvano-cautery is not to be recommended, since it is apt to induce very severe pain and subsequent inflammation. The same can be said of caustic solutions which may, at the time of their use, induce a spasm of the larynx, with a possible fatal termination. In the case of very large growths, resort must be had to tracheotomy. No effort should be made to remove cancerous growths. The pain may be relieved by the internal administration of Arsenicum, Lachesis, or Conium, and by the inhalation of hot steam to which morphia has been added in sufficient amount to produce relief. It will be found that relief may be given for a long period of time by commencing the use of the anodyne in very light doses, increasing the amount very slightly as the absolute need of the patient requires.

CROUP.

Definition.—Croup is an inflammation of the larynx, at times extending to the trachea and bronchi, attended with an exudation on the mucous membrane, and inducing hoarseness, dyspnoea, a sharp ringing cough, and spasm of the glottis.

Synonyms.—Cynanche laryngis, Laryngo-tracheitis, Cynanche trachealis, Angina membranacea, Pseudo-membranous laryngitis, Sufocatis-stridula; Laryngite striduleuse.

True croup is not infantile laryngitis nor diphtheritic laryngitis; there is a distinct and separate affection in which, combined with the symptoms of laryngeal inflammation, there is an exudation which tends, primarily, to invade the larynx. The obscurity in which this subject has been involved, undoubtedly has arisen from the fact that the main sources of error have been in confounding the severe grades of infantile laryngitis without exudation and some cases of diphtheritic laryngitis. We shall see that a distinction can be established which places croup nosologically as an independent disease.

History.—There is so much confusion on this subject that it is not necessary to follow the history of croup closely. Home remarks that probably it has existed more or less in all ages, following some predisposing cause which must have been operative even as now. It has been confounded with pseudo-laryngitis, pertussis, capillary bronchitis, laryngismus stridulus, and diphtheria. Baillou first noticed croup

in an epidemic of whooping-cough in Paris in 1576. In England, Dr. P. Blair, in 1713, gave the distinctive points between it and whooping-cough, and first used the word croup, which signifies strangulation. F. Home, in 1765, established our knowledge of it as an acute inflammation of the larynx and trachea. The distinction was followed with varying accuracy by succeeding writers. Of late years, the most interesting question has been the identity or non-identity of croup and diphtheria, which has been discussed with great ability in America, France, Germany, and England by eminent men. The question is yet manifestly unsettled. The lines of demarcation, however, seem to us very strong. Diphtheritic laryngitis is not croup, as we describe it here. It is a distinct and different form of disease. In the tables of differential diagnosis given by Leischmann, Cohen, and others, differences are given which, though they may blend at times, are yet, to our mind, discriminative. The discussion on this subject is only another illustration of the futility of attempting to settle on a definite name for a train of symptoms. A *perfect* nosology will never exist until each separate case in each separate individual has a name. Hahnemann hit the nail squarely when he coined the phrase, "The totality of the symptoms constitutes the disease." The most suggestive points of distinction between the two diseases are as follows:

CROUP.

Asthenic and local inflammation.
 Not contagious.
 Larynx is attacked first.
 No paralysis.
 Sporadic usually.
 Rarely attacks adults.
 Always has exudation.
 Fatal by stenosis.
 Not inoculable.

DIPHTHERIA.

General and asthenic inflammation.
 Contagious.
 Fauces and nares first invaded.
 Paralysis often follows.
 Usually endemic or epidemic.
 Frequently attacks adults.
 May be without exudation.
 Death without impediment to respiration.
 Inoculable.

We do not believe it right to establish a difference between two diseases merely from the fact that in one the exudation takes place upon the free surface of the mucous membrane, and in the other within the tissue, but we do maintain, from the weight of evidence in the case, from the combination of all the clinical and anatomical facts, that it is possible to establish an absolute dissimilarity as between croup and diphtheria. If we accept the views of some standard authorities on these points, we see no reason why true croup should be in any way described separately from diphtheritic laryngitis, since it is regarded merely as a variety of this latter affection, which may occur in different forms.

The most convincing clinical distinctions lie in the fact that true croup, or membranous croup, begins with decided laryngeal symptoms, and that its exudation takes by preference the larynx. It is true, we may, at times, have an exudation extending into the pharynx, in-

volving its posterior wall, the soft palate and uvula, but its tendency is to the formation of the exudate in the larynx mainly. The exact opposite always occurs in diphtheria; at least, if there are exceptions to this rule, they are exceedingly rare. The exudate forms first on the pharynx, and it is generally many days, or a number of days, before the exudation involves the larynx. Diphtheritic laryngitis, therefore, is a secondary affection, while true croup is a primary one.

The secondary or symptomatic croup, which is described as following pyæmia, notably the exanthems, measles and scarlatina, and also that accompanying epidemic diphtheria, is undoubtedly diphtheritic in its character.

Ætiology.—Croup is a disease of childhood, occurring most frequently from the first to the tenth year, very rarely after that. It is not as common in the first year as in the second and third. Its greatest mortality is in the second year. Boys are attacked more often than girls, and suffer a greater fatality. Ruehle gives the proportion of boys to girls attacked as 3 to 2.

Climate has a great influence in its production. A cold northeast wind has a special quality which induces attacks of croup. A child may be exposed to a considerable degree of cold in our country without laryngeal inflammation, but the croupy sound appears after trivial exposure to an east wind. There is, undoubtedly, some peculiar characteristic which is possessed by a north or northeast wind, which directly influences an attack of croup; it is not the temperature, for after exposure to a west or southwest wind, with a far greater degree of cold, there is much less liability to attacks of croup.

Season has also its effect. The larger number of fatal cases occur in winter and spring. Summer and autumn usually have the least fatality. The character of the season has, however, great influence. A cold spell, with prevalence of damp winds, will result in the production of many cases, and in an increase in fatality.

Out of 467 epidemics of croup, collected by A. Hirsch, 159 belonged to winter (December, 56; January, 48; February, 33); 130 to spring (March, 51; April, 42; May, 37), 72 to summer (June, 21; July, 24; August, 38); and 106 to autumn (September, 22; October, 41; November, 42).

Predisposing Causes.—**First, Heredity.**—The children of phthisical, carcinomatous, or insane parents are particularly liable; the inexorable diathesis renders the offspring of these much more disposed to such attacks. Hereditary croup has always a taint behind it. A fine complexion and a florid face, though fair to look upon, are the heritage often of these children, and the sensitive skin renders them more susceptible to cold. It is difficult to understand why such an author as Steiner should assert that there is no evidence that scrofulosis specially predisposes to croup. He, however, admits that there

is a certain hereditary and family disposition to croupous inflammation in general, and to laryngeal croup in particular, but he does not believe that this hereditary predisposition is especially noticeable in children whose parents have been subject to tonsillar enlargement, or that it originates in scrofulosis.

The disease does not tend to recur. Steiner states that in an experience of more than 100,000 cases of the disease among children, he has never yet met with a single instance of true croup occurring twice. It is found that in the instances which have been recorded of attacks of croup occurring a number of times, the affection has been mistaken for false croup.

Food has no influence other than that good nourishment tends to ward off any form of disease. Ill health, from any cause, makes children more liable to croup.

The exciting cause is always some exposure to cold and dampness. It is found that dampness directly influences the prevalence of croup. The draining of marshes has been followed by a diminution in the prevalence of croup, as is shown by Crawford's observation (Ziemssen, vol. iv., p. 237). Cold, dry winds do not so frequently influence the attacks.

Symptoms.—The child is usually attacked towards night; there is, early, slight fever, with or without coldness, increasing often rapidly; hoarseness is generally present, but may be of moderate degree. The cough has its peculiar characteristic form, though it may occur infrequently for a day or two. The first night the child usually sleeps well, awakening only once or twice; the second night the febrile movement is rather increased, and the peculiar hoarse, ringing sound of the cough more pronounced. There is no coryza; indeed, the secretions seem checked. The urine is particularly prone to be diminished. The pharynx will be found hyperæmic; sometimes the redness is slight, and sometimes quite intense; there is also enlargement of the tonsils. These are the phenomena of the first stage.

Between 9 and 12 o'clock, usually, on the second or third night, the child awakens with decided dyspnœa; it starts in a fright, the eyes stare, terror is depicted on its face; the inspiration is wheezing, prolonged, and stridulous, especially after the cough. The expiration is prolonged; the face is red, then purple; the child clutches at its throat and extends its arms. Every effort at coughing produces a harsh, ringing, and barking sound; eventually, there may be little or no sound when the child coughs. The dyspnœa, which is always present, is due to a veritable spasm of the glottis. The irritation may extend to the terminal nerve filaments of the bronchioles, and add very much to the apnœa. The attacks of dyspnœa may last a few moments or, exceptionally, an hour, or more, but they tend to recur. There is rarely enough exudation to produce complete stenosis. When the dyspnœa

is great we have inspiratory retraction. During inspiration the chest expands without sufficient air entering, a partial vacuum is formed, and the epigastrium sinks. The respiratory movements are also deficient in power. These are the symptoms of the second stage.

At times, during the progress of the dyspnoea, we have what are termed the suffocative attacks. The child is intensely restless, calls out to be walked, and, after having been walked awhile, begs to be placed back in bed, then rises to insist again upon movement; if in bed, kicks off the bed-clothing; the face shows the greatest anxiety; the veins are swollen and the eyes protrude, and there are, in fine, marked indications of impending suffocation. After these attacks we have the third or last stage, that of asphyxia.

In addition to the dyspnoea, we have carbonic-acid poisoning. Instead of the flushed face, the skin grows pale and of a shining hue; instead of an agitated look, the expression becomes indifferent and dull, the eyes droop, and there are all the indications of languor and depression. Cyanosis obtains to a considerable degree in all portions of the mucous membrane which are visible. The respiratory movements are more quiet and superficial, and we lose the pronounced stridor. At times, there are violent efforts made for breath, but the patient soon sinks again into a comatose condition. At this time there is a very rapid, feeble, and intermittent pulse. The extremities are cold, there is loss of sensibility in the skin, the perspiration is cold and clammy; there is partial unconsciousness and, sometimes, slight convulsive movements, and the fatal result occurs, if it takes place at this time, from exhaustion. Sometimes it is not possible to establish any line of demarcation between the different stages. In what is termed the fulminant form, the child awakens suddenly on the first night with all the symptoms of intense dyspnoea, such as we have in an ordinary case of false croup, but, from this time on, the symptoms rapidly increase in severity, suffocative attacks soon appear, and the stage of asphyxia follows closely.

Special Symptoms.—Breathing.—The peculiar breathing of croup, which gives it its distinctive character, and which has the sound which is most dreaded by the parents and physician, is due to the fact that, notwithstanding the labored breathing, only a small quantity of air is able to pass through the narrow glottis. There is prolonged inspiration, and a wheezing, whistling, snoring sound, sometimes heard for a long distance. It has a sibilant, tubular, metallic quality, and its pitch is high. In one case which was under my charge, it was scarcely possible to find any part of the house so distant that the distressing sound could not be heard. The expiration is marked, and accompanied by the rattling of mucus, and is distinguished from the sharper and sawing nature of the inspiratory sound by its low tone and snoring quality. The breathing usually continues to manifest

these characteristics from the time the second stage is reached until the end, or until there has been relief to the dyspnoea.

The **respiratory sounds** are also distinctive; they are notably deficient, but if, during the prevalence of dyspnoea, they become increased in frequency, they are not effective. The supra-clavicular spaces are depressed during inspiration; the intercostal spaces do not bulge, nor do the chest-walls expand to the normal extent. The inspiratory retraction, which has been before noticed, is significant of marked dyspnoea. The febrile movement is not marked after the first or second day. The temperature may rise as high as 102° or 103° , but ordinarily it will be found to be about 100° , and on the third or, at least, the fifth day, it will subside. In those cases where it is found up to 104° or $105\frac{1}{2}^{\circ}$, we shall find that extensive bronchitis or pneumonia exists. The pulse, early, is full, hard, and from 120 to 130. In the second stage it continues at about this rate, except that during the suffocative spells it may rise 20 or 30 beats; in the last stage it becomes very rapid, 160, or even 180, small, compressible, and intermittent. A persistent high temperature is significant either of diphtheria or catarrhal laryngitis.

The **dyspnoea** is one of the evidences of the disease. It is the result of laryngeal stenosis, and marks the advance of the second stage. The respirations rise from 28 to 32 per minute, sometimes more; all the accessory muscles are brought into play. The child throws the head upward with each respiration, somewhat after the manner of the asthmatic. His whole efforts are bent upon expanding the chest. The inspirations grow more labored as the laryngeal contraction increases; the mouth is opened widely. The alæ nasi now contract, and again are widely open; the larynx is depressed after each inspiration, and the cartilages of the lower ribs are drawn inwards.

Different opinions have been expressed as to the cause of this dyspnoea. Niemeyer has advanced the view that it is dependent mainly upon paralysis of the laryngeal muscles. He regards this paralysis as the result of the infiltration of the mucous and sub-mucous tissues which exerts pressure upon the muscles and renders them sodden and powerless. An important clinical fact is brought out by this consideration, for in paralysis of the laryngeal muscles inspiration is affected, being rendered prolonged and stridulous while the expiration is easy; difficulty in both inspiration and expiration indicates that there is an exudation, or a contraction of the glottis from œdema.

I once had an opportunity to make a post-mortem examination in the case of a child that had died from a severe attack of false croup, which, throughout its history of eleven days, simulated constantly the symptoms of membranous croup, with the exception that there was at no time evidence of exudation. We had, however, every other symptom characteristic of membranous croup. The child died during one of the suffocative attacks. There was no evidence of any membrane

in the larynx, nor was there any evidence of the severe dyspnoea to which the child had been subjected; there was a slight trace of œdema glottidis, but entirely insufficient to account for the dyspnoea and prolonged stridor. The parts were not hyperæmic, though, of course, this is explained by the well-known fact that the laryngeal mucous membrane is rich in elastic fibres, and we often find it free from hyperæmia after death, when previous laryngoscopic examination had shown an intense degree of congestion. This case of stridor and dyspnoea, which was worse upon inspiration, was undoubtedly due to inflammatory extension so far affecting the muscles as to interfere with their proper action. There was no evidence that the difficulty was in any way due to central nervous lesion.

Rudnicky* claims that the dyspnoea of croup is due to lack of co-ordination of the respiratory movement from nervous irritation. He insists that there is a special disturbance of the nerves, and that it may be outside the larynx. He refers to the fact that the branches of the superior laryngeal and recurrent nerves have many ganglionic cells, which are provided before their separation into muscular subdivisions. They are true ganglia, from which distinct bands of nerve fibres may extend to the muscular layers of the larynx. Rudnicky contends that Niemeyer's theory is not correct, as was evidenced from laryngoscopic examinations which he made, demonstrating that the vocal cords move as usual during the existence of croup, thus showing there could be no paralysis. Ziemssen (vol. iv., p. 242) regards the dyspnoea of croup as the combined result of several causes, acting together or in succession, the most common of which is, undoubtedly, a mechanical one, namely, the swollen, relaxed, and intensely-congested state of the mucous membrane of the larynx on the one hand, and the false membrane and muco-purulent secretion on the other. He says that every one who has had frequent opportunities for observation after death of the anatomical changes in the larynx of children, and who considers how little is needed to block up the glottis in such patients, must be justified in inferring the intimate causal connection between the dyspnoea of croup and the changes referred to. He cites cases in which the most marked dyspnoea is observed in children during life, without any croupous membrane being found after death, and in which the anatomical changes are out of proportion to the symptoms of stenosis; he states that in more than one hundred cases of fatal croup among children, he has been always able to find the false membrane in the larynx, though, of course, more intensely and more widely developed in some cases than others. But the single case to which I have just referred, shows that a fatal dyspnoea may obtain without the presence of the slightest amount of exudation. This shows that even in true

* Wiener Med. Wochenschrift, Nos. 323, 324, 325, 1873.

croup it is not necessary that the exudation must be the sole cause of the dyspnœa, and we may reasonably believe that if we can control the œdema and the spasm of the glottis, we may apprehend comparatively little danger from the exudate, unless its quantity be so great as to completely fill up the larynx.

In one case, which I had the opportunity of examining through the kindness of Dr. S. P. Hedges, the larynx was completely filled with a tough, fibrous exudate, so that it would apparently have been impossible for the smallest quantity of air to enter. Indeed, it seemed as if the exudate and laryngeal structures were simply one solid mass.

A therapeutic hint may be obtained here. The treatment undoubtedly should be directed more specially to the stenosis, with the presumption that it is the result of the œdema of the glottis and spasm of the glottis rather than of the presence of the exudate. It is a well-known fact that after tracheotomy the dyspnœa sometimes continues as urgent as before, the larynx being then no longer a portion of the respiratory apparatus.

Remissions.—These occur in those cases of croup which are characterized by a moderate course. There are instances where distinct remissions occur in the second stage. There is a marked improvement in the dyspnœa, although it does not disappear wholly. There is also a remission of the cough, the voice becomes more natural, and we find an improvement in the general condition of the patient. The febrile movement is almost entirely gone, and the appetite partially or wholly returns, and there is a disposition to sleep. These remissions are very favorable, especially when they are attended by an exfoliation of a certain portion of the false membrane, which may be thrown off in small masses mingled with mucus, or in irregular masses, sometimes in the form of tubular casts of the part. If these exfoliations continue, the remissions indicate that there will probably be a favorable termination of the disease, there is a longer period between the suffocative spells, and the dyspnœa is markedly diminished. The cough grows looser, and the expectoration of mucus, or a muco-purulent secretion mixed with the flakes of fibrin, increases. The voice becomes less and less hoarse, and the fever stops entirely, perspiration occurs, the patient becomes more cheerful and natural, and the case turns into one of simple laryngeal catarrh.

But many times these remissions are delusive; the suffocative attacks occur after the remissions, being more severe than before. There is now a fresh exudation occurring, or a spasm of the glottis or of the laryngeal muscles which has given rise to it, and the dyspnœa is increased through the special influences which are at work, and instead of the remissions, we have a disposition to pass into the stage of asphyxia, which is followed by a fatal termination of the case.

Glandular Enlargement.—It is only in those cases which are

characterized by considerable exudation into the pharynx that we have enlargement of the submaxillary and cervical glands, and the existence of albuminuria. We have already noted the fact that the exudate tends by preference to manifest itself mainly within the larynx itself or its upper portion. It is in this class of cases, characterized by albuminuria and pharyngeal exudation, that we find the difficulty in drawing the line between diphtheritic laryngitis and true croup; but for these cases, which are by no means the rule, it seems to us, there would have been less confusion on this subject.

Pain.—We are not able to determine whether there is much pain connected with this disease. The child suffers so much from the dyspnoea and discomfort that the clutching at the throat may mean nothing beyond the *besoin de respirer*. Older children sometimes complain of a soreness about the larynx and a sensation of squeezing or pinching, and there is also a decided feeling as of a lump in the parts.

Gastric Symptoms.—We are not likely to encounter much disturbance of the digestion unless it may result from the treatment.

Complications.—The most frequent complication is bronchial catarrh, but the diagnosis of its degree is exceedingly difficult. It has been found that the sibilant and sonorous rales, together with the pronounced mucous sounds, disappear immediately after the performance of tracheotomy, indicating that the congestion was simply a temporary one, due to the dyspnoea. In yet other cases, after a free entrance of air to the lungs has been effected, the rales still continue as a very prominent feature. In such cases a coincident bronchitis has arisen from extension of the inflammatory process, and we may assume the existence of fibrinous exudation in various portions of the bronchi and bronchioles.

The explanation of Niemeyer (Ziemssen, vol. iv., p. 251) seems hardly necessary. His view is that the pulmonary alveoli enlarge, when laryngeal stenosis has obtained, without the entrance of a sufficient quantity of air, thus resulting in the rarefaction of air contained in the bronchi and alveoli. This rarefied air acts upon the bronchial mucous membrane and upon the walls of the alveoli, just as cupping does upon the skin, the result being congestion and increased exudation from the bloodvessels as the result of the diminished pressure upon the walls of the vessels. To our mind, the extension of the inflammatory process, as in other forms of catarrh, seems to be all the explanation required. Pneumonia occurs less frequently as a sequence of croup; when it exists, it may occur in the lobular form, not so often as a lobar pneumonia.

Atelectasis may occur as a result of the asphyxiated stage of croup. The portions of the lung involved are usually the lower and posterior parts. Before death, their presence cannot be recognized readily by physical examination, unless they should involve a large portion of

the lung, which is not usual. The less frequent complications are pulmonary apoplexy and gangrene of the lung. It is doubtful if the latter ever obtains in a case of true croup; the instances which have been noted are undoubtedly the result of diphtheritic laryngitis.

Course and Termination.—Croup ordinarily runs its course in from five to ten days. The severest cases of the fulminant variety may terminate fatally in from twenty-four to forty-eight hours. The full duration is from four to six days. Instances are on record in which the continued exudation of false membrane on the mucous surface of the larynx and bronchi continued for several weeks.

Pathology.—In the first stage of the disease, the main feature is an intense hyperæmia with its ordinary accompaniments. The mucous surface of the larynx is of a bright-red color, and is considerably swollen and puffy. The exudate varies from a very thin pellicle to a thick, firm, tenacious false membrane, which may entirely block up the larynx. Its color is a yellowish-white, sometimes brown or gray; it may be blackened from extravasation of blood; the transudation of blood may be sufficiently extensive to render it, in some instances, blood-streaked, or dotted with small clots. The exudate is but loosely adherent to the mucous surface, and may be readily detached; in other instances its attachment to the mucous surface is much more firm. It, however, has not the tendency of the diphtheritic exudate to extend into the mucous tissue, involving the mucous and submucous structures.

While, as we have already said, this anatomical difference does not warrant us in assuming its non-identity with diphtheria, it is, notwithstanding, a decidedly important link in the chain of evidence. The disposition of the exudate is to extend downwards rather than upwards. The early writers divide croup into the ascending and descending, and it is admitted that the tendency is manifestly downwards.

It is easy to understand how quickly the dyspnoea may be increased by the presence of the exudate in the bronchioles; even if the amount of membrane in the larynx should not be extensive, the cutting off the entrance of air to the alveoli, by the filling up of the bronchioles, adds promptly and effectively to the amount of dyspnoea.

The vocal cords are specially prone to be the seat of the exudate. A moderate amount of exudation at this point, therefore, the subglottic space being quite free, may induce dangerous asphyxia. The inner surface of the epiglottis is generally also involved to a marked extent. The tendency of the membrane is to re-form, which constitutes one of the discouraging and dangerous features of croup. After the first exfoliation of the membrane in flakes or threads, or masses of considerable size, a second formation occurs, and even a third. How much this re-formation is influenced by the active methods of treatment,

locally and internally, which have been in use, is yet difficult to determine.

Microscopically, the exudation is found to be made up of amorphous or fibrillated fibrin with numerous young cells. Chemically, it is shown to be coagulated fibrin, soluble in alkalis, and particularly in lime-water.

Diagnosis.—The early diagnosis is attended with difficulty. It is impossible to designate true croup from a severe case of infantile laryngitis, or false croup, until the exudation has unmistakably appeared.

The difficulty of laryngoscopic examination in children is much to be deplored, for if a view of the larynx could be obtained, an early and positive diagnosis could be made. Some of the cases of infantile laryngitis, as in the one already referred to, unfortunately present symptoms which render their differentiation from true croup entirely impossible. On the second or third day it is usually possible to make the diagnosis with accuracy, if careful attention is paid to all the points. One prominent diagnostic feature is, that in pseudo-croup there is a much greater amenability to treatment; there is not, usually, so strong a disposition to the continuance of the dyspnoea; it is not so intense nor so prominent. In false croup the febrile movement is more readily controlled; there is not as much hoarseness, the voice is not as frequently lost, nor as rough and harsh. Instead, also, of tending to grow hoarse on the second or third day, false croup is ameliorated, as a rule, on the second night, and largely disappears upon the third. The steady progress of the symptoms from the first should incline us to apprehend that we are dealing with a case of true croup.

In false croup, the suffocative attacks do not occur so often and are not so severe. Parents, and even physicians, often say that they have had children affected with several attacks of true croup; undoubtedly, such cases are those of severe infantile laryngitis without any exudation whatever.

It may be mistaken for œdema of the glottis, but if we note carefully the history of the case, and make a thorough examination, we can usually settle the diagnosis. Palpation, which can always be employed before the case has progressed far, will put us upon the right track. Spasm of the glottis is more likely to be confounded with this affection, but its convulsive nature enables us to distinguish it. Between the paroxysms the child is perfectly well; there are no croupy sounds, no hoarseness, no stridor. In most instances there is not in croup, or at least only very occasionally, a tendency to spasm of a carpo-pedal form.

Foreign bodies in the larynx induce symptoms which greatly resemble croup. The child is taken with sudden stridor and dyspnoea, together with hoarseness and a sense of obstruction to respiration. In

these cases, also, the history usually enables us to make a diagnosis. We have already given the points of diagnosis between laryngeal diphtheritis and true croup.

Injuries of the larynx and morbid growths of the larynx give rise to croupy symptoms, but the diagnosis of these affections is generally rendered easy by examination.

Prognosis.—True croup is an exceedingly fatal disease. The fatality ranges from 23 to 75 per cent. There are cases which seem to resist, from the start, all treatment, however carefully and judiciously applied. With the evidence which we have of its deadliness, the statement of Cohen, since he has used the treatment of inhalations of steam in a hot room, should be carefully noted.

We cannot believe that healthy, robust children succumb as readily to the disease as do the feeble. Our view is emphatically that it is a disease of scrofulous children, that the strong and robust bear the brunt of it much more readily, and afford more hope of relief from treatment. A careful analysis of cases treated will show that the children attacked who were, before, subject to enlarged glands and other manifestations of scrofulosis, succumb almost surely.

The tendency to a fatal termination is increased by the occurrence of complication. If we have bronchitis or pneumonia supervening, the danger is greatly intensified. Even when the membrane is confined largely to the larynx, there is but a slight prospect of recovery, though, of course, it is better than if the membrane extends above or below. There is little hope when we find severe and continued dyspnoea with suffocative attacks occurring often, febrile movement high, and the stenosis marked, and stupor present, in a greater or less degree, with an intermittent pulse.

During the stage of asphyxia, it is generally the course for three paroxysms of collapse to occur. This clinical feature gives us an indication for tracheotomy which should be promptly employed after the first attack of collapse. The patient will rally from this under the use of a small amount of stimulant, and then the operation can be performed.

Exudation.—If there is any exudation on the pharynx, which my experience demonstrates to be somewhat rare, the true nature of the disease is certain; but the exudation is usually out of sight, and tends to extend downwards, and to involve the trachea and bronchi even to the bronchioles, and all know the difficulty of laryngoscopic inspection in children. With a little tact, the use of the mirror in the throat with a strong direct light may be effected in some instances; such an examination will readily show the exudation. If not seen, its presence may be assumed from the history and symptoms, and, later, we have the expulsion of the membrane in flakes or casts. The larynx, trachea, and bronchioles have all been implicated, as post-mortem examinations

have shown. Sometimes only inspissated mucus is thrown off for a while. If inspiration and expiration are equally affected, we may assume the presence of adventitious membrane; if, however, inspiration is difficult, and expiration easy, we have merely a paralytic state of the glottis.

Varieties.—The form of simple croup, which has no exudation, is very common in America. The child may present the phenomena of true croup. After exposure to cold, having been somewhat restless, it awakens suddenly in the night in a high fever and with a hoarse, ringing cough; some dyspnoea exists, which may be, later, quite urgent. The attacks usually subside quickly; the next day the child is well, though it may cough occasionally. At night another paroxysm occurs, but is generally lighter; exceptionally, it may be more severe. The third night, there is a slight attack, which generally ends the difficulty. Many cases end with the attack upon the first night.

This form is much more amenable to treatment than true croup, and the tendency is readily to improvement. True croup grows worse steadily, and lasts from five to eight days longer. There may be such urgent symptoms that a fatal termination may occur in twenty-four to forty-eight hours.

Treatment.—**Aconite.**—In the early stages, with high fever, restlessness, tossing about; it will cut short the attack. It is a specific for croup without exudation, and very serviceable in membranous croup. It limits the amount of exudation by moderating inflammatory action at first. Homœopaths do not always realize how many pathological lesions are aborted by the prompt administration of our remedies.

Arsenicum is not often enough given in croup, for pale face and restlessness, in cases occurring in debilitated children. A pathological explanation of its effect may be found in the fact that it reduces the œdema glottidis which is, as we have seen, one special element in the production of dyspnoea.

Bromine.—Aggravation in spite of Aconite and other remedies; dyspnoea marked; cough dry and wheezing; expectoration scanty, though there is rattling in the larynx on coughing.

Hepar sulph.—Feeling as if there were a foreign body in the larynx; stitching pains from ear to ear; febrile movement marked; loose cough, but no expectoration; hoarse, rattling cough, with croupy ring; inspiration difficult; expiration easy, making the general respiration attended with comparatively little difficulty.

Iodine relieves urgent dyspnoea and tends to lessen exudation. The cough loose and hoarse in the morning; free expectoration of mucus, sometimes blood-tinged; also indicated in fibrinous exudations; increasing hoarseness and a tendency to stupor; great restlessness.

Kali bichrom.—Great sensitiveness of the larynx; especially adapted to fatty children; voice very hoarse; cough constant. This remedy offers the most hope of effecting the removal of the membrane; it corresponds to the pathological basis of the disease; it has a tough, stringy expectoration. In diphtheria it effects the removal of the same morphological elements better than any remedy; the exudation of membranous croup corresponds closely to that of non-malignant diphtheria.

Phosphorus.—Useful when the exudation extends to the finer bronchi; this remedy hastens its absorption; there is much prostration of the nervous system.

Spongia.—Dry, harsh, crowing sound, usually indicated earlier than Hepar, Sulph., or Kali.

Sanguinaria.—Indicated by dryness of the throat, with feeling of fulness in the larynx, followed by the expectoration of thick mucus; cough steady and severe, then followed by mucous sputa; loss of voice, and exceedingly hoarse cough.

Tartar emetic.—Hoarseness, worse in the morning; cyanosis, cold perspiration, frequent pulse; secretion very tough and not readily expectorated; useful in the later stage, when there are coldness of the surface, mucous rales in the larynx and chest, great prostration and dyspnoea.

Ipecacuanha is of great service when the disease is complicated with bronchial catarrh. There is a convulsive evening cough; free secretion of mucus in the bronchial tubes, which threatens suffocation.

Bryonia is useful in the complications when there is sub-sternal pain, sensation of roughness in the trachea; dry or hoarse cough, at first without, afterwards with, free expectoration of mucus.

Consult also Kaolin, Belladonna, Causticum, Lactic acid, Lycopodium, Drosera, and Carbo veg.

Prophylaxis.—Bathe the throat, neck, and chest with cold salt water; don't house the child too tenderly.

Local treatment.—Inhalations of steam with the atomizer are far preferable to the hot room and the surcharging of the air with steam, which is recommended by some authorities. The object of these measures is to reach the exudation. It is said that experiments demonstrate that but a small quantity of the medicament used in the atomizer reaches the bronchi, but by directing a suitable apparatus towards the fauces of the child the requisite quantity of steam can be inhaled. Our main reliance should be placed upon the remedies. It must be confessed that the expulsion of the membrane has occurred after efforts at internal medication had ceased; therefore we should not abandon hope until the last. The inhalation of slackened lime, as proposed by Dr. Geiger, is an experiment worthy of trial. Bromine inhalations, after the formula of Ozeanam, one drachm of Bromide of Potassium, one grain of Bromine, and one ounce of water, exercises a salutary effect upon the dyspnoea. A few drops of the Tincture of Iodine on a sponge in the bottom of a tumbler, placed near the nostrils, will sometimes rally the child when other expedients have failed.

Solis Cohen, of Philadelphia, claims to have saved every case of membranous laryngitis since he adopted the method of inhalations of steam in a heated room. His plan is to place the patient, after it is manifest there is an exudation, in a closed room heated to a temperature of eighty degrees, which should be constantly maintained without intermission until the child is out of danger. The room is then surcharged with moisture by hanging pieces of cloth or towels, wet with hot water, about the room. The water is placed upon the stove or grate, and by the placing of hot flats in pans of water, sufficient steam is generated to produce a considerable degree of moisture. It is claimed that by this process the exudate is softened and finally exfoliated.

C. DISEASES OF THE TRACHEA AND BRONCHIA.

BY JOSEPH SIDNEY MITCHELL, M.D.

BRONCHITIS.

Definition.—Bronchitis is an inflammation of the mucous membrane lining the bronchial tubes, varying in degree from slight hyperemia to an intense implication of the deeper structures.

The **Synonyms** are bronchial catarrh; angina bronchialis; catarrhus pituitosus; bronchite; Bronchialentzündung.

Varieties.—There are two prominent forms, the catarrhal and the croupous; each may be acute or chronic. The catarrhal occurs as trachea-bronchitis or capillary bronchitis.

Acute Catarrhal Bronchitis.—**Ætiology.**—As regards age, it is more commonly met with in the young and old. This is due to the diminished vitality which exists at these periods of life. In the acute forms it is specially prevalent during the period of dentition, and in the chronic it is notably a disease of advanced age.

It may be secondary to other diseases. Debilitating diseases which weaken the constitution, such as tuberculosis, Bright's disease, carcinoma, diabetes, emphysema, and bronchiectasis, favor its onset.

Habits.—Civilization, with its furnace-heated rooms, has done more to predispose to bronchial affections than any other cause. It induces a debilitated, relaxed state of the system, a disposition to easy prostration, and reduces the resisting power towards atmospheric changes which is possessed by those whose habits of life inure them to marked temperature vicissitudes. One attack renders the system much more liable to another, and it becomes natural for those thus affected to suffer frequent attacks every year.

Occupation.—Those who are exposed to the inhalation of irritating substances, as wood filings, steel and iron filings, cotton, etc., or the vapor of gases, are susceptible, while those whose business involves exposure to atmospheric changes, contrary to the view expressed by some authorities, are but little subject. Soldiers, sailors, artisans of various kinds, whose occupation is out of doors, are seldom troubled with cough.

Climate.—Bronchitis is a disease of climates marked by sudden changes of temperature combined with considerable moisture. Hirsch says it is due more to humidity than to change of climate, instancing the fact that upper and lower Egypt and western America and India are exempt. England, and those portions of America which are situated upon the seacoast or along the shores of the great lakes, render their inhabitants prone to the disease from the bleakness and dampness of the atmosphere.

Season.—It is essentially a disease of the cold months of the year, especially when there is humidity of the atmosphere, as in the spring and fall. On the seashore or along the lakes the prevalence of north-east or easterly winds is very conducive to bronchial attacks.

Sex has little modifying influence. Women whose lives are spent indoors are rather more frequently attacked. The mortality tables, however, bring the numbers for the two sexes very nearly equal.

Exciting Causes.—Exposure to cold and dampness is usually the immediate exciting cause of bronchitis in the acute forms. The attack may be induced from the inhalation of cold air or by the application of a cold draught upon the back, especially also by insufficient clothing in cold weather. Exposure of portions of the body, particularly of the feet, to cold and wet, sleeping in damp beds, and putting on damp clothing, all these are well-known causes. It is very probable that a depressing influence is effected upon the spinal nerves, which lowers the tone of the bronchial mucous membrane, secondarily inducing a local irritation, followed by congestion and inflammation. Cold applied to the chest in front will not induce bronchitis as certain as cold directed against the back. Various irritants act directly upon the mucous membrane lining the bronchi as exciting causes. Prominent among these are the irritating gases, powders, such as Ipecacuanha, and emanations from other vegetable substances, wood, dust, iron or steel filings, flour, etc. Doubtless miasma acts in the same way.

The circulation of morbid blood gives rise to bronchitis. Iodine, taken internally, has been known to induce bronchial catarrh from its circulating through the capillaries and acting as an irritant.

Influenza, either sporadically or epidemically, has a marked influence. To this cause we may assign the cases which complicate the febrile affections, particularly typhoid fever, scarlatina, measles, small-pox, whooping-cough, diphtheria, syphilis, gout, rheumatism, and erysipelas. The suppression of long-continued discharges and of long-standing skin diseases by local application produces a metastasis which may result in bronchitis. Deposits in the lungs, such as tubercle or cancer, by giving rise to the presence of vitiated blood, act as an exciting cause of inflammation of the bronchial mucous membrane.

Symptoms.—Attacks of acute bronchitis vary to a marked extent from slight colds affecting the trachea and large bronchi to those involving the whole bronchial system, making the disease exceedingly grave. In the form now under consideration the attack is ushered in by rigors of greater or less intensity rather than by a single prolonged chill; following this we find febrile movement; the patient feels hot, but there is only slight elevation of the temperature. The pulse may early be somewhat increased, but it is characteristic of even acute bron-

chitis that it is not attended with a high pulse or temperature. There is muscular rheumatism, manifested by pain of an aching character throughout the whole system; the joints even may be somewhat affected. There is a sense of fatigue and of general malaise. In the severer forms there is furred tongue, loss of appetite, and sometimes vomiting, complicating the bronchial catarrh; the urine is loaded with urates, but presents a diminished amount of chlorides; there is heat on micturition.

We have implication of the mucous membrane lining the nares and other communicating sinuses. The pharynx and larynx are generally involved. There is an irritating watery discharge from the nose and eyes, heat and soreness with frequent sneezing. Frontal headache of a throbbing character exists, due to the implication of the frontal sinuses. There is some sore throat and accumulation of mucus, of a tenacious character at first, afterwards easily detached. Owing to the laryngeal complication, the voice becomes hoarse, husky, and there is cough of a laryngeal character, hoarse and barking. Some cases of bronchitis are ushered in by a catarrh of the nares, followed by an extension along the respiratory tract, the pharynx being involved; then the larynx and, lastly, the bronchial mucous membrane. In other instances the bronchial surface may be involved from the very first, and these other regions escape. There are various subjective symptoms noticeable, such as sense of heat or burning in the sternum, or a feeling of rawness or soreness with a moderate amount of pain. Ordinarily, in bronchitis pain is inconsiderable; when it exists, it is aggravated by deep inspirations. From severe persistent coughing, aching may be developed throughout the chest and sides, and particularly about the abdominal muscles.

Cough.—This is one of the first and most marked symptoms. If the larynx is involved, it will be hoarse; usually, however, the laryngeal implication lasts but a short time, and then the cough is free from hoarseness. It may be spasmodic or occur irregularly. It may be easily controlled or, in nervous irritable people, difficult of suppression. Many times it is severe on first lying down at night, and again on wakening in the morning.

Cough, from the experiments of Longet, was found to be excited by irritation of the bronchial mucous membrane, and Cruveilhier, Romberg and Budge excited cough by irritating the pneumogastric. J. Rosenthal considered the superior laryngeal nerve as the special nerve of cough, inasmuch as he observed relaxation of the diaphragm, with simultaneous constriction of the glottis, and spasmodic contraction of the expiratory muscles on irritating the inner branch of that nerve.

Nothnagel has made an important advance in our knowledge of cough, proving by actual experiment that cough may be excited by irritation of the tracheal and bronchial mucous membrane, and that

not only does the superior laryngeal nerve act as a nerve of cough, but that there are fibres situated still further backwards in the pneumogastric nerve at its terminal extremities in the mucous membrane of the trachea, which excite the reflex act of cough when considerably irritated. But Nothnagel was unable to excite cough by irritation of the pleura, or irritation of the intact branch or central stump of the pneumogastric or superior laryngeal nerve. Kohts demonstrated that irritation of the posterior pharyngeal mucous membrane, as well as of the inner surface of the soft palate, produced one or two successions of cough, while it only rarely caused continuous cough. Intense cough ensued both upon mechanical and electrical irritation of the pharyngeal nerve, and the cough following powerful pulling of the nerve amounted to a veritable paroxysm. Pulling or pinching the œsophagus also succeeded in exciting cough.*

From these experiments we see that direct irritation of the tracheal and bronchial mucous membrane is a constant exciter of cough, but that irritation of the pneumogastric or superior laryngeal does not always induce it. Clinically, however, we are aware that some of the most constant, prolonged, and spasmodic coughs are those due to reflex irritation. At first the expectoration is comparatively slight, the cough being hard and dry; later, we have an altered secretion, the expectoration early being thin and watery and of a saltish taste; later, it grows more and more opaque, increasing in thickness, becoming more viscid and less frothy; it may be mucous, muco-purulent, or purulent. It is at first white, afterwards of a grayish-yellow, or yellowish-white. Sometimes it is expectorated with ease, again it is adhesive, stringy and ropy; ordinarily it has no blood, but a few flecks of blood may be seen, and sometimes it may be streaked. By the microscope it is shown to contain pavement, columnar, and ciliated epithelium; afterwards, abundant young cells from the surface of the mucous membrane, and later pus-cells, molecular and granular matter are present, a few blood-corpuscles, amorphous matter, crystals of oxalates, and cholesterolin.

Course and Termination.—Usually, this form terminates in from three to five days without leaving any trace of its existence. The fever, if present at first, soon subsides, and the cough gradually diminishes; this latter symptom, however, may remain for several days after all other symptoms have passed away. In rare cases the disease may continue for two or three weeks, and the cough be very persistent and stubborn, in some instances remaining as a chronic affection, especially in cases in which the tissues were deeply affected.

In the debilitated or in the aged, fever may be present from the first, with rapid feeble pulse, dry, brown, cracked tongue, and some delirium. These patients are not always able to expectorate, and the secretion

* Ziemssen, p. 278, vol. iv.

collects, blocking up the bronchi, and leading in some instances to suffocation. In delicate children bronchitis, for similar reasons, sometimes proves a very serious affection.

Capillary Bronchitis.—An inflammation involving the mucous membrane of the smaller bronchioles, attended with profuse secretion, and often causing suffocation. It is particularly a disease of children. Old people and debilitated people are also subject to it. Some cases seem to result from the form of bronchitis just described by extension of inflammation, while others show that the whole respiratory tract is involved from the beginning. There are cases in which the disease seems to commence as an affection of the smaller tubes. The early symptoms are those of the form already described. If the capillary tubes alone are involved, there is an absence of the sub-sternal pain. Children, however, always complain of more or less aching and soreness about the base of the chest. Epigastric pain, due to the severe contraction of the expiratory muscles, is also present. There is much more difficulty of breathing than in the form already described, and it is always proportionate to the amount of impediment. There are two sources of dyspnoea, one the swelling of the bronchial mucous membrane, and the other the secretion. In mild cases it may be moderate, but when there exists an extensive implication of the bronchi it increases to a severe degree, and suffocative attacks with cyanosis ensue; the children are unable to breathe unless they are raised; they are exceedingly restless, tossing about continually; the nostrils dilate; the thorax is hastily elevated as in laryngeal stenosis; inspiratory retraction may take place upon deep inspiration, the number of respirations may rise to fifty, or more. During ordinary inspiration the epigastrium and hypochondrium are distended, and retracted during expiration; when an ample quantity of air can enter the lowest portions of the thorax, these parts undergo inspiratory distension; when a sufficient quantity of air cannot enter, the condition is different, the increased capacity of the chest not being supplied with a due amount of air, the air which enters becomes rarefied at each inspiration; hence the pressure of the atmosphere upon the epigastrium and hypochondrium depresses these parts and forces up the diaphragm. According to Sitz, there is another indication of incomplete breathing, which is the bulging forward of the superior clavicular and infraclavicular regions, and the indistinctness of respiratory movements in this section of the thorax is due to distension of the lungs from bulging of the alveola from the impediment offered to the egress of air.

The cough is violent and distressing, occurring in paroxysms, or being continuous. It is usually dry for a short time only, then it becomes exceedingly loose, but is attended, particularly in the cases of children, with little expectoration.

Expectoration.—This is ordinarily effected with difficulty in any case, as the secretion is tough and tenacious in the early stage. At first, it is small in quantity and thin; after a time it becomes copious and less sticky in those old enough to expectorate. It is, at first, mucous, afterwards becomes muco-purulent, growing richer in cells. It is usually yellowish-white, and sometimes presents the appearance of foam, from which thin threads hang down below the surface. The former portion of the mass comes from the larger tubes, and contains a mixture of bubbles of air, while the threads come from the minute bronchi, retaining their form. Children usually swallow the expectoration, which, after a sufficient amount has accumulated in the stomach, may give rise to vomiting; its characteristics are then, of course, somewhat changed. Often, during the act of coughing, the child may be thrown forward, and a quantity secured upon a cloth.

The *febrile movement* is usually much more marked than in ordinary acute bronchitis, but it does not tend to be as high as in pneumonia. It is important in this connection to note the difference in temperature, which is diagnostic of lung-inflammation, as compared with bronchitis. By careful observation of the temperature we are enabled to note the transition from most extensive capillary bronchitis to broncho-pneumonia. The increased temperature which takes place may be readily noted. A comparatively circumscribed pneumonitis will give rise to a rapid elevation of temperature much more rapidly than even a diffuse bronchial catarrh. If this diagnostic point were more closely noted, fewer errors would be made. But capillary bronchitis may have a temperature of at least 104° without the existence of pulmonic complication. (Ziemssen, vol. 4, 373.) The pulse is rapid, reaching from 100 to 140, being at first full and firm, later small. The skin is hot and dry in the beginning of the disease, but when it is fully established there is a tendency to profuse perspiration. The cyanosis is a marked feature, varying very much in degree with the extent to which the bronchi are involved; those cases in which there is very much œdema, with copious secretion, give rise to it in marked degree.

Cerebral symptoms are not present; that is, they do not belong to capillary bronchitis. When catarrhal pneumonia has supervened, we may have delirium manifested.

Gastric disturbances are common. Anorexia, coated tongue, and sometimes vomiting occur. There is constipation at first, and later diarrhœa. The urine is sometimes slightly albuminous and deficient in chlorides; a trace of sugar is said to be occasionally present. In the severer grades defective aëration of the blood is observed, the respiratory process is insufficient, and gradual suffocation ensues. The blood is charged with carbonic acid gas, and its oxygen is correspondingly deficient, the cyanosis deepens, the face is turbid, bloated, dusky, or livid. The lips, tips of the nose, malar protuberances,

tongue, and ears are very livid, and in marked contrast with the pallor of the surrounding skin; the veins of the head and neck swell. The fingers and toes, especially the nails, show also the cyanosis; the feet and hands may become œdematous. The temperature falls, clammy sweats break out, particularly about the face, and then involve the whole body. The patient is exhausted, the head drops about in any direction. The pulse is very rapid, weak, small, compressible, and often irregular. The patient is restless; there is an anxious expression of countenance, which continues until the mind begins to wander, and the patient grows dull and apathetic, falling into a drowsy state, then a stupor, and finally a complete coma ensues, which precedes death. In some children there may be convulsions. The cough is not severe, and no attempt is made at expectorating; the breathing is very rapid, and gradually grows more shallow. Bronchial rales are plainly audible, and as the large tubes become filled there is distinct crackling. Death occurs either from blocking up of the large bronchi suddenly, or from extensive pulmonary collapse, congestion giving rise to œdema, or from lobular or lobar pneumonia. In old people the symptoms are those of adynamia: the tongue is dry and brown, or it may be thickly covered with dark fur; the pulse is very frequent, irregular, and fine. Acute delirium may ensue, followed by stupor or profound coma; prostration is excessive, and the extremities are cold; the excessive secretions block up the air-passages, giving rise to carbonic-acid poisoning, and there is paralysis of the muscular fibres of the bronchi, which gradually induces slow suffocation.

Duration and Termination.—Capillary bronchitis lasts generally four or five days, or it may continue three or four weeks. The fatal cases occur, according to the best authorities, from the sixth to the eighth day in children, and from the tenth or twelfth in adults. Relapses are not common, but it is a disease which is very liable to recur. It is regarded by some authorities as the foundation of certain forms of disease. Niemeyer believes that excessive acute bronchial catarrh is the most common cause of "galloping" consumption. We incline to the belief that no form of bronchitis will lead to phthisis, unless there is a dyscrasia previously existing.

Physical Signs.—In the acute catarrhal form, inspection shows the size of the chest but little altered, except as regards the bulging to which Sitz referred. The respiratory movements are seen to be much more rapid than in health, and are dependent upon the amount of dyspnœa. We have already referred to the inspiratory retraction. Palpation gives usually the rhonchal fremitus, varying very much in degree and extent. It is, in most cases, felt over a large area. The presence of this fremitus shows that the superficial tubes are affected, and it is heard with both inspiration and expiration. It may be varied by coughing, or entirely disappear after coughing.

Percussion.—Percussion gives no significant signs. There is little variation from normal resonance unless we have complications. There may be a slight amount of dulness at the base of the lungs posteriorly, owing to large accumulations of secretions, œdema of the lungs, or collapse, or from a coincident catarrhal pneumonia. If there is an emphysematous condition, the resonance is increased.

Auscultation.—We have a weakened respiratory murmur over the affected parts, or the sound may be totally suppressed, according as the secretion effects the more or less complete closure of the tubes or the thickened mucous membrane diminishes the calibre. Where the bronchi are pervious, the sounds are loud and exaggerated. This is particularly true of the upper portions of the thorax. But the characteristic sounds of bronchitis evidenced by auscultation are the rales. While their absence does not indicate that there is no inflammation of the tracheal and bronchial mucous membrane, their existence is conclusive evidence of the disease. They are commonly divided into the dry and moist; the former are the sibilant, which are high-pitched, hissing, whistling, or musical; and the sonorous, which are low in pitch and gruff in tone, like snoring. The sounds are produced according as the air passes through tubes of larger or smaller calibre, the sibilant resulting from the passage of air through the constricted smaller tubes, and the sonorous from its passage through the large tubes, diminished in calibre from either of the above-mentioned causes. The moist rales indicate that secretion has taken place. They may be heard during inspiration and expiration, sometimes being most audible only during inspiration; they may be fine or coarse, and they are sometimes termed mucous, sub-mucous, and sub-crepitant. These rales vary in size, quality, and pitch according to the amount of secretion and its consistency, and the dimensions of the tubes. In the different forms of bronchitis they are variously combined. In a moderate degree of acute bronchitis we hear at first only a few sibilant or sonorous rales at scattered points, followed by the moist rales somewhat coarse. Their diffusion pretty generally over the chest indicates a rather diffuse bronchitis. In capillary bronchitis we have some greater amount of diminution in the percussion note at the posterior and lower part of the thorax, while there may be a considerable increase in the infra-clavicular region. We have also on auscultation an abundance of fine moist rales. These accompany both inspiration and expiration, and usually destroy the respiratory murmur in the lower portion of the chest. Vocal resonance is not usually affected.

Position of the Organs.—Usually they are normal. The lungs may be gradually distended, in which case the diaphragm is depressed, and the liver and spleen pushed downwards. The heart is said to be pushed downwards and to the right, in some cases occupying a position similar to that described by Niemeyer as occurring in emphysema.

Diagnosis.—Ordinary bronchitis is usually recognized without much difficulty; the substernal pains, the oppression, and cough and expectoration are significant, and physical examination, developing absence of dulness, or any alteration of the vocal fremitus or resonance, and indicating the presence of the various rales, establishes the proper diagnosis. We are sometimes in doubt, in the earlier stages, as to whether the case is not one of the first stage of whooping-cough, but the paroxysmal character of the attacks, and the peculiar cough and expectoration often followed by vomiting, are sufficiently distinctive to soon determine the diagnosis. When laryngitis is present, as it often is, there may be difficulty in differentiating from croup, but the rapid diminution in the character of the hard, ringing cough, and the presence of evidence of extension of the catarrh to the bronchi, as manifested by the moist cough, presence of rales, etc., enable us to differentiate it from this affection. Capillary bronchitis is to be distinguished from pneumonia. We have no single prolonged chill, followed by the intense fever which is characteristic of pneumonitis, but from the lobular pneumonia of children the diagnosis is often difficult. Careful attention to the physical signs will enable us to guard against error on this point. In capillary bronchitis the rales are much more diffuse and of larger size, while in lobular pneumonia they are limited to the affected space, usually at the bases of the lungs, where they are irregularly scattered. In lobular pneumonia we have more frequent respirations and less dyspnoea, and not much tendency to cyanosis. From acute phthisis, by careful attention to physical signs, we can differentiate capillary bronchitis, which has no signs of consolidation. We have only to distinguish it from true tubercle of the miliary form, whose scattered exudations do not show us consolidation, but rales more or less separated and in the upper portion of the lung. The marked febrile movement of tuberculosis aids in the diagnosis.

Pathology.—The catarrhal inflammation of the mucous membrane lining the bronchial tubes is the characteristic lesion. The hyperæmia may be of various forms, arborescent, mottled, streaked, punctated, diffuse, or covering small areas. It does not usually extend over a large surface. The color of the membrane varies from a bright red to a dark venous hue.

The congestion does not usually extend beyond the fourth or fifth divisions, but it is said that even the finest ramifications may exhibit it. The view is held by some writers that there is not, in capillary bronchitis, an intense congestion of the smaller tubes, but that their implication is the result of the secretion from the larger tubes running down, aggravating and causing trouble mechanically by their presence. The mucous membrane is infiltrated from the inflammatory exudations, and these may extend even to the submucous tissue. This is one of the great sources of danger in capillary bronchitis. The bron-

chioles may be completely obstructed, the tissues are relaxed and softened, and there may be epithelial abrasions, but never ulceration. At first there is a dryness of the mucous surface, later secretion occurs; this consists of frothy mucus, which has a mixture of cells, giving us the muco-purulent expectoration; sometimes more or less blood is present. Microscopically, the secretion consists of epithelial cells, some perfect, others in various stages of degeneration, the so-called mucus and exudation corpuscles, pus-corpuscles, a few blood-disks, and granular matter.

Atelectasis is sometimes observed as a result of the blocking up of a tube. Bronchiectasis may also exist, but only to a small extent, the tubes being uniformly dilated. Sometimes the lobules may become emphysematous. Lobular pneumonia may exist as a complication, but post-mortem examinations often show extensive capillary bronchitis without a single lobule being affected. The lungs may be hyperæmic and œdematous, and sometimes paler than normal. In children the bronchial glands are found enlarged, hyperæmic, and soft. The right side of the heart may be overcharged, giving rise to dilatation, which is manifest, if sufficiently marked, by percussion. Examination reveals that the disease may be very varied in its extent, sometimes one lung being involved, sometimes both; different portions of the lung are also affected in different degree.

Varieties.—Bronchitis may occur in connection with the exanthemata. Typhoid fever and measles are most likely to be attended with this affection, in which case it comes on insidiously. It is sometimes necessary to ascertain the presence of this form through physical examination of the chest at frequent intervals, there being so little cough or expectoration. In some instances the bronchial attack is very marked and of little import, but in others it may be so extensive as to form a very serious complication, tending to a fatal result. Secondary bronchitis may be the result of poisonous material in the blood, such as urea in Bright's disease, sugar in diabetes, or uric acid in gout, the secretions from deposits in the lungs, such as tubercle and carcinoma. The disease in these cases may come on insidiously without very marked symptoms, and become settled; but these forms, being chronic, will be further considered in connection with chronic bronchitis.

Prognosis.—Acute catarrhal bronchitis usually terminates favorably. In cases where a large extent of mucous membrane is involved, it may prove quite serious. In healthy adults the tendency is rapidly towards recovery; in the very old there is danger, and the prognosis is grave when there are signs of typhoid fever, low febrile movement, with an expectoration which is thick and tenacious, accumulation of secretion in the bronchi, and inability to cough from muscular weakness. Quick, shallow cough is of ill omen in children. With capil-

lary bronchitis the prognosis is grave according to the extent of tissue involved. If the pulse becomes very frequent and feeble, and cyanosis is persistent, with coarse bubbling rales very extensively diffused, and very great prostration with cold extremities and cold perspiration, we should consider the case as likely to prove fatal. If the bronchitis is complicated with other affections, such as pneumonia, pulmonary œdema, emphysema, pleuritis or cardiac troubles, the danger is very much increased.

Treatment. — Aconite.—In the early stages, particularly from taking cold, with checked perspiration, fever high, skin hot and dry, and great restlessness. The cough is dry, excited by tickling in the larynx or trachea, aggravated by smoking and drinking, or at night. Expectoration slight but frothy, and sometimes blood-tinged.

Arsenicum.—Hard, spasmodic cough, attended with burning in the chest, and excited by sensations of smoke or vapors; dysphagia and dyspnoea, with prostration and great exhaustion; aggravation after drinking and during motion. Expectoration difficult, scanty and profuse; it is saltish, and at times blood-streaked.

Belladonna.—Hot, dry, spasmodic cough, particularly at night; skin hot and moist; expectoration not considerable, and either of mucus or bloody mucus, and most profuse in the morning.

Bryonia.—Racking cough, with subternal irritation; dyspnoea; pleuritic stitches, worse at night, and aggravated by motion; spurting of urine when coughing; expectoration scanty, yellow mucus or pure blood, and sometimes attended with vomiting.

Cactus.—Specially indicated in cases originating from cardiac troubles, with suffocation and palpitation of the heart; sensation as of an iron hand preventing movements of the chest. (As the symptom "sensation as of an iron hand" is sometimes questioned, the following case may be noted: Mr. T., a patient lately treated by me, a strong hearty man of fifty, attacked with bronchitis and rheumatic muscular pains about the chest, described this symptom accurately.) The cough is spasmodic, the sputa yellow, thick, and tenacious.

Calcarea carb.—Especially in scrofulous children with constant cough excited by speaking, and with sensation as of a feather in the throat; aggravation in the evening or at night; expectoration yellow, thick, and fetid; in children with enlarged cervical bronchial glands this remedy acts admirably.

Drosera.—Violent cough with convulsive movements of the abdominal and thoracic muscles, perspiration on waking; sensation as of a feather in the throat, and stitches in the larynx; aggravation at night after lying down; the mucus may be gray, yellow, or green; coughing and vomiting.

Hyoscyamus.—Convulsive cough, worse at night, aggravated by eating, drinking, or vocal exercise; stinging or titillating sensation in the larynx; expectoration at first of white mucus or of greenish color. For incessant cough, day or night, giving no rest, this remedy is invaluable.

Hepar sulph.—Deep, dry cough, with oppression and soreness in the chest; bubbling rales in the chest; cough worse toward morning in scrofulous subjects; expectoration tenacious or loose; subternal stitches; wheezing respiration.

Iodine.—Dry cough in children, with swelling of cervical and bronchial glands, night sweats and emaciation, suffocative feeling and dyspnoea; palpitation of heart; expectoration mucous or bloody.

Ipecacuanha.—Cough attended with nausea and vomiting, pale bluish complexion, asthmatic breathing, soreness of the chest, sensation as if dust had been inhaled.

Kali bichrom.—Cough hoarse and whistling, attended with nausea and tickling in the throat. Expectoration of thick mucus or of muco-purulent matter, tough, stringy, sometimes fetid.

Lachesis.—Violent spasmodic cough, worse at night, with choking sensation, relieved by sitting up; pains in the throat, eyes, and head; expectoration scanty; or

suddenly profuse, frothy, tenacious mucus is expectorated, which causes relief. This remedy is often indispensable in violent nocturnal coughs of bronchitic subjects.

Lycopodium.—Dry teasing cough of feeble emaciated boys, also in (bronchiectasis) coughs with dilatation of the air-tubes. Expectorations scanty, yellowish or grayish-yellow or dirty; respiration difficult during the cough.

Mercurius sol.—Dry cough, worse in the evening and at night, with sensation as if the chest would burst, tickling in the chest, perspiration without relief; thick, white-coated tongue, alternate chills and heat; expectoration of thick yellow mucus.

Pulsatilla.—Dry cough, violent in a warm room and at night; expectoration thick, yellow, and free.

Phosphorus.—The bronchitis of emaciated, thin, and delicate subjects; cough sharp and dry, with tightness across the chest, and pain when coughing. Expectorations worse in the morning; it is viscid or bloody, worse from speaking, laughing, or going into the cold air.

Sanguinaria.—Dry cough, with tickling, crawling sensation under the sternum, and sensation of dryness and constriction of the air-passages; chest sore and painful, burning and stitching pains in the chest. Expectorations scanty or profuse.

Stannum.—Cough attended with pressure deep in the chest, and with feeling of constriction; sore pain throughout the chest; dyspnoea, wheezing, and rattling in the chest; aggravation from using the voice; hoarse cough, dry, or with green or yellow expectoration with a sweet taste, especially indicated when attended with great weakness.

Rumex crispus.—Great sensitiveness of the mucous membrane to atmospheric changes; suffocative feeling extending to the epigastrium; hoarse, barking cough at night and in the morning; cough incessant and dry, with tickling in the larynx and trachea; cough worse, and aggravated by going into the air.

Spongia.—Croupy, dry cough, with mucous rales; hard, dry, racking cough, with dyspnoea and slight expectoration, continuing day and night.

Tartar emetic.—Cough with vomiting; loud rales with sensation of suffocation; expectoration difficult, with sound as though it would be easily expectorated; paroxysms of rattling cough in the night; vomiting.

Consult also *Cina*, *Conium*, *Nux vomica*, *Veratrum viride*.

Prophylaxis.—Daily bathing the chest, or, better still, the upper half of the body, with cold salt water, thus exposing it to a temperature several degrees less than likely to be encountered during the day, affords most hope of diminishing the tendency to bronchitis. The patient should endeavor to avoid living in rooms overheated by a furnace. In this country a temperature of 68° is about as low as can be endured.

Locally.—Inhalations of steam are useful, and in violent spasmodic coughs ether or chloroform may be inhaled for a few moments if the spasms are urgent; glycerinated water may be used in the steam atomizer for producing expectoration. Every case of bronchitis occurring in those with any tendency to pulmonary trouble should be carefully treated from the first. It is advisable to diminish the cough and expectoration speedily, so as to prevent any further effects which may result from extension of the inflammation which has attacked the mucous surface. Patients should be particularly warned against making themselves too tender and effeminate, and should be directed to restrain the cough to the greatest extent possible.

Capillary Bronchitis.—*Aconite* may be required at the onset, but it is not as powerful a remedy as *Belladonna*. The marked effect of this remedy in diminish-

ing capillary congestion brings it specially into service in a disease characterized by capillary inflammation involving so great an extent of surface. It will be found to diminish the dyspnoea and also to mitigate the dry cough in a marked degree. The special indications for it have been already given.

Tartar emetic is indispensable; to the symptoms already given, we may add those common to incipient poisoning by Carbonic acid; the rattling cough ends in vomiting, or continues loose, with simply a disposition to vomit. Indeed it will be found that no inconsiderable proportion of cases of capillary bronchitis will yield to these two remedies.

Ipecacuanha may be required. This remedy has also bubbling rales in the chest, great dyspnoea, with a suffocative cough, and vomiting of mucus occurs more usually than under Tartar emetic.

Mercurius sol. may be useful. It is specially useful where there is a predominance of gastro-intestinal symptoms, coated tongue, diarrhoea, alternations of chill and heat, and profuse perspiration.

Hepar sulph., Spongia, Opium, and **Ver. viride** may also be consulted.

In the conduct of a case of capillary bronchitis, one of the most essential considerations is to maintain a uniform temperature; every experienced physician knows how frequently relapses have resulted from neglect of this one precaution after the case had been carried almost to a successful termination. It is not advisable to urge perspiration. As the case grows serious perspiration will be profuse, and yet there will be no relief from the occurrence of this symptom, but rather still greater prostration. The temperature should, therefore, be uniform, from 72° to 75°. When there is a disposition to violent spasmodic cough, inhalations of steam may be employed. It is only necessary to start the steam atomizer and direct the current of spray toward the child.

Chronic Bronchitis.—Definition: A low form of inflammation of the bronchial mucous membrane, usually attacking adults, and characterized by its tendency to recur.

Ætiology.—It may occur primarily or secondarily: primarily, when it is the result of the acute affection, or after exposure to cold or of irritating dust, vapors, or any irritating substances; secondarily, during the course of acute rheumatism, cardiac or renal disease, syphilis, emphysema, bronchiectasis, and during phthisis, the exanthems, and chronic alcoholism. By far the larger proportion of cases occur in old people. It rarely occurs in children except as a sequela of measles and whooping-cough.

Symptoms.—The symptoms of chronic bronchitis resemble those of the acute form. The most prominent of those are cough and expectoration. We have the same substernal pain, oppression of the chest and dyspnoea, but these latter are not usually so well marked in the chronic form. In order to make the subject clear, it will be necessary to treat all the different forms as they are commonly encountered. These are winter cough, dry cough, bronchial irritation, bronchorrhoea, and fetid bronchitis.

The most common variety is *Winter Cough*. The patient does not suffer much during the summer months, but in the fall the cough sets in either in slight paroxysms or increases to violent paroxysms, which sometimes are very distressing. These cases are generally worse at night; after a time the attacks become permanent, continuing even through the warm months, and characterized by frequent remissions, and sometimes intermissions. The expectoration in some cases is moderate in quantity, and is mucous or muco-purulent; in other cases it may become very abundant, and is mainly muco-purulent or purulent, or it may be a sticky, tenacious, grayish mucus. It is generally of a yellowish-white color, sometimes greenish-yellow, sometimes dark-green, and if the larger tubes are affected, it is aerated and floats in water; when the smaller tubes are mainly involved, it is more solid and sinks in water. There is little fever; when fever exists, it is noticed towards evening, and there may be some disposition to night-sweats. The digestive organs are involved to some extent, producing moderate anorexia, furred tongue, and constipation; but the distinguishing feature of bronchitis, even if there is involved quite an extensive amount of bronchial mucous surface, is that the disposition to febrile movement is *not* marked. Usually, there is but little loss of tissue. Emaciation is rarely marked, but there may be some wasting of flesh and loss of strength, dependent upon the permanence and extent of the chronic bronchitis. The amount of dyspnoea in uncomplicated bronchitis is slight; if we have asthma or emphysema complicating, there may, of course, be severe loss of breath.

Dry Catarrh.—This form, which is described by Laennec as *catarrhe sec*, is observed quite frequently. As its name implies, there is little secretion, and that which is formed originates in the smaller tubes. The irritability of the mucous membrane, and its dryness, result in the production of violent, long-continued, distressing paroxysms of coughing, attended with swelling of the veins; the face becomes turgid and red; the paroxysm results in very little expectoration; at times, masses of tough, viscid, semi-transparent, grayish mucus, like boiled starch, are expectorated; the paroxysms are attended with soreness of the chest and dyspnoea, and not infrequently with a feeling of constriction; they often resemble whooping-cough and terminate in vomiting. There is no febrile movement at all, and the general health is unaffected.

Bronchorrhœa, also, occurs in paroxysms. The expectoration may be moderate, even scanty, or copious, and sero-mucous, viscid, stringy, transparent, sometimes like the white of an egg, and again thin, clear and watery; it may be slightly aerated on the surface. The quantity of the discharge may be enormous, in some cases from two to three pounds within a few hours; the expectoration is sometimes blood-tinged, a result of the severe strain produced by the vio-

lence of the coughing fit, and the patient, after an attack, is much exhausted and bathed in copious perspiration. The attacks are more liable to come during the night or in the early morning. Bronchorrhœa particularly attacks those who are troubled with some cardiac affection. Between the paroxysms the patient is not much troubled with dyspnœa, unless there is valvular disease or emphysema.

The strength is not affected to the degree one would suppose from the amount of expectoration. The patient will expectorate four or five pounds in the twenty-four hours, and yet be able to attend to business. If the disease is long-continued, there may be some emaciation and general weakness, but unless the cardiac complication tends to a fatal termination, the patient may suffer for a long time with this form.

Laennec quotes an instance of an old man of seventy years, who had expectorated for twelve years four pounds daily of a muco-serous fluid, without appreciable injury to his health. I had, under my own charge for years, a gentleman suffering from this form of catarrh, who would expectorate a sufficient amount to fill a good-sized cuspidor in the course of 24 hours, and yet take the care of a large business with apparent ease. In this case the patient died suddenly from pulmonary œdema as the result of a mitral lesion.

Fetid Bronchitis has a violent and sudden cough, more severe in the morning. The expectoration is opaque, thin, semi-transparent, and in large quantity, or scanty; it is often difficult to expectorate. It may be grayish-yellow, greenish or brownish; it is but slightly aerated, and usually sinks in water. It has a marked fetor, resembling that from gangrene of the lungs. The fetid odor is usually supposed to result from decomposition of purulent matter in the sacculated dilations of the bronchi, but there are cases in which the expectoration is fetid, and yet post-mortem examinations show no dilatation. In this variety we have marked constitutional symptoms, febrile movement, hot dry skin, increased frequency of the pulse, and prostration. The causes of the putrid secretion of bronchitis are not yet clear. Traube noted the presence of putrescent yellowish-white exudative flecks of bronchial mucus in the sputa, which consisted of fine granulated detritus and margaric acid.

Professor Leyden and Dr. Jaffreys demonstrated this detritus to be composed of cryptogamic, thread-like sporules with incessant ciliary motion. These Hartwick regarded as of the same family of fungi as those observed in the mouth, and termed *leptothrix pulmonalis* (Meyhoffer, *Chronic Diseases*, p. 268); Meyhoffer states that his microscopic investigation of putrid sputa led to the recognition of the same sporules as those above described; globules of fat, granules of dark pigment, crystals of margaric acid, and elastic fibres.

This variety is most common in persons of a strumous diathesis,

exhausted and broken-down constitutions, and particularly in those addicted to chronic alcoholism. The fetid breath of the patient is an important symptom ; it is often more significant than the sputa. The physical signs are similar to those in acute bronchitis. Inspiration and expiration are labored, and there is diminished expansion of the chest ; it may be enlarged uniformly, especially in dry catarrh, which has resulted in the production of emphysema.

Palpation.—Vocal fremitus is not markedly altered ; in severe cases it may be exaggerated ; when there is complete obstruction of the tubes, it is diminished or absent. Rhonchal fremitus is present in different parts of the chest, changing its position or degree.

Percussion.—The sound is usually normal, unless a coincident emphysema has given rise to exaggeration. Dulness may result from the accumulation of secretion in the bronchi in cases of bronchorrhœa.

Auscultation.—There is diminished vesicular murmur over the chest. Expiration is prolonged in old cases ; the quality of the respiratory sound is harsh, loud and coarse ; after free expectoration, the breathing-sounds are more plainly heard. We have the dry rales, sibilant and sonorous, or the large and small bubbling rales, circumscribed or extensively diffused. In those cases characterized by abundant secretion, the rales may be temporarily absent, or they may be quite persistent. Their number and persistency may be changed by coughing or deep inspiration. The different forms of chronic bronchitis described will give rise to much variety in the character of these rales. Vocal resonance may be normal, diminished, or slightly exaggerated.

Diagnosis.—The diagnosis of chronic bronchitis from phthisis is sometimes a question of much difficulty. Ordinarily it may be done with ease, but when there is emaciation, abundant purulent expectoration, with febrile movement, hæmoptysis, and other symptoms of phthisis, we have to make not only a very careful physical examination, but take the rational signs into consideration. The fact that the dilated bronchi yield the loud bronchial or even broncho-cavernous respiration adds to the difficulty.

If, however, we bear in mind that chronic bronchitis has but little febrile movement, that during its course the emaciation, even when present, does not proceed with the same rapidity, that it is not dependent upon heredity, that the intermissions are very marked, and that it is fairly amenable to treatment, we can establish very soon, if not at once, a positive diagnosis. From pleuritis and pneumonia it is readily diagnosed by the absence of the characteristic physical signs of these affections.

Chronic bronchitis is amenable to treatment, but its complete cure, placing the patient beyond the danger of a relapse, is difficult. The severer cases are dangerous from their tendency to produce emphy-

sema, dilatation of the bronchial tubes, and, in some instances, fatal collapse. While we do not believe that the disease may extend into the air-vesicles and become the immediate cause of phthisis, there is no doubt that in those who are phthisically inclined, bronchitis may be the exciting cause of the deposit of tubercle. In those who have not a phthisical tendency, a winter-cough may exist for twenty or thirty years, and not lead to consumption. Complete cures may be effected in most of the varieties, provided the patient is constantly under observation, and follows the direction both as to internal medication and climatic changes. We cannot subscribe to the view that chronic bronchitis is an incurable disease.

Pathology.—Chronic bronchitis gives rises to passive congestion of the bronchial mucous membrane. It is obvious that the different varieties above described are attended with varying conditions of the mucous surface. In some cases there is marked inflammatory action, involving also the sub-mucous structures. Accompanying the hyperæmia, there is excessive cell-promotion. If we examine the mucous surface, it will be found discolored, sometimes of a bluish hue, at others of a pale red or gray color; the hyperæmia may be diffuse or circumscribed, streaked or punctiform, and there may also be ecchymosis present; varicose vessels are seen. The sub-mucous tissue becomes infiltrated. When bronchiectasis exists, the larger tubes are dilated diffusely or in a saccular manner; the muscular coats of the tubes are hypertrophied, and their elasticity is gone; calculous deposits exist in the cartilages. Superficial lesions of the epithelium occur, and follicular ulceration at times exists. The secretion varies with each form. Emphysematous lobules are present to a greater or less extent.

In some cases there are slight alterations in the consistence of the bronchial mucous membrane, particularly when a purulent secretion has existed for a time.

Treatment.—Most of the remedies mentioned in the treatment of acute bronchitis may be required in some cases of the chronic form. In addition, we must consult:

Ammonium carb.—For bronchorrhœa with copious secretion which it is difficult to expectorate; the cough occurs in the morning and evening, and is sometimes incessant, aggravated from eating, talking in the open air, and on lying down; expectoration generally scanty, consisting of mucus mixed with blood-corpuscles.

Arsenicum.—For the symptoms already given; it is specially serviceable in fetid bronchitis; one of the worst cases of this form, in which the expectoration was so fetid as to make it almost impossible to remain in the room, yielded in the course of three days to Arsenicum 6th. In all forms of chronic bronchitis of old people, it is useful in mitigating the asthmatic symptoms and relieving the irritative symptoms.

Calcareo carb.—For the chronic bronchitis of children we have in this remedy almost a specific. It is particularly indicated when there is thick, yellowish expectoration, sometimes fetid; cough dry and spasmodic.

Causticum.—Hard, dry cough, aggravated at night and by the warmth of the bed, relieved by cold drinks; sputa greasy-tasting; expectoration of tough mucus.

Drosera.—Violent spasms of coughing, ending in vomiting; resembling whooping-cough; worse on lying down.

Chelidonium is useful in dry, spasmodic cough.

Kali carb.—Dry, spasmodic cough; worse at three in the morning, attended with nausea and vomiting. The expectoration is of grayish mucus.

Kreasofum in bronchitis of children during dentition; the expectoration is thick, whitish or yellow.

Silicea.—Obstinate cough, aggravated by cold drinks, relieved by inhaling moist warm air; expectoration transparent or opaque, tough and tenacious. Meyhoffer says it is hardly possible to overcome radically the catarrhe pituiteux of Laennec (bronchorrhœa) without Silicea.

Sulphur in chronic bronchitis characterized by cough, attended with heaviness of the head and dim vision; expectoration of large quantities of tenacious mucus, or scanty yellowish white sputa; in putrid bronchitis its action is salutary. It is indicated for those affected with rheumatic or gouty diathesis, and who present characteristics of great sensitiveness of the skin to atmospheric changes.

Consult, also, Stannum, Phosphoric acid, Sepia, Senega, Pulsatilla, Phosphorus, Opium, Manganum, Nux vomica, Lycopodium, Iodine, Ignatia, Cocculus, Carbo veg., Cannabis sativa, Lobelia, Spongia.

Inhalations of warm steam afford relief in dry bronchitis; in fetid bronchitis, weak solutions of permanganate of potassium or of carbolic acid may be inhaled from the steam atomizer with advantage; in bronchorrhœa we may use hydrastis and pure water, ten drops of the mother tincture to the ounce. In violent paroxysms of coughing, it is far better to inhale a few drops of chloroform than to resort to cough-syrups, if the indicated remedy does not relieve at once. As a prophylactic, the patient should be directed to take cold salt sponge-baths every morning, and wear sufficient warm clothing and flannel next to the skin. Especially should the patients be warned not to remain indoors too much; they should avoid cold bleak winds as much as possible, but in all moderate weather they should be out of doors a great deal. Different forms of bronchitis require different climates. Bronchorrhœa patients do best in dry warm climates, as in Colorado, Dakota, Northern Georgia, New Mexico and Old Mexico; while, for the dry bronchitis, Florida, and especially Southern California, with its moist, soft, and relaxing atmosphere, is better.

Croupous Bronchitis.—Definition: An inflammation of the bronchi, characterized by fibrinous exudation, giving rise to the expectoration of casts of the bronchi.

Synonyms.—Bronchial croup, fibrinous bronchitis, pseudo-membranous bronchitis, bronchial polyps.

Ætiology.—The disease is very rare. Liebert reports but 17 cases of acute fibrinous bronchitis, after careful collection of all the cases known. The chronic form of the disease is more frequent. It occurs more frequently in men than in women, and oftener in youth, and in localities where there is a prevalence of bronchitis; only two cases have been observed in infancy. Its connection with syphilis, rachitis and scrofulosis has not been fully established. The debility of con-

stitution which results in these dyscrasic conditions may, however, play some part.

Croupous bronchitis is characterized by a spasmodic paroxysmal cough, generally painful and dry, or attended with expectoration, as in ordinary bronchitis. The severity of the symptoms depends upon the size of the casts and the ease with which they are expectorated. The acute form has a moderate amount of fever, with oppression in the chest, anorexia, and such symptoms as generally attend a bronchial attack. Some cases begin with a severe rigor, high fever, great dyspnoea, and violent long-continued paroxysms of cough, attended with asphyxia when the large tubes are implicated; after a severe paroxysm, the fibrinous casts are expectorated, or portions of the fibrinous material mixed with mucus.

In the chronic form we have the history of catarrhal bronchitis which lasts for a considerable time; we then have the occurrence of a paroxysm ending in the expectoration of fragments of fibrin or casts; in some instances the effort of sneezing may cause their exfoliation. In some cases we have symptoms of phthisis preceding the exfoliation of the casts, with slight attacks of hæmoptysis. The symptoms recur from time to time, between which there are periods of complete health; some of the paroxysms are exceedingly severe, and with these there may be considerable catarrhal expectoration; at times there is blood in the interior of the casts, or streaks of blood on their exterior. The casts vary in size and thickness as well as in form; those from the large tubes are solid, those from the smaller tubes are cylindrical. The attack may give rise to an excessive acute bronchitis, with abundant muco-purulent expectoration, or may result in the setting-up of a pneumonitis attended with the usual history of this affection. The surface of the casts is generally smooth, but there may be irregular swellings in places. This bulging is regarded by some writers as the result of bronchiectasis. Biermer states that they are due to the exudate finding obstacles to its extrusion in some places, and thus it is not so uniformly thrown out.

Some casts exhibit small spiral portions; they are generally firm and elastic; the finer casts are softer and more gelatinous. In color they are milky-white or yellowish-white.

Microscopically, they consist of a structureless amorphous material with pus-cells, abundant granular matter, and some oil-globules; blood-globules are not found within the substance of the casts, but, as we have heretofore seen, may be upon its surface or within them; they have been regarded as due to remnants of blood poured out into the tubes, which is coagulated and decolorized, but their position shows them to be due to a true exudation from the mucous surface.

Physical Signs.—When there is well-marked exudation, the signs of obstruction may be present in the chest; circumscribed dulness,

weakened or absent respiratory murmur. After coughing and removal of the obstruction, the signs just mentioned may disappear. Sibilant and sonorous rales, and at times bubbling rales, are heard, in various portions of the chest; if there is loose membrane, it may give rise to rubbing or flapping sounds.

Diagnosis.—Croupous bronchitis may be mistaken for acute bronchitis, pneumonia, or pleurisy, but the nature of the paroxysm, together with the characteristic expectoration, will aid in making a correct diagnosis. We differentiate it from pneumonia and pleurisy by exclusion of the signs belonging to these affections.

Prognosis.—The acute form is very fatal, inducing a mortality of about 50 per cent. The chronic form is not so dangerous as regards life, but as foreshadowing phthisis or leading to pneumonia, it is serious. The duration of the disease varies from three to ten days for the fatal cases, or from ten to fourteen in those attended with recovery. The paroxysms of the chronic form continue from ten to twelve days, but their recurrence is marked by longer or shorter intervals, rarely terminating in complete recovery.

Treatment.—Very little clinical experience with the disease under homœopathic treatment has been recorded; obviously it would require much the same treatment as croupous laryngitis. For plastic exudation into the bronchi we have in Phosphorus the best remedy. Under the use of this drug, absorption of the membrane is effected. Belladonna would be indicated for the attending capillary congestion in the early stages of the acute form. We refer to Aconite both as tending to prevent exudation and as one of the leading remedies to control the violent spasmodic cough.

Inhalations of steam are serviceable, and should be continued persistently. Weak solutions of Hamamelis, Hydrastis, and Iodine may also be employed. The continued application of warmth to the chest promotes the loosening of the casts. Dry heat is preferable in the form of flannels frequently heated, or of a hot-water rubber-bag containing a moderate amount of water, so that the weight of it be not oppressive.

BRONCHIAL ASTHMA.

Definition.—A disease attended by paroxysms of urgent dyspnoea, recurring at intervals, with or without cough, and characterized by periods of health between the attacks.

Synonyms.—Spasmodic asthma; (French) Asthme; (German) Bronchial-asthma.

Ætiology.—*Predisposing Causes.*—Undoubtedly dyscrasia is at the foundation of all causes. It is hereditary in the proportion of about 40 per cent. No particular dyscrasia can be assumed to directly predispose; it may be connected with the scrofulous or rheumatic diathesis, likewise with the phthisical or syphilitic. It occurs at all

periods of life. Loomis relates a case where a paroxysm of asthma occurred in an infant six weeks old, born of an asthmatic mother. The majority of cases have been noted as occurring from the period of one to ten years, while few occur between ten and twenty. The cases occurring in old age are usually a chronic bronchitis without the typical asthmatic attacks; asthma may, however, occur in the old as a result of this form of bronchitis. Men are affected in the proportion of two to one to women.

The *exciting* causes are divided into direct and indirect. Of the direct, the irritation produced by some morbid substances attacking directly the bronchial mucous membrane furnishes the largest contingent. These excitants are irritating inhalations, as Ipecacuanha powder, smoking, the dust of the streets, the emanations from new-mown hay, those of atmospheric and climatic conditions particularly, and the exhalations from certain animals. It is difficult to assign the part played by conditions of the atmosphere. Some patients are better in dry air, some in moist. The favorable effect of the removal from the country to the city, even to localities where the air is close and heavy with smoke, is well known. Again, damp dwellings, and those upon marshy ground, particularly dispose to the disease.

Indirectly, we include those cases in which the asthmatic paroxysms result from indigestion, which cases are termed "peptic asthma," from irritants in the rectum, from uterine excitation, application of cold to the surface, wet feet, chilling the spine, mental emotions, and those which result from brain disease.

Among diseases which induce asthma, bronchitis heads the list, giving rise to 80 per cent. of cases. The hyperæmic bronchial mucous membrane is exceedingly irritable and sensitive to the slightest application of an exciting cause in those who are susceptible. Cardiac trouble may also give rise to it.

We do not include under bronchial asthma those cases of dyspnoea which arise during the course of cardiac disease; but there are, undoubtedly, instances in which genuine idiopathic asthma results during the course of cardiac lesions. Emphysema may also indirectly act as a cause.

The form which we term hay asthma, produced by emanations from new-mown hay or other vegetable substances, is well-marked asthma, usually either preceded or accompanied by rhinitis and bronchitis. Not all those who are afflicted with hay-asthma have the violent paroxysms, but there is more or less dyspnoea associated with it, and in the end the paroxysms are likely to occur as in all asthmatics. In measles and whooping-cough, children are liable to be subject to violent attacks of asthma; the proportion of such cases is not inconsiderable.

Varieties of Asthma.—The forms of bronchial asthma may be

included under two heads: idiopathic or primary, and symptomatic or secondary.

The idiopathic form is the form most typical, occurring independent of any other affection. These cases are undoubtedly purely neurotic in their origin, although back of them lies the constitutional dyscrasia predisposing. Indeed, it is now claimed that even hay-asthma, which has, it is well known, a direct exciting cause, should be grouped under the neuroses.

Idiopathic asthma has many points of resemblance to epilepsy, as the attacks come on at regular intervals, or at least the periodicity is quite well marked. The attack seems to act first as a kind of climax, and after its occurrence the patient, who before was dreading an attack, is relieved from his fear for a considerable period, and again exposes himself with seeming impunity to influences which, it seems, would induce a cold and a paroxysm. Salter states that he has known two or three instances in which one kind of attack took the place of another.

Symptomatic or secondary asthma occurs in three forms, the peptic, bronchitic, and cardiac. *Peptic* asthma depends upon the ingestion of certain kinds of food into the blood, the latter producing a peculiar effect upon the bronchi when circulating through them. It is not properly an attack of indigestion, otherwise the trouble would be manifest soon after partaking of food, while these attacks occur at a period varying from one to three hours after eating. The ingestion of wine, which is quickly absorbed, will induce an attack sooner.

Bronchitic asthma furnishes about 80 per cent. of all the cases. Every person subject to chronic bronchitis is in danger of the occurrence of spasmodic asthma. This we may understand from the investigations of Störck, who has demonstrated by laryngoscopic examination that the mucous surface of the trachea and large bronchi is hyperæmic during the prevalence of the attack. We may fairly conclude from the phenomena which obtain in the smaller tubes, that this same extreme degree of hyperæmia extends even to the bronchioles. The mucous surface then may be said to be constantly in the condition of susceptibility to spasm. The intractability of the disease is thus seen. If the bronchitis remains during the periods of exemption from the spasms, the patient is constantly ready for another attack.

The third variety, which is the least common, *cardiac* asthma, depends entirely upon the pulmonary congestion which is the result of the blocking up of the right heart. Cardiac dyspnoea, unattended with any spasm of the bronchioles, is almost always a constant accompaniment of the cardiac lesions, but the form referred to is attended with wheezing, prolonged expiration, and all the symptoms belonging to a genuine bronchial spasm.

Symptoms.—There is one class of cases in which there are no

prodromic symptoms, the attack coming on at once. Others are characterized by well-marked premonitory symptoms which are mainly referable to the nervous system, the patients experiencing either mental exhilaration or depression. There are some cases in which there is a dull and lethargic condition, with irresistible desire to sleep. Again, in some there is well-marked aura; some patients are attacked with profuse diuresis, passing large quantities of clear, pale urine, like spring water, corresponding to a similar condition observed in hysterical patients.

The initial symptoms are marked in some cases, and not present in others, or at least the patient sleeps through the initial symptoms and is not conscious of them.

They consist of slight indications of the characteristic dyspnoea of asthma. The patient feels constriction across the chest; there is dry cough, some wheezing and disposition to remain quiet; there is distension of the epigastrium from flatulence, the development of gases in the stomach being so large that an actual increase of size of the abdomen and chest takes place. These initial symptoms may continue for some days before the occurrence of the attack, but the patient is aware of an increased sense of constriction, and there is a greater amount of wheezing; in other cases we find no occurrence of initial symptoms at all, the attack coming on with the utmost suddenness. The time of the occurrence of the spasm is usually in the early morning from two to four; cases may occur at other times, but it is not common. One patient who had the severest attack I have ever encountered began at about nine or ten in the evening. Usually, the patient retires feeling as well as usual, but after sleeping from one to three hours he awakens with the attack.

In peptic asthma, the attacks follow soon after a meal, usually after dinner or supper. The period when the patient is most free from suffering is the forenoon. Even those who almost constantly experience dyspnoea may be free from it at this period. When the paroxysm is established, the position of the patient is significant; he sits up in bed or in a chair, with his elbows resting upon the knees, or with his head fixed and his shoulders raised. Some take a kneeling position either on the floor or bed or against a chair. The patient is pale, or, if the attack is bad, cyanotic. Perspiration is very free, particularly after the accessory muscles of respiration are brought into full effort, and the paroxysm is violent. During the intensity of the paroxysm the shoulders are thrown high up, the head back, with each inspiration the mouth is opened wide, and every muscle which can be brought into play is called into action. The clothing is loosened, particularly about the neck; he sits either by an open window or in the middle of the room, desiring no one about him, for even the presence of bystanders increases the feeling of suffocation. The extremities are cold,

the veins of the face are turgid; the eyes staring, and the pulse small and quick; the asthmatic seems to be almost on the verge of suffocation, when there is some coughing and expectoration, and the attack subsides, often quite quickly.

In some cases the degree of suffocation is so great as to produce carbonic-acid poisoning, and the paroxysm terminates, for under such conditions the bronchial spasm must at once cease. In a large proportion of cases the attack terminates by the expectoration of a clear mass of mucus in small round globules; in others there is expectoration of profuse watery mucus. The patient often has the idea that it is only necessary to expectorate to terminate the paroxysm; the fact is that there is no expectoration until the hyperæmia has existed for some considerable time. It is not the presence of the expectoration which causes the spasm, but the expectoration is one of its results.

In some cases no secretion exists throughout the whole attack. The thoracic sounds are dry, and the spasm terminates without a particle of expectoration.

The sputum consists either of masses of clear or of grayish-white mucus resembling masses of arrow-root or tapioca; it is rarely frothy or purulent. During violent attacks we may have some hæmoptysis; in many instances a very small amount of blood is expectorated in streaks or small patches, and in other cases there is profuse hæmorrhage. The hæmorrhage is undoubtedly induced by rupture of the capillaries of the bronchi which, as we have already seen, are in a state of intense hyperæmia. The operation is similar to the production of bleeding at the nose.

The respirations are diminished in frequency, falling in some instances as low as nine to the minute. One would at first suppose from watching the patient during an attack that he would experience an increase in the number of respirations; but while the inspiration is short, the expiration is prolonged, sometimes to a very marked extent, and this accounts for the small number of respirations per minute. After the subsidence of the attack the patient is left weak and prostrated according to the severity of the attack. Those who are accustomed to the paroxysms, after a sleep of two or three hours, will frequently go to their business as usual, only feeling languid for the day. There is then a period of health, but sooner or later another attack recurs. These are periodical, many patients being able to fix the period of their attacks with absolute accuracy. Some are taken every night, others do not experience a recurrence oftener than once a month or a year. The most marked illustration of this is shown in hay-asthma, which has an interval of a year, and yet returns with singular periodicity almost upon the very day, and, in some instances, at the very hour. Cases have their peculiarities, and there is a probability that the attacks will grow lighter from year to year. This is partly

due to the fact that the patient becomes habituated to the paroxysms, and is not so nervous at the period of their recurrence. The milder attacks occur more frequently than do those of great severity.

Physical Signs.—*Inspection.*—During the paroxysm, inspection of the chest shows that the respiratory efforts are labored, but that there is after all little actual motion; the muscles strive to raise the ribs, but they do not yield, and notwithstanding the violence of the respiratory effort, the movements are not increased in frequency; inspiration is short and jerky; the intercostal spaces are markedly depressed; the expiration is very long, and ends suddenly and violently with the expiration of the last portion of air, followed at once by a renewed inspiratory effort.

The vocal fremitus and resonance are normal.

Percussion shows the resonance exaggerated. This is due to the distension of the chest and to the emphysematous condition of the lobules.

Auscultation.—The respiratory murmur is loud, at times exaggerated, at others suppressed, dependent upon the degree of bronchial stenosis. In the severe cases the bronchial tubes are completely occluded, and we have an actual want of respiration. There is no respiratory murmur, not because the loud sounds overtop, but because it is actually non-existent. The rales are usually dry and sibilant, or sonorous and of a high-pitched or hoarse sound. They are diffused either over the whole chest or situated at circumscribed spaces. They are significant in that they are inclined to change their site, although in very many cases the extent of the bronchial implication yields no characteristic symptom save the loud musical rales of high pitch. These imitate many sounds, being screeching, chirping, whistling, cooing, snoring, etc.; they are usually louder upon expiration, but may be heard with both sounds. We explain the varying site of these sounds by the fact that there are constantly going on changes in the seat of the bronchial spasm, moving from place to place, and from side to side. There are cases in which during attacks of asthma bubbling rales are present. These occur generally in those subjects in which there is a bronchitis attended with considerable expectoration antedating the paroxysm.

Pathology.—The pathology of asthma is exceedingly interesting; it illustrates the diverse views which may be held by different authorities, and the inability of establishing therapeutics upon a pathological basis. In the early history of asthma the existence of the affection in an idiopathic form was denied by Rostan, Louis, and others, who endeavored to establish it merely as a symptom of other affections. But the labors of Biermer, who resurrected the abandoned theory of a spasm of the bronchi and bronchioles, resulted in securing for this view the respect of many. Wintrich, however, combated this view, maintaining that the spasm was produced by a tonic spasm of the diaphragm, or by a spasm of the diaphragm and respiratory muscles

combined. This view was supported by Bamberger and Leyden. (Ziemssen, 531, vol. iv.)

In discussing this question, it is important to first note the labors of Storck, who ascertained by microscopic examination the presence of hyperæmia of the trachea and bronchi, and partially of the right bronchus. From his observations he was led to believe that the stenosis was due to a swelling in the bronchioles of the mucous membrane, this occluding their calibre. The fallacy of this view seems apparent when we consider that it is possible, and indeed, this often occurs, for the bronchial spasm to subside almost instantly, and its physical signs to suddenly become lost; we can hardly imagine that there is such a prompt subsidence of the hyperæmia and swelling of the mucous membrane as to accomplish this result.

The ingenious theory which has been advanced by Leyden that the bronchial spasm results from the irritation produced by octohedral crystals has not as yet been determined with accuracy. They are supposed to be composed of a substance analogous to mucine. Leyden maintained that these crystals irritate the terminations of the vagus nerve in the bronchial mucous membrane, giving rise to a reflex spasm, and hence the phenomena of the attacks. The weight of evidence seems to be in favor of the view that the true nature of the asthmatic paroxysm is the constricted state of the bronchial tubes.

The view of Wintrich that the cause of the paroxysm is dependent upon a tonic spasm of the diaphragm, or upon a spasm of the diaphragm and respiratory muscles occurring simultaneously, is supported by other pathologists, especially Bamberger and Lehmann. The physical signs of the paroxysm induced Wintrich to hold that it was not possible to result simply from constriction of the smooth muscular fibres of the bronchioles. He believed that the enlargement of the lungs which occurs during an attack could not be the result of the constriction caused by the action of the bronchial muscles. He argued that if spasmodic asthma were caused by the contraction of the muscles, the effect would be felt both during inspiration and expiration, which is not the case, as we know that the inspiratory air-pressure is not diminished.

It seems reasonable, on the contrary, according to Bamberger, that the obstruction to respiration is shown by the fact that it is forced and prolonged, together with the absence of the sibilant rales showing constriction in the medium-sized and smallest bronchi. He cites the investigations of Bert, who succeeded in producing contractions of the bronchi by galvanization of the lungs and also of the vagus. He, moreover, affirms that the bronchial muscles are the antagonists of the inspiratory muscles, and act for respiratory purposes in unison with the elasticity of the lungs, and also advanced the view that the bronchial muscles may act as a sphincter muscle whose action is more

easily overcome in inspiration than in expiration. The position taken by Biermer has the support of Trousseau, Salter, and Romberg, and is confirmed by the experiments of Bert.

Diagnosis.—It is not easy to mistake asthma, as the nature of the paroxysm is ordinarily sufficiently diagnostic; since we have limited asthma to its essential forms, it is not easily confounded with any other diseases. There are varieties of bronchitis, or heart trouble, and of emphysema which may simulate it. Asthma can be distinguished by the sudden onset of the paroxysm, and by the absence of the characteristic purulent expectoration of bronchitis which very rarely occurs in asthma. The dyspnoea is sometimes quite severe, remains for some length of time, and is not relieved instantaneously.

Cardiac dyspnoea resembles it most; both occur in paroxysms, and they are both intense; each usually occurs at night and in a recumbent position; the intervals of the attacks are characterized by normal respiration. Physical examination enables us to diagnose the cardiac disease with certainty. Cardiac dyspnoea has no physical signs of a constriction of the bronchial tubes; there is no wheezing, no prolonged respiration, no suppression of the respiratory murmur; these signs are never wholly absent in asthma.

In emphysema the dyspnoea is the result of chronic lesion of the lung, and it is never entirely wanting, while in asthma the difficult breathing may be entirely relieved between the paroxysms.

The physical signs serve also to establish the differential diagnosis from acute capillary bronchitis. It may be distinguished by the marked febrile movement of the former, and the slower onset and relief of the dyspnoea.

From the spasmodic affection of the larynx it is distinguished by the absence of the characteristic stridor and hoarseness of laryngeal troubles.

Prognosis.—Asthma, uncomplicated, rarely terminates fatally. Indeed, the popular idea that asthmatic patients are protected from other forms of lung trouble and are long-lived is generally well founded.

It is to be noted that there are some exceptions to this rule, for a certain class of asthmatics are, later, affected with phthisis pulmonalis, one attack predisposing to another; length or shortness of the intervals at which the attacks occur affects very much the prognosis. Those patients who have but infrequent attacks, and who are well during the interval, enjoy, as a rule, excellent health and are not in danger. When the attacks are frequent and severe, the danger of the production of cardiac trouble or emphysema is greater. When asthma exists with an inveterate bronchitis, the case, although not hopeless, is likely to be exceedingly intractable. Age greatly influences the prognosis. Young children will recover completely while an old asthmatic will be relieved. The dyscrasia of the patient has more to do in influenc-

ing the prognosis than any other one factor. If asthma occurs in the phthisical, the syphilitic, or the scrofulous, the disposition of the disease to be affected through complication is very great. Whenever the attacks can be attributed to some well-known cause, as, for instance, irritant inhalations, the prognosis, as regards complete recovery, is good.

Treatment.—Aconite.—For violent attacks occurring in the robust, and in the early evening, with heat, restlessness and profuse perspiration; great nausea; the patient is unable to speak at all; full bounding pulse, and expectoration blood-streaked, with cardiac palpitation. The worst case of asthma which I ever encountered, and which had existed for several years, yielded quite promptly to Aconite 3d. The patient was a strong, vigorous adult, and the attack characterized by intense violence.

Apis.—Suppression of urine; aggravation by warmth; feeling of constriction of the chest; cannot bear throat covered.

Aralia.—Dry, wheezing respiration; aggravation on lying down; very marked acrid mucus from nose and throat; sore feeling in the sternum and in the lungs. In the paroxysms accompanying hay-asthma it has been found of benefit.

Argentum nitricum.—Frightful paroxysm, aggravated by drinking or talking, and with suicidal mania.

Arsenicum.—Paroxysms at night, obliging him to sit up at once and to bend forward; restlessness and increased aggravation from motion, by warmth, and during stormy weather; dry, hard paroxysms of cough, followed by expectoration of frothy mucus, streaked with blood. Burning pain in the chest, profuse perspiration, and great prostration. In the dry asthma and in the asthma of old people it is especially valuable.

Belladonna.—When the attacks occur in the afternoon and evening, in hot weather, after sleeping, by motion, and from use of stimulants; constricted feeling of the larynx, great oppression of the chest, paroxysms of dry cough.

Bromium.—Great dyspnoea, with sense of constriction; dry hacking cough; useful for the asthma of sailors which occurs as soon as they go on shore.

Baptisia.—When the lungs feel tight, sharp pains in the chest, paroxysms end with unusually copious expectoration.

Cuprum.—Attacks occur suddenly and cease suddenly; aggravated by coughing, laughing and drinking, and at the period of the menses. It is indicated for children or hysterical women when the attacks are induced by fright or mental emotions; dry suffocative cough, worse at night, with anxious feeling at the heart.

Ferrum.—For full-blooded children who flush easily and who are subject to epistaxis, dyspnoea, palpitation of the heart, paroxysms of spasmodic cough, with expectoration of tenacious mucus, and with attacks, occurring after midnight, which are relieved by moving about, talking, and uncovering the chest.

Grindelia robusta.—For attacks of nervous asthma; when the paroxysms are severe, dyspnoea great, expectoration at first scanty, afterwards becoming looser, with considerable mucus thrown off.

Ipecacuanha.—Expiration labored and slow, dyspnoea violent, and suffocative feeling great, cyanosis, constriction of the throat and chest; goes to the open window; cough constant and severe, sounds loose but no expectoration; paroxysm terminating in vomiting, which affords relief; extremities cold.

Lachesis.—Asthma attended with great constriction of the chest and stuffed feeling, palpitation of the heart; cyanosis, wheezing; slow difficult expiration; impatient of any pressure on throat or chest; cannot lie on left side; aggravation from sleeping, from eating, from motion, and from touching the chest.

Lobelia.—Asthma aggravated from exertion, by indigestion attended with weakness in the stomach, pressure on the epigastrium, attack preceded by prickling all over, extending even to the fingers and toes; dyspnoea urgent and sudden, cannot bear the slightest exposure to cold.

Moschus.—Suffocative attacks as if due to vapors of sulphur; paroxysms caused by desire to cough, and gradually growing worse, causing the patient to despair of relief; aggravated by the least exposure to cold; soreness in the axillary regions; most suitable to hysterical people.

Nux vomica.—For the asthma of dyspeptics who have overindulged in coffee or stimulants. Dyspnea relieved by eructations, also by changing position; worse from cold air or exercise; cough dry and short; expectoration slight, and effected with difficulty; great irritability.

Opium.—Marked congestion of the chest; deep, stertorous, rattling breathing; suffocative attacks during sleep; loose cough and bluish redness of the face; aggravation from eating, or drinking wine, and smoking, and relieved from cold air and bending forward.

Pulsatilla.—Attacks come on in the evening after eating, and are attended with dizziness, and aggravated by heat, by walking, by exercising. Cough dry at night, loose in the daytime, attended with nausea and vomiting. If there is abnormal menstruation or suppression of eruptions, Pulsatilla is very serviceable.

Sanguinaria.—Deep inspirations, increasing the tightness of the chest; cough dry, and relieved by sitting up in bed and eructating. Cyanosis; accelerated respiration; is of service in hay-asthma.

Sulphur.—Invaluable in chronic asthma attended with oppression of the chest, without pain; bubbling rales in the chest; suffocative attacks at night; pressure and burning in the chest, attended with expectoration of whitish or yellowish mucus; attacks recurring every eight days, and recurring in the morning.

Stannum.—Violent cough, followed by copious expectoration of yellow-streaked whitish mucus; aggravation in the evening and at night, and by the least exercise.

Tartar emetic.—Predominance of bubbling rales in the chest, great oppression and suffocation, particularly in the evening or morning in bed, great dyspnea, inability to lie down, suitable for children and old people.

Veratrum alb.—In cases attended with extreme prostration, cyanosis, cold extremities, and perspiration; weak, feeble pulse.

Palmo vulpis, on the authority of Von Grauvogle, for the asthma of old people, with profuse expectoration.

Consult Alumina, Ambra, Asclepias, Bryonia, Phosphorus, Ammonium, Aurum, Benzoic acid, Cocculus, Dulcamara, Sabadilla and Spongia.

General Treatment.—When a paroxysm of asthma supervenes, the patient should be placed under the most favorable hygienic conditions. Free ventilation must be secured, and the patient placed in a room with but a single attendant, in a chair, so arranged that he finds something to lean upon. Some asthmatics stand, but ordinarily the position in a chair, leaning forward, is the best.

If there is any irritating vapor or dust which has provoked the attack, it should obviously be at once removed.

If the attack is due to an overloaded stomach, vomiting should be at once provoked.

If constipation has been marked for some days, an enema should be administered at once.

Some patients are so weak that they prefer to sit in bed, in which case a chair may be placed in front of them on which they can lean the head. Attacks usually yield readily to the indicated remedy. Once in a while we meet with a case characterized by great stubbornness and intractability. Such a case I once treated in the early years of my practice. The patient was a lady of about forty, whose asthma resisted the most careful selection of remedies, both high and low. A cure was effected by sending her to Mackinaw, Michigan, for the summer; after

this, the paroxysms, which had before occurred with great frequency, did not recur in twenty years.

Inhalations.—Those who are not accustomed to tobacco often derive great service from its use during a paroxysm. I am not inclined to subscribe to the view that asthmatics are relieved by habitual smoking; in the long run the continued use of tobacco is unquestionably injurious. Its medicinal use may be carried to an extent sufficient to produce a moderate sense of faintness and nausea, but not to induce vomiting.

Stramonium enjoys a high reputation for the immediate relief of a paroxysm. Stramonium cigarettes are prepared, or the leaves are smoked in a pipe. Arsenical cigarettes have also been advised.

Chloroform.—The worst spasm can usually be subdued by the use of this agent. Its effects, however, soon disappear, and the paroxysm returns even worse than before. It is not wise to resort to its use except as a dernier ressort. It is given in doses of 5 to 10 drops in a little milk or by inhalation.

Nitre paper.—Most asthmatics well know the use of this remedy. The papers are prepared by putting hard blotting paper, cut into pieces six or eight inches square, into a strong solution of saltpetre. The druggists usually keep them, so that it is not necessary to keep them on hand unless one lives at some distance. One of the pieces may be lighted, and the fumes inhaled. Stramonium and nitre form the basis of most of the preparations which are sold for the relief of asthma. Some patients are relieved by the ingestion of a cup of strong coffee, very hot; stimulants, when given hot, half spirits and boiling water, furnish relief. Nitrite of amyl, a few drops by inhalation, affords partial relief, but it is only temporary.

Climatic Change.—It is well known to asthmatics that there are certain kinds of air which they cannot breathe, and others in which they are entirely exempt from attacks. An asthmatic cannot sleep in an east room, while he will enjoy a good night's rest in the west room in the same house. In our country Colorado affords the best climate-cure, and the summer-resorts of northern Michigan usually afford marked and, often, permanent relief to the victims of hay-fever.

D. DISEASES OF THE PARENCHYMA OF THE LUNGS.

PNEUMONIA.

BY A. K. CRAWFORD, M.D.

Synonyms.—Inflammation of the lungs, Peripneumonia, Peripneumony, Pneumonitis, Pulmonitis, Peripneumonia vera; from the Gr. *πνευμονία*; Fr., Pneumonie; Ger., Lungenentzündung; It., Pnemonitide; Sp., Pneumonitis.

Definition.—Inflammation of the pulmonary parenchyma, characterized by high fever, with a variable degree of pain in some part of the chest, hurried and oppressed breathing, cough, with viscid and rusty-colored expectoration, the crepitant rhonchus at first, followed by bronchial respiration and bronchophony, and a greater or less ex-

tent of dulness on percussion. Its onset is sudden, its course definite, and its inflammatory products are removed by absorption. It is subject to marked modifications through the existence of constitutional or specific diseases.

Anatomical Characters.—From the standpoint of acute pneumonic inflammation the parenchyma of the lungs refers to the air-cells, vesicles, or alveoli, and does not include either the terminal bronchial branches or the connective tissue of the organ. The bronchial mucous membrane, lined with cylindrical and ciliated epithelium and mucous follicles, is continuous through the subdivisions of the bronchial tree to the termination of the bronchioles. The air-vesicles are made up of a delicate membrane lined with squamous or tessellated epithelium, and totally devoid of mucous follicles, and it is demonstrable that the bronchial vessels do not reach the air-sacs, but are confined in their distribution to the bronchial tubes and areolar tissue. It is seen also that the vessels which ramify the air-sacs come entirely from the pulmonary artery, and, consequently, this portion of the lung-tissue must derive its nourishment from the pulmonary vessels, so that, by reason of the difference in anatomical structure, as well as in function and blood supply, an acute pneumonitis is confined, as a rule, to the tissue of the air-vesicles. The rapidity with which the air-cells are filled with exudative material is circumstantially in favor of its being the work of the pulmonary, and not of vessels of so small calibre as the bronchial. To claim that the cellular tissue is the seat of inflammation, in conjunction with the air-sacs, is still less tenable, for it is found that the group of air-cells at the termination of each bronchiole, forming a lobulette, has no cellular tissue in its composition. Even the groups of lobulettes which go to form a lobule possess no connective tissue, or at most only an occasional trace of it. Between the lobules it does exist; but there it is separated from the pulmonary circulation, and by the pathological law that inflammation of a structure does not usually extend to another structure, the cellular tissue is not likely to be implicated in an inflammation of the air-cells. Although usually considered a mucous inflammation, pneumonia is not strictly so, because of the difference in the anatomy of the tissue involved, and the consequent important differences in the products of the inflammation as compared with those of the bronchial, and other, mucous membranes.

The amount of lung texture found diseased in the post-mortem examinations of pneumonic subjects has been so variable that numerous terms have been applied to correspond with these observations. The more ordinarily accepted divisions are *lobar* and *lobular*, although Andral added, with some reason, that of *vesicular*. The latter name is given to pneumonia which attacks individual air-vesicles. This marks the cut surface of the lung with minute red spots, often not

larger than a pin's head. Later in the disease, when the blood-tint is lost, the spots look not unlike tubercular deposits, but they are essentially different in their nature. It is considered quite probable that this is the mode of development of lobular pneumonia. The term "lobular" applies to the confinement of the inflammatory process to a greater or less number of individual lobules. It is the form which is most common in children, as well as a sequence of major operations or accidents. It will be considered separately later on. By lobar pneumonia is meant that type which involves a considerable section or the whole of a lobe. It may extend until the whole lung is invaded or even cross to the opposite side, and subject some portion of that lung to the inflammation. This is the variety of pneumonia most frequently met with, and which furnishes the truest type of pulmonary inflammation.

The coincident inflammation of the pleura over the involved portions of the lung is so common that the terms *pleuro-pneumonia* or *peripneumonia*, designating the combination of the two affections, and *pneumonia*, have often been used synonymously. But as the pleuritic inflammation is usually so slight as to have but little or no modifying influence on the course of the inflamed lung, the compound term does not deserve such prominence. In these cases the pleura presents small red patches, and on its surface is seen a thin albuminous deposit, but only when the pneumonia is of long continuation does this exudation tend to become organized. If the pleurisy is sufficiently pronounced to go on to the development of a considerable amount of liquid effusion, and thereby exert a baneful influence on the existing pneumonia, the double term is certainly applicable. Laennec considered this rarely occurring condition, and no other, true pleuro-pneumonia.

ACUTE LOBAR PNEUMONIA—CROUPOUS PNEUMONIA.

Pathology.—The term croupous was first given to this form of pneumonitis by certain German authors, and it is now in general acceptance. They considered the inflammation of the air-cells to be precisely the same in its nature as that which invades the larynx in croup, because of the appearance of the coagulable fibrinous exudation which filled the vesicles.

Three stages mark the progress of the disease, viz.: First, engorgement; second, red hepatization; and, third, gray hepatization. Any other states which may result from the inflammation, such as abscess or gangrene, must be considered exceptions to the rule.

The stage of *engorgement* is recognized by a darker color than normal of the lung surface, varying in degree according to the amount of extra blood the tissue contains, and according to the age of the patient. The color ranges from the blood-tint seen in the lungs of chil-

dren to the dingy, almost black, hue, produced by an excess of pigment, seen in the lungs of the aged. A certain pale opaque condition of the pleura causes somewhat of a violet color. The impression conveyed to the touch is that of a doughy consistence, and pressure elicits only a slight amount of crepitation. It retains the impression of the fingers like a surface which is cedematous. When cut, the lung tissue emits a frothy, bloody serum. The frothy appearance is due to the admixture of air-bubbles with the lighter or darker sanguinolent fluid. A section of the lung in this stage, if thrown into water, has sufficient air in it to keep it from sinking, and if lightly squeezed and washed, it can be restored to almost its natural condition. The greater the quantity of fluid, and the less the proportion of air found in the tissue, the more intense has been the inflammation. Andral was the first to point out the friability of the lung texture in this stage of the disease. The engorgement of the tissue renders it more resistant, and at the same time diminishes its cohesive force, so that the fingers rupture it much more readily than they do the normal lung.

The stage of *red hepatization*, so called from its resemblance to the substance of the liver, is marked by a lighter color, a lessened quantity of fluid, a greater degree of solidity, and an increased friability, as compared with the characters of the first stage. To the touch it is both solid and elastic, and yields no sense of crepitation. Slight pressure causes a very little bloody fluid to exude from the cut surface without a trace of air-bubbles. Firm pressure not only discovers its greater friability, but reduces it to a red, pulpy mass. The bronchi with their vessels, as well as the tissue between the lobules, by escaping the inflammatory process, remain lighter colored, and give to a section of the lung a streaked and specked appearance. By closer examination the cut surface is seen to be studded with small ovoid bodies, which give it a granular aspect. These particles are composed of the exuded albuminous matter coagulated into firm plugs, which completely fill and are adherent to the air-vesicles. An overflow of the exudation causes the granules to project into the terminal bronchi, which has led to the belief that the latter structures had taken part in the inflammation. Laennec looked on the presence of these granulations as a necessary part of the stage of hepatization, but they are found to exist in variable degrees in different cases, or even to be entirely absent. When they are not present, the lung presents a more uniform and darker appearance, to which the term *splenization* has been applied. Under the microscope the exudation material is seen to be composed of a granular form of albuminoid matter, with red and white blood-corpuscles, and an abundance of new cell-formations on the air-vesicles. The presence of fatty globules is no doubt due to the fatty metamorphosis which takes place prior to absorption of those products. The lung in this stage sometimes enlarges suffi-

ciently to take the imprint of the ribs on its surface. It does not collapse on opening the thorax, and is found to have increased to over ten times its normal weight.

The stage of *gray hepatization* retains many of the characters of its predecessor, red hepatization. The chief change is in the color, passing by gradations from the red to a drab stone-tint, by reason of the infiltration of pus-cells throughout the solidified mass. When in the process of changing, portions which yet remain more or less red, dispersed among the gray, give the tissue the appearance of granite. It is still solid, granular, and, lacking air, it sinks when thrown into water. When cut, the tissue may not give forth any purulent matter until it is pressed between the fingers. Later in the process of suppuration the whole lung becomes very soft, assumes a sulphur tint, and a puncture made into its substance will be immediately replaced by a well of pus. The vesicular texture disintegrates, and little remains beyond a network of bronchial tubes and vessels and the lobular septa.

Clinical History.—The chill which ushers in the attack lasts variably from half an hour to several hours. In its severity it is comparable to the chills of ague or pyæmia, but the latter repeat themselves, the former occurs but once. The temperature is found to have risen during the continuance of the rigor. The heat increases rapidly, and about the second day reaches its maximum point. Only bad cases indicate higher than 105° F. The fever continues to range high up to the fifth day, at the end of which time, or early on the sixth day, it begins to decline, and soon falls rapidly. The thermometer shows certain variations during the twenty-four hours. Its lowest marking is in the early morning. During the forenoon it begins to rise again, and continues going up until the afternoon. The comparatively sudden termination of the fever, or crisis, does not occur until the process set up by the inflammation is complete; then it is accompanied by a profuse sweat, an inordinate flow of urine, or a diarrhoea.

The duration of the different stages may be generalized as follows: The stage of engorgement, only a few hours; the stage of red hepatization takes twenty-four to forty-eight hours for the exudative process, and two to four days for solidification to continue before absorption begins; the stage of gray hepatization is usually terminated in a few days by death. The first stage may not progress to the development of inflammatory products, but simply end by resolution. It more usually goes on to hepatization, however, and then, instead of ending in purulent infiltration, it gives way to the reparative process of resolution or absorption. This stage of resolution seldom takes less than three or four days to remove the solidified exudation, and more frequently occupies twice that time. Many cases do not entirely recover for some weeks. Sometimes, thus, the whole course of the malady

may be compassed within the space of six or eight days, or it may continue with evening exacerbations for two or three weeks, the symptoms remaining with this prolongation of time being confined to the rather rapid pulse and some dyspnoea, with, may-be, a little of the cough.

If the disease does not progress favorably, the addition of threatening symptoms usually takes place about the third or fourth day. The temperature rises, the pulse becomes smaller and more frequent, and the difficulty in breathing is very much increased. The patient requires to be propped up, and at the same time works laboriously in performing the act of respiration. The sputum is deeper tinted with blood, and becomes so viscid that inverting the vessel containing it does not displace it.

All authors do not agree on the question of which side is the more frequently attacked, but the general testimony is in favor of the right lung being the one most often involved, and of the base more frequently than the apex. Of the comparative frequency of inflammation of the apices, Grisolle says, that it occurs in the right two and a half times oftener than in the left.

From the time of Hippocrates it has been known and noted that the disease has a decided tendency to ameliorate on certain days. These *critical days* are commonly the seventh, eleventh, fourteenth, and twentieth, and but few cases turn toward recovery on days other than these.

Unless the utmost care is taken, relapses are very apt to take place. They must be looked upon with apprehension, for much vitality has already been expended in the first attack, and consequently the renewal of the fever is more than likely to be adynamic in form, and the increased sanguinolent secretion is much less readily coughed up, and the dangers are thereby increased. If the case tends to a fatal issue, there will be marked failure of the patient's strength, combined with increased dyspnoea from inability to expectorate all the sputa. The little that is expectorated is changed in hue and character. It may assume any opaque, dirty, greenish, drab, or yellowish tint, with blood and purulent matter mixed through it, and, sometimes, it emits a fetid odor. It was Andral who first noticed a dark-colored, sticky fluid, not unlike liquorice-water, expectorated by patients having pneumonia shortly before their death. Simultaneous with any of these threatening changes, the pulse will be thready and frequent, the face pale, cold, and clammy with perspiration, the lips bluish, the respiration shallow and gasping, and it will be noted that nature kindly blunts and veils the senses so that the patient is unaware of the distressing terminal struggle with death.

Causation.—The conditions which predispose to an attack of pneumonia may be set down to its previous occurrence in the indi-

vidual, or to tuberculosis; but neither of these can be considered as common to the majority of cases seen. Chomel tells of a patient who had pneumonia ten times. Dezoteux followed one through seven attacks who had had the disease eight times previously. And Rush gives the history of a German who had passed through twenty-eight attacks.

By all means the most frequent and most easily traceable of the exciting causes of pneumonia is exposure to rigorous weather. It is not merely the severity of the weather itself which does the mischief, for individuals habitually exposed can withstand the greatest variations of the thermometer without apparent effect, but those who are either unused to out-door life, or who, from drunkenness, debauchery, overwork, mental or physical, or anything which lowers the vitality and staying powers, will quite readily contract the inflammation when subjected to a chilling atmosphere, especially if after overexertion or overheating. The individuals most prone to be attacked are those who are most actively engaged in life's struggle, and consequently the majority of the cases occur between the years of 20 and 40; and it follows that men are more frequently the sufferers than women. The presence of bronchitis does not necessarily favor an attack of pneumonia, nor *vice versa*, for the affections, although so contiguous, are not related the one to the other. Nor does the condition of emphysema tend to favor the occurrence of pneumonia. It will, at times, be found to attack and run the ordinary acute course in a tuberculous subject, possibly confining itself to a portion of non-infiltrated tissue, and terminate without affecting the progress of the phthisis. And it will, too, complicate cases of typhus fever, as well as of rubeola, in which case it is termed "secondary pneumonia." The inhalation of irritating fumes, of toxic gases, the bite of the rattlesnake, or other forms of blood-poisoning, as well as pulmonary apoplexy, embolism, or wounds about or within the thorax, may give rise to acute pneumonia.

The influence of season is quite marked in the production of this inflammation, the late winter and early spring months being the most fertile in the year. Statistics from hospital practice in Edinburgh show that about twice as many cases occur during the first six months of the year as compared with the last six, while the records of both Paris and Philadelphia hospitals give the proportion of three cases between January to June to one case between July and December. That pneumonia is often epidemic seems to be beyond dispute, and that in certain localities it is endemic is equally true. In the careful study of seventy-nine consecutive cases by Chomel, fifty-six had no assignable cause, the remainder being traceable to the ordinary physical conditions producing it. Because of the obscurity of its source in so many cases, and because of the intensity of its fever, it has oftentimes been relegated to the list of contagious fevers. Its prevalence in the

environs of Mount Vesuvius furnishes a good example of the endemic type, being due there to abundant noxious exhalations.

Symptoms and Signs.—The first indications that acute pneumonia is setting in are well-pronounced chills or severe rigors, either of which soon give way to febrile reaction of considerable intensity. The patient complains of pain in the chest, not always of a dull character, even when the pleura escapes being implicated. But this pain differs from the pleuritic in that it is not diffused nor shifting, but generally deep and localized about the region of the nipple. The cough, which begins early, has a peculiar metallic ring, which is of itself an almost pathognomonic sign of the disease. It is accompanied at first by a light, frothy, or glairy sort of sputum, which soon changes to a viscid quality; then follows the characteristic rust-colored expectoration. This rust-colored sputum is the result of the thorough admixture of the mucous secretion with some exuded blood and air-globules, and occurs in no state excepting the inflammatory involvement of the air-cells of the lungs. Sometimes the expectoration assumes a deep-colored appearance, resembling in some measure prune-juice, from the greater addition of dark blood, or it may become more or less purulent in character, either of which conditions portends evil. Or it may be that throughout the whole course of the pneumonia there is an entire absence of expectoration, when there is no doubt that the inflammation exists, and often without developing any more serious symptoms than if it were present.

The fever ranges high in this affection, higher than in any other form of pulmonary inflammation. The thermometer indicates usually about 104° F., and is therefore an all-important aid in the diagnosis. The pulse is rapid and full, running from 100 to 120 beats per minute. The respirations are also increased, in fact, more so proportionately than the pulse. They will number from 40 to 80 to the minute, and, taken in connection with the number of pulsations in the same time, completely annul the normal pulse-respiratory ratio pointed out by Walshe.

The *physical signs* attendant upon the first stage, or that of engorgement, are: Restrained movement of the affected side, observable both by inspection and palpation. The hand discovers no alteration from the normal in the transmission of vocal fremitus. Percussion elicits slight dulness over the involved portion of lung-tissue, and early in the engorgement the ear detects diminished respiration in the same locality, and augmented respiratory sounds in the remaining portions of the lung. Following this, we have the development of the *crepitant rale*, the only marked, definite, or certain auscultatory sign in the stage of pneumonic engorgement. This crepitant rale was wont to be considered a rhonchus or dry rale, but it is now believed to result from the expansion of the air-sacs when they are covered with a viscid

secretion, and it is consequently classed as a moist rale of the finest quality.

Stokes has drawn the attention of the profession to a physical sign in the initial period of an attack of pneumonia, which, if evidencing a condition common to the larger part of the cases having this disease, should be counted one of the regular and reliable signs. He argues that, as all membranes undergoing inflammation have always a stage of dryness prior to either engorgement or exudation, therefore the air-cells of the lungs, in assuming this state, would present, if seen, intense arterial injection and a bright vermilion color. And the auscultatory sign corresponding with this condition, he says, is that of a "harsh, loud, puerile, respiratory murmur." In the cases in which he had the opportunity to examine them thus early, Waters was able to foretell by this sign the portion of the lung which eventually became the seat of the exudation, and thereby substantiated the clinical value of Stokes's sign.

In the stage of red hepatization there is a modification of the pain, if it existed in the first stage, but the cough and expectoration continue. The cough is less painful to the patient than it was, and the sputum is less hard to raise, is more abundant than before, and gradually loses its rusty appearance. The pulse is now small and more frequent, owing to the obstructed pulmonary circulation, and the breathing continues to be rapid. In this stage, too, the invasion of more lung tissue is apt to take place. If the primary attack involved only one lobe of the lung, it is likely to progress to another lobe; or if a whole lung is first inflamed, a lobe of the opposite side may be invaded. This increase of extent of the inflammation seldom exhibits the signs pertaining to the initial attack. There is little likelihood of a chill marking its commencement, or of the crepitant rale being heard in the newly inflamed part.

In the second stage the *physical signs* are more definite and numerous than in the first. Inspection shows the increased respiratory movement of the well side, as well as the restricted action of the affected side. The vocal fremitus is usually increased, although this is not invariably so, for in some cases palpation makes out a diminished thrill. A dull percussion note is found as certainly as there exists consolidation of the lung tissue, and the solidified portion may be mapped out by this means. Auscultation furnishes the signs of loud tubular breathing or bronchial respiration, a total absence of vesicular murmur, and the transmission of the vocal sounds exaggerated to the degree of bronchophony. By means of the solidification the heart sounds are also heard through the lung with peculiar clearness. The three most marked and significant of the physical signs in the stage of hepatization are, therefore, "dulness on percussion, bronchial breathing, and bronchophony."

The stage of absorption shows gradual and progressive improvement in the condition of the patient. The fever no longer holds its reign, but diminishes until it ceases entirely. The cough is much less frequent and troublesome, and the breathing becomes more natural. With the return of the appetite, the strength of the patient increases apace. But if, instead of absorption of the exudative material, suppuration should set in in this third stage, the pulse will become more frequent and weak, the expectoration will assume a purulent quality and become more abundant, and the respirations will be more rapid. The already exhausted vitality of the patient will be further taxed and drained, and the chances are that it will end in death by asthenia.

The *physical signs* of the process of absorption will be found in a decreasing degree of dulness on percussion, although there is apt to be some dulness existing for a considerable time. The loud bronchial breathing heard in the previous stage gives place to a greater or less mixture of the bronchial with the vesicular murmur, termed the broncho-vesicular; and as resorption goes on, there is less and less of the tubular quality heard, until it is no longer present, and the breathing assumes the normal vesicular. As the bronchial breathing diminishes, the crepitant and subcrepitant rales reappear, and die out again when healthy respiration is reached. These are the *râles redux* of pneumonia, indicative of the air-cells resuming their normal function. The sign of bronchophony, so prominent in the second stage, is no longer heard in the third stage, having given way to an exaggeration of vocal resonance, and soon the normal vocal sound only is transmitted.

There are other conditions to be found in pneumonia than those already enumerated, all of which may not be common to every case, but they are sufficiently frequent and important to bear careful consideration. The examination of the urine detects an excess of urea, and very often there is a trace of albumen, but the most significant change is that of the absence of the chlorides. They remain absent during the height of the fever, and reappear when resolution begins, for it is in some way dependent upon the process of exudation that the chlorides are withheld from the kidneys. The urine is scant in quantity, high-colored, by reason of the bile acids and the excess of urates present, and it ranges in weight from 1025 to 1035 by the urinometer.

Along with the general sense of aching in the back, the loins, and limbs, complained of by the patient, headache is also added to his list of pains. The latter is sharp, lancinating, and frontal, and usually increases in severity up to the fourth day, and then subsides.

The delirium which so often attends the course of pneumonic inflammation is usually preceded by a period of sleeplessness, the patient exhibiting restlessness, vacant staring of the eyes, and some tremor of

the muscles. It bears no relationship to the delirium of that rare affection "cerebral inflammation," but is seemingly due to either a condition of blood-poisoning, or to an altered state of the blood from the presence of some foreign material held in it. When the brain of a delirious patient has been examined after death, not only has there been no sign of congestion or inflammation, but it has presented, at times, some degree of anæmia. Thus, whether this delirium occurs in connection with one of the exanthems, with pneumonia, pericarditis, erysipelas, or alcoholism, it may be ascribed to a combination of these factors. There is another state wherein delirium frequently occurs, to which the delirium attending a local inflammation may very justly be compared, and that is in traumatism. The one by an accident, and the other by an acute disease, succeeds in arresting the normal function of a part of the system and interfering with the patient's mode of life. If to this be added a debilitated state prior to the onset of the disease, a weakened heart, or some mechanical interference with its action, and a depraved state of the blood, the resemblance between the surgical and the medical cases is strong, and it is possible that the consequent delirium may be identical. It is a grave complication in pneumonia, and should be obviated, if this can be accomplished, or checked in its course as soon as possible.

The face usually assumes a circumscribed dark-red flush on one or both cheeks, corresponding in the choice of sides, usually, to the lung involved. The flush is more common to cases of inflammation of the apex than of the base, and so is the delirium more usual when the upper lobe is attacked. The eyes present a lustrous hue, and with the increase of respiratory embarrassment the *alæ nasi* work with a fan-like motion.

Pneumonia may be complicated with malarial symptoms, from the presence in the system of a former or newly contracted ague, and it is not rare that typhoid symptoms should also develop in a case. A little care only is necessary to prevent confounding typhoid pneumonia with typhoid fever having pneumonia added as a complication. The one is, primarily, inflammation of the lungs, with an adynamic state impeding its progress, just as any fever of local inflammatory origin may assume a typhoid condition. The other occurs when the pulmonary affection is secondary to, and superimposed upon, an otherwise ordinary case of typhoid fever.

When pneumonia occurs in conjunction with cases of acute articular rheumatism, its attack is usually so insidious that it is very apt to go undiscovered until the lungs are in full possession of the inflammation. First, because the patient may complain of no chest pain, and may have no cough or expectoration; and second, because the slight degree of dyspnœa that may be evident is likely to be attributed to cardiac complication with the rheumatism.

As the heart is so frequently in sympathy with articular inflammation, the chest should be subjected to frequent examinations in an acute rheumatic attack, and at such examinations the lungs should receive due attention to see that pneumonic consolidation does not creep in unawares. There is one feature about pneumonia and rheumatic fever combined which is encouraging, and that is its well-pronounced tendency toward recovery, for most of the cases get well whether the pulmonary involvement is discovered early or late. When there is any concurrent cardiac inflammation with pneumonia, the pulse does not resume its normal beat as soon as it does otherwise. Instead of the pulsations steadily lowering through the third stage of the disease, they keep up an unusual frequency for a longer or shorter time after convalescence is established.

Diagnosis.—The onset, the nature, the course, the symptoms, and the physical signs, all combine to form so clearly defined a picture of pulmonary inflammation that its diagnosis is generally made without trouble.

The sign of crepitation is found in œdema of the lungs as well as in pneumonia. The same portion of the lung texture is involved in both, and in both the air-vessels are subjected to a fluid exudation; hence the same morbid sound is emitted. This, with the dyspnœa present, gives œdema some resemblance to pneumonia. But in the former there is no fever; the rales, crepitant and coarse, are diffused and two-sided, and the sputum is frothy, but never bloody. The signs of hypostatic congestion are very insipid as compared with pneumonia. The fever is slight, and so is the expectoration; there is no dulness, but simply a lessened degree of percussion resonance over the bases of both lungs. The respiratory murmur is feeble, and there are, in addition, some few moist rales heard. From phthisis it is differentiated by the rapid development of the symptoms in pneumonia, with previous good health, in opposition to the impaired health and progressive course of phthisis. In pneumonia the lower portions of the lung are usually the seat of disease; in phthisis, the upper. They may co-exist, and acute phthisis may proclaim itself at the termination of an apparent acute pneumonia. If there is doubt about the nature of the affection in such instances, the after behavior, as well as the family and personal history, will distinguish them. Pulmonary hæmorrhage is likely to give evidence of its occurrence by some bleeding from the mouth and nose. It exhibits its greatest degree of dyspnœa at the commencement, while the respiration in pneumonia increases in embarrassment during the first four days. The expectoration in the one is of pure blood; in the other, of frothy, bloody mucus, and fever is absent in hæmoptysis.

Other conditions which give evidence of solidification of pulmonary tissue, and consequently have some signs common with pneu-

monia, are atelectasis, pulmonary collapse, pleuritic effusion, and the presence of coagulated lymph blocking up the pulmonary vesicles, to the chapters on which the reader is referred for their special diagnosis.

Prognosis.—The favorable or unfavorable progress of a case of pneumonia is, as a rule, determined by the state of the pulse, the respiration, and the temperature. The greater the frequency of the pulse and breathing, and the higher the range of the thermometer, the more violent is the inflammation, and when these are excessive, the first danger to the life of the patient is from the intensity of the fever, and the second is from the extent of the exudation, which may destroy life later on by apnoea.

Pneumonia in infants is a very fatal malady, but in children from five to fifteen years of age it does not prove to be so. Barthez publishes a table of 212 cases of pneumonia occurring between the ages of two and fifteen, with only two deaths.

The death-rate between the ages of fifteen and forty is also small if the disease runs an uncomplicated course. But if pneumonia is secondary to some acute dyscrasia, such as measles or typhoid fever, it is attended with many dangers, and may readily be fatal. After fifty years of age the mortality increases very much, and by adding drunkards to the list of the feeble, the deaths mount up to sixty or seventy per cent. Deaths are more frequent when the inflammation attacks the upper lobes or roots of the lungs than when the bases are involved, possibly because of the pressure exerted on the larger vessels and tubes in the former case, thus cutting off the supply of air and blood from the non-inflamed parts.

Much may be learned from the sputum to aid in determining the prognosis of pneumonia. After being viscid and rusty, if it becomes more free in quantity and less tenacious and bloody, the inference is that resolution is established and recovery quite promising. But if it becomes over-profuse and of a thin, serous quality, or of a dark, brownish-red color, or if it disappear entirely, the prospect is the reverse of encouraging. The condition of the sputa and their significance are much altered and modified if catarrh, bronchitis, or phthisis exists with the pneumonia. When the other symptoms are not correspondingly grave, the disappearance of expectoration does not signify, but if rattling of the secretion is heard with each respiration, along with absence of sputa, denoting paresis of the vagi, œdema may set in at any moment, and death will ensue.

Should the urine, previously cloudy, become clear before the fourth day, while the inflammation is still active, the chances are against the patient, and so is the appearance of albumen in this stage a bad sign. If by the sputum or by the exhalations from the breath there is evidence that gangrene has invaded the lung tissue, the condition is full

of peril, although several such cases are recorded as surviving the attack.

LOBULAR PNEUMONIA, CATARRHAL, OR BRONCHO-PNEUMONIA.

This special form of the disease bears the imprint of inflammation simultaneously in both the bronchial tubes and in the air-cells of the lungs. The names do not apply to any true croupous pneumonia where, probably from the intensity of the inflammation, the bronchial tubes also appear reddened and more or less inflamed, but to a pneumonia that follows a catarrhal or inflammatory condition of the bronchial tubes.

It is therefore a secondary pneumonia, being preceded frequently by whooping-cough, measles, or capillary bronchitis, and, like the latter affection, is confined almost entirely to the extremes of life. It is probably never met with in adult life, unless in connection with pyæmia, the puerperal state,* or subsequent to the severe injuries of surgical operations and accidents. The terms "circumscribed," "patchy," and "lobular" refer to the limitation of the inflammation to isolated sections of lung tissue scattered throughout the whole.

Viewed pathologically, the inflamed foci do not present the granular appearance of the consolidated tissue in croupous pneumonia, but a smooth homogeneous look. The air-cells contain desquamated epithelium and leucocytes, but no exudation. The development of this malady in an infant may be first noticed by the augmented respiratory movements, or by the aggravation of the cough every time nursing is attempted. The rales heard are more of the subcrepitant and coarser order than those found in the lobar variety of adults. Dulness on percussion is an unreliable sign, therefore does not help to distinguish lobular pneumonia from bronchitis; neither are the other ordinary signs of pneumonia to be depended upon.

But if the fever suddenly rises several degrees, with increased embarrassment of respiration, lessened cough, probably signs of localized dry pleurisy, and the discovery of a few dull and inert spots over the chest-wall, the inference is strong that the bronchial inflammation has extended into the air-cells of the lungs. The two diseases, capillary bronchitis and catarrhal pneumonia, differ much in their duration, the former running its course much more speedily than the latter. With the predisposition of children to develop brain-symptoms in acute fevers, they prove to be specially liable to delirium in pneumonia, and they therefore suggest the possibility of the local inflammation being meningeal rather than pulmonary. But the thermometer will obviate any liability to confound them, for in pneumonia the record is high, and is continuously so, while in meningitis it has

* See Jousset's Clinical Medicine, page 393.

marked remissions. Infantile peritonitis also bears such resemblance to pneumonia in its continuous fever, rapid pulse and quick breathing that they require to be differentiated from each other at times. In peritoneal trouble the development of abdominal tympanitis will be sufficient to direct the attention to the locality inflamed.

The catarrhal pneumonia of the aged is insidious in its attack, difficult of detection, and asthenic in its course. A complication that sometimes befalls pneumonia in advanced life is the occurrence of hemiplegia. It involves the same side of the body as the diseased lung, but does not signify any grave state, for it is not of central origin, and disappears with the abatement of the pulmonary inflammation.

Treatment.—The record made by homœopathy in the treatment of pneumonia is so exceptionally good that any and all other modes of practice and schools of medicine may be challenged to compare results, and with perfect safety in so far as the laurels of homœopathy are concerned. Leaving out of the question the statement published by Dr. Hughes Bennett that he lost only a little more than three per cent. of his cases of pneumonia, because it has been shown that his affirmations are unreliable in several particulars, the nearest approach to the success attained by homœopathy is found in the Vienna test of the "expectant" method of treatment. During the first year of this trial, the mortality was only about seven and one-half per cent., but subsequent statistics of series of pneumonic cases treated without medication increased the average mortality to nearly nineteen per cent.

In the Sainte Marguerite Hospital of Paris, pneumonia was treated homœopathically by Tessier and allopathically by Valleix and Marrotte, for a consecutive period of three years, with the result of three per cent. less mortality under homœopathy. The losses by death from pneumonia in two hospitals there, conducted homœopathically, were five and six per cent. respectively, while under old-school treatment the mortality ranges anywhere from twelve to thirty or thirty-five per cent.

Not only is the death-rate so greatly diminished by homœopathic treatment, but the duration of the disease and the severity of its course are lessened materially. For instance, in one of the tests just cited, with the same number of beds and in the same period of time, the homœopathic service cared for some three hundred cases of pneumonia over and above the number treated by the allopathic corps. And it has been definitely noted that under this modern-school system of treatment, the febrile symptoms gradually decline, instead of terminating abruptly with defervescence as is the natural tendency of the malady.

There is even a greater difference than this in the persistence of the physical signs under the expectant treatment, as compared with their duration under homœopathy. In the former, although the fever may

have subsided about the ninth or eleventh day, the physical signs continue up to the twenty-fifth or thirtieth day, while in the latter they are frequently non-discoverable after the eighth day.

Entering now upon the consideration of the remedies in use for the treatment of pneumonia, the number is found to be limited, and the specifications concerning each are, in the main, both definite and well agreed on. In speaking of this, the *British Journal of Homœopathy* once put it that "we may say that our knowledge of the treatment of pneumonia is as perfect as is our diagnosis of the disease."

Aconitum.—There is usually the utmost accord among homœopathic physicians as to the time and adaptation of this remedy to a disease; but there is a division in the ranks about the place Aconite should hold and the value that should be attached to it in the therapeutics of pneumonia. Kafka says it has never given him any results when he has used it in croupous pneumonia. Jousset totally ignores the drug; and Hughes says that if you expect much from Aconite in pneumonia you will be disappointed. On the other hand, Baehr writes that no one who has watched the striking effects of Aconite will ever doubt its great virtues in this disease. And Carroll Dunham states that Aconite may be employed in pneumonia and other pure inflammations, and may do an heroic work. He considers its time of administration to be during the stage of arterial excitement, prior to that stage which is characterized by local deposit; if promptly and judiciously used, it may cut short the entire disease. Again S. H. Hayward says that if aconite is given in the initiatory chill, in the early reactive fever, or in the stage of simple vascular engorgement, in a case of uncomplicated pneumonia, the morbid process will almost always be arrested within twenty-four hours. The universal testimony of physicians on this side of the water accords with the views last expressed.

The special symptoms calling for Aconite are: Great anguish of mind and body, restlessness, and disquiet that can not be allayed; high fever, preceded by a chill, with burning heat and dryness of the skin, full and bounding pulse, and a deep redness of the face; labored respiration, dull pressure and weight on the chest, or stitches in the chest during a deep inspiration and during motion; dry, racking cough with some tenacious, blood-streaked expectoration; headache; intense thirst; scanty and high-colored urine; the recumbent posture on the back; and the physical signs pertaining to the first stage of the disease.

Veratrum viride.—This remedy supplements aconite, and, like aconite, has the credit of being able to abort pneumonia when it is given early, and in the tincture or a low dilution. Its symptoms are: High temperature, very rapid, hard and strong, or intermitting pulse; flushed face; labored respiration; dry and hacking cough with abundant and bloody expectoration; red streak through the centre of the tongue; and sinking, faint feeling in the pit of the stomach. It lowers the pulse and the temperature with extraordinary rapidity, and although the respirations may not be so markedly affected, the dyspnoea is never distressing to the patient, even in bilateral cases of pneumonia.

Bryonia was considered by Tessier the remedy for pneumonia. He prescribed it in every case, and frequently gave no other from the beginning to the end. Jousset is quite as warm a champion for Bryonia, and as the remedy for the benign form of pneumonia he claims that it fills all the indications.

The provings of the drug show that it is capable of producing exudations in the lungs of a thoroughly fibrinous nature, and in this wise it presents us with a better pathological picture of the disease than does any other remedy. The peculiar adaptability of Bryonia to the inflammation of serous membranes and the stitch-like character of the chest pains so often occurring in its pathogenesis, places this remedy at the head of the list for the treatment of pleuro-pneumonia.

Baehr recommends its use after the fever has abated, and when red hepatization is fully established, but this is altogether too long delayed. To accomplish its greatest good, Bryonia must be given during the process of exudation, for, even according to this author's own showing, if resolution is too tardy, or if gray hepatization sets in, Bryonia is of no further use, so that, unless the case tends toward speedy recovery, this remedy has but an indifferent position among his therapeutics of pneumonia.

Phosphorus.—This remedy is indicated when the patient exhibits something

of a typhoid condition, and the tongue presents a dry appearance with a dark brown coating on it. It is well adapted also to cases of catarrhal pneumonia. But even in true croupous pneumonia, when the sharp pleuritic pains of Bryonia are not present, when the attack has not been caused by exposure to dry cold winds, and when the patient is of a tall and spare build, Phosphorus is usually even more efficacious than Bryonia. The peculiar use of these two remedies in the treatment of pneumonia, as formulated by Tessier, is called by Jousset the "classic treatment" of that disease. If, after having given Bryonia, a progressive diminution of the frequency of the pulse is not noted within twenty-four to forty-eight hours, and other symptoms are increasing in gravity, Phosphorus is prescribed for the night, and the Bryonia continued through the day.

Probably the finest hospital record ever made in the treatment of pneumonia was that of Fleischmann, of Vienna, who by the use of Phosphorus alone cured 95 per cent. of his cases.

Tartar emetic is indicated in the stage of resolution when there is oppression of the chest, and difficult breathing. The pulmonary inflammation is on the decline, and the vesicles, as well as the smaller bronchial tubes, seem to be filled with a viscid secretion, not tinged with blood, which the patient finds the greatest difficulty in raising. It is, therefore, particularly useful in broncho-pneumonia, the form of the malady so common in infancy and old age. The dyspnoea is accompanied with wheezing and rattling of mucus in the air-passages. The expectoration may be completely suppressed, with fits of suffocation and a spasmodic cough, or if bronchial catarrh is present and the hepatization persists, there may be a considerable amount expectorated, but only after much effort. It is the remedy for pneumonia supervening on whooping cough or emphysema, or delirium tremens, and is only the more strongly indicated if gastric catarrh complicates the case. The attendant symptoms are: a livid or pallid countenance; a frequent pulse; a lowered temperature; a loose cough, with great anxiety; and a cool, moist skin.

Sulphur.—When high febrile symptoms persist after the completion of exudation, and the stage of resolution is delayed, without the development of typhoid symptoms; when the pneumonic processes seem to be at a stand-still, and there appears to be danger of purulent infiltration setting in, instead of terminating by resolution, Sulphur is the remedy called for. The time for its employment is about the fifth or sixth day when there is a great lack of reactionary force. It quickens into life the reabsorption process in such cases. The face is frequently puffy in appearance, and there is a great tendency to sweats. Eideherr recommends its use from the beginning of the exudative process.

Mercurius is a remedy little used in the treatment of pneumonia, but both Müller and Behr give it a definite place among the therapeutics of pulmonary inflammation. In epidemic broncho-pneumonia, Behr says, it is a leading remedy, as well as in the catarrhal or lobular form, and Müller thinks it specially well adapted to the third stage of pneumonia. The symptoms indicating Mercurius are: a continuous but not intense degree of fever; the skin is at times dry and hot, and again is covered with profuse perspiration; a dry, rough, irritating cough, worse at night; sometimes a slight amount of yellowish-green expectoration streaked with blood; dyspnoea unchanged or slightly increased; violent headache, stupor and light delirium; the tongue is coated yellow and soon becomes dry; the urine is cloudy and scant. In fact, the tendency is wholly in the direction of a typhoid condition. In children, when they have suffered from whooping-cough, bronchitis, or a severe influenza, and signs of pneumonic exudation set in, Mercurius proves to be a valuable remedial agent.

Hepar sulph is a companion remedy to the foregoing, or rather is the one which best follows it, when to the conditions found under Mercurius the suppurative process is added. There will be signs of hectic fever, with only limited portions of the lung infiltrated with pus. It is specially valuable also in pneumonia retarded by a concurrent bronchitis.

Iodine.—Instead of employing either Bryonia or Phosphorus in the first stage of pneumonia, Kafka prefers this agent. He claims that Iodine cuts the inflammation short, while other remedies only modify it.

Bromine resembles Iodine in its action, but is preferable if the hepatization becomes more extensive, and when the Iodine has not fulfilled its mission.

Arsenicum album is never required in an ordinary case of pneumonia, but when the disease assumes more and more of a grave aspect, its employment may be demanded. It is indicated when there is extreme prostration, restlessness, pallor of

the face, coolness of the surface, periodical exacerbations, considerable dyspnoea, and an irregular pulse.

Lycopodium.—When the inflammation assumes a low type, or if it has already reached a chronic condition before it is seen, and the characteristic symptoms of the remedy are present, then *Lycopodium* will prove beneficial. It is called for when the right side is most involved, when there is a fan-like motion of the *alæ nasi*, circumscribed redness of the cheeks, constant cough with abundant mucus, or grayish and bloody expectoration, and a marked aggravation of the symptoms from 4 to 8 P.M.

Chelidonium.—*Teste* considers this remedy preferable to *Bryonia* when the subject is of a light complexion and placid temperament. He has also commended it very highly for catarrhal pneumonia or capillary bronchitis in children. *Ludlam* says he has used it with the greatest success when these affections could not, readily, be distinguished at the bed-side. The indications for its use resemble somewhat those of *Tartar emetic*, there being an excess of secretion in the tubes, and an inability to raise the same. But the last-named authority does not think it adapted, like *Tartar emetic*, to reopen the hepatized air-cells. *Hughes* looks on *Chelidonium* as being particularly valuable in pneumonia when the right lung is affected with involvement of the liver.

Ammonium carb. is another remedy which compares with *Tartar emetic* when the symptoms point to a paretic condition of the *vagi* in the pneumonia of old people. The pneumonia is usually attended with a copious expectoration, an incessant cough from a sense of irritation in the larynx, and the patient is always worse about 3 or 4 A.M.

Kali carb. has proved efficacious in the stage of resolution when both *Tart. emetic* and *Ipecac.* had failed to relieve. It has been used mostly in children, when considerable bubbling and rattling mucous rales are heard, with inability to raise the tough phlegm; a tormenting cough, great dyspnoea preventing the child from sleeping or drinking; stitches in the chest, and puffiness and cyanosis of the hands and feet.

Sanguinaria ranks with *Phosphorus* and *Lycopodium* in the stage of gray hepatization, and in pulmonary abscess. The general symptoms are those of hectic or of typhoid pneumonia.

Rhus tox.—For pneumonia caused by exposure to wet and cold, for cases of an adynamic type from the beginning, for pneumonia attended with an eruption, or for an accompanying delirium due to deterioration of the blood, *Rhus tox.* is the first and foremost remedy. Like *Arsenicum*, it bears no relation to uncomplicated pneumonia, and like it the well-known symptoms calling for its employment in other states indicate its choice here. *Rhus* is most useful when the onset of the disease is so indefinite that to predict its development into typhus, or into pneumonia, is impossible. It is even preferable to *Phosphorus* in the typhoid form of lung inflammation when the latter is preceded and accompanied by bronchitis. The dyspnoea of *Rhus* is peculiar in that it is occasioned by distension of the pit of the stomach. Other symptoms are dry and hot skin; dry, raspy and dark tongue, with a triangular red tip; loss of strength; sopor; dull hearing; subsultus tendinum, and involuntary passages of urine and stool.

Belladonna, Hyoscyamus, and Opium are the chief remedies for the delirium which so frequently complicates pneumonia, when it is due to arterial or venous congestion. They can be considered merely as intercurrent remedies. When the upper portion of the lung is involved, and the delirium is directly referable to circulatory disturbance, and not to blood change, and especially if the head symptoms are prominent from the start, *Belladonna* may be given at once, and with better effect than *Aconite*. *Hyoscyamus* is specially valuable in hypostatic pneumonia, with delirium, not so violent in form as that of *Belladonna*. There is less congestion, but more nervous excitement, with talkativeness and hallucination, under *Hyoscyamus*. Over the pneumonia of drunkards and of the aged, but more particularly in children, when there is great cerebral depression from congestion and sudden threatening of dissolution, *Opium* exerts a wonderful spell. The patient does not complain of pain; the respiration is labored and slow, stertorous, or even entirely suspended; the face becomes rapidly cyanotic; the eyes are immovable, the lids half open; there is coldness of the surface; an irregular or almost imperceptible pulse, and stupor.

Carbo veg. holds a high place in the therapeutics of the third stage of pneumonia. Great prostration accompanying the suppurative process is its chief and constant symptom. The patient is listless, and is covered with a cold perspiration; the pulse is feeble and rapid; the tongue is dry, without thirst; and the distressing cough

is unattended by expectoration, although much rattling is heard in the chest. These conditions supervene mostly in pneumonia of the aged, and it is much needed if emphysema or right heart troubles coexist with the pneumonia. The distinction made between the chest symptoms of Carbo veg. and Tartar emetic is that the former has but very slight expectoration which affords no relief, while the latter has the ability to raise some sputa, and feels the better for it.

Digitalis.—This remedy is of great value when irregularity of the pulse exists in pneumonia. This is a very threatening symptom, and usually signifies a lesion of the heart or aorta. It is most commonly met with among old people, and presages a fatal termination. An irregular pulse is not an uncommon habitual condition to find in those of advanced years. And among them the irregularity may disappear during the height of the pneumonic fever. It again makes its appearance as the symptoms abate, and indicates then a return of the normal condition. But if the irregularity reappears without an abatement of the general symptoms, the outlook is very unfavorable, unless a remedy like Digitalis meets the case and affords speedy relief. *Cactus grand.* is recommended for a like condition in pneumonia, when the sense of constriction characteristic of the drug is present also. But *alcohol* is commended even more highly when there is threatened failure of the heart, the circulation, and innervation. The patient usually cannot take any kind of nourishment into the stomach, and his small stock of vitality is rapidly being exhausted. In such cases stimulation is necessary. Not more than an ounce or two of whiskey or brandy in the twenty-four hours is required to gain the desired effect.

The room in which the patient lies should be kept at an equable temperature of about 70° F. The air should be renewed, so as to keep it fresh, and it should be moist as well as warm. It is not necessary to place heavy coverings on the sufferer. The use of hot, damp applications to the chest, especially when there is a complication of pleurisy, is frequently advisable.

It is better to restrict the diet to the use of milk or some farinaceous substance during the height of the fever, and as the general symptoms abate and the pulse softens, beef-tea, broths, and soups may be substituted. Brown sugar dissolved in warm water has been found to be much relished by infants, but if they exhibit any gastric irritability, a tea made from parched corn will prove more suitable.

PHTHISIS PULMONALIS.

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Synonyms.—Pulmonary phthisis, pulmonary consumption, consumption, pulmonary tuberculosis, tubercular disease of the lungs; French, Phthisie; German, Schwindsucht.

Definition.—Phthisis pulmonalis (*phthis*, I waste or consume) is an infectious disease, caused by the introduction into the system of a micro-organism called the bacillus tuberculosis, and characterized by the deposition of tubercle chiefly in the lungs, and its cheesy or fibrous degeneration, as well as that of the inflammatory products which it excites; also characterized by more or less hyperplasia of the pulmonary connective tissue, thickening of the alveolar walls, and bronchiectasis, and by the calcification, or else softening and expulsion, of

the cheesy material, with more or less destruction (resulting in cavities) and retraction of the pulmonary substance.

Ætiology.—Recent investigations now enable us to conclude with some confidence that the *special cause* of phthisis is the bacillus tuberculosis, the rod-shaped parasite discovered by Koch, which probably oftenest gains an entrance to the system by the inhalation of pulverized phthisical sputum, which, in most parts of the world, floats as dust in the air, in such quantities that few can escape from breathing it. This special cause, however, is powerless to act unless there be a certain predisposition to the disease, either inherited or acquired; in the latter case (by far more frequent) the susceptibility being developed under the influence of certain co-operating conditions, which may properly be called the *predisposing causes*. Such are overwork, mental depression, poor ventilation, excessive confinement indoors, moisture of the soil, poor food, some trades and occupations, climatic influences, general debilitating conditions, etc. These predisposing causes, including heredity, probably never produce phthisis without the fructifying influence of the specific cause, the bacillus. The co-operation of both is as necessary in the production of each case of the disease, as is the co-operation of the human father and mother in the propagation of our race. There is now no real difficulty in harmonizing what have hitherto been more or less conflicting and troublesome facts. Phthisis must now be recognized as an infectious or contagious disease. The reasons for these opinions will presently be given. The evidence may be studied in groups, as follows: 1. Clinical observation in man. 2. Clinical observation in cattle. 3. Experiments in inoculating animals with tuberculous material. 4. Inhalation experiments on animals with the same. 5. Feeding animals with the same. 6. Koch's discovery of the bacilli tuberculosis.

This subject, which is necessarily here treated only in abstract, may be investigated in greater detail in the writer's work, entitled, *Is Consumption Contagious?* (published before Koch's discovery of the bacillus), Boston, 1880, 2d edition 1882; in Belfield's *Micro-organisms*, New York, 1883; in Sattler's *Tuberculosis*, Cincinnati, 1883; and in recent periodical literature.

1. From the earliest times until a hundred years ago, phthisis was generally believed to be a communicable disease. Hippocrates and Aristotle testified to this belief among the Greeks, Galen considered it dangerous to pass the whole day with a consumptive, Valsalva and Morgagni avoided autopsies of persons dead with the disease from fear of catching it, Riverius declared contagion to be the chiefest cause of phthisis, etc., etc. The strong reaction which set in against this prevalent belief in the last century, continuing undiminished till after the middle of the present century, during which time infection was regarded as an exploded theory, and which has only recently

begun to give place to a belief in contagion, never gained a foothold in Southern Europe, especially in Italy, where extreme views have always prevailed, and consumptives have often been treated as if they had the plague. The belief in infection, which has thus been more or less prevalent in all ages, has never been based on the supposed large number of cases which have been obviously communicated in that way, for such cases have always been in the minority ; but in all times it has been occasionally noted that a perfectly healthy individual, with no hereditary tendency to the disease, has contracted it after a more or less intimate association with a consumptive, as for instance, in the relation of husband or wife, roommate or particular friend. Undoubtedly, brothers and sisters have frequently thus contracted it from each other ; but as skeptics would naturally declare this to be the result of a common family constitution, if not directly from hereditary tubercular taint, the believers in infection have generally laid more stress on cases where there was no blood relationship. The following, from Herman Weber, may be quoted as a striking instance of this class of cases, which, though not common, are still frequent enough to excite the suspicions, not only of physicians, but also of the laity.

"J—— had seen his mother, two brothers, and a sister die of pulmonary consumption, and had himself, on two occasions, had hæmorrhages when twenty and twenty-one years old. He became a sailor, and was apparently in good health when he left home, in his twenty-fifth year. He first married at the age of twenty-seven.

"He married four wives :

"*First.* A woman belonging to a perfectly healthy family ; she enjoyed excellent health until her third pregnancy, when she began to cough and grow thin. She died of consumption after her third confinement.

"*Second.* At the end of a year he remarried, the second wife having every appearance of health ; but, at the end of a year of conjugal life, she began to cough and spit blood, and soon died of quick consumption.

"*Third.* The third wife belonged to an exceptionally healthy family, consisting of a father, mother, four brothers, and two sisters, all living, and in good health.

"When married, she was twenty-five years old, and continued to have good health until her second pregnancy, when she began to cough and to have feverish turns. She had two hæmorrhages, and when I saw her, seven weeks after her second confinement, she showed extensive lesions in the upper part of the lungs ; also hectic fever and profuse sweats. A month later she was taken with severe hæmorrhage, and died shortly after, eight months from the appearance of the first symptoms.

"The autopsy revealed signs of pneumonic and tuberculous consumption combined, to make use of an expression employed by the late Dr. Addison, who visited the patient with me.

"*Fourth.* The fourth wife, whom I also attended, had not a sign of consumption in her family, and at the time of her marriage was twenty-three years old, and in the enjoyment of perfect health. About thirteen months later, three months after her first confinement, which had resulted happily, she began to cough, and had a little fever. Then very clearly defined signs appeared, first at the upper part of the right, then of the left lung ; moreover, she coughed up blood, and had a slight pleuritic effusion.

"She experienced some relief during a voyage which she took to Melbourne, but on her arrival there had a severe hæmorrhage, and died a short time after her return to England, nine months after the appearance of the disease. The autopsy showed extensive pneumonic and tubercular lesions in both lungs, as well as tubercles in the intestines, spleen, and liver.

"At two different times, in 1854 and 1857, after the third wife's death, and during the illness of the fourth, I had occasion to examine J. His general health was excel-

lent, and he assured me that he did not cough, and merely expectorated a little mucus in the morning. The upper part of the left thorax was flattened, and percussion showed it to be less resonant than the right; inspiration was less distinct, expiration was prolonged, and from time to time rales were heard. He did not remarry, not wishing to expose his choice to 'certain death.' He was apparently healthy, and continued to do active duty as a sailor until 1869, when he was forced to keep his bed for some months, on account of a severe fracture; he then began to cough.

"The upper part of the right lung, which had until then been healthy, became diseased, and consumption developed in the usual way, and caused the patient's death in 1871. The autopsy showed cicatrization where the disease had first seized him, and also more recent lesions."

Few physicians meet with such remarkable series of cases linked together, but almost all must occasionally have, among their families, single instances in which the origin seemed similar. No one within the last thirty years has done more to dispel the cloud of skepticism by clinical evidence than Dr. William Budd, who, after many years of deep thought, announced in the London *Lancet*, in 1867, that he considered tuberculosis to be a true zymotic disease of specific nature, in the same sense as typhoid, scarlet fever, typhus, syphilis, etc., and that, like those diseases, tuberculosis never originates spontaneously, but is perpetuated solely by the law of continuous succession. Among other evidence he cites the well-authenticated facts, that phthisis was unknown in the South Sea Islands, and also in the interior of Africa, before the whites came in contact with the population.

As an index of the state of feeling of physicians on the subject shortly before Koch's great discovery of the bacillus tuberculosis, a feeling therefore based on clinical observations, it may be stated that out of 182 physicians who answered Dr. Bowditch's question in a circular sent out under the auspices of the State Board of Health of Massachusetts, in 1872, 110 considered consumption contagious, 45 held the opposite view, and 27 were doubtful. To a similar question in a circular issued by Dr. Holden, of Newark, N. J., in 1878, out of 250 answers received, 126 were affirmative, 74 were negative, and 50 were doubtful. Dr. Holden, in making his report, added that it appeared evident that those whose attention was much given to pulmonary diseases, quite frequently inclined to a belief in contagion, while those, however eminent as scientific men, who were interested especially in other directions, often doubted it. Although we thus see that the majority of physicians, as far as consulted, appeared to believe in the infectiousness of phthisis, as a result of their observations in actual practice, we must yet acknowledge that clinical evidence alone is not, and cannot very well be, absolutely decisive, however strongly it may point in one direction or the other. For the influences to which any particular consumptive has been exposed, besides contagion, are so varied (among them being many which are frequently regarded as efficient causes), and the onset of the disease is so gradual and insidious, and the period of incubation so uncertain, that from clinical evidence alone it is not easy to decide the share of each agency

in its production. Indeed, many who rely on the numerical method, and are able to recognize only the claims of the majority, think they have in statistics, as did Dr. Cotton in the Brompton Hospital for Consumptives, conclusive evidence against contagion. Acknowledging, therefore, the indecisiveness of clinical evidence alone, we will endeavor to strengthen it by the results of experiments on animals. But before considering these, it will be interesting to take a rapid glance at—

2. Clinical observation in cattle. For many years not a few veterinary surgeons have insisted that the *perlsucht*, which is now pretty generally considered to be identical with human tuberculosis, is propagated by contagion among the bovine species; one animal acquiring it either from inhaling the breath of a diseased fellow, or from eating food that had been contaminated by his secretions, especially by his expectoration. Such authorities as Dupont, Cruzel, Viseur, Zundel, and Fleming, hold strongly to the belief that this cause is efficient, aside from all questions of heredity, ventilation, food, general care, acclimatization, etc. Grad, veterinary surgeon in Alsace, in supporting this view, relates an interesting case, where six cows in succession had died in the same stall from phthisis, no other deaths occurring in the establishment during the same time. The stalls were boxed in at the head, to prevent interference. On Grad's recommendation, all the woodwork was removed after the death of the sixth cow, the manger and rack thoroughly disinfected, the spot left unoccupied for a time, the stall again rebuilt and occupied by several animals in succession, but no deaths from tuberculosis followed. The sputa, in which we *now* know the bacilli can remain active for a long time, even in the dried state, apparently spread the disease. Grad noticed many other similar instances, and always recommended disinfection.

3. Experiments in inoculating animals with tuberculous material were made by Dr. Villemin, of Paris, in 1865, and have since been repeated by a multitude of experimenters. The animals selected were not only rabbits and guinea-pigs, which often have the disease spontaneously, but also others, such as cats and dogs, among which it is rare. Animals inoculated with other substances, such as pus, etc., did not become tuberculous, while those who received tubercle, as a rule, took the local and general disease, though some more readily than others, the susceptibility varying as it does in spontaneous tuberculosis. Villemin, after many experiments, came to the following conclusion: "Tuberculosis is the effect of a specific or virulent causal agent,—in one word, of a virus. . . . Introduced into an organism capable of being affected by it, this agent is reproduced, and, at the same time, reproduces the disease of which it is the essential principle and the determining cause." The other experimenters in different parts of the world confirmed the inoculability of tubercle, and Marcet,

of London, went so far as to assert that a doubtful case in man might be corroborated or denied by the result of inoculating a guinea-pig with his expectoration. But soon a practical difficulty arose. Wilson Fox, Burdon Sanderson, Andrew Clarke, and others, claimed to produce tubercles by the inoculation not only of tuberculous, but also of non-tuberculous or indifferent substances, such as putrid muscle, pus, carcinoma, sarcoma, cinnabar, cuttle-fish powder, sand, glass, wood, etc., and therefore denied the specificity of tubercle. This was a stumbling-block, indeed, and if proven would, of necessity, utterly demolish the theory of the infectiousness of phthisis. Some asserted, however, that these tubercles were not genuine pathologically, although they might be histologically similar, but were simply inflammatory nodules. But the strongest objection to these successes with indifferent substances was that they were not indifferent at all, being really accompanied by the germs of the disease floating in the air, and deriving their origin from incarcerated animals, which either spontaneously or experimentally had become tuberculous, and were at the time kept in the same quarters, or else which had, previous to their death, contaminated those quarters with their secretions. If not in this way derived, the germs might easily come from the tuberculous material used for inoculation in the laboratory. (This explanation becomes all the more plausible since the discovery of Koch's bacillus.) The eminent pathologist Cohnheim, who, on account of his own and others' successes with indifferent substances, had thrown discredit on Villemin's researches, acting on this suggestion, and excluding, as far as he could, every possible source of tuberculous infection, now repeated his experiments on rabbits and guinea-pigs, but not a single one became tuberculous. He then magnanimously acknowledged his error and became an infectionist. Fränkel also repeated his experiments in a similar way at his private house, with absolutely negative results. The other most prominent leaders in the experiments with indifferent substances—Wilson Fox, Burdon Sanderson, and others—have also since, with true moral courage, retracted their previous utterances and acknowledged the specificity of tubercle.

4. The inhalation experiments of Tappeiner, of Meran, in 1877, were the first to attract general attention. He argued, that if consumption is contagious, it must, in all likelihood, be conveyed by inhaling with the breath fine particles of tuberculous sputa atomized into the air by the patient's cough, and that this point could, to a certain extent, be established, if animals could be made tuberculous in consequence of the inhalation of such sputa artificially atomized. Therefore he caused animals to breathe, for several hours each day, the air of a chamber in which tuberculous expectoration from persons in the last stages of consumption had been diffused by means of a common steam atomizer. Almost invariably the animals became tuberculous, and in counter

tests, in which various indifferent substances were used, no tubercle was produced. His experiments were repeated by Bertheau, Lippl, Schweininger, Giboux, and others, with similar results. Giboux also made other experiments with such air disinfected by being made to pass through carbolized cotton, with negative results. On the other hand, Schottelius and a few others, for a time, weakened the force of these arguments by claiming to produce tubercles as well after substituting for tuberculous sputa that of bronchitis, and also pulverized cheese, brain, etc. Those who have so constantly quoted Schottelius, in opposition to the infectiousness of phthisis, will be interested to know that Schottelius himself has lately acknowledged the fallacy in his experiments, and has become an infectionist.

5. Feeding animals with tuberculous substances has been undertaken by Chauveau, Klebs, Aufrecht, Gerlach, Guenther and Harms, Bollinger, Tappeiner, Toussaint, Zurn, and many others. The results were not so uniformly successful as when such material was inoculated or inhaled; still, they left little room for doubt that it is possible for absorption to take place from the alimentary canal, as well as from the lungs and subcutaneous tissue, although probably with not the same degree of activity. These experiments have a special and immediately practical interest on account of the frequent use by us for food of the meat and milk of tuberculous cattle, for it is now pretty well established that the *perlsucht* is essentially identical with tuberculosis in man, and is, moreover, a very common disease. These experiments, if not absolutely conclusive, nevertheless indicate with great clearness the duty of government to institute rigid inspection of slaughter-houses and of milch cows.

6. Koch's great discovery, in 1882, of the bacilli tuberculosis, of itself did not prove that they, by gaining entrance into the system and multiplying therein, were the cause of tubercle. Without further demonstration, they might just as well have been the effect, the product of tubercle. In order therefore to settle this point, it became necessary for him to prove their causative action by skilfully isolating them by ingenious methods from other minute organisms, as well as from their gross surroundings; by cultivating them, generation after generation, for months, on a specially prepared solidified gelatinous substance; and then by invariably producing the disease in animals by the inoculation of the cultivated parasites, purified from every particle of diseased product or tissue, and by these only; the simultaneous inoculation in other animals of the same culture substance without the bacilli, or of any indifferent substance, always resulting negatively.

Koch's methods of cultivating micro-organisms were so much superior to those of his predecessors, that a brief abstract is here given. Instead of using a fluid for culture (any fluid being open to objections), he chose a solid, transparent nutritive soil in the form of blood-serum

gelatine, on which he could, when desired, actually see, through the microscope, the multiplication of the bacilli in continuous succession, and thus be sure that what he considered propagated from the original stock, were not, as had undoubtedly often happened in the experiments of others, extraneous bacteria. To begin with, the serum is sterilized, so far as all living organisms are concerned, by daily heating to 140° F. in a closed test-tube, or in the hollow of a microscopic slide, an hour at a time for six days, and is then solidified by heating to 150° for several hours. To this, in 6 or 8 test-tubes or slides, the tuberculous substance is then quickly transferred with antiseptic precautions, a small speck being carried on platinum wire just previously heated red hot. The test-tubes are now kept constantly at a temperature of from 98½ to 100½°, and with a microscope of low power the colonies of bacilli directly proceeding from the tuberculous substance may be seen in about a week, their growth continuing for several weeks. In order to cultivate the bacilli through many generations, he found it best to transfer a few of them carefully on previously heated platinum wire to a fresh nutritive soil in from ten to fourteen days. Thus he was able to cultivate the bacilli and to have the evidence of his own eyesight that they were really descended from those in the original substance, from generation to generation, for over half a year, and it could have been done in all probability for an indefinite period. They were thus entirely separated and purified from their gross surroundings and from other forms of bacteria. The cultivated bacilli not only had the same size, form, and chemical reaction as those in the original tuberculous substance, but they were also proved to be their progeny by having been seen to grow from them by continuity of structure from generation to generation. The next step was to prove experimentally that these cultivated bacilli were really the *cause* of tuberculosis, and could produce it. Previously to this, however, he repeated the inoculation experiments of Villemin and others, with microscopical examinations for bacilli added; and found that whenever he inoculated rabbits or guinea-pigs with substances containing bacilli, tuberculosis rapidly followed, the induced tubercles likewise containing bacilli, but negative results followed the use of indifferent substances, and also the use of tubercles soaked in alcohol for a month, or dried for two months. Now, to prove that the results of these inoculations of tuberculous substances were actually due to the bacilli contained in them, and not to any so-called virus aside from these, he inoculated over 200 animals, not only rabbits and guinea-pigs, which were known to be susceptible, but also cats, a dog, white rats, pigeons, frogs, etc., some in the subcutaneous cellular tissue, some in the peritoneal cavity, some in the aqueous chamber of the eye, and some in the bloodvessels, with his isolated, purified, culture-bacilli; and in every instance tuberculosis followed, with reproduction of the bacilli. He spent two years in these investigations before announcing

his results in a modest paper, when he felt justified in asserting that the bacilli were not merely the attendants of tuberculous processes, but the real cause, and that there was no tubercle virus except the bacilli. Koch also determined by culture-experiments that the bacilli multiplied only at temperatures between 86° and 106° F., no growth taking place above or below these limits, and therefore concluded that they naturally multiply only in the animal body. After having been produced, however, he found by inoculation-experiments, that they retained their activity for a long time, even when dried, as in the sputa from phthisical individuals, in which, in the majority of cases, he found them in large numbers. He considered that they were in all probability oftenest conveyed from one person to another by means of dried and pulverized sputa wafted in the air, in which they have since been found. From Koch's experiments and discovery, therefore, which have never yet been disproved, it follows of necessity that pulmonary phthisis is an infectious or contagious disease, and that the special agent which, under favorable circumstances, is capable of causing it, is the microscopical bacillus tuberculosis. Judging from the analogy of the other contagious diseases, it is exceedingly improbable that phthisis is ever produced in any other way, without the agency of this contagium vivum, which is so wide-spread throughout most of the earth, and retains its activity so long, and is so constantly being reproduced in the bodies of men and the lower animals, that we need have no difficulty on the score of the improbability of its presence, in accounting for the production of any isolated case in the most sequestered neighborhood. From Koch's discovery the conclusion is also warranted that phthisis is at first a local disease, and afterwards becomes generalized by the migration of the bacilli from the parts of the lungs where they first gained entrance by inhalation, to other parts of the lungs and to other tissues of the body.

The Predisposition.—Having considered at some length the agency of the *special cause* of phthisis, and our reasons for so considering it, it is now necessary to inquire into an equally important factor—the *predisposition* of the individual. To some, when studying the wonders of the germ theory, the temptation is so strong to dwell on the marvellous properties and powers of a micro-organism in the production of disease, that they overlook or belittle the condition of receptivity in the system, which is just as necessary for the growth and multiplication of the germ, as the good soil of the parable was for the development of the seed, which, if it had fallen in stony places or among thorns, would have perished. In other words, the predisposition is as necessary to the bacillus, and the bacillus is as necessary to the predisposition, as to the theologian faith is to works and works to faith. And yet the opponents of the contagiousness of phthisis, practically disregarding the fitness of the breeding-ground, and looking only to

the supposed source of contagion, claim that it is clearly impossible for this to be the cause, since so many are exposed and so few affected. Yet, there is here nothing conflicting and incompatible. These same physicians acknowledge scarlet fever to be contagious, and yet not half the people in the world ever have it, although often exposed, and they who do have it once very seldom have it the second time. The germ is often there, but the predisposition is wanting. No epidemic of cholera, small-pox, or yellow-fever has ever included in its victims the whole population in any community, although all are presumably exposed. Such would not be the case, if the same susceptibility everywhere existed. It is precisely the same in kind, though not the same in degree, with phthisis. The bacilli are probably so profusely scattered, that few escape inhaling or swallowing them. In some constitutions which have the proper predisposition, or diathesis, either inborn or acquired, they will find a fit nidus, and in others they will not, as in botany some plants will thrive in one soil, but refuse to grow in another. Inoculation experiments have abundantly shown that some animals, rabbits for instance, are more susceptible to tuberculosis than others, such as dogs; and culture experiments in laboratories have proved that each species of bacteria takes most kindly to one particular culture-medium, fluid or solid, in which it will flourish far better than in others, which, however, may be preferable for some different species. A certain degree of moisture, temperature, certain elements of composition, and so forth, are conditions necessary for the success of each. Professor Tyndall, speaking generally, says: "Two bacteria germs, of equal vital vigor, dropping from the atmosphere, the one into a neutral or slightly alkaline, the other into an acid infusion, soon cease to be equal in vigor; the life of the one is promoted, the life of the other only tolerated by its environment. . . . A germ, brought close to the death-point, in a neutral or in an alkaline infusion may revive, while in an acid one it may perish; just as proper nutriment may rescue a dying man, while improper nutriment would fail to do so." Such considerations as these ought to convince those who disbelieve the doctrine because clinical evidence shows that the majority of exposed persons escape phthisis. It really requires very little more credulity to believe that a healthy person, 35 years of age, has escaped the contagion of phthisis, than that he has escaped from an attack of scarlet-fever, millions of whose germs he has, in all probability, inhaled without effect; for one-seventh of the deaths from all causes are due to phthisis, to say nothing of those persons who have it and recover; and some claim also that one-third of all the deaths of the young adult population are from the same cause. Surely, this is frequent enough. The susceptibility to contagious diseases varies, also, in the same person at different times. Even to measles, to which there is almost a universal susceptibility, some persons are exposed many

times during a course of years before they succumb, and the same is true of vaccination. It is altogether probable, also, that the susceptibility to phthisis may be more easily acquired by persons previously insusceptible, if particularly close and intimate relations are, for a considerable time, held with a consumptive, as in the marital relation, for instance. It is encouraging to think that the susceptibility to phthisis may, at times, under favorable circumstances, be diminished or destroyed, as, on the other hand, we know it may be acquired. It follows, therefore, that we take a very one-sided view, and cannot reach correct conclusions, if, in the causation of phthisis, we consider only the germ, and neglect the varying resisting power in living tissue, on account of which the germs sometimes do, and sometimes do not, find a fit nidus for their development and growth. Without the diathesis or predisposition, innate or acquired, any individual may breathe in, or swallow with his food, millions of the bacilli tuberculosis with impunity, while, with the diathesis, he will escape only if he can escape contact with the bacilli, which in most parts of the world is impossible for any considerable length of time. The practical conclusion necessarily is, that remedies should be addressed, not so much to the destruction of the bacilli, which is an almost hopeless task, but to the prevention or removal of the diathesis. In order to know how to do this, it is desirable to ascertain, as far as possible, *what the co-operating conditions are which strengthen or induce the diathesis or predisposition*; in other words,

The Predisposing Causes.—These may be classed as general and local, and often co-operate with each other. The general, or constitutional predisposing causes are those which affect the whole system, as heredity or family predisposition, alcohol, poor food, poor ventilation, poor climate, syphilis, debilitating conditions, damp soil, etc. Here the functions of nutrition and assimilation especially suffer. The local predisposing causes, such as bronchitis, pneumonia, pleurisy, dusty trades and occupations, etc., act directly on the bronchi and alveoli, inducing inflammatory lesions, with thickening and induration, which probably form a fit nidus for the development of the bacilli.

Heredity, or, to put it more broadly, family predisposition, is most undoubtedly effective in the causation of phthisis, although its influence has been greatly exaggerated, not only by the laity, but also by physicians, who often confuse with its operation that of the various insalutary surroundings of the child after birth. Not only may phthisical parents transmit to their offspring a susceptibility to the disease, but also, a feebleness or vice of constitution which inclines to phthisis may be inherited by the children of drunkards, or of those who are affected by syphilis, cancer, nervous exhaustion, rheumatism, etc. Many people have an opinion that the child of a consumptive parent or parents is almost of necessity doomed, which is, of course,

erroneous. In such cases, careful attention to food, clothing, and general hygiene will frequently forestall the disease.

Bad ventilation, and the constant breathing of a vitiated atmosphere, is universally admitted to be a strong predisposing cause of phthisis. The disease is known to prevail more extensively among those who have in-door occupations, such as printers, compositors, tailors, milliners, seamstresses, etc., even when they are well fed, than among drivers of teams, letter-carriers, and others who live much out of doors. Two-thirds of the patients in the Brompton Hospital, during ten years, had indoor occupations. Phthisis is often twenty-five per cent. more common in cities, especially in the most thickly populated parts of these, than in the country where the air is purer. It particularly prevails in prisons and barracks, where the food is generally better than the ventilation; the bad air in crowded school-rooms often has a bad effect.

Phthisis can often be developed in the lower animals by confinement in close, poorly-ventilated apartments; and in the mining districts of Cornwall and Devonshire, England, which are very healthy above ground, one-half of the miners are said to die of phthisis.

Climatic influences have long been recognized. Some climates certainly favor and some oppose its development. In the temperate zone it is far more common than in either the frigid or torrid, and high altitudes (of at least 2000 feet) are especially antagonistic to phthisical developments. The inhabitants of Iceland and of the interior of Africa, in both of which places the disease is very rare, often acquire it on removing to the temperate zones. As a rule, phthisis is apt to prevail particularly in those countries, and among those tribes, where scrofula prevails. Moist climates, in which are frequent alternations of temperature, are worse than dry climates in which the temperature is uniformly either cold or warm.

Dampness of soil has been proved to be an undoubted predisposing cause of consumption, by the investigations of Dr. Buchanan of England, the Registrar-General of Scotland, and Dr. Bowditch of Boston, which show that the wet, heavy, clayey soils are the hotbeds of the disease, which greatly diminishes after proper drainage. Not only is this true of townships, but also of individual houselots. Near a lot of this character may be others with dry, sandy soil, especially if more elevated, on which the disease rarely appears.

Poor food has a decided influence in the development of the tubercular diathesis. Not only is this seen among the lower classes, especially in times of business depression, when food is scarce and dear, but also among those children of the rich who are allowed to eat much candy and cake, and indigestible substances generally. For it is not so much the amount and quality of the food taken into the stomach, as that which is properly digested and assimilated, which builds up

the system ; and mal-assimilation and mal-nutrition is the important point. It is probably by diminishing the appetite and interfering with nutrition that some of the other causes act.

Age is also to be considered in this connection. Although phthisis may occur at any age, and affect the very young or the very old, yet it is by far most common in early adult life, almost one-half of the entire number of cases occurring in persons between twenty and thirty years of age. The next most common decade is from thirty to forty years, the next forty to fifty years, and the next ten to twenty years. The reason for this we cannot tell ; it is a part of the predisposition. Acute phthisis is more common in young, and the chronic disease in older persons.

Sex does not seem to exert any special influence in the production of the disease. Authorities differ as to the preponderance of males or females.

Debilitating diseases and conditions have a very decided influence. Among these may be classed miscarriages, parturition and over-lactation in feeble women, typhoid fever, syphilis, mental depression, extreme bodily exercise, and the cessation of habitual discharges, as from anal fistulæ or old ulcers ; indeed, anything which is permanently exhausting.

Local predisposing causes of phthisis, like general causes, are not sufficient of themselves alone to produce the diathesis. In each case there must be added an indescribable something for them to work upon ; else few persons would escape.

Dusty trades and occupations have been shown by Dr. Greenhow to furnish an obvious source of irritation to the air-passages, and to be quite active agents in the development of phthisis. Stone-masons, needle-grinders, cotton and wool carders, porcelain workers, coal miners, potters, and others who are constantly obliged to inhale fine particles of stone, iron, cotton, wool, flax, clay, straw, etc., are particularly subject to the disease. Such particles have frequently been recognized in the lungs by chemical and microscopical examination in the midst of masses of real tubercle, with softening, cavities, etc. Dr. Greenhow estimated that 45,000 deaths occurred from the inhalation of such kinds of dust in England and Wales.

Bronchitis, pneumonia, pleurisy, hæmoptysis, and chronic pharyngitis, are all by many, especially since Niemeyer espoused these views, considered as local causes of phthisis, while Louis and his many followers have contended that they have no particular causative action. Flint has argued, in his work on phthisis, from a large clinical experience, that these diseases have been antecedent to only a very small proportion of his collected cases of phthisis ; and also that from a consideration of separate collections of these individual diseases, very few of them appear to eventuate in phthisis ; and that if this

association is more than a coincidence, these diseases only serve to determine the local manifestation, the cachexia already existing; they, in other words, acting the part of the match when everything is ready for the explosion. He thinks that the new doctrine of the special causative agency of the bacilli, in which he seems to be a firm believer, militates against the direct causative agency of these affections as well as of traumatism.

Deformity of the chest does not, as some have supposed, particularly favor the production of the disease. Emphysema, asthma, and also those cardiac lesions which interfere with the proper aëration of the blood, act, to a certain extent, as preventives to phthisis. Marriage and childbearing, instead of acting this way, as some have claimed, really hasten the progress of the disease in those predisposed to it.

Pathology and Pathological Anatomy.—The modern doctrine of the bacillus tuberculosis enables us to introduce a little more order into the confusion which previously attended the teaching on the pathology of phthisis. Before the promulgation of this doctrine, the most commonly accepted division of the varieties of this disease, based on the authority of Virchow and Niemeyer, had been a trifold one, into *caseous*, *tubercular*, and *fibroid* phthisis. Caseous phthisis was characterized by the cheesy degeneration of the inflammatory products of catarrhal pneumonia, in consequence of some "vulnerability" of constitution, followed by the liquefaction and expulsion of these products, and consequent injuries to the lung substance. Here tubercle played a secondary part, and was not supposed to be introduced until the disease was well advanced. The key to the proper understanding of this form lies in Niemeyer's famous axiom, that the greatest danger which hangs over such a patient is the possibility that he may become tuberculous. This form, being inflammatory, was often called cheesy pneumonia, broncho-pneumonia, chronic catarrhal pneumonia, etc. The second variety, on the other hand, tubercular phthisis, as its name indicated, was dependent from the beginning on the deposit of tubercle as its starting-point. Here the tubercle-granulation was the exciting cause, and not the consequence, of the catarrhal pneumonia with its cheesy degeneration; the same softening, expulsion, and destruction of lung substance followed. The third variety, fibroid phthisis, was characterized principally by hyperplasia of the connective tissue, and retraction of the lung, and by atrophy and degeneration of its peculiar substance, together with cavities resulting from bronchiectasis. Here, too, tubercle played a secondary part, not being introduced into the first act.

This division must now be changed; for enough has been said in the section on aetiology to prove that tubercle is the starting-point, the *fons et origo* of all forms of phthisis. No one variety of phthisis is distinctively tubercular. Pulmonary phthisis is synonymous with pul-

monary tuberculosis. Besides, on a more careful examination it was found that Virchow's caseous pneumonia was not, at its commencement, such a purely inflammatory process as he thought, for from the beginning tubercles can be found alongside of the inflammatory products, and also in the vanguard with them as these advance; a fact which does not support the theory that tubercles are the result of a retrograde metamorphosis. They also accompany all stages of fibroid phthisis. The latter being quite distinctive, both in its pathology and clinical history, must remain as one variety of phthisis, but the caseous and tubercular varieties must be coalesced and form the other great division, to be called caseous or catarrhal phthisis, there being now no longer any reason for their separate maintenance, tubercles originating both. It is not to be supposed that each of these two great varieties is entirely independent of the other, there being in every case of fibroid phthisis more or less of the cheesy products, and there being in every case of catarrhal or caseous phthisis more or less of hyperplasia or induration of the connective tissue, with its results. We simply mean that in one case one feature greatly predominates, and in another case the other feature, enough to warrant the use of a distinctive name, especially as the symptoms of the two forms also greatly differ. Acute miliary tuberculosis, the tubercles being pretty uniformly and extensively diffused throughout the system, not being a lung disease, but a general affection, does not come up in this place for consideration.

The chief characteristic, then, of phthisis is *tubercle*, which, in the miliary form, is a small, grayish-white, semi-transparent, non-vascular, roundish granulation, smaller than a millet-seed, and just large enough to be visible, generally, to the naked eye; at its periphery having many round cells like leucocytes, larger cells, epithelioid, like formative cells of granulation tissue nearer its centre, and at its centre one or more very large cells with numerous nuclei, called giant cells. These cells are very apt to undergo caseous necrosis, beginning at the centre of the tubercle, so that at the latter place the structure may be completely obscured. Fatty degeneration often occurs, and occasionally, though rarely, fibrous transformation. These tubercles, probably both because they have a specific virus and are foreign bodies, in the great majority of cases, excite inflammation around them, and the inflamed tissues and inflammatory products joining with them serve to make them seem much larger than they really are. Inflammation may also be excited at some little distance from them. They continually spread and propagate themselves, exciting inflammation about their new locations in bronchi, alveoli, bloodvessels and interstitial tissue, and both they themselves, and the products of inflammation induced by them, undergo caseous degeneration, as a further and more severe result of that specific irritant, the tubercular virus; thus, also, evidencing infective character. The lymphatics and veins are a favorite

channel for their progress. The gradual coalescence of these little patches of caseous necrosis form those larger masses of dry, yellowish, cheesy-looking material, formerly called crude or yellow tubercle, as distinguished from the gray granulation, which is also the infiltrated tubercle of Laennec. We have about gone back to the views of Laennec, with this exception: he considered the essential cause of tuberculosis to be a particular state of the constitution; we recognize this latter simply as a preparatory state, and require in addition the seeds of the disease, the bacilli tuberculosis. Phthisis is no longer a general disease with a local manifestation in the lungs, but at the outset it is a local disease, although the system may eventually become more or less infected.

Miliary tubercles first form, says Rindfleisch, in the walls of the smallest bronchi, where they open into the alveolar passages. It is here, then, that the bacilli, wafted on the air in the form of dried, pulverized sputa, first find a successful lodgment, if the dyscrasia exists. If not, they are rendered inoperative. It has been spoken of as probable that the reason why the apices are the first affected is that they are the least expansible portions of the lung, and that in persons who do not breathe deeply the air is, consequently, apt to stagnate in them, thus giving the bacilli a better chance to find a fit nidus.

The tubercular virus, operating on the bronchioles, produces not only a deposit of miliary tubercles there, but also a chronic catarrh of their mucous membrane, which is also often accompanied by ulceration of the latter (resembling tubercular ulcers in the intestine), the little depressions thus formed appearing to the naked eye like saccular dilatations of the bronchioles. The tubercles are deposited, not only in the bronchioles in immediate proximity to the lobules, but for some distance beyond. From these deposits the disease tends to spread mostly in one of two directions—either to the *alveoli*, the inflammation being principally catarrhal, or to the surrounding connective tissue, and thence into the *general connective tissue* of the lungs, the inflammation producing new formation and induration of this tissue. We say *mostly*, because in all cases there is more or less of both kinds of spreading, but in one the extension to the alveoli predominates, and in the other the extension to the connective tissue predominates. This is the basis of the division into the two great classes of phthisis already mentioned—the catarrhal or caseous and the fibroid. In both, a peribronchitis is first set up by the deposit of tubercles, and inflammation and induration of the connective tissue in the immediate neighborhood of the little ulcers of the bronchioles already mentioned. Why the spreading should sometimes take place in one direction and sometimes in the other it is impossible to say, excepting that it probably depends on individual peculiarities. That to the alveoli, producing caseous phthisis, is by far more common, and will first be explained.

Caseous or Catarrhal Phthisis.—The catarrhal inflammation of the alveoli, already spoken of, leads to their filling up with large epithelioid cells, and rarely with the small round cells and fibrin of hepatization. The alveolar walls are often so much swollen by their infiltration and inflammation, that it is difficult to mark out their boundaries. The walls of the little bloodvessels are also so much swollen by their infiltration with tubercles and inflammation, as to rupture occasionally from weakness and cause hæmorrhage. Many bloodvessels at the apex of the lung becoming occluded, the pressure in the rest becomes greater. The infiltration with miliary tubercles of all these structures—bronchioles, peribronchial connective tissue, alveoli, and bloodvessels, together with the products of inflammation—causes a grayish-colored solidification of the lung tissue in larger or smaller areas, which have a distinct lobular arrangement, like bunches of grapes, depending on the distribution of the small bronchi. These almost always form first at one of the apices; at the left apex a little oftener than at the right. After a while the solidified structures, including the tubercles, undergo a caseous necrosis, when the grayish color gives place to an opaque yellow or white appearance, with the friability of cheese. This necrosis begins in the central part of each small condensation, and works outward toward the periphery. Under the microscope the outlines of the alveoli are almost, if not quite, obscured, and nothing is seen but fine homogeneous granules. If the patient gets well, from this time the caseous mass becomes encapsulated, dried, infiltrated with lime salts, and converted into a putty-like material, or chalky mass, which remains harmless in the lungs for years or for the rest of life, or sometimes becomes absorbed. Unfortunately, this is the exception rather than the rule. Oftener the caseous material softens and breaks down into a greenish-yellow or gray, creamy, homogeneous fluid, in which may be found fibrils of the elastic tissue of the lungs. Thus cavities in the lung substance are formed, and their broken-down, liquefied contents are discharged by ulceration into one or more bronchi, whence they make their way through the trachea and larynx, and are expectorated. The cavities are at first small, but soon increase in size by the coalescence of neighboring softenings. They extend as long as they are bounded by softening tubercle and caseous masses, their walls being ragged and ill-defined. Later, a partial smoothing of their walls may take place by the formation of a connective-tissue lining, which constantly secretes a greenish-yellow pus, which is sometimes fetid on account of decomposition from the presence of air. These cavities are often traversed by trabeculæ, representing branches of the pulmonary artery which have survived the general necrosis, some of them being obstructed and some partially pervious, with aneurismal dilatations of their weakened walls. From the rupture of these aneurisms, either in the traversing

trabeculæ or else in the walls of the extending cavities, come the frequently copious hæmorrhages of the latter stage of the disease, hæmorrhages which would be still more copious, were it not for the narrowed calibre of the bloodvessels. When the disease approaches the pleura, a dry inflammation generally takes place over a greater or less extent, gluing the pleural surfaces together so firmly, that at a post-mortem examination, in tearing them apart, there is great risk of opening into one or more cavities. If, however, as occasionally happens, especially in acute cases, a cavity comes to the pleural surface at a place where vascular adhesion has not taken place, necrosis and giving way of that portion of the pleura occurs, and the escape of the contents of the cavern into the pleural cavity gives rise to a pneumothorax and also to an acute attack of pleurisy with effusion. Thus a pneumothorax, depending for its production on the absence of pleural adhesions, is more apt to occur in the lung least affected. The great pathological law for the extension of a tubercular deposit is, that at first one apex is attacked, and the disease gradually extends downwards. After it has made more or less progress, however, the same process is repeated in the other lung. The disease, although it generally exists in both lungs after the patient has been sick for a good while, is, therefore, always further advanced on one side than on the other. The rule that the upper portions of the lungs are attacked first is almost universal. It is exceedingly rare for tubercular trouble to begin in a lower lobe.

It must be remembered, as before stated, that with the changes just described in caseous phthisis, more or less inflammation and induration of the general connective tissue takes place. Such induration, forming the most prominent feature in another class of cases of phthisis, will now be discussed at length in connection with the pathology of

Fibroid Phthisis.—This has been often called chronic interstitial pneumonia, or cirrhosis of the lung, and in its typical manifestations is not nearly so common as the caseous form, although its essential features enter to some extent into almost every case of phthisis. As with the other variety, the tubercular deposit and inflammation begin in the small bronchial tubes, the mucous membrane of which is at first dark red and later of a slate color, and contains here and there tubercular ulcers. The sub-mucous connective tissue of the bronchi is greatly thickened, containing round cells, and their muscular layer is at first hypertrophied, but afterwards softened and dilated. Peribronchitis is produced.

The connective tissue of the healthy lung lies mostly around the bronchi, around the bloodvessels, between the lobules, and under the pleura, and is all more or less intimately connected by means of the lymphatics. Through the lymphatics then, to all this network of interstitial lung tissue, the tubercular poison in this form of the disease

is apt to spread from its first location in the bronchi, in just the same way that Hamilton has shown how coal-dust or any other foreign material, after inhalation, may be carried about and deposited in the interstitial texture of the lungs. In fact, in this form of the disease, the inhalation of coal-dust or fine particles of stone, iron, cotton, flax, wool, clay, etc., have undoubtedly much to do in co-operating with the bacilli to produce the disease. The tubercular virus thus introduced excites inflammatory induration and new formation of dense connective tissue, containing round or spindle cells. On section, this shows as trabeculæ of very firm, almost cartilage-like tissue, traversing the lung in the direction of its root, of a grayish color, with patches of brown pigment, and with little vascularity. In all stages may be found miliary tubercles, which here, following the fashion of the changes in the connective tissue, undergo the fibroid transformation. In all such tubercles, no matter how deeply seated, as well as in the tubercles in the caseous form, have been found under the microscope the bacilli tuberculosis.

Bronchiectasis is one very striking feature of this form of the disease. Several forces combine to produce this dilatation of the tubes. The ulcerations in the mucous membrane of the bronchi and the softening of their muscular layers have already been described. The thickened pleura, which in this form of the disease sometimes acquires the remarkable thickness of a half inch, is firmly adherent to the chest walls, and is connected by the toughened, constantly contracting interstitial tissue to the peribronchial induration, which pulls out the weakened bronchial wall and also drags in the chest wall, especially at the apex, a sinking in which is a very common feature in the disease. Another force is that of the expiration in coughing. Still another is that of inspiration, by compensation, on account of the general contraction of the lung. The cavities of bronchiectasis are either fusiform or sacculated, the latter predominating. They have a distinct lining membrane, which is often directly continuous with the bronchial lining membrane. Sometimes also the peribronchial connective tissue contracts concentrically and obstructs the bronchus, in which the secretions may accumulate and cause dilatation of the tube beyond the obstruction. The walls of these, as of other bronchiectatic cavities, generally contain ciliated epithelial cells.

The constant contraction of the newly-formed connective tissue also compresses many of the alveoli, of the bloodvessels, and of the bronchioles. Compensatory emphysema naturally results on account of the dilatation of others of the alveoli, to make up for those that are obliterated. The compression of the little arteries and of the bronchioles results in an atrophy from lack of blood supply, and a collapse of lobules (atelectasis). In the collapsed lobules a catarrhal inflammation takes place, and cheesy masses form, soften, liquefy, and are

expelled from the cavities thus produced, as in caseous phthisis. Thus we see again that these two forms of phthisis are intimately related to each other, but that in one the cheesy, catarrhal process predominates, and in the other the fibroid. Between these two typical forms may be met in practice all degrees of transition. In the early stages of fibroid phthisis, the lung, especially in its upper lobe, on section, seems dotted over with small, isolated, hard, nearly black masses, which are found to be the small bronchi surrounded by indurated and pigmented connective tissue containing tubercles. At a later stage, the lung seems greatly shrunken in size, a result of the shrinkage being seen not only in a retracted chest, but also often in a lateral curvature of the spine. Although not entirely confined to one lung, the affection is much more one-sided than is caseous phthisis. The principally affected lung being so much retracted, the other lung is apt to be drawn over towards it. The heart also is more or less dragged out of place, and suffers organic alteration from the compression and closure of the pulmonary arterioles. For, the circulation in the lung being obstructed to so great an extent, the right cavities, as a natural result, become dilated, a stasis of the venous circulation follows, the liver enlarges, the kidneys are congested, albumen appears in the urine, and dropsy is added. Fibroid phthisis is said to be often preceded by pleuritic effusion, pneumonia, or pleuro-pneumonia.

The *bronchial glands* in both forms of phthisis, as a rule, contain tubercles. In the caseous form they enlarge, caseate, sometimes soften, sometimes calcify. In the fibroid form, they undergo fibrous transformation and become dense, hard and pigmented.

The mucous membrane of the *larger bronchi*, of the *trachea*, and of the *larynx* may also be the seat of tubercular ulceration, which probably arises from the passage over them of the virulent, tubercular, broken-down lung substance during expectoration. The same substance is often swallowed, and produces tubercular ulceration of the *intestines*. The occasional presence in phthisis of tubercles in the liver and kidneys and urine and genital organs (although rare in comparison with their presence in those parts in acute miliary tuberculosis), is probable evidence that the bacilli have been transported by the blood, especially since the recent discoveries by Ponfick of tuberculosis of the thoracic duct, by Weigert of tuberculosis of the veins, and by Weichselbaum (*Wiener med. Wochenschrift*, No. 12, March 22d, 1884), of tubercle bacilli in the blood.

Physical Signs.—These, which are of the utmost importance in diagnosis, will be considered with especial reference to the three stages of the disease—first, the incipient or stage of *consolidation*; second, the stage of *softening*; and, third, the stage of *excavation*. One set of signs in any of these stages directly indicates the physical condition of solidification of the lung, another set a cavity, and other signs certain acces-

sory conditions, as circumscribed bronchitis, pneumonia, or pleurisy. When one lung only is affected, the signs are to be heard, as a rule, at the apex at first; and as they in their progress gradually reach the parts below, signs of commencing trouble at the other apex may be expected.

First Stage.—*Inspection* is not often to be depended upon here. The *percussion* at the apex is dull in all degrees, from that which is almost indistinguishable from the normal sound to that which is very decided. Slight degrees of dullness at the left apex must always be counted; but owing to the occasional existence of a very slight amount of dullness at the right apex in health, considerable judgment is necessary in making a decision as to its importance in disease, a judgment which is only to be based on experience; in some cases an opinion should be reserved for a future examination; beginners often make allowance for too much dullness. The dullness may be either in front or behind. In some cases, a secondary emphysematous condition may be set up in lobules near the deposits, which may give rise to a vesiculo-tympanitic or exaggerated resonance on percussion; or this resonance may so modify the dullness, that a kind of balance results, which may sound very like the normal vesicular resonance. The *respiration* is weakened or broncho-vesicular, occasionally jerking. The vocal resonance, bronchial whisper, and vocal fremitus are increased. The slight possible normal increase on the right side must be allowed for. These are the signs of a small portion of the lung solidified by a tubercular deposit. There need be of necessity no *rales*. If these exist, they are heard at the apex, and do not primarily but only inferentially indicate phthisis; for they depend for their production on a local secondary bronchitis, pneumonia or pleurisy, which is excited by some irritation, and the most likely irritation at the apex is a tubercular deposit. If this secondary affection is a circumscribed bronchitis, or a spasm of the tubes, sibilant *rales* are heard; if a circumscribed capillary bronchitis, subcrepitant *rales*; if a circumscribed pneumonia, crepitant or crackling *rales*; if a circumscribed dry pleurisy, rubbing or crumpling friction-sounds. Any *rales*, in fact, heard at one or the other apex, are suspicious. A tubercular deposit occurs somewhat oftener at the left apex than at the right, the proportion being about five to three.

Second Stage.—On *inspection*, a certain amount of flattening and deficient expansion at one apex can be seen. Mensuration often shows a decided decrease in size. On *percussion* of the affected side, more or less dullness is found at the upper part, owing to the solidification, and sometimes exaggerated resonance from a coexisting emphysematous condition. The *respiration* is bronchial or broncho-vesicular in proportion to the amount of deposit, or weakened, and sometimes jerking, if the tubes are more or less obstructed. The heart-sounds are heard more distinctly transmitted through solidified than through normal

lung texture. The same *rales* may be heard as in the first stage, and indicating the same secondary, circumscribed affections at the upper part of the chest. In addition, fine and coarse bubbling rales are produced by the breaking down and liquefying of the tubercular deposit. These are heard better in the morning before much expectoration takes place. If there is sufficient solidification, *bronchophony* and whispering bronchophony are heard; if not, the vocal resonance and whisper are increased. Generally, during this stage, signs of commencing trouble are to be heard at the other apex.

Third Stage.—Softening has now proceeded to such an extent that cavities form, generally in the upper part of the lung. Around them may be heard the signs of solidification. The upper parts of the lung fall in so much that the clavicle seems very prominent on *inspection*, and the deficient expansion and diminished size on mensuration are far more noticeable than in the second stage. On *percussion* over the cavity, the resonance is tympanitic, and occasionally cracked-metal or amphoric. When the cavity is full of morbid products, however, as often in the morning before expectoration, dulness takes the place of these sounds. The *respiration* is cavernous, if the cavity is of good size and has been emptied by free expectoration. If small, the neighboring bronchial or broncho-vesicular respiration may predominate. The *rales*, unless the cavity is full, are gurgling, and are very distinctive of this stage. The *vocal resonance* is cavernous pectoriloquy and whispering pectoriloquy, or amphoric. The vocal fremitus is often increased. The heart may be dragged out of place by shrinking of the lung, and its new position recognized by palpation, auscultation, and percussion.

Symptomatology.—Phthisis is often developed in a very insidious manner. Long before there are any distinct evidences of the disease, indications of deterioration of the general health and loss of constitutional vigor may manifest themselves. Lassitude, diminished appetite, indigestion, daintiness, aversion to fatty substances, irregular movements of the bowels, cold feet, pallor, loss of weight, are supposed by some to indicate what they call a *pre-tubercular stage*. But these symptoms, occurring in a previously healthy person, although they may put us on our guard, yet certainly cannot be considered as decided evidence of approaching phthisis, since they so often occur without this disease as a sequence. It is always easier to look back and see their connection with phthisis after its full development, than to look ahead and from them to predict it with any certainty. Such an assemblage of symptoms, however, so often ushering in the disease, it behooves us to watch very carefully. A more decided symptom, which sometimes attracts attention and sometimes does not, is a cough, at first slight, dry and hacking, afterwards with expectoration of mucus, which gradually becomes more abundant. Other symptoms follow sooner

or later, such as emaciation, pallor, weakness, pains in the chest, a quickened pulse, hæmorrhage, chills, a rise in temperature, with the hectic flush in the afternoon, night-sweats, quickened respiration, indigestion, a white tongue, torpid bowels, and scanty urine. Of these the constant cough and increasing emaciation are the most common and prominent features. As the disease progresses, the expectoration becomes more abundant and purulent, and contains filaments of lung tissue, the cough increases in severity, diarrhoea sets in, in women menstruation is diminished or suppressed, the emaciation rapidly progresses, hoarseness, or even complete aphonia appears, the fingers are clubbed, the feet and ankles are swelled, and the patient dies of exhaustion, sometimes of suffocation.

Such, in brief, is an outline of the course of phthisis. Some of its symptoms may be profitably studied in detail.

The cough of phthisis is never entirely absent, and varies in severity with the extent of the disease, increasing with the latter's aggravation and subsiding with its arrest. At first dry or hacking, it is frequently for a long time unnoticed by the patient, who, unless his attention is particularly directed to it, will often declare that he has no cough. As it increases in intensity, it becomes moister and is sometimes paroxysmal, occasionally inducing vomiting. Although it may be particularly violent and distressing in some cases, yet, as a rule, the cough of consumption is not extremely severe. After the disease has made some progress, it is by far more common in the morning, owing to the irritation of the morbid products accumulated in large quantities during the night, the patient going through a regular clearing-out process; this is repeated, to a lesser extent, in the evening, shortly after lying down. After the supervention of laryngeal complications with ulceration of the vocal cords, the cough becomes hoarse and greatly altered in tone. With these changes and those produced by large cavities in the lungs, the character of the cough seems to many sepulchral.

The expectoration at the beginning of the disease, when there is any expectoration, is a glairy mucus from an accompanying catarrhal process. In most cases, it does not commence until the cough has continued for some time. Dots and streaks of blood are interspersed when the cough is paroxysmal and violent. When the lung texture begins to break down, shreds of elastic tissue may be found upon microscopical examination of the sputa. When cavities have formed, the sputa becomes round, compact, grayish or yellowish masses with ragged edges, often called nummular, which sink in water, and contain amorphous granular matter besides cells and elastic tissue. Often lumps of cheesy material with an offensive odor are expectorated. Now and then fragments of calcareous or chalky masses are coughed up, which may even equal a pea in size. Although the expectoration of such stony bodies is rare, they are frequently found in the lungs at a

post-mortem examination, surrounded by a thick capsule of cicatricial tissue, which prevents their escape. While in such cases they may indicate a curative tendency in an old phthisical process, yet when they do escape and are expectorated, the indications are, from the rupture of the capsule, that softening is now progressing. As the disease advances, the expectoration contains increasing quantities of pus, which comes to a great extent from the walls of cavities. Collecting in these cavities, it is now and then expelled in great quantities during paroxysms of coughing. This pus often has a greenish or dirty-gray color and an offensive odor from its putrefaction. The quantity of the expectoration will vary greatly with the extent of the bronchial catarrh and the size of the cavities.

Hæmoptysis, or the spitting of pure blood—not of blood-streaked expectoration—is of very common occurrence in all stages of phthisis; and, although usually quite alarming to patient and friends, is rarely of immediate danger to life, except when the disease is far advanced.

At or near the beginning, before other symptoms have become prominent, it forms quite an important element in the diagnosis. It may be the first indication of approaching trouble, the patient, previous to the attack, being apparently in the best of health. Some have considered that such a hæmorrhage really precedes and is the cause of phthisis, blood remaining in the bronchi and alveoli, and by its irritation starting up a pneumonic process, which undergoes the cheesy transformation. Actual experiments on animals render this unlikely. Decidedly the more probable view, especially since the discovery of the parasitic origin of phthisis, is that the disease of the arterial coats, which allowed the escape of blood, was really of a tubercular nature, even though positive symptoms had not declared themselves; and several autopsies have confirmed this view. Additional confirmation comes from the clinical fact that two-thirds of such hæmorrhages are not immediately followed by any phthisical process; an interval of weeks, months or several years intervening. Indeed, phthisis may never follow a hæmorrhage from the lungs, which cannot be considered pathognomonic of the disease; still, it is well to remember that when hæmoptysis occurs in a patient free from organic heart disease, either phthisis already exists, or, in the great majority of cases, will sooner or later follow. More often, hæmoptysis is not the first symptom of the disease, even in those cases where, from its startling nature, it at first seemed so; for, the patient or his friends, on careful retrospection, can now generally remember a previously-unnoticed slight cough, at least, as its predecessor. Except in the last stage of the disease (and sometimes even then), the hæmorrhage comes from the bronchial mucous membrane, particularly that of the smaller tubes, on account of the rupture of minute bloodvessels. The alarming hæmorrhages, often causing death from syncope or suffocation, which occur in the last

stage of the disease, generally come from bloodvessels in bands of pulmonary tissue, which are left stretching across cavities, or from minute aneurisms in the walls of these cavities.

The amount of blood lost varies greatly, from a few drops to a pint or more. In the largest hæmorrhage ever witnessed by the writer, over two quarts came up in one day, the patient, in the early cavernous stage, although exceedingly prostrated and anæmic, yet pulling through and living for several months. The blood may all come at once, or within a few minutes, or may continue to come at irregular intervals for hours, days or weeks. After one attack of hæmoptysis, others are likely to occur from time to time. The natural anxiety felt by the patient and his friends may be quieted by the assurance that a hæmorrhage rarely proves fatal, and that, instead of hastening the progress of the disease, it actually exerts a somewhat favorable influence on its duration. With hæmoptysis, the cough may be no stronger than usual, or it may come in violent paroxysms, in the latter case the blood being forced from both nose and mouth. Unless the blood flows rapidly, it is more or less frothy from admixture of air.

When blood is found issuing from the mouth, it is important at once to determine its source. If it comes from the lungs, it is preceded by discomfort in the chest, swells up or is raised by coughing, which is not, as a rule, violent, and is followed by a sense of relief. It has a saltish taste, is bright red, and is frothy, unless in great quantity. After the hæmorrhage has ceased, the patient frequently coughs up from time to time a little blood, which has a dark-red color from retention in the air-passages. This latter state of things following a hæmoptysis, and not a hæmatemesis, forms an important means of distinguishing between them, when, as often happens during a violent paroxysm of coughing, the blood from the lungs is swallowed before it can be expectorated, and then vomited. Auscultation would generally throw light on the subject, but it is rarely safe to practice this for several days after the hæmorrhage, for fear of starting it afresh. If the blood comes from the stomach (hæmatemesis proper), it is preceded by weight and discomfort in the epigastrium, and sometimes also by nausea, is expelled generally by one act of vomiting, has a dark, grumous appearance on account of the gastric juice, unless a good sized artery has been eaten into (when it is copious and florid), is often mixed with particles of food in different stages of digestion, and, unlike blood from the lungs, has an acid odor and reaction. It is followed by black-colored discharges from the bowels. When, in epistaxis, the blood flowing backwards is coughed up, it can generally be seen trickling down the pharynx, and will run out the nose, if the patient leans forward. If it comes from the mouth or fauces, inspection will usually reveal the fact. If an aneurism has burst into the air-passages, the blood is bright red, but, from its amount and vio-

lence, the patient rarely lives long; and if he does, physical signs, when it is safe to employ them, will disclose the tumor.

A hæmorrhage can, sometimes, be traced to violent physical exertion, straining at stool, lifting, severe coughing, etc., but oftener no apparent adequate cause can be remembered. It more easily occurs in high altitudes with diminished atmospheric pressure. It sometimes, though rarely, seems to be vicarious for menstruation, but certainly not to the extent which is often imagined.

Pain in the chest, although common, is not an invariable accompaniment of phthisis, some patients going through the whole course of the disease without any; and when it occurs, it does not depend on any lesion of the pulmonary substance, but generally on a circumscribed dry pleurisy, occasioned by an extension of the tubercular trouble in the direction of the external surface of the lung. These pains are not usually very severe, and pass off in a few days to return from time to time. They are particularly apt to be felt in the region of the clavicles or scapulæ, and occur on both sides successively, often being worse on the least-affected side; they afford no indication whatever of the progress of the disease. In view of the fact that post-mortems reveal so many extensive adhesions of the pleural surfaces after phthisis, it is remarkable that pain enters so little into its clinical history. Rheumatic and neuralgic pains in the chest also frequently occur.

Fever is an invariable accompaniment to phthisis during a part, at least, of its course, and its intensity increases in proportion to the rapidity of the progress of the disease, although the different forms present great variations. No particular fever curve is characteristic of the malady, and during its course all the chief types of fever are to be found,—the continuous, the remitting, and the intermitting or hectic. These are rendered very much less regular than might be expected, from the fact that few cases of phthisis advance with a perfectly uniform movement, without remissions, exacerbations, and complications; hence, there are no definite invariable rules for its temperature curves. In the worst forms of caseous phthisis the temperature is apt to be high from the commencement of the disease, and to remain high to the end, rarely falling below 102° in the morning, unless profuse perspirations occur, and rising in the evening to 104° or 105° , and even now and then to 107° . In average cases it runs from 100° to 102° . In fibroid phthisis the temperature rarely rises above 100° . The physician may overlook the fever, if his visits are in the forenoon, for its chief characteristic is its occurrence after noon. Hectic fever occurs in all the forms of the disease, when softening and excavation take place, and sometimes, though less frequently, in the earlier stages. Chills, heat and sweating succeed each other as in regular intermittent fever, many a time giving occasion for the mistake of confounding the two diseases, especially in localities where malaria abounds; an error,

however, which ought not to be committed, if physical diagnosis is properly employed. The chill in hectic is more often only a creeping chilliness, with cold hands and feet, lasting an hour, or less. It may be absent. The length of the hot stage is variable. A circumscribed flush appears on the cheeks, giving them the characteristic bright rosy tint; the eyes are brilliant, with dilated pupils, the face hot and the lips dry; the palms of the hands and soles of the feet sometimes burn. After awhile, perhaps towards morning, follow the night-sweats, which may be very profuse and exhausting. The sweating does not correspond in amount to the temperature; indeed, it is often profuse, when there is little fever; depending on loss of power in the vasomotor system in the skin, caused by the general exhaustion. It is often amenable to treatment, and sometimes comes and goes, without any apparent cause. The more active the tuberculization, the higher the fever. On the other hand, if the process retrogrades, the thermometer will indicate a fall, so that this instrument will convey a fair idea of the advance or retrogression of the disease in its various ups and downs. We have hitherto spoken of temperatures above the normal. Owing to depression of the constitutional powers, the mercury may fall in the early morning to 92° , or even below, and in some cases may even remain below the normal during the whole forenoon. Indeed, it is said to be possible, though far from common, for tubercle to form and go through its stages, without any rise in temperature.

In an average case of phthisis (not incipient) the rise in temperature begins after 2 P.M., and reaches its maximum, of perhaps 103° or 104° , about 8 P.M. There succeeds a gradual fall until about 5 A.M., when, perhaps, 96° may be reached. From this the mercury rises until about 10 A.M., when, perhaps, the normal point is reached. During softening, the maximum may be postponed until 10 or 11 P.M. The greatest extremes are noticed in active cases in the cavernous stage, when the curve closely resembles that of suppuration and pyæmia. Diarrhœa, depending on the intestinal tubercular ulceration, causes a decided evening rise of temperature, followed by well-marked morning remissions.

The pulse in phthisis is pretty generally accelerated, although it varies with the form of the disease, being lowest and rarely going above 100 in the fibroid variety. Considerable changes may occur in the lungs with a normal pulse. Still a quickened circulation is the rule, and it is often found, especially after slight exercise or mental excitement, even before the disease is otherwise recognized. If a normal pulse is found in the evening, the disease is either making slow progress, or an arrest has taken place. In the early stage of the disease, the pulse is apt to be very excitable, going up immediately 15 or 20 beats from very slight causes. As the disease progresses, it corresponds to a considerable extent with the variations in the temperature.

The more acute the disease, the more rapid the pulse, from 100 to 140 or more being that of the acutest form. In all forms it is almost always weak.

The respiration, with its changes, is of more importance to observe than the pulse. True dyspnoea, or labored respiration, rarely occurs, unless pneumothorax, œdema, hæmoptysis, pleuritic effusion, or a copious eruption of miliary tubercles occasion it. Acceleration of the breathing, however, is an exceedingly common symptom, especially after any exertion, as going up-stairs, coughing, etc. This depends on the fever, on the diminution in extent of the breathing surfaces from obstruction or destruction of the air-vesicles, and on pain. Unless the disease is very acute, or very far advanced, the respirations are not particularly rapid, except after exercise.

Digestion and appetite are more or less impaired in the majority of cases of phthisis, although exceptionally they remain unaffected. Often, unfortunately, there is utter loss of appetite, and even repugnance to food. Vomiting is common, and is frequently caused in a reflex manner by violent fits of coughing. It may also depend on subacute gastric catarrh. Phthisical patients, perhaps more than others, often manifest an antipathy to fatty articles of food.

Diarrhœa of a persistent character may occur at any stage of the disease, but is more common near its end, when comparatively few escape it altogether. It may depend on intestinal irritation produced by undigested food, on atony of the intestines, or on specific tuberculous ulceration of either the small or large bowel. In the latter case, the diarrhœa is very persistent, or frequently recurs, and is exceedingly exhausting, weakening the patient more than either the cough, the fever, or the night-sweats, which is saying a great deal; the discharges are soft and ochre-colored, and sometimes streaked with blood, and accompanying pains and tenderness on pressure are referred to the seat of ulceration, which is often in Peyer's patches and the solitary glands. As a result of the tubercular ulceration of the intestines, circumscribed and even general peritonitis may ensue, with tympanites, etc. Either perforation of the intestine or hæmorrhage from the bowels may take place. The very profuse discharges near the end of the disease are often called colliquative diarrhœa. Although this generally depends on tubercular ulceration, yet it is not necessarily so, the cause being sometimes imperfect digestion or the watery condition of the blood.

Emaciation is perhaps the most marked of all the symptoms of phthisis, and depends upon the fever, the diarrhœa, the perspirations, the hæmorrhage, the expectoration, poor appetite, imperfect assimilation, etc. Loss of weight is usually noticed from the very beginning, and in many cases even before any other symptoms have appeared. Sometimes it thus may be directly the result of the otherwise silently working tubercle; sometimes it may be non-tubercular, the result of

impaired digestion and nutrition, enfeebling the vital powers and establishing, perhaps, the predisposition to the disease, which now has an opportunity to take root. The total loss of weight produced in the course of the disease is generally from one-quarter to one-third of the weight of the individual when healthy, full as much as is lost in any malady, and involves not the fat alone, but also all the tissues and the blood. This accounts for the fact that in all ages the disease has been commonly known simply as consumption, the appropriateness of which is obvious. In catarrhal phthisis the emaciation is often progressive and rapid; in the more chronic forms, and especially in the fibroid variety, it is often very slow, sometimes none taking place for a long while, and now and then a gain in flesh following. In the latter cases the progress of the disease may be considered to be either temporarily or permanently arrested. With the emaciation generally go great debility and loss of muscular power. During the first part of the disease, this is rarely sufficient to confine the patient to the house, and even in the last stage he may be up and out of doors to the last day of life. But generally the few weeks or months at the end have to be passed in bed. The strength of different patients varies greatly. Some manage to work during a considerable part of the disease, and others are practically used up from the start.

Suppression of menstruation, either partial or entire, is a common symptom, due to the anæmia and exhaustion. Sometimes in young girls it occurs very early, but oftener it comes on after the disease has made considerable progress. The patients themselves, in either case, are frequently persuaded that the diminished amount or suppression of the menses is the sole cause of their sickness, and beg the physician to give them something to bring it on, and thus accomplish a cure. He should instruct them that this is an effect, and not the cause, of their troubles, and that nothing but injury can follow the use of violent emmenagogues.

Hopefulness and buoyancy of spirits are certainly to be classed as symptoms of phthisis. It is generally very easy to persuade a consumptive, even when reduced to a skeleton, and confined to the bed from weakness, one whom even a friend, utterly ignorant of medicine, recognizes as rapidly passing away, that he has only a little throat difficulty or a slight bronchial trouble, from which he will soon recover. Such a patient, even with one foot in the grave, is constantly making plans for the future, and telling what he will do next winter or next summer or next year. He makes light of his bad symptoms, always has some simple explanation for them, is constantly rejoicing over the slightest indications of improvement, regarding them as the harbingers of recovery. In fact, his hopefulness amounts almost to an insane delusion. Consumptives without unwarranted hopefulness form a very small minority.

Hoarseness, occurring in phthisis, may be simply catarrhal, but if

not of very short duration, it generally indicates an extension of the tubercular process to the larynx. Tubercular laryngitis is almost always secondary to pulmonary tuberculosis. It may exist early, but is more common in the later stages. Although sometimes slight, yet very few patients entirely escape it. Late in the disease, the sufferings from the laryngeal affection may be so great that the patient's anxiety seems to be only to get rid of them, the lung symptoms being as nothing in his eyes. The voice may be entirely lost (aphonia), every act of deglutition may excite great pain, the pain arising from the pressure on the larynx (very rarely on the pharynx), of the food when being swallowed. The patient often dreads to eat in consequence. A burning pain is often present, even when deglutition is not taking place. Laryngeal symptoms are always unfavorable.

Clubbed fingers and toes, a bulbous drum-stick-like enlargement of their terminal phalanges, with claw-like in-curving nails, most common in cases of long duration, are noticed in about one-quarter of the cases of phthisis in its later stages. They are not peculiar to this malady, being also seen frequently in cases of organic heart-disease with marked cyanosis. This deformity, which occasionally is very striking, probably depends upon hypertrophy of the connective tissue due to interference with the peripheral circulation.

Oedema of the feet and ankles frequently comes on near the end, and is always a symptom that augurs ill. It may be due to thrombosis of the veins of one or both lower extremities, dependent on a weak heart and a consequent slow return circulation, or much less often on secondary changes in the kidneys. At first, the swelling is slight and disappears on assuming the recumbent position, but gradually it increases and extends, perhaps, up to the body and is constant.

Varieties of Phthisis.—In the section on pathology and pathological anatomy, the two great divisions of phthisis into catarrhal or caseous and fibroid have been shown. The symptomatology of the most common or chronic form of caseous phthisis has already been given; that of fibroid phthisis will soon follow. It only remains to describe the course of phthisis florida, which is a very acute form of caseous phthisis. Different authors have described other varieties, such as *hæmorrhagic phthisis*, characterized by frequent and copious hæmorrhages without much detectable disease of the lung for a long time, and five times as common in men as in women; *scrofulous phthisis*, which is preceded or accompanied by scrofulous affections of joints, caries of the sternum, ribs and vertebræ, otorrhœa, fistula in ano, enlarged and caseating glands, etc.; *latent phthisis*, and others; but it seems to the writer an unnecessary refinement, and only perplexing to the student to increase to too great an extent the varieties of the disease. *Acute miliary tuberculosis* can hardly be called a lung disease, although miliary tubercles are deposited in the lungs in common with many other organs.

Phthisis florida or acute phthisis, sometimes called galloping consumption, is comparatively rare. It runs its course in a few weeks or months, and rapidly involves almost the whole of one or parts of both lungs. Its symptoms are chills, high fever, rapid pulse, anorexia, vomiting, great prostration, a cough, generally violent, and pain in the chest. The temperature runs up to 104° or 105° F., or higher, with evening exacerbations and morning remissions. Emaciation, exhausting sweats, rapid breathing, great dyspnoea, livid prolabia, and occasional diarrhoea are noticeable. The expectoration is trifling or purulent and bloody, but not rusty. Delirium often sets in before death. In some cases, the cheesy metamorphosis does not take place, but great quantities of miliary tubercles are crowded into both lungs, and either remain isolated, or else coalesce. When they remain isolated, there may be little or no noticeable dulness on percussion, and no other signs of solidification, which increases the difficulty in diagnosis.

Fibroid phthisis is very much less common than the chronic catarrhal form, and its course is very much longer, often lasting for many years. It begins with a slight, persistent cough, either dry, or with slight mucous expectoration, more troublesome in cold weather, but better for awhile, and sometimes absent, in summer time, finally, however, becoming continuous all the year through. The appetite, weight and strength may remain almost unimpaired for a long time. At length, the thermometer begins to show 100° F., or higher, in the evening, the pulse is small and weak, chills and sweats occur, appetite and digestion fail, the weight decreases, the cough grows more violent, and often ends with vomiting. Expectoration is more profuse and purulent, and is often very fetid from retention in the bronchial dilatations. Other late symptoms are hoarseness, diarrhoea, œdema of the feet and ankles, swelling of the legs and scrotum, and ascites. Hæmoptysis is a common symptom all through.

Diagnosis.—In daily practice, phthisis has to be discriminated from a number of diseases, the most important of which are bronchitis, pleurisy, croupous pneumonia; pulmonary cancer, pulmonary syphilis, abscess, and gangrene; anæmia and chlorosis. There is danger of confusing phthisis florida with acute pneumonia, acute pleurisy, typhoid fever and capillary bronchitis. It is often desirable also to distinguish a common phthisical cavity from a bronchial dilatation, such as is met with in fibroid phthisis.

At the outset, it may be well to call particular attention to the fact, which cannot be reiterated too often, as it is one of the most essential points in the diagnosis of phthisis, that the physical signs indicative of the trouble almost invariably *begin at one apex* of the lung, and gradually creep downwards, and that some time before they have reached the lower portion of the lung, similar signs begin to appear at the other apex. Thus, although the disease, if very extensive, affects both

lungs, yet it is not bilateral in the usual sense of the term, the stage of the affection in one lung always being behind that of the affection in the other. The apices, therefore, are always the most important parts to be examined.

Chronic bronchitis can easily be discriminated from phthisis, after the latter has lasted sufficiently long for the physical signs of solidification of lung substance (see chapter on Physical Diagnosis) to become well marked, by the absence of those signs, by the absence of severe constitutional symptoms, and also by the fact that it is strictly a bilateral disease. It is only at an early stage of phthisis, before the evidences of solidification have become very positive, that any doubt can reasonably arise; and even here the skilled auscultator is generally able to detect the nice shades of difference necessary for the diagnosis. Exceptionally, however, there occur cases, where it is hard to say whether the slight amount of dulness, broncho-vesicular respiration, and increased vocal resonance, which may be heard at the right apex, exceeds that which is allowable at that place in health. It may be of assistance to remember in such cases, that the general constitutional disturbance in phthisis, but not in bronchitis, is apt to be quite noticeable even from the beginning; but, on the other hand, a patient with bronchitis may be more or less debilitated from other causes. In like manner, for a while other symptoms, even that of hæmorrhage, may be capable of a double construction, and unless in such cases the bacilli tuberculosis can be found in the sputa, the physician should be content to reserve his judgment until definite signs of consolidation can be detected, for which, however, he has not generally long to wait.

Chronic pleurisy with effusion causes a persistent cough, emaciation, prostration, dyspnoea, and, if the fluid is pus, regular hectic with night sweats, all of which symptoms are common to phthisis. One who has a good practical knowledge of physical diagnosis, however, need never confound the two diseases. The dulness in pleurisy begins at the lower part of the chest and gradually creeps upwards, and is always more pronounced than that of phthisis, generally amounting to flatness. The others 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 by compression the superjacent lung, 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 signs of solidification at the apex, either from compression or from tubercular deposit, being pretty much the same. If, however, as is often the case with the latter trouble, rales also are present at the apex, if the emaciation and 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.

Pneumonia (acute croupous), in the great majority of cases when the whole lung is not attacked, affects by preference the lower lobe. This fact alone generally makes the differential diagnosis easy. Exceptionally, however, it may involve the apex, the favorite seat of phthisis, when the physical signs will be the same as those of the latter disease. The history of the case will then immediately settle the question, unless, as is possible, the trouble begins as croupous pneumonia, and phthisis supervenes on an imperfect resolution. The beginning of phthisis in a lower lobe is exceedingly rare.

Pulmonary cancer is comparatively a very rare disease, but the possibility of its existence and the danger of its being mistaken for consumption should not be lost sight of, especially as some of its important symptoms, cough, hæmoptysis, emaciation, night-sweats, anæmia, and solidified lung substance, are common also to phthisis. When it is secondary to a cancerous tumor in other parts of the body where it can be inspected, as in the breast or uterus, its probable detection in the lungs is rendered easy by the fact that cancer and tubercle rarely co-exist, and that the lungs are especially apt to be invaded by cancer after its extirpation in another place. Therefore any grave pulmonary symptoms and signs under such circumstances point to cancer. Here both lungs are apt to be affected; but in primary cancerous infiltration of the lung, only one side of the chest is invaded. On this hinges a strong diagnostic point, for if the same amount of deposit were tubercular, we should surely expect to find more at the other apex. Besides, in cancer of the lung the solidified portion does not soften and break down so quickly and extensively as in phthisis; therefore the signs of softening, the moist rales, and those of cavities do not show themselves for a long while after the time of their usual appearance in phthisis. As to the symptoms, the currant-jelly expectoration of cancer is not found in phthisis, nor is the facies of the cancerous cachexia; fever and high pulse do not come till late in cancer, and emaciation is more tardy; pain is persistent and severe, while it is entirely absent or transient, stitch-like and shifting in phthisis.

Pulmonary syphilis, also rare, can be distinguished from phthisis with any degree of certainty only by a previous syphilitic history of the patient; nor will this always suffice, for syphilis is undoubtedly one of the causes of the tuberculous predisposition. Hints may be derived from the fact that syphilitic nodulus affect generally one lung

only, generally the base or lower part of the upper lobe, that they do not spread extensively, and that they are not apt to be accompanied by hæmoptysis or fever.

Pulmonary abscess, occurring after pneumonia, exhibits the same physical signs as a phthisical cavity; but it affects only one lung and usually the lower lobe of that, causes a comparatively small amount of constitutional disturbance, and emits copious, purulent, fetid sputa.

Pulmonary gangrene may also exhibit the physical signs of excavation, and produce, like phthisis, cough, emaciation, hæmoptysis, great prostration, dyspnoea, etc., but the cavity is found at the lower part of one lung only. The strong diagnostic criterion of pulmonary gangrene is the really terrible and persistent fetor of the expectoration and of the breath, especially after coughing, taken in connection with the signs of breaking down of the pulmonary tissue and its generally brownish-colored sputum.

Bronchial dilatation of the saccular form gives rise also to the signs of a cavity, and that of the cylindrical form to bronchial respiration, yet these are by far more common at the middle or lower portion of the chest, and are accompanied by less night-sweating, emaciation and hæmorrhage. The dulness on percussion around the saccular dilatation is also less than about the more common excavation, and that over the cylindrical dilatation is not at all proportionate to the amount of bronchial or tubular respiration. Bronchial dilatation is more common in advanced and a common phthisical cavity in early life; in the former, the physical signs do not change for months, in the latter the affection is less stationary. In the former the cavernous signs precede the dulness, in the latter the dulness precedes the cavernous signs. The expectoration in bronchial dilatation is more abundant and often very fetid, almost rivalling the odor of gangrene, and the cough is more persistent.

The diagnosis of phthisis from anæmia and chlorosis is made by the physical signs.

Acute phthisis, or phthisis florida, when the tubercles are scattered throughout the lungs, is sometimes distinguished with difficulty from capillary bronchitis. The physical signs may be much the same in the latter disease, except that the rales are more noticeable at the lower part of the chest, but the emaciation, chills and night-sweats are absent, and the height and variations of temperature are less. When, however, signs of aggregation of tubercles, evidenced by dulness, are present, and hæmorrhage, the case becomes clear enough. Acute phthisis often resembles typhoid fever, but the eruption is wanting, the temperature has great and sudden variations, instead of being persistently high after it has reached its acme, and the physical signs steadily progress. Tympanites, iliac tenderness and gurgling are absent, and generally diarrhœa. Respiration is much more embarrassed than

in typhoid. Croupous pneumonia and heart disease, having some symptoms in common, have sometimes been mistaken for acute phthisis.

Diagnostic Value of Bacilli Tuberculosis.—In the vast majority of cases of phthisis which present themselves to the physician for examination, the physical signs, in connection with the symptoms, are amply sufficient for a positive diagnosis. There are cases occasionally, however, which even the skilled diagnostician recognizes as doubtful. Many of such cases can be cleared up, and supporting evidence can be furnished in cases that are not doubtful, by the microscopical examination of the sputa with reference to the detection of Koch's bacilli tuberculosis. It may be laid down as an axiom, no longer to be stated on the authority merely of Koch, Ehrlich and Gibbes, but resting on the testimony of hundreds, and perhaps thousands of observers, that, with few exceptions, if tubercle bacilli are found in the sputum, active tubercular disease exists in the lungs, in the larynx, or in both. On the other hand, if after repeated and careful examinations (at least four or five, and better more), by one who has made himself familiar with the necessary processes, no bacilli are found in the sputum, provided that it comes from the lungs and not from the upper air-passages, tubercular disease of the lungs probably does not exist; at any rate, no softening foci are discharging into the bronchi. The bacilli are present in greatest numbers in acute phthisis, or at the times when the chronic disease is making the greatest progress. In quiescent cases, and in a small proportion of cases of fibroid phthisis, they may become greatly diminished, or may even entirely disappear. They may be found in the fluid of a hæmorrhage from the lungs, or in that of a perineal fistula associated with lung symptoms, or in discharge from laryngeal ulcers, where they are highly diagnostic. They are apt to vary in number according to the period of the day at which the sputum is expectorated, being more numerous in the morning. They are not evenly distributed in the sputum. They are never present in emphysema, bronchitis, nor in any non-tubercular disease of the lungs. Allowance must be made for the fact that in true tuberculosis the sputum examined may come from the nose, pharynx or mouth, when no bacilli will be found. Again, as Gibbes states, a lung may be stuffed with tubercles, each one containing thousands of bacilli, and yet the patient may die before the destructive process has gone far enough to cause any of them to be ejected with the sputum. Although incipient phthisis may sometimes be recognized by bacilli in the sputa before the physical signs are distinct enough to warrant a positive diagnosis, yet in this condition the quantity of expectoration is sometimes so trifling, that it is difficult to assure one's self that what is under examination really comes from the lungs. On the other hand, it may be wise for us to remember the theoretical objection to the statement that tubercle bacilli in the sputum mean tuberculosis pulmonum, as expressed in the

following question. If, when exposed, we are constantly inhaling, all of us, these bacilli, why should they not be removed by our expectoration when they fail to take root? Practically, however, we have abundant evidence to support the truth of the above statement in the great majority of cases, and we cordially welcome to our aid this new and efficient method of diagnosis.

The two principal methods now used for the detection of the tubercle bacillus are those of Koch-Ehrlich and Gibbes. Numerous modifications of each of these are advocated in different parts of the world. Some of those which are most easily accessible to American readers can be found described in the article by Haupt in the *Transactions* for 1883 of the American Institute of Homœopathy, in one by Gradle and Waltmann in the *Medical News*, for February 17th, 1883 (Phila.), in one by Berman in the same paper for December 1st, 1883, in one by Mercer, in the *Medical News* for July 7th, 1883, page 24, etc., etc. The following process, which I have generally followed, taken from the appendix to Flint's *Practice of Medicine*, is perhaps as convenient as any. It is called

Ehrlich's Modified Method.—"This process may be divided into three steps: (1) the preparation of the sputum for staining; (2) the preparation of the staining fluid, the staining of the sputum, and its preparation for the microscopical examination; (3) the microscopical recognition of the bacilli."

First Step.—"A small quantity of the suspected sputum is seized with a forceps and placed upon the centre of a carefully cleansed cover-glass. A second clear cover-glass is then firmly pressed upon the first, until the sputum is equally distributed upon the opposed surfaces of both glasses. The covers are then separated by gentle lateral traction, and placed aside, with the sputum upward, until the latter is almost or quite dry. The covers are passed a few times through the flame of a Bunsen burner, or of an alcohol lamp, after which the sputum is ready for staining."

Second Step.—"The staining fluid is prepared by mixing the filtrate from a mixture of aniline oil with a saturated alcoholic solution of fuchsine. The aniline oil is first thoroughly shaken in a flask with pure water, until the latter assumes a milky appearance. It is desirable that such a quantity of oil be added to the water, that a few drops of the oil will appear on the surface when the mixture is allowed to stand a moment. The mixture is then filtered, and the filtrate, which is nearly colorless, is placed in a porcelain evaporating dish, or a large watch-glass."

"A few drops of a saturated alcoholic solution of fuchsine are now added to the filtrate, the proportion being about ten drops of the fuchsine solution to one fluidounce of the filtrate. The staining fluid is then ready for use. The porcelain evaporating dish or watch-glass

is now placed over a water-bath, and the staining fluid heated until a little vapor is seen arising from its surface. The cover-glasses are next gently dropped upon the surface of the staining fluid and allowed to float, with the side upon which the sputum is spread downward, for about fifteen minutes, the fluid being kept uniformly at the point of gentle evaporation, during that time, by regulation of the flame beneath the water-bath."

"If it seem desirable, in doubtful cases, to subject the sputum to a longer action of the staining fluid, the covers may be placed upon the surface of the fluid and allowed to remain for twenty-four hours in the cold fluid; at the end of which interval the process of heating should be adopted as above described and for the same length of time. After proper exposure of the sputum to the staining fluid, according to either of the above methods, the covers are removed and the sputum is seen to be colored red. The covers are then washed an instant in pure water, to remove any excess of the fluid, and next immersed for a moment in a watery solution of pure white nitric acid, in the proportion of one to five. Most of the color is abstracted from the sputum by the nitric acid solution, and all the bacilli, save those of tubercle, are decolorized. The cover-glass is next quickly dipped into pure water, to remove any excess of nitric acid, and its surface which has not the layer of sputum upon it carefully wiped dry with a piece of soft muslin. A drop of glycerin is now put upon a microscopic slide, and the cover-glass placed upon this with the sputum downward."

Third Step.—"The bacilli are recognized under the microscope by the fact that they have retained their red color, while all other bacteria have been decolorized. The bacillus of leprosy forms the only exception to the above rule. The diameter of the bacilli is from about one-quarter to three-quarters that of a red blood-corpuscle. Their form is not especially distinctive, although many of the rods present a somewhat characteristic angular bend or a crescentic shape. Some of the bacilli contain globular spores, which are held by some pathologists to denote that rapid reproduction of the micro-organisms is taking place."

Sources of Error.—"Small particles of the fuchsine are often precipitated, and, although usually amorphous, may assume a form resembling that of the bacilli of Koch. The sputum for the entire twenty-four hours should be examined, as the bacilli are sometimes absent from sputum collected during a shorter interval, even although present in the expectoration of the same patient at some other hour of the day. Since the micro-organisms are often irregularly distributed in the sputum, repeated examinations should be made before a negative conclusion relative to their presence is reached."

Generally the most opaque part should be selected. A very neat device for floating cover-glasses on the staining fluid is a little spoon or

loop of bent wire. Some prefer also to stain the background another color, in order to show the bacilli better by contrast. Thus stained, the bacilli can be detected with a good one-fifth or one-quarter objective, with simple central illumination, without a condenser; but they can be brought out much better by higher powers and special illumination. Fraenzel recommends a one-twelfth immersion objective and No. 4 eye-piece, with Abbé's illuminating apparatus.

The following method I have not tried, but quote it from the *Lancet*, of May 5th, 1883, as coming from quite an authority on the subject.

"A RAPID METHOD OF DEMONSTRATING THE TUBERCLE BACILLUS WITHOUT THE USE OF NITRIC ACID.—Dr. Heneage Gibbes, in a paper on this subject, says: The following method, which I have used for some time with great success, will, I think, prove useful to those requiring the demonstration of the tubercle bacillus for diagnostic purposes in a rapid manner. The great advantage consists in doing away with the use of nitric acid. The stain is made as follows: 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 been 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. I have not tried to do this against time, but have merely placed the sections in the stain and allowed them to remain for some hours, and then transferred them to methylated spirit, where they have been left as long as the color came out. In this way beautiful specimens have been made, without the shrinking which always occurs in the nitric acid process."

Dr. R. C. Smith has succeeded in demonstrating with facility the presence of the bacilli in the *breath* of phthisical patients, by causing them to breathe through two thin sheets of gun-cotton in a respirator, and then dissolving the gun-cotton in rectified spirit and ether. The collodion thus formed is poured over a microscopic slide, and in the thin film, stained by the usual methods, the bacilli appear (*Lancet*, January 20th, 1883). Dr. C. T. Williams suspended glass plates covered with glycerin in the extracting flues of the Brompton Hospital for consumptives, through which the air exhaled by the patients passes

out at the rate of three hundred feet a minute, and in the glycerin found the bacilli in great abundance (*Lancet*, February 24th, 1883).

While examining the sputum for bacilli, the physician should not forget to look also with the microscope for fragments of the areolar and *elastic tissue* from disintegration of the lung substance. Fenwick's process of preparing it is the best. The sputa is to be mixed with an equal quantity of a solution of one part of caustic soda in five of distilled water. After boiling, four times as much water is to be added to the mixture in a conical glass, and on cooling the elastic tissue will be found in the sediment. The fibrils are often in circles and half circles from the form of the air-vesicles, and are sometimes, though rarely, present before the physical signs of the disease appear. In the late stages they are abundant; Drs. Detweiler and Meissen having found the elastic tissue in 82 cases out of 87 examined, the bacilli showing in 85.

FIG. 6.



Elastic lung tissue (a), and Bacilli tuberculosis (b).

Prognosis.—Nobody needs to be told that, as a general thing, the outlook is bad, and yet the prevailing sentiment among the profession to-day is far more encouraging than formerly; partially owing to better methods of treatment, hygienic, dietetic and medicinal, and partially because, with the rapid advance in the science of auscultation and percussion, the diagnosis can be accurately made at a much earlier stage in the disease, when of course all remedial measures are more effective. The general impression among the laity, whose ideas almost always lag behind, is still perhaps almost as hopeless as it was among the profession a comparatively few years ago. As an index of the feeling among physicians, Dr. John Hughes Bennett says: "At present, so far from phthisis being considered to be uniformly or even generally fatal, it is admitted that treatment can in a great majority of cases prolong life, whilst in many, the number of which is annually increasing, a complete and permanent cure may be effected." Prof. Austin Flint, and others of long practice, consider that "the mortality from the disease has undoubtedly diminished within the past three decades." He reports that out of 670 cases of which he kept records in thirty-four years, 44 ended in complete recovery, and in 31 the disease was arrested without perfect recovery ensuing. The followers of

Hahnemann can probably show a still better record. Undoubtedly the science of homœopathy, by modifying and influencing, directly and indirectly, old school treatment, has had not a little to do with the present lessened death rate. When the patient is fortunate enough to recover, absorption or calcification of the deposit takes place, or the walls of a cavity may cicatrize. The physical signs of solidification or of a cavity sometimes remain long after the patient has been restored to perfect health. At one time it was the fashion to doubt the correctness of the diagnosis when a patient recovered; but since the institution of the practice of making such immense numbers of careful autopsies in large hospitals, especially in Europe, cicatrices and calcifications and remnants of old solidifications and innocuous cavities, bearing ample testimony to the previous existence of tubercular trouble, have been so frequently and repeatedly found in persons who have died of some other disease, although many years before they may have had hæmoptysis or exhibited other phthisical symptoms, that it is absolutely inconceivable that any rational mind should doubt the possibility of a perfect cure in any stage of the disease. The modern methods of diagnosis, including the microscopical detection of the bacilli, are so accurate, that they may almost be considered as cumulative evidence to such positive demonstrations as these necropsies. Although admitting the possibility of a cure in the third stage of phthisis, it is almost unnecessary to state that the vast majority of recoveries occur in the early part of the disease.

Looking at the varieties of the affection, acute phthisis, with its persistent, intense fever, rapid emaciation, and formation of cavities, is almost hopeless, destroying life in a few weeks, and rarely exceeding six months. Laryngeal phthisis is likewise short and wellnigh hopeless. In fibroid phthisis, on the other hand, although complete recovery rarely occurs, yet life may be prolonged occasionally for twenty or thirty or more years. The average is perhaps eight or ten years. In case the fibroid contraction of the lung is very marked, the obstructed circulation and consequent dilatation of the heart and kidney affection may do considerable to hurry the patient off. A second attack of any form of the disease is much more unfavorable than the first. Perhaps the most frequent duration of the common form of the disease among all classes of society is from a year and a half to two years. This is particularly true of the poorer classes in the community, those having sufficient means to enable them to enjoy the advantages of good treatment and the comforts of life generally, often prolonging their days much beyond this period. Dr. C. T. Williams, of England, who has compiled statistics on this point, states that the average duration among the upper classes in 198 cases, where death was the result, was seven years and eight months, and that the later in life a person was attacked, the longer did he have a chance of living. Females averaged two years less than males.

At the beginning of the ordinary form of the disease, if it seems to advance slowly, and without much fever and emaciation, under favorable circumstances the patient may be encouraged, but the prognosis should be cautious. In the second and third stages, the favorable symptoms are a low pulse and temperature, a good appetite and digestion, not much emaciation or expectoration, the slow increase and limitation of the dulness or cavernous signs to one lung (the less of that the better), little diarrhoea or sweating, and the capability for taking exercise. The unfavorable symptoms are high pulse and temperature, anorexia, indigestion, considerable and progressive emaciation, strong hereditary predisposition, profuse expectoration, copious and frequent hæmorrhage, the rapid extension of the local manifestations of the disease and its occupation of the second lung, perineal fistula, exhausting diarrhoea and night-sweats, great muscular prostration, and the complications of chronic laryngitis, pleurisy with effusion, capillary bronchitis, pulmonary œdema of the feet and legs, and pneumothorax. In fact, as death occurs in the great majority of cases by asthenia before sufficient lung tissue has been destroyed to produce apnoea, any symptom which causes a special drain on the vitality of the patient is of bad omen. He is literally worn out. The most important element in the prognosis is the amount of general infection of the system. In average cases of phthisis, the nearer this comes to the degree of infection in acute phthisis, which resembles the pyæmic state, the more rapid will be the course of the disease. The acute process may be fired up at any time in the course of a slowly-proceeding phthisis, or complications may arise; and on the other hand, a patient seemingly with one foot in the grave may yet drag out an existence for a surprisingly long time. So that it behooves the physician, although he may be very confident of his diagnosis, and in other respects fairly so of his prognosis, to be exceedingly cautious about setting the exact *time* of death.

Hæmoptysis, if very profuse in the later stages, may cause death by suffocation, but this event is not very common. If profuse and frequent, it may hasten death by producing exhaustion; but if not, statistics seem to show that it has a favorable effect on the prognosis; that such patients live longer than those who do not bleed, and that they more often recover.

The bacilli tuberculosis under the microscope influence the prognosis, as follows: If found in abundance on frequently repeated examinations, the disease, as a rule (with numerous exceptions), may be considered as actively progressing, and vice versa, if they are few in number. If, after having been present for some time in a case of phthisis, they entirely disappear, and their absence continues on repeated examination, the indications are that the tubercular disease has ended, no matter how much damage to the lung tissue remains.

Treatment.—The absolutely indisputable fact that many (albeit

still a small minority) of the victims of phthisis in all stages, particularly the first, are restored to health, and that even among those who die the great majority can be more or less benefited by treatment, and the opinion to-day of a large number of physicians of forty or fifty years' experience that the mortality of the disease is much less than it was in the early years of their practice, ought to remove from us the last vestige of that utter discouragement and hopelessness in undertaking a case, which used to be far too common, and which necessarily either leads to inaction, a folding of the hands and a grim contemplation of approaching death, or at least paralyzes our best efforts. It is not necessary to add, and likewise destroys the helpful confidence of the patient, for that by a peculiarity of the disease is, as a rule, abundantly assured. This view does not by any means advocate that over-sanguine enthusiasm which would always promise a cure, for it must be allowed that, even at the best, the great majority of phthisical patients, no matter how soon they are seen by the physician, will surely die.

Assuming (as the great majority of scientific men now do) that the modern doctrine is correct that the bacillus tuberculosis is the cause of the disease, but that it will act only on a constitution especially predisposed, not only in originating the disease, but also in keeping up its activity, the rational method would seem to be the avoidance of the bacillus, its destruction both before and after its entrance into the body of the patient, and the employment of any means which, in general terms, will prevent or remove the particular fitness of soil for the growth of the micro-organism, which fitness we for convenience call the predisposition. These principles will apply, to a great extent, in the treatment both of the diseased person and of the candidate for the disease, the latter judged to be such from his family history, or from indications perceptible or supposed. It sometimes being very difficult to decide who is and who is not a candidate for the disease, the error, if any, should be on the safe side.

The destruction at will of tubercle bacilli *after* their entrance into the lungs or other organs of the living body, without the simultaneous destruction of the patient, in spite of many experiments, has never, in all probability, as yet been accomplished. The natural inference at first from Koch's great discovery was, especially to an enthusiastic nature, that some substance might be discovered, some parasiticide, which, either by inhalation or by introduction in some way into the blood, might kill the little causes of such great mischief. Whether any such substance ever will be found or not, it is now impossible to predict; but even if it is found, there will still be the same need for treatment for the other equally important factor in the disease, the diathesis, the susceptibility, the predisposition, the cachexia; for without the removal of this, a new cargo of bacilli, so easy to obtain, will soon place the patient where he was before. Thus we see that, contrary

to the expectation of many, the discovery of the bacillus has shed very little light on the *treatment* of phthisis (except prophylactic to some extent), although in ætiology, pathology, diagnosis, and prognosis its influence has been so sensibly felt. Now, as heretofore, for the most part, the prevention of the disease in those already predisposed, the remedy against the acquisition of the diathesis in those not predisposed, and the treatment of those in whom the disease has already started and has made more or less progress, depend on strengthening and invigorating the system by every available means in the broad field of hygiene, by climatic influences, and by such medicines as may in each case seem indicated. The treatment, therefore, will be discussed as prophylactic, hygienic, climatic, and medicinal.

Prophylactic Treatment.—As to the avoidance of the bacilli, it has been shown, in the section on ætiology, that in most parts of the globe it is extremely difficult, if not absolutely impossible, to escape from their introduction into the system. Still, as the likelihood of contagion increases with closeness of contact and long continuance of the exposure, it is not advisable for a healthy person to sleep in the same bed, and, if possible, not in the same room, with a consumptive. Nor should he unnecessarily live in sanitarium or other resorts frequented by consumptives. Those who are obliged to live much with such persons, should see to it that the ventilation is of the best, and that the patient's sputum is disinfected, etc., and that they themselves maintain as much constitutional vigor as possible.

The *destruction of the bacillus outside of the body* has been the object of many recent experiments, notably of Drs. Schull and Fischer in Germany, of MM. Parrot and Martin of France, and others (*Med. News*, Phila., Dec. 22d, 1883, and April 19th, 1884), and seems to be satisfactorily accomplished. Alcohol, Creosote, Arsenious acid, Corrosive sublimate, Thymol, Bromine, Iodine, Iodide and Bromide of potassium, Salicylic acid, Turpentine, Ammonia, caustic Soda and Potash, Aniline oil and other substances, were tried and abandoned, because they were either inefficacious or unsatisfactory for some other reason. The verdict was in favor of *Carbolic acid*. With a five per cent. solution of this placed in a spit-cup, an equal bulk of fresh sputum can be disinfected. Every consumptive therefore ought, by good right, as a precautionary measure, in order to prevent, as far as may be, the transmission of the disease, to spit into such a solution. (Perhaps Platt's Chlorides or Bromo-chloralum, which lack the villainous smell of Carbolic acid, would do as well.) The desirability of this can be argued from the fact that Schull and Fischer found that dried, non-disinfected sputum, from 95 to 126 days old, was in all instances capable of producing tuberculosis in guinea-pigs inoculated with it, and that even after this age it was active, but that its activity progressively diminished. They also found that the scalding and boiling of our clothes,

in the ordinary process of washing, is sufficient to destroy the virulence of tubercle bacilli. A committee of the hygienic section of the Vienna College of Physicians has recently recommended (May 10th, 1884) boiling the clothing for an hour in water containing Sodium carbonate, and exposing such as cannot be boiled to a dry or steam heat of 212° F. for the same time. This committee also advises the disinfection and prompt removal of the fecal discharges of those who have intestinal tuberculosis, as well as the disinfection with Carbolic acid and frequent removal of sputum, not only in sick rooms but also in all public places where consumptives most congregate, to prevent pulverization, and the most scrupulous cleanliness of body and bedclothing, floor and walls, houses and streets. In fact this society, like the great majority of physicians to-day throughout the civilized world, sanctions all those reasonable expedients which are the natural outgrowth of the bacillus doctrine.

The old proverb about prevention being better than cure being nowhere more applicable than with regard to phthisis, it will, of course, be understood that prophylactic treatment, other than the avoidance and destruction of the bacilli, should be undertaken at any time from the earliest infancy even, in those whom we may have the faintest excuse for suspecting to have an inherited tendency to the disease, or an acquired diathesis. This treatment should be mostly hygienic (suitable medicines, of course, being added when necessary), and should be regulated by the general principles of hygiene, more particularly those shortly to be mentioned as suitable for persons who have already acquired the disease. In addition, it may be stated that phthisical or feeble mothers should never be allowed to nurse their own children, a healthy wet nurse or good boiled milk from a healthy non-tuberculous cow being selected. School life should be carefully regulated, enjoyable exercise in the open air encouraged, later suitable business and occupations chosen, involving considerable out-door exercise, rather than a sedentary life. A phthisical person should not be married, both on account of the partner and of the offspring, the best precepts should be inculcated with regard to diet, temperance, clothing, ventilation, sleep, etc.,—in fact every agency which can operate to build up a healthy manhood or womanhood should be systematically employed for years. Such unremitting care is very often rewarded by an exemption from the disease, which, aided by carelessness, would, in all probability, gain a firm foothold.

Hygienic Treatment relates particularly to diet, clothing, fresh air, exercise, bathing, etc. The great indication in this disease being to strengthen and invigorate the system, the *diet* should be of the most generous kind and should be limited only by the powers of digestion. Lucky is that phthisical patient who is hungry and knows not that he has a stomach. Such a one should be encouraged to eat everything reasonable which he has a relish for, as a well person would eat, the

more nutritious articles being especially emphasized. Unfortunately for the majority, however, anorexia and indigestion are too common, and oppose one of the greatest obstacles to our success. In such cases the appetite should be tempted, as much as possible, with delicacies and favorite articles of food, even if they be not such as we should be apt to prescribe on theoretical principles; for it is better for the patient occasionally to eat food not generally considered desirable, and which may cause a little indigestion, than to eat nothing. No general cast-iron rule can be laid down for all cases. The homœopathist, who is accustomed so much to individualize his cases with regard to medicines, must not forget to individualize with regard to diet. Each case demands a special study, which should try to ascertain, both from experience and by experiment, what for that particular case is most digestible and most nourishing. The largest possible latitude should be allowed, for variety is very desirable. Some with weak stomachs will digest much more, if they eat less at a time, and four, five or six times a day. Without particularizing further, it is important to state that by far the most generally useful article of food for consumptives is *milk*, which they should be encouraged to take to the extent of from one to four pints a day, and which in one form or another will be found very apt to agree, even if the patient declares at the outset that he never can take it. If not taken in its simplest form, it can be made into blanc mange with sea-moss-farine or corn-starch, or cooked with various farinaceous puddings, or in bread, in oyster-stew, in ice-cream, etc. Many like it in the form of koumiss, which is now nicely prepared and sold in many of the stores. Cream is a very valuable adjunct, and is often used as a substitute for cod-liver oil, its delicious taste being a great recommendation. Butter and other fats should be used as far as they can be digested. When the consumptive is very much prostrated from excessive hæmorrhage or otherwise, Murdock's Liquid Food forms an admirable restorer, being very easily digested and nutritious. The occasional occurrence of a bad bottle, resulting from some imperfection in its preparation, should not militate against its use any more than one bad egg in a dozen should prevent the use of the eleven. *Cod-liver oil*, during the last forty years, has been advocated extensively throughout the world, and has had a pretty thorough trial. There is probably nothing specific in its effect on the disease, and its reputation should rest solely on its nourishing properties. Fat of some kind seems to be demanded, and the oil, in many cases, answers the purpose better than any other form. A great objection to it is its disagreeable taste, which in many excites so much repulsion, that it should not with them be urged. A less amount of dislike is often overcome after a while. Wherever it occasions indigestion, diarrhœa, nausea, anorexia, it should be stopped at once. Four minims of ether to each teaspoonful will make it digest more easily. If well borne,

it may be continued in doses of one, two, or three teaspoonfuls of the clear, pale oil each meal. Some who cannot take the pure oil can take an emulsion. Of the numerous emulsions now sold, Phillips's has given me the most satisfaction. The excessive enthusiasm about cod-liver oil, so prevalent not long ago, has since been considerably modified. In most cases, plenty of pure fresh cream or rich milk is to be preferred. A malt extract is occasionally quite a serviceable food. One of the best of these is Liebe's; another is Maltine. The same can be said of the Syrup of the Hypophosphites, which sometimes proves very beneficial. *Alcohol* in different forms has been extolled to the skies, and a few years ago every patient was deluged with whiskey. Though still recommended by some, its use has greatly declined. It will undoubtedly often confer temporary benefits and encourage the patient; but I have become convinced from careful comparisons *in several hundreds of cases*, in some of which it was used in different forms, and in others abstained from, that in the long run its habitual use is injurious, and that it is neither a prophylactic nor a curative. I have had frequent occasion to remonstrate with dispensary patients for depriving themselves of milk for the sake of buying ale or beer, under the impression that it was more strengthening. Not that alcohol is never useful, but it, like other poisons, should be transferred from the list of foods to that of medicines, and employed only in the emergencies where it is strictly called for, which emergencies will be found seldom to occur.

The *clothing* should be so regulated that at all times the patient shall be, in one word, comfortable, or as near so as may be. This covers the whole ground. Practically, most patients will need woollen or merino or silk underclothing, being good non-conductors of heat and absorbers of perspiration, with a chamois-skin vest added in winter time, and such other garments as will keep them warm. The numerous layers of flannels which the physician, desirous of making an examination, often sees peeled off, one after another, even in warm weather, cause excessive perspiration and weakness. At the same time, the patient should not allow himself to be chilled.

Fresh air is of vital importance to the consumptive. The time has entirely gone by when such patients were confined to the room, with cotton-batting stuffed into the window cracks and every breath of pure outside atmosphere excluded. In these days of what may almost be called without disrespect the ventilation-craze, to which the public has got pretty well waked up, it is unnecessary to dwell on this point, except to suggest that the greatest amount of fresh air possible should invariably be introduced into the patient's room, day and night, consistent with a proper degree of warmth and the absence of direct draughts blowing on him. An open fire in a sleeping room is a luxury which those should have who can afford it. This or a par-

tially-open furnace register will allow of a window let down at the top in all but the very coldest weather, or at any rate an open window in an adjoining room. He should also be encouraged, when strong enough, to get out-doors into the fresh air every day, unless the weather is excessively inclement. Ordinary storms he should not mind.

Bodily exercise, particularly out of doors, is now universally recommended as much as the patient's strength will allow; and justly, on account of the many recoveries which are reported from all over the world as occurring in consequence of this as a chief factor. It will necessarily have to be proportioned in amount to the stage of the disease. Walking and horseback and carriage riding are allowable at all times when they can be borne. Slowly climbing up a hill is beneficial, and in the early stages carefully conducted gymnastic exercises, which expand the chest, especially the upper portion, and thus call for deep inspirations. The health-lift for ten minutes a day may be tried under instruction. Exercise should not be too violent or persisted in to the extent of exhaustion, and it should be entirely discontinued for a while after a hæmorrhage which is at all severe. The more mental enjoyment to be derived from the exercise, the more good it will do; and, therefore, such sports as boating, fishing, hunting, and also pleasant sight-seeing, for those who like them, are to be desired. A constitutional walk is a notoriously stupid affair, and yet it is better than nothing for those who can do no more. Where it is practicable, benefit often follows a change of occupation from a sedentary life to a more active one. Undoubtedly, much of the good effects usually attributed to change of climate may often come from just such a change of occupation. Patients who are strong enough should be encouraged to exercise out-doors, properly clad, in all weathers but the very worst. Those who are at all feeble should be directed to take their exercise on the instalment plan, frequent rests intervening. Much more is thus accomplished and with less fatigue. Where the patient can do no better, sailing should be advised, or swinging in a hammock, or sitting in a garden, or by an open window, anything, in fact, to get him into the open air. In the last stages, or in fact at any time when the disinclination to exertion cannot be overcome, rubbings and other passive exercises may be employed.

Bathing should be practiced, both for its tonic effect and in order to encourage the sensible and insensible perspiration, by keeping freely open the pores of the skin, which has such an intimate relation to the lungs. This, like out-door life, constitutes a sort of toughening process, which diminishes the sensibility of the skin to changes of temperature, and to some extent prevents taking cold. The temperature and duration of the bath should vary with the reactive power of the patient, who should never feel chilly for any great length of time after it, but instead experience a healthy glow. Generally the sponge bath

is to be preferred, and in many cases simply sponging the face, neck, and chest is all that is desirable, on account of feeble reactive power. If the patient is unused to cold bathing, he may begin, especially in cold seasons, with tepid water and gradually lower the temperature. If he has troublesome night-sweats, the warm bath in a bath-tub, from 95° to 96° F., for fifteen or twenty minutes, every other night at bedtime, the temperature being maintained by the addition from time to time of hot water, will often prove very serviceable. Salt can be added with great advantage. Besides diminishing the sweats, other symptoms may be benefited—the fever, pulse, cough, expectoration, cold hands and feet, poor sleep and diarrhœa. If the bath-tub is not used, the patient should be sponged all over every night until the relief comes, with hot salt water of a higher temperature. After the bath the patient should be well rubbed down.

Climatic Treatment, undoubtedly potent, is a much-talked-of method, one by no means as yet thoroughly understood, and one, the virtues of which by many people are probably overestimated. Flint, in his able work on *Phthisis*, says: "My studies seem to lead to conclusions at variance with the prevailing popular and professional belief in a special climate influence. In the first place, it does not appear from the analysis of my cases that changes of climate have in a marked degree a beneficial influence, as compared with the hygienic measures available at home. In the second place, the improvement following a change appears to pertain alike to different climates and places. Hence it seems a fair inference that the benefit derived from the change is due, not so much to a climatic influence *per se*, as to the circumstances incidental to the change. These circumstances are often a change of habits from those which are sedentary and confining within doors to those involving out-of-door life and activity, freedom from cares, anxiety, and annoyance of business at home, and, it may be added, the moral effect of the hope or expectation of being benefited by climatic influence."

Lebert, in his recent French work on phthisis, thinks that the best climates do not have any direct or specific action upon tubercular disease, but that the good they do results from general hygienic influences. Parkes, the great hygienist, in his well-known work, calls attention to the fact that, in the true Alpine region, where strangers are so often cured or relieved, and where the male natives, living mostly out of doors, are almost exempt, the women, who in making embroidery, are confined in ill-ventilated rooms all day, and have poor food, suffer from scrofula or phthisis. He adds: "It would seem even probable that after all it is not indeed elevation and rarefaction of air, but simply plenty of fresh air and exercise which cures phthisis."

Climatology as a science is still in its infancy, which fact no one can appreciate better than he who takes the trouble to wade through

the many and voluminous pages of the intensely (pseudo?) scientific disquisitions on the subject, which learnedly discuss the influence of temperature, its range and changes, of dryness or moisture, of winds, of the weight of the air and barometrical changes, of the electrical conditions, ozone, the purity of the atmosphere, of the amount of light, especially of sunshine, of the character of the soil, of the proximity of the sea, lakes, ponds, rivers, marshes, of the balsamic odors of pine forests, and of high altitudes. It cannot be denied that these are of importance, and that at some future day succeeding generations may utilize them scientifically; but candor compels us to own that as yet we know too little of most of these agencies to warrant an accurate prescription in individual cases. We cannot claim to have yet got very far beyond the advice of old Dr. Chambers: "In choosing a home for your consumptive patient, do not mind the average height of the thermometer, or its variation; do not trouble yourself about the mean rainfall; do not be scientific at all; but find out from somebody's journal how many days were fine enough to go out forenoon and afternoon; that is the test you require, and by that you may be confidently guided."

The question which is very apt to be asked about a change of climate is often a very troublesome one to the physician who is conscientious and wants to do the best he can by the patient in every way. Especially is this so among people of moderate circumstances, to whom the expense is a great burden, depriving the family of many comforts; and it is often so, even among the wealthy, for various reasons. Nevertheless, it becomes easy enough to decide, if the patient has acute phthisis or is in the last stage of the chronic disease, when he will do far better to remain at home. To send such patients, who look to us trustingly for advice, and whose hopes of recovery we may feel tolerably sure are fallacious, to *any* place away from family, friends, and home comforts, or even to allow them to go if we can help it, is not only exceedingly unwise, but should be condemned in the strongest language possible. The feeble chance offered by a climate which may be superior is greatly overbalanced by the almost necessary depression resulting from the forced separation from dear ones and the absence of many accustomed luxuries, by the fatigue and dangers of travelling, and by the far from pleasant prospect of dying in a strange land.

It is only in the first stage, as a rule, that we can dare to hope for much benefit from a decided change of climate, although sometimes a patient with a chronic single cavity in one lung and no trouble in the other, with no special fever, hæmorrhage, or complication, will do well in a dry, bracing climate. Dr. Pollock's advice is pretty sensible, that persons ought not to travel at all with feverish symptoms, especially with high evening temperature; with secondary complications, like continuous or frequent diarrhœa, serious gastric disorder, or laryngeal

irritation; with a large amount of local disease in any stage; with both lungs diseased; or in such a state of weakness or emaciation as to require home comforts, peculiar beds or chairs, or varieties of invalid cookery.

After the physician has decided to recommend his patient to try a change of climate, or if the patient, taking it into his own hands, informs the physician that he has decided to change, and asks for farther advice, the question next arises, *what climate is best?* Dr. Loomis, of New York, has answered this question very neatly in general terms. "The individual peculiarities of each case must decide this question. Experience shows that one individual improves in a warm, moist air; another individual improves in a cold, dry air. Every phthisical patient has a climate adapted to his peculiar diathesis; a few well-directed questions will enable you to determine in which direction and in what locality your patient will be most likely to receive benefit. In the first place, by careful questioning determine whether your patient, when in a state of health, was most vigorous in warm or cold weather, in a damp or dry atmosphere. Again, you must determine whether he has most vigor in a dry and cold or a dry and warm atmosphere, or in a warm-moist or cold-moist atmosphere. If these questions cannot be settled by the experience of the patient, direct him to travel in the direction which seems best suited to his case, until he finds a locality where he is comparatively comfortable, endeavoring to select a climate where he may be out of doors every day and at any hour of the day."

Besides the mere selection of a locality from the point of view of its temperature, dryness, etc., the physician has several other things to consider which may be full as important for the patient's recovery. If he should banish the latter to a place lacking everything like the food, accommodations, mental resources, and amusements to which he has been accustomed, no matter how delightful the climate, these deprivations, with some persons, might more than counterbalance its good effects. Others, however, might enjoy these changes. Therefore the individual's tastes should be consulted as far as possible. The great trouble with our best climates for consumptives in this country is that to-day they have very little else to recommend them, because they are so uncivilized, so to speak. Out-of-door life being so necessary, there should be some inducement for it. Has the proposed place any such? The constant change of scene and mental occupation in travelling in foreign countries or in different parts of our own country without regard to particular climatic indications, especially if it also brings relief from home cares, anxieties, and business, will sometimes be of great benefit to a consumptive. For a different class, who have more resources within themselves and are therefore not so dependent on outside influences, a long sea voyage in warm latitudes may be the

best thing, especially if the patient does not suffer excessively from sea-sickness.

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 hillside, from a swampy neighborhood to a dry, gravelly soil, may be sufficient. This fact is too often forgotten, but has been repeatedly proved. In this connection it may be well to state that the researches of Dr. Bowditch, of Boston, and of Dr. Buchanan, of England, proving an undoubted connection between dampness of soil and the prevalence of the disease, and a comparative immunity from it on high, gravelly soil, well drained, have been abundantly substantiated by the experience of many others. Therefore this element should be a conspicuous one in the selection of any climate for consumptives. In some cases it may be advisable to recommend a permanent residence in the locality where the patient may seem to be particularly benefited. As a rule, it will be found that more are helped in a moderately cool and dry air than in a warm, especially if moist, atmosphere.

As to the choice between the mountains and the seashore, Professor Loomis thinks that sea air is best for phthisical persons past middle life, for those who cannot tolerate any sudden change in the atmosphere, and for those in whom the tissue-change requires hastening or stimulating, the system being in too feeble a condition for muscular exercise. If there seems to be no special need for this hastening, they are better in the mountains. Consumptives should not go to the mountains, he thinks, unless they are capable of considerable muscular activity. Comparative youth and vigor are required. An exhausted nervous system, with an overtaxed brain, the muscle being in fair condition, will do well at the mountains.

As to the desirability of particular localities, there is space here for only a few words. For further information the reader is referred to J. W. Howe's *Winter Homes for Invalids* (New York), for American health resorts; to C. Theodore Williams's *Influence of Climate on Consumption* (London), for foreign climes; and to Walton's *Comparison of the European and American Climatic Resorts* (Philadelphia, 1877), for both. There are other sources of information, but these are perhaps as accessible and concise as any. No mention will be made here of foreign resorts, as our own country probably offers more advantageous regions in far greater variety, and as comparatively few of our people care to go abroad for the purpose.

Our Southern States have been greatly resorted to in times past, especially *Florida*, and doubtless some have been benefited, but the vast majority of those who have gone to Florida have either died there

or have rapidly failed after, perhaps, some improvement at first, and have come home just in time to die. Those cases which improve most in Florida are not phthisis, but obstinate bronchitis or slowly-dragging and imperfectly-resolved pneumonias threatening phthisis, which often there do remarkably well. The lowlands of the South are too *hot* and *moist* to suit most consumptives, who are very apt to sink under their depressing and debilitating influence. The malaria which may poison the system there is another objection. Florida is one great stretch of lowland, with scarcely any elevation worthy the name of a hill, except perhaps near its upper borders. While Northern consumptives rush to these lowlands for help, the natives with the disease seek the highlands in different directions. Still, it is not to be denied that some cases of phthisis are benefited here. Magnolia, Jacksonville, Pilatka, St. Augustine, Enterprise, and Gainesville are the most frequented resorts in this State.

In the same connection may be mentioned the climate of the *Bermuda Islands*, 700 miles from New York and 600 from Cape Hatteras, where the climate is very mild and moist, the winter mean temperature being 60° F., rarely falling below 40°. Cold, southwest, disagreeable storms are common, however, but malaria is unknown. The winter in the *Bahama Islands*, east and southeast of Florida, is warm and moist. From November to April the temperature varies between 60° and 70° F., and is equable indeed. The sea breezes from the north are cool and delightful. In the summer the mercury ranges from 70° to 90°. Nassau, the capital, is on a range of hills near the coast of the island of New Providence. Turk's Island at the southern end of the group is also frequented as a health resort. In the Lesser Antilles, nearer the equator, are three islands to which consumptives go; Santa Cruz, St. Thomas and St. Vincent. Santa Cruz has a pleasant and highly cultivated area of 100 square miles of plains and hills, with comfortable homes, beautiful hard roads and no malaria. The atmosphere is dry, warm and pure, and the mercury ranges in winter from 76° to 82°, the summer heat being a little higher. Cuba in winter is of course resorted to, but the climate is warm, moist and inferior. Matanzas, San Antonio, Santiago and villages in the interior near the mountains have the best reputation for invalids in this island.

To go to the other extreme, *Minnesota* has a remarkably *cold* and *dry* climate. Its country is elevated a thousand feet or more, the annual rainfall is only twenty-five inches, including snow (about forty in Massachusetts), and the winters are cold and long, although the summers are hot. The air is dry and bracing, changes of temperature are sudden, and forests of spruce and pine abound. It is stated that about one consumptive in fifteen is cured in Minnesota. Some years ago very enthusiastic reports were sent from here of wonderful cures, but we hear much less of such cures now. It is beneficial for those who

are strong enough to exercise in the open air regularly, and it requires no little toughness to do this with the thermometer below zero, but others with less vitality have died by the hundreds. The same remarks are applicable to Canada and the famous Adirondack region in New York, about which so much enthusiasm has been aroused lately, and so many brilliant hopes have been raised, most of them destined to disappointment. And yet there certainly have been recoveries in both of these regions, and also in the White Mountains of New Hampshire.

The *Rocky Mountains* in Colorado, Wyoming, New Mexico and Arizona, with their foot-hills and elevated plateau, and with all varieties of temperature, have gained a great reputation for consumptives. In some parts of Colorado the cold is severe and changes great, but in others it is very mild and peculiarly dry. The atmosphere is wonderfully dry, exhilarating and healthful. The annual rainfall is about sixteen inches. The average height of the Rocky Mountains is 11,000 feet, some peaks being higher. The celebrated and large North, Middle, and South Peaks and San Luis, Estes and Manitou Peaks are from 7000 to 9000 feet high. Even at the foot of the mountains the altitude is 4000 feet, and the eastern third of Colorado and western half of Kansas form one large plateau, gradually rising from 1500 to 4000 feet. A very good feature in Colorado is abundant sunshine, some one once reporting from a well-favored location 303 clear days in a year. Bad features are the violent and fierce winds with clouds of dust, scarcity of water, poor food, and lack of many comforts, except in Denver and a few other places where the climate is not so favorable. Besides the places already mentioned, Colorado Springs, Boulder, Manitou, Pueblo, Cañon City, and Punched Springs are resorted to by invalids.

New Mexico and Arizona promise well in the future, when they are more developed. Tyndale thinks that this country, and particularly the Mesilla Valley in southern New Mexico, will be the ideal of a warm, dry climate, when it gets more civilized, on account of its almost perpetual sunshine, the dryness and purity of the air, so extreme that meat becomes desiccated, without decomposition, by exposure to it (dead bodies being formerly brought here for mummification), its abundant and fine vegetables and fruit, especially grapes, its elevation, etc. There are now two hotels, which are said to be good, at Las Vegas Hot Springs, on a branch of the Atchison, Topeka and Santa Fé R. R. The neighboring State of Texas, in some parts, offers certain advantages, incident to a dry and warm climate.

The climate of *California* cannot be described in a word, because almost every variety is represented in its different parts. Within a day's ride can be experienced arctic cold, tropical warmth, or great variability. The principal health resorts are in Southern California,

where many consider the climate to be superior to any in Europe or America for consumptives, who can be out in the mild and equable yet somewhat bracing air the most of the time. Many cures have been reported, and yet many die here too. Eastern consumptives might expect to derive much more benefit, if it were not for the long and fatiguing journey requisite to get there. Among the most desirable localities is Santa Barbara, near Point Concepcion, whose climate is dry and mild and free from changes. In summer the average temperature is below 70°, rarely getting above 80°, and in winter the average is 53°. The coldest day in nine years was 42°. The rainfall is from twelve to fifteen inches. On the north it is protected from the cold and winds by the Coast Mountains, and on the south from the sea fogs by beautiful islands. San Diego lies on a bay on the Pacific, 500 miles south of San Francisco and 150 miles south of Santa Barbara. It is a little warmer than the latter place, and is subject to sudden changes. The rainfall is ten inches. Malaria and rheumatism abound here, but not in San Bernardino, 75 miles from the sea, where the air is warm, dry, and pleasant. San José, in the beautiful Santa Clara Valley, 50 miles from San Francisco, and many other places, are resorted to by invalids. The State Board of Health of California, after a careful consideration, has favorably reported on two localities for the establishment of a sanitarium for consumptives—one in the Sierra Madre Valley in Los Angeles County in almost the extreme southern part of the State, and the other on Atlas Peak in Napa County, just north of San Francisco, and at an elevation of 1500 feet.

Aiken, in South Carolina, is much oftener frequented by Eastern invalids, being so much nearer. It is on a high, sandy ridge, near the Savannah River, and has a clear and mild atmosphere, with an even, warm temperature, except that, sometimes, cold northeast storms prevail. Near by are groves of pines. Spartanburg and Greenville are cooler, but have not yet many comforts. Such places and others, like Asheville in North Carolina, are a great improvement on the debilitating and enervating effects of the lowlands of the South.

Georgia, in parts, after all things have been considered, seems to come nearer the ideal climate for most consumptives than any other State in the eastern part of our Union, unless it be Eastern Tennessee. The air is not so dry as in California, but still it is dry. The altitude varies so much, that one has only to travel a comparatively short distance to secure a change of several degrees in temperature. Thus it is possible to get with ease a climate that is cool enough to excite a healthy reaction of the system, with the increase of vigor which always comes with such reaction, like that derived by a healthy man from surf-bathing, for instance, without enough cold to exhaust the constitution. A consumptive, with vigor enough to withstand the clear cold of a winter in the Adirondacks or in Minnesota, will be all the better

for it; but, unfortunately, most are not strong enough to battle with such forces, which are out of proportion to the reactive capacity of their constitutions. Atlanta and the neighboring little village of Marietta, near the Kenesaw Mountains, 1132 feet above the sea, are desirable places, with the comforts of life attainable. The winter mean temperature is 45°, and the summer 75°, at Atlanta. Many other places in this country will, in all probability, grow into favorite resorts for consumptives.

In *Eastern Tennessee*, on the Cumberland Table Lands, are undoubtedly many factors favorable for a beneficial climate. Dr. Wright, of Chattanooga, claims that, on Walden's Ridge in this section, consumption is not an indigenous disease among the inhabitants. So he states in an essay, "A People without Consumption." Perhaps our grandchildren may profit and renew their health in this region, but now it is so uncivilized that few, except the most robust consumptives, can or will venture into it.

Medicinal treatment, according to the homœopathic method, calls for remedies to be prescribed after a careful consideration of the totality of the symptoms, including everything of importance that can possibly have an influence on the case, to be learned from the past history, present surroundings, etc. It being impossible in this place to give anything like a full account of the indications for the remedies, only the most prominent will be mentioned, the reader being referred to works on materia medica for the rest.

Tuberular Cachexia.—Calc. carb., Calc. iod., Ferr., Ars., Phos., Sulph., Dros.

Indigestion.—Nux vom., Puls., Hydras., Carbo veg., Ars., Kreos., Ferrum, Lycop.

Cough.—Phos., Hyoscy., Bell., Bry., Calc. carb., Dros., Ipec., Corallium rub., Lobel., Stannum, Kali carb., Antimon. tart., Sang., Rumex, Lach.

Fever.—China, Acon., Baptisia, Antimon. tart., Ars.

Night-sweats.—China, Iodine, Phos. ac., Ars., Sambucus, Pilocarpin, Sulph. ac., Nit. ac.

Diarrhœa.—Ars., China, Cham., Puls., Calc. carb., Sulph., Merc.

Hæmoptysis.—Millef., Hamam., Acon., Trill., Secale, Ipec., Ferr. acet., Ledum, Arn., Ergotin.

Dyspnœa.—Ars., Antimon. tart., Ipec.

Hoarseness.—Spongia, Caustic., Kali bichr., Bell., Kali hydr., Rumex, Brom., Iod.

Pleuritic Pains.—Bryon., Arnica, Sulphur. acid., Acon., Kali carb.

A few of the more prominent indications for the twenty-five leading remedies in phthisis will be given. Other less important remedies, which may be consulted, but which are here merely mentioned by name, are: *Actea rac.*, *Ars. iod.*, *Ammon. carb.*, *Bapt.*, *Borax*, *Brom.*,

Caps., *Conium mac.*, *Calc. phos.*, *Dulc.*, *Hydras.*, *Ign.*, *Kali bichrom.*, *Kaolin.*, *Lauroc.*, *Ledum.*, *Lycopo.*, *Merc.*, *Myrtus.*, *Naph.*, *Nat. mur.*, *Phos. acid.*, *Sarracenia.*, *Septia.*, *Silicea.*, *Trill.*, *Verat.*

Aconite.—Full, bounding, compressible pulse, with high fever; frequent congestion of the chest; hectic fever; restlessness, with anxious expression of the face; palpitation; hæmoptysis; pleuritic pains, aggravated by coughing or breathing; short, dry cough with morning and evening paroxysms; tickling in the throat.

Antimon. tart.—Loose, rattling, hollow cough, worse at night, with suffocation; rattling of mucus audible to the patients and friends; aggravated by lying down; cough followed by vomiting; free and copious expectoration; prostration; afternoon hectic.

Arsenicum.—I have found *Ars.* one of the most valuable remedies for the tubercular cachexia, and also for giving relief in those very bad cases where a cure can hardly be looked for, characterized by the following symptoms: Utter prostration; rapid emaciation and pronounced hectic; urgent thirst; burning in the stomach; nausea; diarrhœa; depression of spirits; greatly oppressed breathing; sharp pains in lung. *Ars. iod.* is often substituted.

Belladonna.—Violent, spasmodic cough, worse at night and after motion; congestion of the head, with alternate redness and paleness of the face; bright-red blood expectorated; aphonia; larynx painful to pressure; dysphagia; perspiration; pains at apex and scapular region.

Bryonia.—Tearing dry cough, as if the head and chest would burst; stitching pains in the sides, catching the breath; symptoms aggravated by motion; sputum thin, blood-streaked and scanty; soreness under sternum.

Calcareo carb.—A valuable remedy when there is a threatening of phthisis, especially in young girls with too frequent and too profuse menstruation; or for scrofulous children, or those with weak bones, slow or difficult dentition, sensitiveness to cold or damp; poor digestion and assimilation; easily fatigued; epistaxis. After the disease has actually begun, short, dry, hacking cough in evening and night, with copious yellow, offensive expectoration, sometimes bloody during the day; dyspnoea and fatigue on walking up a hill, especially in the morning; good for pale, blonde, leucopneumatic persons with weak eyes. *Calcareo phos.* is often substituted, and covers pretty nearly the same ground. *Calc. iod.* likewise, especially for the tubercular predisposition.

Carbo veg.—Hard cough, followed by purulent, sometimes fetid expectoration; nosebleed; sensitiveness to sudden atmospheric changes; afternoon restlessness; flatulence; sour belchings; fistula in ano; hot hands and sweat on feet; night-sweats.

Causticum.—Dry cough, aggravated by going from a cold to a warm place; urine passed involuntarily during cough; cough relieved by cold drink; aphonia sometimes complete; hoarseness worse in morning.

China.—Copious, exhausting sweats, not only at night, but whenever patient falls asleep; hectic; prostration after hæmoptysis, seminal emissions, over-lactation, leucorrhœa, and diarrhœa; weak voice; cough at night, worse after midnight, or after talking, laughing, eating or drinking; irritability.

Drosera rot.—Paroxysmal cough, somewhat resembling whooping-cough; paroxysms of variable duration, about two or three hours apart; paroxysms frequently end with vomiting of mucus or food; cough worse at night and on lying down; profuse disagreeable expectoration at end of paroxysm; diarrhœa; suffocation; hoarseness; pharyngeal catarrh. Tubercular predisposition. Phthisis after pertussis.

Ferrum met.—Anæmia; hæmoptysis; painless diarrhœa; epistaxis; œdema of the lower extremities; patient flushes easily, or has palpitation on emotion or exertion; is easily fatigued; dyspnoea relieved by warmth; hectic; fulness at stomach; vomiting; amenorrhœa or watery menses; cough dry at night, but with copious expectoration of mucus or pus in the morning; symptoms relieved by slowly walking about. Tubercular cachexia or predisposition.

Hepar sulphur.—Scrofulous patients in the early stage, especially if they are young; blondes with soft and flabby muscles. Barking, wheezing, choking cough, excited when any part of the body gets cold from being uncovered; patient sensitive to open air; sweats easily from exertion and turns pale; burning of palms and soles;

depression of spirits; scraping and irritation in the larynx, aggravated towards morning; hoarseness; bubbling rales audible to patient and bystanders; high temperature; acute phthisis or acute exacerbations of the chronic disease.

Hycosyanus.—Spasmodic, dry cough, aggravated at night and on lying down; paroxysms relieved by being bolstered up; headache; dizziness; hiccough; especially indicated for patients over forty years of age.

Iodine.—Adapted to scrofulous people with swollen glands and general emaciation; cough from constant tickling in the windpipe and under the sternum; expectoration of transparent mucus; morbid hunger and yet loss of flesh; morning sweat.

Ipecacuanha.—Asthmatic, suffocative cough, with dyspnoea in paroxysms and cyanosis; nausea and vomiting; plenty of sonorous and bubbling rales; symptoms worse at night and in the evening.

Kali carb.—Beneficial both in incipient and in later stages, especially for women run down after confinement or over-lactation. Nervousness; cough worse about 5 P.M. Mucus expelled from mouth forcibly in white globular masses, when coughing; burning on top of head and on soles; circumscribed red spot on one cheek; constrictive pains in chest and throat.

Lachesis.—Dry, tickling, croupy cough, worse in the day, with sensation of a lump in the throat, which is the cause of much hawking and swallowing; offensive stools; sore mouth in last stage of the disease; cough made worse by touching the larynx, by mental emotion, and by alcohol; sometimes hoarseness, even to aphonia.

Nux vomica.—Specially indicated for dark-complexioned people, with sallow skin, of sedentary habits and anxious temperament, also for hard drinkers. Flatulence; heartburn; acid eructations; constipation; dry cough, with irritation in the pharynx and soreness under the sternum.

Phosphorus.—The king of remedies for phthisis in the writer's experience, who has seen more recoveries under this than with any other single remedy. Not only serviceable when the disease seems to be threatening in one predisposed, but also when it is well advanced. Short dry cough, aggravated by lying on affected side; pain, soreness or oppression in the chest; burning between shoulders; dyspnoea; paleness; prostration; emaciation; poor appetite; indigestion; painless diarrhoea; hoarseness in evening; sometimes aphonia; small, quick pulse; night-sweats during sleep; almost every kind of expectoration; hæmoptysis; rust-colored sputum; particularly good for slender persons with fair skin and sanguine temperament, and also in children, notably delicate girls.

Pulsatilla.—For light-complexioned people, subject to diarrhoea, to whom fatty food is distasteful, or to chlorotic girls. Dyspeptic symptoms very prominent; moist cough by day, but dry at night; cough aggravated by warmth; relieved by cool air, cold drinks, holding the head high and walking; expectoration saltish; scanty or delayed menses.

Rumex crispus.—Dry fatiguing cough, in long paroxysms, aggravated by cold air, talking, and pressure on larynx; soreness in trachea, with annoying tickling; catarrhal hoarseness; cough worse after retiring; left chest oftener affected; brown watery diarrhoea, early in morning.

Sanguinaria.—Incipient phthisis; dry throat; bad smell, even to patient, of breath and expectoration; cough loose, but expectoration difficult; chest sore; cold hands and blue nails; dyspnoea; pain in right chest; phthisis in syphilitic patients; circumscribed redness of cheeks; cough worse on lying down; loose stools; lassitude in the evening.

Spongia.—Dryness of larynx; hoarseness; aphonia; sudden giving way of voice; contraction of glottis; paroxysms of dyspnoea; hoarse, hollow, wheezing, dry cough, aggravated by warmth; crowing; exhaustion in chest after exertion; chilliness in back not removed by heat.

Stannum.—Profuse mucons expectoration in first stage; afterwards profuse yellow or green, sweetish expectoration, with forcible expulsion of small balls; loose cough; great exhaustion; weakness of legs; too weak and short of breath to talk more than two or three words at a time; empty feeling in chest; bloating of stomach after eating; hands and feet cold, or else hot; profuse night and morning sweats; chill at 10 A.M.

Sulphur.—Soreness in upper part of left lung, going through to back; patient complains of being too hot, and wants to keep his feet outside of the bedclothes; cough mostly dry, with now and then a profuse discharge of purulent matter; palpitation;

profuse night-sweats; diarrhoea early in the morning; no appetite for breakfast, but faint long before dinner; emaciation and debility; dyspnoea; leucorrhœa; too profuse and frequent menses; long, lingering cases, that seem to improve and then relapse; frequent slight attacks of hæmoptysis; for patients of melancholy lymphatic temperament, subject to venous plethora and hæmorrhoids, scrofulous eruptions, abscesses, boils or glandular swellings.

Adjuvants.—The *cough* can often be allayed somewhat by simple means in addition to the homœopathic remedy. Such are sipping from time to time a little glycerine and water, barley-water, gum-arabic water, rice-water, Iceland-moss tea, flaxseed tea; or chewing up occasionally slippery elm bark, or letting simple candy, or cocoa-butter, or gum-arabic dissolve slowly in the mouth. The patient should be taught to restrain the cough as much as possible. Surely not all, but a part of the coughing, can be controlled by an effort of the will. Some remedies may be given by inhalation with good effect; especially, Iodine, Kreasote, Carbolic acid (for fetid breath and expectoration), Aconite, Hyoscyamus, Belladonna, Ipecac., Bryonia, and Phosphorus; also Tar. If dryness of the throat is caused, a little glycerine should be swallowed before inhaling. A regular steam-atomizer or other inhaler may be used, or one extemporized from a jug or tea-kettle; and the inhalation may be kept up from five to fifteen or twenty minutes, twice a day. The fumes of benzoin or resin may also be inhaled, or a few drops of sulphuric ether. Chloroform, although temporarily effective, is too dangerous for the patient to handle alone. When the case is hopeless, and the cough very distressing, physiological doses of belladonna, conium, hyoscyamus, hydrocyanic acid or morphine may be given. These, particularly the latter, should be given only as a last resort. The morphine should be given in as small a dose as possible, from the $\frac{1}{16}$ of a grain to the $\frac{1}{2}$ of a grain in granules, parvules, or gelatine or sugar-coated pills. The unpleasant effects of the morphine can often be prevented by the addition of sulphate of atropine. Gelatine-coated pills are made combining $\frac{1}{2}$ of a grain of the former with $\frac{1}{16}$ of a grain of the latter.

For *night-sweats* the hot bath has been already spoken of under "Bathing." The patient may instead be sponged over with vinegar and water, or what is more pleasant, acetic or sulphuric acid with cologne and water, at bedtime for several nights in succession. From two to four grains of oxide of zinc at bedtime will often prove successful; or the hypodermic injection of the sulphate of atropine in doses of from $\frac{1}{32}$ to $\frac{1}{16}$ of a grain, or the administration by the stomach of the same in doses of $\frac{1}{16}$ of a grain, or five minims of the second decimal dilution of muscarin. Picrotoxin in doses of $\frac{1}{16}$ of a grain at bedtime is strictly homœopathic. A tumblerful of milk or other simple food in the night sometimes works well.

During *hæmoptysis*, if at all severe, the patient should be put to bed in a cool room, and kept perfectly still, forbidden to talk, and asked to

restrain his cough as much as possible. All food and drink should be cold. He and the friends, who are often much excited, should be calmed as much as possible, by informing them that more blood may very likely come, but that it is exceedingly rare for any one to bleed to death. Diet must be very simple and nourishing, without alcohol. Ice may be sucked, but it is generally inadvisable to put ice in a bladder or rubber bag on the patient's chest. The tincture of Hamamelis may be given in two or three drop doses every whole, half, or quarter hour, according to the amount of hæmorrhage. A shawl-strap about one of the limbs in severe cases may be of service, and the urine should be drawn for several days, unless the patient can use the bed-pan when lying on his back. A physical examination should not be made until some days after bleeding has ceased.

Diarrhœa and *constipation* should be regulated as far as possible by appropriate diet. *Pleuritic pains* may be helped by cold compresses, hot fomentations or poultices. As to the propriety of operating upon *fistula in ano* in a phthisical patient the best authorities differ. For pains in the *bowels* hot applications, wet or dry, should be applied; and when they are very severe, as sometimes in the last stages, Morphine should by all means be given for humanitarian reasons.

Bed-sores are very apt to form in the last stage of the disease. When threatening, the reddened skin should be toughened by bathing in alcohol, or protected by collodion, and the patient should be placed on a water-bed or air-bed. If the bed-sore has actually formed, it should be dressed with calendula infusion or cerate, vaseline, carbolic acid, absorbent cotton or oakum, or strapped with adhesive plaster. The pressure should invariably be removed and be brought to bear on the surrounding parts by means of an air- or down-cushion, used on the same principle as a corn-shield.

The injection of lung cavities through the chest-walls by means of an aspirator-needle, or through the larynx, with different substances, has been attempted often enough to show that it is of no practical benefit. The inhalation of oxygen, hydrogen, and nitrous oxide also has failed to give satisfaction; but much good can often be done mechanically in the way of distending unused air-cells thoroughly and safely, for the weak as well as for the strong, by the inspiration of slightly compressed air.

PULMONARY CONGESTION, ŒDEMA, HÆMORRHAGE, AND APOPLEXY.

BY A. K. CRAWFORD, M.D.

Definition.—An undue accumulation of blood in the capillary vessels of the lung, leading to extravasations into the air-cells, the bronchioles, or the pulmonary connective tissue.

Pathology.—There are several forms of excess of blood-pressure in the lungs, as well as degrees and conditions of hæmorrhage, to which distinctive names have been applied, but which are so often only stages in the same process, and are so frequently coexistent in the same person, that they are better considered under one head.

Hyperæmia and *congestion* are used synonymously for any active, passive, or mechanical stasis of blood in the pulmonary or bronchial vessels. The lung in this condition is of a dark-red color, grading down to almost a black, according to the amount of blood and pigment present. The engorged portion is larger and heavier than normal, but floats in water. It gives diminished crepitation under the fingers, and a frothy, bloody fluid escapes when it is cut.

Hypostatic congestion is a more advanced state of engorgement, in which the lung is found to be somewhat friable and the vesicular structure barely visible. This condition of the lung has been termed “splenified,” and it can very readily develop into hypostatic pneumonia.

Œdema of the lungs is associated usually with œdema elsewhere, and is essentially the same in either situation. The serous transudation occurs in the air-cells especially, more marked in the pendent parts. The lung does not collapse when the chest-wall is opened, and its surface pits on pressure. More or less watery fluid escapes when the tissue is cut, mixed with blood in proportion to the degree of congestion accompanying the œdema.

Hæmoptysis is a discharge of blood, indicative of a hæmorrhage into the air-passages, and is, therefore, a symptom common to the many maladies in which pulmonary hæmorrhages occur. These extravasations of blood appear under several different forms. That which is known as the *diffuse* form results from the rupture of a vessel of some size, although recent and careful examination of such lungs has shown that hæmorrhages rarely occur from the larger vessels. But the lung tissue is always torn, and, as a consequence, we have an irregular cavity, containing clotted and fluid blood in varying proportions. Another form of hæmorrhage is the *circumscribed* or *pulmonary apoplectic*. It is limited in extent, nodular in appearance, and firm to the touch. Those occurring in the centre of the lung are usually larger than those found near the surfaces. The latter often occupy the space of a single lobule, and are then wedge-shaped, presenting some of the characteristics of consolidation in lobular pneumonia. But when section is made through the nodule, it appears of a dark-red tint, somewhat granular, and contains clotted blood. On removing some of this blood the lung-tissue can be seen. Often several of these circumscribed hæmorrhages occur at once, and their most frequent seat is in the centre of the lower lobes, or near the root of the lung. There is no rupture of tissue, as in the diffuse variety, and the

pulmonary capillary vessels which supply the blood pour it into the alveoli and the finest bronchial tubes, and the adjacent tissue is found to be more or less congested. Pulmonary apoplexy is also known by the name of "hæmorrhagic infarction," and includes pulmonary thrombosis and embolism in its pathology. The central vessel of a circumscribed hæmorrhage is discovered to be blocked, partially or wholly, by a clot, and these clots are now looked upon as emboli, carried thence through the venous circulation, as a rule, from some distant and disintegrating thrombus.

Why an obstructed vessel will cause a hæmorrhage to occur from the capillaries in its neighborhood, has not yet been satisfactorily explained. The appearance and condition of the infarction change with its age. It pales and becomes more solid on account of absorption of the coloring matter and of the fluid portion of the blood. Sometimes the extravasation is entirely absorbed, sometimes it develops pneumonia or abscess, or becomes encapsuled, but more often the remnant of the apoplectic clot is nothing more than a permanent pigmented induration. Other forms of pulmonary hæmorrhage are the interlobular and the petechial, but as these occur but seldom, description in detail is unnecessary.

Causation.—*Active congestion* results from such causes as give rise to pulmonary inflammations, from interfering with the act of respiration or of the capillary circulation, from irritating vapors, and from greatly increased action of the heart. Mechanical congestion is due most frequently to mitral disease, or it may result from a weakened left ventricle, or from the pressure of a tumor on the pulmonary veins. *Passive congestion* is a concomitant of low fevers and of such states as depress the heart's action. It is in advanced life and in those prematurely enfeebled that through, possibly, a weakened right ventricle or disturbed capillary circulation, hypostatic congestion is induced.

The mechanical causes of the development of *œdema* are usually found to be a mitral regurgitant lesion, or the effect on the lung of a general anasarca condition. It is also often traceable to renal disorders, but how the latter produce pulmonary œdema is not clear. There are reasons for believing that none of the causes mentioned are the most common or the most potent factors in developing œdema. When it is considered that œdema of the lungs oftentimes exists without other tissues in the body being implicated in like manner, and that the reverse is also true; when it is noticed with what suddenness it develops in some cases of acute nephritis and of pregnancy; when it is frequently seen to invade only portions of the lungs, or of one lung, and to leave the remainder normal; when we remember that conditions which affect other tissues do not act on the lungs in a manner calculated to produce an œdematous state, such as the injec-

tion of large quantities of saline solutions,—then it would seem well to look beyond a mechanical agent as the sole cause of œdema.

In the early part of this century, Edwards, Breschet, and Vasseur showed that division of the pneumogastrics in animals causes in them death from œdema of the lungs. Other experiments, made by Cohnheim and Lichtheim, have shown that mere additional pressure of blood in the pulmonary vessels will not produce transudation of serum. So that pulmonary œdemas may be attributable to vaso-motor paralysis, which enervates the tissue composing the vessel walls, giving rise to serous osmosis. Equally interesting experiments have been made in regard to the heart and the production of œdema of the lungs, and from these, with certain clinical cases cited by Falk, it has been determined that a parietic condition of the left ventricle, causing an arrhythmical action of the venous and arterial sides of the heart, will produce pulmonary œdema.

Hæmorrhages and *hæmoptysis* result from congestion of the lungs, from rupture of any of the pulmonary tissues, from diseases of the heart or lungs or arteries, from pneumonia, phthisis, cancerous or other growths, thoracic aneurisms, ulcers, or from the lodgment of emboli in the pulmonary vessels. They occur also in consequence of injuries about the chest, from straining, from a sudden change in atmospheric pressure, as in ascending a high mountain, and sometimes without apparent reason in plethoric individuals.

Hæmoptysis is seen likewise in malignant fevers, in purpura, and other blood disorders, and occasionally it appears to be hereditary. It was formerly supposed that the firm tissue inclosing a cavity in the lungs contained no vessels, but such is now known not to be the case. Not only that, but the bloodvessels in this condensed tissue are frequently aneurismal, and their rupture into the adjacent cavity produces the gravest hæmorrhages. In amenorrhœa a compensatory hæmoptysis has been observed, but this is of rare occurrence, and when it appears it assumes the periodicity of the menstrual flow.

Symptoms and Physical Signs.—These, as a rule, are not very definite. Perhaps quite suddenly, a cough or a tickling sensation in the throat brings about an expectoration of a profuse watery fluid if the condition be œdema, or more or less blood if it be hæmorrhage. Occasionally, a sense of weight in the chest, and of heat, or of pain between the shoulders, palpitation and dyspnœa, may be complained of by the patient for a few days before the attack occurs. The dyspnœa is probably the most prominent symptom at first, especially if the hæmorrhage is large. Then there will be gurgling sounds heard in breathing, much weakness, or even complete prostration of the patient, while the pale and pinched face presents the expression of anxiety and alarm. The quantity of blood lost by pulmonary hæmorrhage is sometimes so great as to cause complete syncope, and this serves

the purpose of arresting the flow. If a hæmorrhagic clot sets up an inflammation in the pulmonary tissue, febrile symptoms will mark its development.

Hæmorrhages which are sudden, profuse, and violent, and without prodroma, are ordinarily from the rupture of an aneurism, and may within a few moments cause the patient's death.

The severity of the symptoms in pulmonary apoplexy will depend on the number and extent of the hæmorrhagic infarctions. So the symptoms may consist only in an increase of those already existing, indicative of valvular disease of the heart. Or they may be such as sudden orthopnoea with threatening suffocation, cough, expectoration of blood, coarse rales, the face bordering on a purplish tint, and the pulse small and frequent. If the patient survives the onset, pneumonia or pleurisy commonly starts up around the site of the hæmorrhage.

The physical signs of congestion are inappreciable, unless it is accompanied by œdema or hæmorrhage.

In œdema we find some dulness on percussion, usually on both sides and more marked posteriorly. By auscultation a crepitant rale is heard, resembling somewhat that noticed in the first stage of pneumonia; in œdema the rale is more moist.

Even in slight hæmorrhages the ear may detect moist rales over a limited area. When the hæmorrhage is to any degree extensive, there will be a corresponding amount of dulness on percussion, with weakened or absent respiratory murmur, and an abundance of moist rales, heard until the fluid blood is coagulated or resorbed. The locality of apoplectic nodules cannot be defined unless they are both large and superficial. In the latter instance, besides the signs already given, there may be bronchial breathing and augmented vocal sounds, because of the hæmorrhage being close to a bronchial tube.

Diagnosis.—Between pulmonary hæmorrhage, pneumonia, and hæmatemesis there are some general signs in common. But in hæmoptysis the blood expectorated is pure, either bright or dark brown, and without air. In pneumonia it consists of mucus, blood, and air-bubbles finely intermixed. In hæmatemesis it is usually black, of an acid reaction, attended with nausea, and afterwards black, tarry stools are passed. The dyspnoea of hæmorrhage is greatest at first; that of pneumonia increases as the disease progresses, up to the commencement of resolution, and the former is accompanied with less fever than the latter.

The existence of dulness on percussion contraindicates acute bronchitis, and the difficult breathing is never so marked in the bronchial inflammation. The discovery of pulmonary signs or of heart-disease, when there is doubt as to whether the blood had its source in the stomach or lungs, will decide in favor of pulmonary hæmorrhage.

Prognosis.—The prognosis in these affections is not at all favorable. In congestion of the lungs it is all the more serious if it is complicated with some low form of fever, and the outlook of hæmoptysis, especially if the hæmorrhages are frequent, is towards a fatal issue. As hæmoptysis is almost invariably linked with some organic affection, there is but little prospect of the patient ever being out of danger; but it may be years, as in some cases of phthisis, before a fatal termination ensues. When the hæmoptysis has been slight, and no marked febrile action follows within a few days, the patient will probably recover.

Treatment.—To allay the excitement of both the patient and friends, which always attends an occurrence of blood-spitting, is something the physician must needs meet early in his treatment of the case. And as soon as practicable the patient should be put to bed, propped up in a half-reclining posture, covered with light clothing, and in the utmost quiet. The room should be kept cool, and it is even recommended that the patient should breathe through an ice respirator. A very light diet should be prescribed, consisting of broths and milk, and these preferably given cold. The application of ice or of chloroform to the chest over the site of the hæmorrhage often proves of service. Constricting the limbs with bandages, so that the return circulation of the blood is impeded, and a considerable quantity thereby retained in the peripheral vessels, also aids in arresting the hæmorrhage.

When the hæmoptysis is continuous, and seems liable to interfere with the administration of a remedy by the mouth, and especially if a very speedy action of the medicine is desired, the hypodermic syringe should be used.

Arnica is the first remedy to be thought of if the hæmorrhage comes from violence or over-exertion. The blood is abundant, dark, and clotted, and the patient is despondent.

Aconite is indicated in active hæmorrhages when there is high arterial tension, flushed face, great anxiety, an incessant cough, with abundant expectoration of red, frothy blood. Hughes says he has never had occasion to use it, but relies on

Millefolium and **Hamamelis**.—The former is given for a painless hæmorrhage of light-colored, fluid blood, with but little cough, and the latter for a passive, dark-colored venous hæmorrhage. According to Jousset, *Millefolium* in the treatment of hæmoptysis has the preference among physicians on the continent. It acts well in cases complicated with amenorrhœa, or suppressed lochia, and also in tubercular, cardiac, and supplementary hæmoptyses. On the other hand, *Hamamelis* is probably the remedy most frequently employed by homeopaths in this country for pulmonary hæmorrhage. It is very efficacious when there is difficulty in breathing, the patient being unable to lie down; there is a feeling of constriction across the chest, tickling cough, a taste of blood or of sulphur is experienced, and the blood, as before stated, is venous in hue.

Ipecacuanha is indicated where there is a tickling sensation behind the sternum, with more cough than attends a *Hamamelis* case. The patient requiring *Ipecacuanha* often describes a sensation of bubbling in the chest prior to an abundant expectoration.

Digitalis purpurea may be used in cases of hæmoptysis due to embarrassment of the pulmonary circulation through heart-disease. The veins about the head

are engorged; the face is pale and livid; the skin cold; the pulse irregular, with throbbing of the heart. There is great distress in breathing, anxiety, restlessness, and a disposition to faint. If the lungs are tubercular, these symptoms are all the more marked indications for *Digitalis*.

Cactus grand.—Another special heart remedy. It is indicated in hæmoptysis from cardiac disease when that organ is turbulent in its action. There is less fever and restlessness than in *Aconite*, and it has the constrictive sensation of an iron band about the heart.

Ledum palustre is recommended for a profuse hæmoptysis of red and frothy blood. The cough is violent and spasmodic, from a tickling sensation in the larynx and trachea, and the pulse is strong.

Arsenicum album is occasionally indicated when a prostrated, irritable condition is found in connection with an excessive cardiac excitability. It is of little value in hæmoptotic phthisis, but stands in support of *Digitalis* in cardiac affections.

Phosphorus is rarely used now in the active stage of hæmoptysis. But when inflammation threatens after a hæmorrhage, and when there are signs of tuberculosis, with a hoarse voice, dry frequent cough, tickling below the larynx, and rapid, panting respiration, it is plainly needed. The hæmorrhagic diathesis is another prominent indication for this remedy.

Ferrum aceticum is found to supplement *Millefolium* when, in addition to the symptoms for the latter remedy, there is a dry, tickling cough and spitting of bright, coagulated blood.

In the form of the *perchloride*, *Ferrum* has been considerably in vogue for persistent and profuse hæmoptysis, and with some degree of success. It is usually administered in appreciable doses.

Gallic acid is also of great service in these cases of chronic and stubborn hæmorrhage.

Probably the greater part of the treatment demanded of us for cases of pulmonary hæmorrhage is not so much for the hæmorrhage itself as for the effects of the attack, for the constitutional condition inducing the attack, and for the prevention of its recurrence. Such being the case, the therapeutic field must be an unlimited one. The remedies to be given in each case during the intervals between the hæmorrhages must be chosen with reference to the ætiological factor of the hæmoptysis; and this will oftentimes require the finest diagnostic skill.

There are many remedies besides those already given which have proved efficacious in pulmonary hæmorrhages in different hands, some of which are herewith enumerated, with the conditions in which they are found most frequently useful.

For ACTIVE pulmonary congestion: *Aconite*, *Arnica*, *Belladonna*, *Millefolium*, *Nux*, *Trillium*, *Verat. vir.*

For PASSIVE pulmonary congestion: *Arsenicum*, *Digitalis*, *Hamelis*, *Erigeron*, *Ipecacuanha*.

For MECHANICAL pulmonary congestion: *Cactus*, *Digitalis*, *Ledum*, *Arsenicum*.

For pulmonary ŒDEMA: *Phosphorus*, *Digitalis*, *Tart. emetic*, *Arsenicum*.

For VICARIOUS hæmoptysis: *Pulsatilla*, *Bryonia*, *Senecio*.

For hæmoptysis due to TUBERCULOSIS: *Aconite*, *Arnica*, *Pulsatilla*, *Millefolium*, *Ledum*, *Phosphorus*; due to CARDIAC disease: *Aconite*, *Cactus*, *Digitalis*, *Arsenicum*; due to EMPHYSEMA and ASTHMA: *Cuprum*, *Ipecacuanha*, *Arsenic*, *Nux*, *Bryonia*, *Digitalis*, *Carbo veg.*; due to CATARRH: *Belladonna*, *Hyoscyamus*, *Mercurius*, *Scilla*.

For PNEUMONIC INFARCTIONS: *Arnica*, *Bryonia*, *Digitalis*, *Phosphorus*, *Mercurius*.

For the prevention of the return of hæmoptysis, study *Calcarea carbonica*, *Carbo. veg.*, *Conium*, *Ferrum*, *Sepia*, and *Silicea*.

EMPHYSEMA PULMONUM.

BY A. K. CRAWFORD, M.D.

Synonyms.—Latin, *Emphysema*; French, *Emphysème*; German, *Emphysem*; Italian and Spanish, *Enfisema*.

Varieties.—The presence of air in the areolar tissue is the condition to which the term *emphysema* applies in general. It presents itself on the body in the form of a puffy, shining, indolent tumor, which conveys a sense of crackling to the touch, and which is the outcome of gaseous formation, or extravasation of air into the connective tissue. According as it is traceable to external violence or some internal derangement, it is called *symptomatic* or *idiopathic*.

The application of this term to the lungs formerly meant precisely the same condition as that found in the body, viz., air in the connective tissue. But since the time of Laennec another form of pulmonary distension with air has been acknowledged to exist, and, consequently, the term now obtains a wider significance. Air in the areolar tissue of the lungs, from its anatomical position, receives the name of *interlobular* or *interstitial emphysema*. It is the same form which, at times, permeates the subpleural tissue; and in either case it is so commonly the result of injury to the thorax, that it more properly belongs to the field of surgery.

The variety with which we have to do, is that first clearly described by Laennec, and which he named *vesicular emphysema*. This applies to an excess of air in the air-cells of the lungs, and because of the state of expansion of the air-vesicles which this induces, it is sometimes referred to as dilatation of the air-cells. The extent of lung tissue involved in vesicular emphysema has given rise to its subdivision into *partial*, *lobular*, and *lobar emphysema*. The first refers to emphysematous patches affecting only a few air-sacs scattered along the margins of a lobe. It is generally seen in connection with the second form, or lobular, which implies that one or more lobules have been subjected to the disease throughout the lung. The lobar, of course, refers to the involvement of a whole lobe, or, perhaps, does not stop short of all the tissue of a lung. This form is less frequent, but much more serious than the lobular. The terms *vicarious* and *substantive* have been used to express emphysema developed from supplemental respiration in the one instance, and in the other from some source inherent in the individual.

Pathology.—The most marked feature of the altered pulmonary

tissue, and the one which precedes all other visible effects, is the enlargement and permanent distension of the air-cells. They may attain such size that they become visible on the external surface of the lung. The whole lung increases its bulk, and when the thorax is opened it does not collapse like healthy tissue, but often bulges out instead. When pressed with the fingers, there is much less crepitation than is felt in the normal lung, and much of its contractile power is lost. The spaces existing in an emphysematous lung are probably the result of the junction of many cells, through destruction or rupture of their septa, and when a dried specimen is cut, the spaces are found to vary from the size of a pin's head to an almond-kernel.

The direct result of the increased intra-pulmonic pressure and the coalescence of the air-vesicles is the contraction and, often, obliteration of a share of the capillary bloodvessels distributed through the lung tissue. The aerating surface of the lung is also very much diminished in extent. Therefore the dilated or diseased portion of the pulmonary texture is pale, anæmic, and drier than normal. The interference with the capillary circulation reacts on the heart, and there develops a right-sided dilatation, or dilated hypertrophy. The increased size of the lungs displaces the heart as well as the diaphragm, with the viscera below it. The bronchial tubes frequently become dilated, and intercurrent attacks of bronchitis are common. Usually, both lungs are involved to a greater or less extent, although the left is apt to be most affected. Louis puts it that the emphysematous state is greatest, as a rule, in the upper portion of the right lung and the lower portion of the left.

Clinical History.—Emphysema is of necessity a chronic affection, and belongs to a class of non-inflammatory pulmonary diseases. No fever is ever discovered, the surface of the body remains cool, and the pulse is weak. The obstruction to the circulation in the lungs, and the distension of the right heart, result in venous congestion and, occasionally, cyanosis. At first, when there is still sufficient healthy tissue to aerate the blood, there is no distress in breathing. But usually the patient does not apply for medical aid until the damage is so great that the breathing, even in the state of repose, is labored, especially in expiration. It will be seen then that the rhythm of respiration is abnormal, the inspiration being shortened and the expiration lengthened. An extensive lobar emphysema sometimes develops quite rapidly in both lungs, and runs a much more acute course than the ordinary form, the latter really having no definite limit to its duration, but continuing and augmenting throughout life. The presence of emphysema seems to be unfriendly towards the development of tubercle, and it is rare that pneumonia ever occurs as a complication. Asthma is a frequent associate of emphysema, and adds materially to the discomfort of the patient.

Causation.—The theories of the mechanical production of distension of the air-cells of the lungs are manifold. Laennec thought it was occasioned by the inability of the expiratory act to force the inspired air through a viscid mucous plug, and the volume of imprisoned air being increased by each inspiration, dilatation of the air-vesicles resulted. As this opinion was based on the supposition that inspiration was stronger than expiration, it does not agree with the physiology of to-day, and, consequently, it has been dropped. That the dilatation occurs in connection with, or in consequence of, a bronchial catarrh, is agreed to by most pathologists, and the manner of its development therefrom may be stated as being the result of inspiration or of forced expiration. An example of the former may be had from the perusal of Gairdner's views, wherein he takes the ground that the plugs of mucus situated as Laennec described them produced collapse, and not dilatation, of the air-cells, and that the proximate cells compensated by dilating. Examples of the expiratory act causing distended vesicles are such as blowing on wind-instruments, and the act of coughing. Sir William Jenner gave the minutiae of the effects on the lungs of coughing years ago, and Waters has since added his theory thereto. They hinge mostly on the partial closure of the glottis, and the concussive force of the cough expending itself within the lungs. But Louis comes to the conclusion that catarrh has but little influence in producing emphysema, because he found that the oppressed breathing and dyspnœa, in those having this disease, preceded the bronchial trouble and cough for a considerable time. And Waters, while he regards the production of the lobular variety as due most likely to catarrh and cough, believes the lobar and more severe forms to be a constitutional disease, and that its primary effect is malnutrition of the pulmonary tissue, and its subsequent degeneration. The four-fold reason given for this view is that emphysema develops extensively before there is any history of cough, that both lungs are attacked and the morbid changes are uniform throughout, that it is hereditary, and that the disease is benefited by treatment such as is prescribed for degeneration of tissue elsewhere. The conclusion to be arrived at is, therefore, that emphysema results from two distinct causative agents, the one mechanical, the other constitutional.

That there is a hereditary tendency towards the production of emphysema is shown by observations such as Greenhow has made. Out of forty-two cases he found twenty-three of them were of emphysematous parents. And Jackson discovered the same relationship in eighteen out of twenty-eight cases closely studied.

Emphysema is often produced by pertussis, and it is caused by, and in its turn complicates, bronchitis. It has been already stated that tuberculosis seldom develops in an emphysematous lung, but it is

none the less true that emphysema does frequently develop in a tuberculous lung. It is in this case of the lobular variety, and is an attempt on the part of nature to compensate for the solidified tubercular spots.

Symptoms and Physical Signs.—The symptom which is most noticeable to the patient is the difficulty in breathing; while striving constantly, he never succeeds in getting a satisfactory full breath, and a little exertion out-winds him completely. The cough which usually attends emphysema belongs more to the concomitant chronic bronchitis, and the amount and quality of the expectoration vary considerably. It is always with difficulty that any sputum is raised; this may exceptionally be streaked with blood, but usually it is clear and frothy, and not unlike soapsuds. There is so much difficulty connected with the expiratory act, that a cough occasions considerable torture. It partakes of the nature of whooping-cough, is violent, spasmodic, and exceedingly exhausting. The face shows some of the bluish tint due to obstruction of the pulmonary circulation, and besides becoming puffy, it wears a distressed expression, and has a dingy hue. The appetite may not become affected for a considerable time, but eventually it wanes, and more or less emaciation follows. When the disease is far advanced, the growing hypertrophy or dilatation of the right ventricle shows its influence by producing palpitations, general anasarca, and, may be, dropsical effusion.

The *physical signs* of emphysema are determined by means of inspection, percussion, and auscultation. None of the other artifices of examination give any reliable data unless it be that of mensuration. The chest of an emphysematous patient presents such changes to the eye that by this means alone strong evidence of the existence of the disease is furnished. Both sides are more than usually prominent, attaining such a full convexity that it has had applied to it the name of "barrel-shaped." The intercostal spaces are widened in the upper part of the chest, and narrowed in the lower. The respiratory act is labored, yet there is little or no expansion of the upper chest. The chest wall rises and falls almost vertically; often, too, the supra-clavicular region, as well as the lower segment of the thorax, sinks in during inspiration, and the breathing accomplished is mostly abdominal. The percussion note is clear, lowered in pitch, and increased beyond the normal; it has become very generally known and described as the vesiculo-tympanic. By auscultation the respiratory sounds are found to have changed to a short and feeble or, sometimes, absent inspiratory murmur, while the expiratory is prolonged, thus reversing the usual relative proportion of time the one occupies to the other. Occasionally, the respiratory murmurs have been described as harsh and sibilant and of equal length. From the nature of these sounds they must be developed in lesser-sized and contracted bronchi.

Diagnosis.—If any question arise as to whether a given case may be one of emphysema or of pleuritic effusion, it may be determined by finding, in the latter instance, that the percussion clearness in the upper part of the chest is replaced by dulness below, over the accumulation in the pleura. Sometimes growths in the mediastinal space, or an aneurismal tumor, will cause such bulging of the chest wall as to suggest emphysema. But the dull percussion sound over every solid mass hidden there, and the pulsation and murmurs of an aneurism, will be efficient to separate those from the lung affection. In pneumothorax we have the disease of all others most closely simulating emphysema. Both present an enlarged chest; both cause displacement of the viscera; both are accompanied with dyspnoea; both have clearness on percussion, but in this sign we find our first point of divergence, for the quality of this clearness is distinct in each. The percussion sound of emphysema still retains part of its pulmonic quality, and this modifies the increased resonance. But in pneumothorax percussion produces an absolutely tympanitic note. Moreover, because of the almost invariable pleuritis that occurs secondary to pneumothorax, in the signs of the latter affection there will be some dulness over the pendent portion of the pleural cavity, and by auscultation some splashing sounds. Emphysema involves both lungs, as a rule, while pneumothorax is almost certain to be found in but one.

Prognosis.—From the pathological character of the changes in this disease, it is not difficult to sum up its ultimate outcome. When the emphysematous lung still possesses the alveoli of the cells intact, the disease is not beyond repair. But when the septa are absorbed, broken down, or destroyed, there is no possible chance for recovery. In neither case is there any prospect of speedy death. The disease runs along, gradually lessening the physical strength of the individual, increasing the risk if another disease sets in, and making life miserable generally, because of the limitations imposed on every exertion attempted by the patient, and the constant dyspnoea. The symptoms which develop towards the close of an uncomplicated case of emphysema point more strongly to the failure of the circulatory system than of the respiratory.

Treatment.—The patient should be warned against taking an undue amount of exercise, and great care should be used in the selection of food. The flatulence of indigestion increases the distress in breathing, and disturbs the heart by its pressure. Imperfect assimilation is one of the first states to be overcome before a building-up or a recuperative process can be established. Therefore the food should be plain, nutritious, easy of digestion, moderate in quantity, and sparing in its fluid constituents. By this means there will be a lessened amount of blood to pass through the deficient lung without lacking in nutritive elements.

An atmosphere free from miasms and poisons of all kinds should be chosen to live in, and the patient will be better for being considerably in the open air, walking or driving leisurely.

The remedies for this disease must be chosen with reference to the intercurrent affections, when they are present, and to the tissue changes in the lungs; in the first case, to relieve or dispose of an attack of asthma or bronchitis, for instance, and in the second, to stop the progress or restore the damage done to the air-cell.

Under the separate heads of functional gastric and cardiac troubles, and under bronchitis, acute and chronic, as well as asthma, the proper remedies will be found from which to choose in the treatment of emphysema. The following deserve particular mention :

Tartar emetic is specially indicated when the secretion in the bronchial tubes is very difficult to raise.

Carbo vegetabilis, when the quantity of mucus is greater, and is expectorated easily.

Arsenicum, for the chronic but scanty secretion of a white, glairy mucus.

Lobelia will relieve the distress of an occasional smothering in the chest much complained of in emphysema.

Lycopodium stands first among the remedies for intestinal complication. The indications for it are a catarrhal, flatulent and constipated condition of the bowel.

Digitalis is of service when the dyspnoea is increased by a weak state of the heart, and Bähr speaks of

Natrum mur., relieving a distressing case of cardiac involvement.

Bryonia and **Mercurius** will probably best suit an attack of acute bronchitis while the fever prevails, after which

Phosphorus, Tart. emetic, or some other of the catarrhal remedies will be required to complete the treatment.

We are, as yet, so much in the dark in regard to the process which induces the destructive change in the air-vesicles, that it is impossible to base a therapy on our pathology. As there exists something of an analogy between this pulmonary degeneration and that of Bright's disease, or of the fatty heart, the remedies for these affections deserve our careful attention. Phosphorus would seem to be ruled out of the list of those likely to be of service, because it is claimed that the degeneration of the septa of the cells does not take on the fatty form. But the deeper acting tissue-remedies that are held to be useful in those other destructive diseases, should always be kept in mind. They are Aurum muriaticum, Arsenicum, Cantharides, Cuprum aceticum, Hepar sulph., Mercurius cor., Nitric acid, Phosphoric acid, Plumbum, and Silicea.

APNEUMATOSIS—ATELECTASIS PULMONUM.

BY A. K. CRAWFORD, M.D.

Synonyms.—Pulmonary collapse, Pulmonary compression, Carnification; Latin, Atelectasis; French, Atelectasie; German, Atelectasis; Italian, Atelettasia.

Definition.—The terms mean “*without air*,” and are applied to an imperfect expansion of the lungs, or the total absence of air in the lungs, like their normal condition in foetal life. When the pulmonary tissue has not yet been unfolded, the name Atelectasis is applied. When through some means, external or internal, the air-cells, having been dilated, again become solid, Dr. W. T. Gairdner called it pulmonary collapse; but when the same occurrence takes place in the early years of infancy, it is generally styled post-natal atelectasis.

Pathology.—The condition of *collapse* is found in circumscribed patches, called *lobular*, or it is *diffused* throughout the greater portion or whole of a lung. It occurs usually in the lobular form, the scattered condensed portions then presenting a wedge-shape, the base being towards the circumference. The lobules near the surfaces or margins of the lungs are most apt to be involved. The state of collapse exhibits very nearly the same appearance as that of the undeveloped foetal lung. Although Legendre and Bailly have frequently been credited with first describing this similarity, in 1844, it was in reality Jörg, a German author, who first, in 1835, spoke of the return of a once expanded lung to its foetal condition without its undergoing an inflammatory process. Experiments demonstrating the expansibility of the solid lung tissue have since been frequently made, adding very fair proof to the correctness of the original statement. But Friedelben asserts that these sections of airless tissue are due to imperforate canaliculi of the respiratory vessels or bronchial tubes, a condition of imperfect development which may last for years; he further declares that it is an impossibility for a lung once expanded to resume its former state.

Prior to the revelations made by Jörg, those condensed portions of lung were always ascribed to lobular pneumonia. Pathologists had observed the different appearance such lung tissue presents from that of hepatization, but they rested there.

The collapsed tissue varies in aspect according as it is examined soon or late after the change has occurred. It presents, at first, somewhat of a dark-red or violet hue when some congestion is present, but as the blood alters, loses color, lessens, and becomes firmer, the color of the condensed tissue assumes a much paler tint. The divisions of the lobules are often seen as whitish streaks through the condensed tissue. Where neither catarrhal pneumonia nor other inflammatory action has been set up, the collapsed air-cells are found to be inflated to a considerable extent by blowing through the bronchus leading to the affected lobules; it then looks like normal lung, taking a light-red tint. There is a great tendency for the air-vesicles to adhere when they have remained in contact for some time; when this condition exists, inflation, of course, can be, at most, only partial. The vessels leading to the portion of lung involved, from obstruction and loss of function

contract and become obliterated, and the tubes which are distributed to the same point usually have an obstructing plug in them. In proximity to the collapsed cells some of the neighboring lobules become more or less emphysematous.

The condensation of lung tissue by pressure, as, for instance, where an accumulation of fluid in the pleural cavity expels the air from the cells of the lungs, is the condition which Laennec called "carnification."

This solidification is complete as far as it advances, and does not involve single lobules as it does in collapse progressing from within. If the compression is not continued too long, the lung resumes its former state of expansion; but if it is kept up, the tissue loses its fleshy look, and becomes somewhat bloodless, tough and shrunken.

Causation.—The most common of the exciting causes of pulmonary collapse is the accumulation of some material in the bronchial tubes hindering the free passage of air to the cells. It matters not what this substance is, so long as it obstructs the tube to some extent, for the same collapsed state has been induced in animals by the introduction of a foreign body into the air-passages. The mechanism of its production is that the plug is carried by the column of inspired air against the orifice of a lesser bronchial tube, and no air is permitted to enter the cells beyond. When expiration takes place, the plug shifts sufficiently to allow the exit of a portion of the residual air of the part. The tube is again closed on inspiration, and the same process is repeated until no air remains, and the vesicles are collapsed. It will, very naturally, be inferred that bronchitis is the preëxisting disease most likely to develop atelectasis. Add to this the possibility of the bronchial inflammation being secondary to whooping-cough, croup, or measles, and the patient, consequently, being in a debilitated state from sickness; or if there is feeble respiratory movement, from typhoid conditions, and inability to expectorate the secretions; or if there is a rickety dyscrasia under it all, with poor hygienic surroundings, and a badly nourished patient, then there are more than sufficient causes to bring about collapse of the lungs. When a tumor is sufficiently large to press on a large bronchial tube, collapse of the whole lung may take place, after a time, as the growth increases.

The causes of the lung becoming carnified are such conditions as will produce compression of the lung from without. It may result, then, from a deformed thorax, excessive pericardial effusion, aneurisms or tumors, or from abdominal growths and distension. But the chief of the causes is the accumulation of fluid or gas within the pleural sac or, sometimes, pleuritic adhesions.

Symptoms and Physical Signs.—These do not constitute a very reliable group for determining the presence of atelectasis in the living. It is only under favorable circumstances that sufficient of them will be found in one individual to make out a clear case. When collapse

has taken place, there is marked difficulty in breathing, and this is sudden in its development. With the strong effort to inspire air, Rees says, the chest falls in, more or less, because of the non-expansion of the lung. The signs of deficient aeration of the blood ensue, accompanied by a feeble cough, and the patient becomes wasted and exhausted. Dulness on percussion will be found in proportion to the area of lung condensation beneath, and is absent when the collapsed tissue is in small scattered points. Bronchial breathing is sometimes heard, but it is not so tense as in pneumonia, and vocal fremitus may be increased in localized spots.

The absence of vesicular murmur over a portion of the lung may be replaced by a dry, crepitant rale or compression-rhonchus if the patient is instructed to take a full inspiration. It will be heard only at the end of inspiration, and will last during but a few breaths; then all will be quiet again. The recession of the chest walls when they should expand, and the inspiratory dyspnoea are, at times, the only signs of collapsed lung to be adduced in infancy. The tissues may remain in a state of collapse for a considerable period, and if pneumonia has attacked the condensed portion the dulness is permanent.

Diagnosis.—Both lobar pneumonia and pleurisy have dulness on percussion, similar to that which is elicited in diffused collapse. But they have each their special history of development and progress, with definite signs and symptoms pertaining thereto, which will differentiate them from atelectasis. The same may be said of phthisis. A patient succumbing under pulmonary collapse, presenting progressive wasting, is not unlike a consumptive in appearance. But the physical signs of the two maladies are not at all in unison, and while the one has its rise and fall of the thermometer from hectic fever, the other is more apt to be found with a sub-normal temperature.

Prognosis.—The termination of this affection by death is very frequent in children, and if it is associated with any of the severe inflammatory affections of early life it adds much to the mortality of those diseases. Yet, if the collapse is not sufficient to threaten immediate death, the natural strength of the patient, the hygienic surroundings, the care bestowed, and the remedies prescribed will have greatly to do with the chances for recovery.

Treatment.—If suffocation seems imminent from suspected collapse during the progress of an attack of bronchitis, assistance should be rendered to the respiratory efforts as quickly as possible. Sometimes artificial respiration, a hot bath, or rubbing the chest thoroughly with oil, may aid nature in the struggle. Stimulants may also be of temporary use, but to secure the expulsion of the mucus causing the threatening symptoms there is probably no remedy in our *Materia Medica* that equals *Tartar emetic*. In the August number of the *North American Journal of Homœopathy*, 1860, Dr. R. Ludlam relates a

case presenting sudden and alarming symptoms of collapse of the air-cells, following an attack of bronchitis, in a boy ten days old. After trying other remedies, with little or no effect, a grain of Tartar emetic, 2d dec., was put in a third of a glass of water, and doses of it given at short intervals. The result was almost instantaneous relief, and the child recovered. Dr. L. expressed the belief that Antimonium tartaricum was practically and pathologically specific for post-natal collapse of the air-cells.

To prevent this condition of collapse setting in, much care must be exercised in the selection of the proper remedies during the progress of a bronchial affection which may lead to it. These remedies belong to the group for the treatment of capillary bronchitis, and consist chiefly of: *Aconite*, *Belladonna*, *Bryonia*, *Chamomilla*, *Chelidon.*, *Hepar*, *Ipecacuanha*, *Mercurius*, *Pulsatilla*, *Spongia*, and *Tartar emetic*, according to the stage of the disease and the symptoms peculiar to the case.

When the collapsed state is consequent on pressure from distention of the pleural cavity, the ways and means requisite for the treatment of the pleuritic affection must be adopted before any hope can be entertained of compressed pulmonary tissue resuming its normal condition and function.

In either case, not the least important element aiding in the care of the patient, will be the success with which the strength of the patient is sustained; thus the attention of the attendant to the hygiene of the room, as well as of the patient, and the selection of simple but nourishing food must not be lost sight of.

PULMONARY GANGRENE.

BY A. K. CRAWFORD, M.D.

Pulmonary gangrene has been simply mentioned as a possible outcome of pneumonia, but it occurs also in consequence of pulmonary hæmorrhages, infarctions, emboli of the bronchial artery, or even of the pulmonary. Retention of decaying matters in bronchiectasis, the pressure of a tumor, or the breathing of irritating gases may cause it; and so may phthisis, cancer, pyæmia, septicæmia, insanity, typhus, alcoholism, and epilepsy be producing agents. It is usually found to be very limited in extent, and only occasionally does it involve a considerable portion of a lobe. According to the amount of lung tissue affected, it is called *circumscribed* or *diffused*. The circumscribed variety is usually well defined in outline and does not exceed in size a toy marble to a walnut. Diffuse pulmonary gangrene is more or less extensive, and has no line of demarcation. The lung thus diseased is moist, pulpy, greenish-black, or brownish and black, and

gives forth an extremely putrid odor. The discovery of this fetor in the breath is an almost certain symptom of the presence of gangrene of the lung, and the only other symptom of positive value is the expectoration of gangrenous matter containing fragments of lung tissue. The patient is greatly depressed, runs into a typhoid state, and tends towards collapse. There is additional danger in these cases of pleurisy, extensive bronchitis, peritonitis, abscesses, or severe diarrhoea setting in and lessening the chances of recovery. Gangrene is a very rare pulmonary affection, and terminates fatally in the large majority of cases, thus always justifying a grave prognosis.

Treatment.—Much can be done to modify the characteristic stench, even when the case is beyond hope of recovery. The inhalation of antiseptic vapors and of the spirits of turpentine poured on boiling water exerts a good influence. Condy's fluid in solution, as a gargle, is also highly commended. The patient should be fed liberally on easily digested food, added to stimulants of alcoholic or malt liquors. Many of the antiseptics are used internally also; such as phenic acid, the sulpho-carbolates, sulphites, chlorides of lime and of soda, the chlorate of potash, and the hypochlorites. Dr. A. E. Small recommends the internal administration of teaspoonful-doses of willow-charcoal in water, repeated quite frequently. The homœopathic remedies in vogue for pulmonary gangrene are *Carbo veg.*, *Arsenicum*, *Lachesis*, *Kreosote*, *Secale*, *Silicea*, *Camphor*, and *China*.

SYPHILITIC DISEASES OF THE LUNGS.

BY W. B. TRITES, M.D.

That the lungs are liable to suffer from the baleful effects of syphilis was known as early as the beginning of the eighteenth century, but the careful study of the diseases thus derived, the symptoms by which they may be recognized, together with their treatment, is of very recent date. As a consequence, our knowledge is limited, and much of it still a matter of dispute. That such diseases occur has been proved conclusively both at the bedside and by the revelations of the post-mortem examination.

Snitzler has stated that a bronchial or lung catarrh is not an uncommon attendant upon the earlier skin manifestations of syphilis. The great majority of observers differ from him, and teach that syphilitic affections of the lungs are developed only during the tertiary stage. The most usual period of development is from the fifth to the sixth year after contagion. Sometimes they occur as late as the tenth or fifteenth year, or as early as the latter part of the first year, but the latter has been seen only in cases of most malignant character.

Two forms of this disease have been recognized, an interstitial hyperplasia and circumscribed gumma.

Interstitial Hyperplasia.—This is characterized by a rapid cellular development, thickening the septa of the lung, and compressing the alveoli. The change begins in the interlobular connective tissue; small, spindle-shaped cells appear which quickly develop into connective tissue and are early traversed by bloodvessels. The vascularity of this new tissue is a peculiarity, and will aid us in understanding the frequent occurrence of hæmoptysis during its course. Laucereaux gave the name of syphilitic pneumonia to this form of lung disease. This cellular infiltration takes place primarily about the bloodvessels and smaller bronchi, both of which may be blocked by the hyperplastic process. A lung thus affected exhibits a smoother surface than normal, is firmer to the touch, and heavier. Its color is a grayish-red or yellow. When the disease is manifested in new-born children, we have a form in which the lung has a whitish color, but this is extremely rare in adults. The whole lung may be affected, but usually the process is limited to a single lobe. As time goes on, this hyperplastic material becomes converted into a tough, contracting, fibrous tissue, which draws together the lobules of the lung, thus deforming and even obliterating them.

Circumscribed Gumma.—In the early stage of this form of syphilis the tissue changes are very similar to those described above, only instead of a general cellular infiltration of the lung it is limited to certain localities, especially in the neighborhood of small bloodvessels and bronchi. The hyperplasia is also less active, and results in the production of gray or yellowish-gray, hard, well-defined masses, varying in size from that of a hempseed to that of a walnut. They are separated from the lung tissue by a fibrous envelope which converts them into tumors or nodules. They are usually few in number, rarely more than six or eight being found, and are often single, differing in this from tubercular infiltration. Gummata usually occur in but one lung; any part of the organ may become the seat of the disease, though the apices are not commonly attacked. The circumscribed tumors thus developed eventually soften at their centres from fatty degeneration, partial absorption occurs, followed by calcification and shrinkage, leaving a hardened nodule imbedded in a fibrous mass in the lung tissue. If such tumors occur near a bronchus they may discharge their contents into it, and leave a cavity which afterward heals by contraction and cicatrization.

Symptoms.—What symptoms will a patient suffering from syphilitic affections of the lungs exhibit? Unfortunately, the symptomatology of these diseases is extremely limited and uncertain. During life it is impossible to distinguish between the two forms. Snitzler has called attention to a troublesome tickling in the throat as an early

symptom of importance, but experience has proven it to be of little value, as a variety of laryngeal difficulties may have the same symptoms. In the early stage the dyspnoea is slight, and if a cough exists it will be infrequent and dry, or else attended with a very scanty expectoration. Nor will physical signs aid us to any great extent, they being as a rule absent or limited to weak respiration; later, after contraction of the interstitial substance, or softening, has taken place, the signs exhibited are very similar to those of phthisis. As the disease progresses, dyspnoea increases, though it seldom becomes severe, the cough occurs in paroxysms, and the expectoration grows purulent, and is often tinged with blood. Symptoms also appear which indicate the serious nature of the disorder, such as debility, pallor and emaciation, though these are all less marked in syphilitic lung diseases than in phthisis. Should such cases go unrecognized, and hence be deprived of proper treatment, hectic fever and night-sweats finally develop, thus completing the resemblance between syphilitic lung diseases and phthisis.

Fournier, who has carefully studied the effects of syphilis as exhibited in the lung, has described three varieties of these affections.

1st. A latent form in which the lesions are circumscribed, produce no symptoms, and hence are not detected until after death.

2d. In the second variety there is merely slight disturbance of respiration without disorder of the general condition, the symptoms being those of limited induration or of a cavity.

3d. The third is a severe form presenting all the symptoms of phthisis.

The symptoms of syphilitic lung disease, it will be noticed, are far from characteristic. In practice our great difficulty is to distinguish between these troubles and tubercular phthisis, which they so much resemble, but from which they widely differ in both treatment and termination.

The points of difference as given by Frederick Robinson are as follows:

1. The physique. The ordinary characteristics of phthisis are wanting. The chest is well developed, and the body well nourished.

2. The absence of constitutional irritation of a severe character. The thermometer rises but little above the normal standard. There is freedom from night perspiration, diarrhoea, and irritating cough.

3. The dulness of percussion is less pronounced and less definable in extent; it more frequently affects both apices,* and simultaneously.

4. The characteristics of tubercular sputa in the earliest stage are

* Robinson thinks the apices are especially liable to disease in syphilis, in this differing from all other authors. Fournier makes the absence of dulness at the apex a strong sign of syphilis, believing it to be developed most frequently in the middle or lower lobe. An evidence of the unsettled character of the whole subject.

wanting. The patient is pallid, complexion waxy, and his general appearance indicative of cachexia. Auscultation reveals loud, harsh inspiration, with expiratory murmur of same character, or else tubular breathing if the case is more advanced. Vocal resonance, more or less distinct, is always present. The pulse is frequent, but not so rapid as in phthisis. There may be no sputa, or else a little frothy mucus is hawked up from the throat rather than expectorated.*

Besides these differences, we will be guided in our diagnosis by the history of the patient; if he can recall an attack of syphilis it will aid us materially. Fournier has called attention to the remarkable tolerance which such patients develop, the disease continuing for a long time, and yet the patient retaining both strength and flesh. This is very different from phthisis, and will aid us in distinguishing between it and syphilitic hyperplasia or gumma of the lung.

The course of the disease is usually slow, and the prognosis favorable. Such cases often run two or three years before life is threatened, and even in the most formidable cases a cure can be promised.

The treatment of syphilitic lung affections consists in placing the patient under the best possible hygienic conditions, and feeding him upon a nourishing diet. Cod-liver oil will be found of value here, as in the nearly related disease, phthisis. The body should be bathed at regular intervals, and clothed in warm comfortable garments. Internally the patient must receive the iodide of potassium, and it is wonderful how rapidly improvement follows its use. Cases which have seemed to be in the last stage of tubercular phthisis will rapidly improve, the cough will cease, the night-sweats and hectic disappear, the dull places in the lung clear up, and the breathing again become natural. The dose should consist of from five to fifteen grains of the salt administered three times a day. The following formula is recommended by Ricord and others.

R. Potassii iodidi, zi
 Syrupi cort. aurantii, ʒvi
 M.—Dose from a teaspoonful to a tablespoonful three times a day.

Lane thinks it an important point in the use of the iodide to avoid large doses at the commencement; he favors doses of two, three, or four grains, given thrice daily, and gradually increased until the larger doses are reached. He thinks also that mercurial preparations have but little value in the treatment of these conditions. Mercury will be found beneficial in proportion to the sthenic character of the morbid process to be treated, being useful when the general condition tends in the direction of hyperæmia and of vascular and nervous excitement. It is injurious in the opposite condition of vascular

* Reginald Thompson, who, in the main, concurs with Robinson, says the sputum is sometimes abundant.

depression, anæmia, and a general failure of power, and these are the almost constant characteristics of tertiary lesions.

Homœopathic literature contains but little concerning the value of the similar remedy in this class of disease. Jahr's work was written when but little was known of the visceral ravages of syphilis. Yeldham used the Iodide, while Berjeau, Morgan, and Franklin merely refer to the subject. Hoyne mentions a case cured by *Carbo vegetabilis* alone, and recommends as of value Nitric acid, Hepar, Silicea, and Sulphur.

Helmuth has derived good effects from Kali bichrom., in the second decimal trituration, given twice or thrice a day. Of the mercurials, he prefers the bichloride. Arsenic, Iodum, Macrotys, and *Podophyllum* have been given from time to time with benefit.

CANCER OF THE LUNG.

BY H. R. ARNDT, M.D.

Synonyms.—Pulmonary cancer, Malignant disease of the lung.

Pathology.—Pulmonary cancer is a disease of rare occurrence, hence possesses comparatively little clinical interest. Childhood and the period of adolescence are almost wholly exempt from it, but with this exception, age has no marked bearing upon it. It is found more frequently in men than in women, and almost always is unilateral. Authorities differ concerning the greater liability of one lung over the other to an invasion by cancer. It has been maintained, usually, that the right lung more frequently becomes the seat of the disease; J. Risdon Bennett states, however, that of thirty-nine cases tabulated by him, "the left lung was the principal seat in fourteen, and the right in nine only, whilst of the remainder, either both lungs were affected, or the disease was confined to the mediastinum."

Pulmonary cancer rarely occurs as a primary disease; in fact, eminent authorities hold that it is always a secondary affection. This latter view is not tenable; yet, it is undoubtedly true that in an overwhelming majority of cases cancer of the lung is secondary, occurring particularly often after the full establishment of cancer in the testicle (*Walsche*) and in the bony structure (*Days*).

Various forms of pulmonary cancer have been noted, of which the *medullary* or *encephaloid* is of particular interest, because it occurs far more frequently than all the other forms combined; the *scirrhous* ranks next in frequency, though it is quite rare. Of the *colloid* only few cases have been recorded, and they have usually occurred as a sequela of a growth of the same nature in the mucous membrane of the alimentary or biliary canals; this form consists of small spherical masses,

composed of small transparent grains, which are surrounded by the wall of an infundibulum.

The medullary cancer bears a striking resemblance to the brain, and varies in consistency from a very soft to a tolerably firm mass. The consistency of the tumor depends upon the density of the stroma, a network of fibrous bundles which have undergone fatty degeneration. An abundance of cancer-juice is readily obtained by squeezing the cut surfaces; it is a creamy, thick fluid, freely supplied with cells and free nuclei, fatty detritus, and free oil-globules. The cancerous growth, especially in its early stage of development, is freely traversed by minute bloodvessels, which give it a rather pinkish appearance; the walls of these vessels are exceedingly delicate and easily ruptured. When ruptured, the admixture of blood and blood-clots with the contents proper of the tumor forms the *fungus hæmatodes*. The term *fungus melanodes* refers to a dark-colored, blackish cancerous mass, and its color is due to the presence of black coloring-matter in the cancer-cell.

The primary cancer commences with nodules which enlarge, forming one or more round masses, with a decided thickening of the covering pleura. "Upon cutting into the diseased parts, it is common to observe whitish islands or granulations similar to those of the hepaticized lung, separated by pigmented septa of lung tissue. These islands are due to the stuffing of an infundibulum by the carcinomatous elements. In scraping the cut surface with a scalpel these granulations are removed, and a milky fluid is obtained. A microscopic examination of these sections shows the alveoli filled by large spherical or polygonal cells containing large, usually oval, nuclei, with distinct nucleoli. The alveolar walls are very frequently preserved intact, or they may be somewhat thickened by the formation of small round cells between their fibres. Their vessels are gorged with blood. There is, therefore, no stroma of new formation in carcinoma of the lung, but the fibrous trabeculæ are constituted by the altered inter-alveolar septa." (Cornil and Ranvier, *Manual of Pathological Histology*, p. 428.)

Secondary pulmonary cancer, depending upon the existence of the disease in some other organ or structure of the body, is found accompanied with cancerous condition of the adjoining organs, pleura, bronchial tubes, heart, pericardium, diaphragm, bloodvessels, and nerves; these organs may become involved by the gradual extension of the disease from the pulmonary structure, or they may have been affected first, the disease later involving the lung. The connective tissue of the lung is first affected; it becomes infiltrated and thickened, firmly holding, and gradually encroaching upon, the bronchial tubes, usually involving the latter throughout their entire thickness. Little disk-like elevations appear scattered more or less thickly upon the mucous

surface, which eventually coalesce and form well-defined, slightly elevated ridges, easily distinguished from the healthy structure, and not infrequently alternating quite regularly with them. As the disease progresses, the integrity of the bronchial tubes is more or less completely destroyed; the glandular structure becomes involved, the mediastinal glands at times forming an enormously large cancerous mass; the walls of the veins become affected, those of the arteries usually resisting the action of the destructive process; both vessels, however, not infrequently, are much compressed by the steadily enlarging and encroaching tumor; the nerves also may become involved in the degenerative changes, and Beigel (*Reynolds's System of Medicine*) states that "the vagus and recurrentes are particularly liable to become involved in the process, and to be materially altered." In the mean time, inflammation of the parts leads to the firm adhesion of the diseased lung to the inner surface of the sternum or of the ribs; or the continuous growth of the tumor, practically replacing the normal pulmonary structures, results in compression and atrophy of the involved lung, with more or less extensive adhesions. The shape of the diseased side of the thorax and the contour of the diseased lung not infrequently remain unchanged; the healthy lung, however, being called upon to perform double duty to compensate for the uselessness of its mate, becomes enlarged, and the chest-wall of that side may show considerable fulness.

Secondary pulmonary cancer is multiple. Very numerous small bodies, no larger than a millet-seed, may be scattered throughout the diseased lung, or a smaller number of tumors, frequently attaining remarkable proportions and a weight of many pounds, may be found. These tumors, while still of moderate size, are round and clearly defined; as they assume large proportions they lose their clearness of outline, in part by a process of "blending," but more particularly from hæmorrhages resulting within them, and from adhesive inflammation. Occasionally, distinct and firm cancerous tumors originate in the lung substance, and, enlarging centrifugally, eventually burst through the pleura.

Cancerous growths of the lung, like similar tumors in other portions of the body, undergo rapid degenerative changes. They soften from the centre to the periphery, forming either cancerous ulcers or cavities which contain a foul, bloody, puriform substance; the walls of these cavities are thickened and, like their contents, in a state of disintegration. Sloughing away of masses of the diseased structure, though not of frequent occurrence, may take place.

Semiotology.—The symptoms of pulmonary cancer vary in clearness with the conditions surrounding the case, their character and that of the concomitant symptoms depending largely upon the structures implicated. Quite often the absence of diagnostic symptoms is

remarkable, especially in cases in which the affection in the lung is secondary to more advanced disease in other parts of the organism. It must also be borne in mind that small malignant growths may exist for a considerable length of time and not give rise to distinctive physical signs, nor to sufficiently marked constitutional symptoms to afford room for a reliable diagnosis; this absence of physical signs is easily understood when we remember that these small growths are surrounded by normal lung tissue, giving normal sounds upon auscultation and percussion.

Nearly all sufferers from pulmonary cancer are more or less annoyed by *cough*, which in some cases is dry, tearing, and hacking, while in others it reaches considerable violence, and is barking or ringing, or even resembles whooping-cough. The character of the cough depends to a considerable extent upon the degree of bronchial or pleural affection, and even a very persistent and tormenting laryngeal cough may result from implication of the vagi. If the former complications are extensive, and, as is often the case, effusion has taken place, the patient suffers more or less, and often very severely, from the symptoms following effusion into the pleural cavity, among which inability to lie on the well side and distressing shortness of breath deserve especial mention.

The *expectoration* accompanying the cough may be insignificant in amount or even wholly absent. Usually, however, and almost always when the morbid action involves a considerable area, the expectoration is muco-purulent, contains admixture of blood, and the microscope shows the presence of cancerous tissue. A very fetid odor of the expectoration proves the existence of a cavity in the lung communicating with a bronchus, in which case detritus of lung-tissue is likely to be found present in the expectoration. If sloughing of the lung-tissue has taken place, large, putrid, gangrenous masses are coughed up. If there occurs destruction of the walls of a large blood-vessel, copious, and perchance fatal, hæmorrhage from the lungs is the result; the blood, owing to the peculiar exemption of the arteries from destruction by the cancerous process, is almost always venous.

The development of these symptoms is not accompanied by much pain or fever. *Pain* may not be experienced to any great extent even in severe cases; when it is present, it is the result of compression of, and pressure upon, a nerve, and extends along the course of the affected nerve, even to parts far removed from the seat of pressure. The *fever* is usually of a low grade and partakes of the hectic; neither pulse nor temperature rises high, but distinct exacerbations are likely to occur in the evening, with an increase of the pulse more marked than that of the temperature, and followed by copious and very exhausting sweating.

Auscultation and percussion do not yield physical signs of

diagnostic value. Small hard masses in the lungs are not readily detected, but if the solid tumor is of considerable size, we have dulness on percussion, and fail to get the normal respiratory murmur over the affected part. The presence of large pus-cavities or the existence of extensive miliary deposits is recognizable by the proper sounds.—The external chest, in well-established cases, will be found to differ from the normal both in form and in facility of movement. If much pressure from within outward is made by a very large tumor or by a very copious effusion into the pleural cavity, the thorax presents a bulging, enlarged appearance; if much atrophy exists, or extensive adhesions have formed between the costal and pulmonary pleura, the chest appears depressed and flattened. The full movement of the chest-walls is embarrassed by adhesions and compression of the normal lung-tissue from the presence of fluid or air.

Various conditions combine to affect the *heart*. The extension, by contiguity of tissue, of the morbid action to the pericardium and to the heart itself; the pressure upon the heart by a large foreign mass within the chest; extensive effusion in the chest-cavity and pressure upon the heart, or displacement of this organ resulting therefrom; closure of the bronchial tubes by filling up with cancerous masses; the disturbances necessarily arising when a lung is sufficiently diseased to cease the performance of its important duty,—all these directly lead to a disturbed action of the heart which is likely to cause much discomfort to the patient. Two other conditions contribute to the same end: pressure upon some terminal fibre of the vagus, caught in the meshes of the tumor, and atrophy of the heart itself, which may occur as a part of that general atrophy which results from cancer.—*Dyspnœa* is one of the most distressing symptoms found in pulmonary cancer. It is largely the result of the disturbed action of the heart, but may depend upon pressure upon a fibre of the vagus, and even, to a certain extent, upon a lack of elasticity in the lung-tissue which is occasioned by the free distribution and the effect of abundant miliary deposits throughout the lung. Pressure upon the recurrent nerves and, in some cases, paralysis of the laryngeal muscles from pressure upon the controlling nerves, lead to an *impairment* and, later, to a complete *loss of voice*.—The power of deglutition is affected by swelling of the œsophagus and by compression of the organ, resulting in *dysphagia*, probably necessitating the use of the stomach-pump for purposes of feeding.

The general appearance of the patient, after the morbid process has become established, is not unlike that of a person well advanced in consumption. An attentive study of the symptoms described shows the really considerable similarity which exists between the two conditions; even the hectic fever, night-sweats, emaciation, and colliquative diarrhœa are found alike present in both conditions. In ma-

lignant disease of the lung, however, we find evidences of the cancerous cachexia which are wholly wanting in phthisis.

Several symptoms are found in all intrathoracic tumors, hence occur also in pulmonary cancer. To these belong a marked contraction of one or both pupils of the eye, and a light-yellow, limpid effusion into the pleural cavity, often very copious and containing albumen; this effusion refills rapidly if removed by trocar or aspirator.

The progress of this disease is accompanied by the gradual loss of appetite and sleep, an anxious state of the mind, considerable and, usually, rapid emaciation, languor, physical debility, an enlarging of the superficial veins, and, finally, dropsy of the lower extremities.

Diagnosis.—The diagnosis of primary cancer of the lung, even if far advanced, resolves itself into a mere suspicion of its existence, suggested by the presence of a group of symptoms difficult of explanation upon any other hypothesis; in the earlier stages of the primary form, its recognition is practically impossible.

The diagnosis of secondary pulmonary cancer in the earlier stages is still surrounded by many difficulties. We must depend chiefly upon the existence of cancerous growths in other parts of the body, and upon the appearance of lung-symptoms after the removal of a cancerous growth. The gradual or sudden diminution of the amount of air admitted into the lung, as shown by the spirometer, or the appearance of symptoms which betray the cancerous habit, with the evidence of the microscope, showing the existence of cancer-elements in the sputa, would place a positive diagnosis within reach.

In differentiating pulmonary cancer from other morbid conditions, it is of the utmost importance to make a thorough study of the history of the case, and it will be found that the constitutional and concomitant symptoms will, in a majority of cases, prove much more valuable than the physical signs.

The close resemblance between *pulmonary consumption* and pulmonary cancer has already been pointed out. It is to be remembered that, outside of the symptoms already pointed out, cancer is rather more limited in the extent of the area involved, is more likely to be one-sided, and gives rise to a variety of symptoms which have been described as resulting from pressure upon neighboring organs or nerves, such as palpitation of the heart, dysphagia, loss of voice, etc. In pulmonary consumption, on the other hand, the territory involved is larger, the bleeding is of much more frequent occurrence, the sputum shows the characteristics of tubercular disease, and there is an absence of symptoms indicating the cancerous cachexia. A symptom which deserves far more emphasis than is usually placed upon it is the peculiar hopefulness of the consumptive which confidently looks for eventual recovery in spite of the most alarming symptoms, in contradistinction to the anxious, and even despairing, state of mind of the

patient suffering from cancer. The two affections may, in exceptional cases, coexist, in which case a differential diagnosis is out of question.

It may become necessary to determine whether an existing effusion into the pleural cavity depends upon pulmonary cancer or upon a bronchitis. Here, again, the history of the patient, and the expression of an existing cachexia, as shown by the constitutional and concomitant symptoms, form our chief reliance. In addition, it is to be remembered that the effusion of bronchitis gives rise to an area of dulness which changes as the position of the effusion itself, in obedience to the law of gravitation, changes with every change in the position of the patient; it has also been pointed out by writers on this subject, that in the latter condition the effusion may diminish considerably, and with it, the area of dulness on percussion, after profuse sweating or copious diuresis.

The pathognomonic signs of aneurism are usually well pronounced, but a possibility exists of mistaking this condition for pulmonary cancer at the root of the lung, producing a decided prominence in the clavicular region. In addition to the general indications of the cancerous habit, it is well to bear in mind that the pulsation in cancer of this form must necessarily be diffuse, while in aneurism it is circumscribed.

Prognosis and Treatment.—The prognosis is absolutely hopeless. The disease always terminates fatally, death, in the majority of cases, occurring in from one to two years after the disease was recognized.

The treatment is practically limited to the relief of the suffering of the patient, to the careful watch over symptoms which are likely to arise from complications, and which the homœopathic remedy is very likely to control in a measure, to well-chosen regimen, and, eventually, to the judicious use of narcotics when imperatively demanded by the condition of the patient and our inability to furnish relief by other and more satisfactory means.

If the patient suffers from bronchial, pleuritic, and other complications, we meet the symptoms by the exhibition of remedies, homœopathically, which are known to act curatively in such conditions; for instruction on this point, the chapters on bronchial affections, pleuritis, etc., must be consulted.

Dyspnœa constitutes one of the most frequent and tormenting concomitants of cancer of the lung. In attempting to control it, the physician must recognize the causative condition, whether it be effusion, pressure upon nerve-fibres, or muscular weakness; but even then he is confronted, almost always, with the absolute impossibility of reaching the cause. Relief may be afforded by the use of counter-irritants, particularly small blisters, dry-cupping, or by the performance of paracentesis. Frequently, the relief from tapping is of very

short duration ; yet, this relief is so marked that the operation is not impracticable in spite of the rapid filling-in of the effusion.

Inhalations containing chlorine, carbolic acid, creasote, perchloride of iron, or Declat's phenic acid, remove, to a great extent, the horrible fetor of the breath proceeding from such patients.

The use of morphine, chloral-hydrate, and anodynes generally, becomes a necessity sooner or later. Morphine is preferable to all others. Its use is to be put off as long as possible ; when this can be done no longer, the drug should be given hypodermically, and in very light doses, increasing the dose only as imperatively demanded by the increasing suffering of the patient.

The diet of the patient should be nourishing and easily digested. Dysphagia existing, the use of the stomach pump may become a necessity. Quiet, moderate exercise, judicious bathing, the best hygienic surroundings obtainable, all these make up the sum total of treatment.

In Germany, considerable confidence is placed by the profession and by the laity on the value of the "grape-cure," in persons of a suspicious family-history who give evidence of incipient cancer. At Bingen on the Rhine, in Germany, and at Presburg, Hungary, extensive arrangements exist, particularly during the season of the vintage, for affording all necessary conveniences to persons who desire to avail themselves of this treatment.

It is almost useless to point out remedies suggested directly by the existence of the cancer itself, and to give indications for their use. Arsenicum album, Arsenic. iodatum, Conium, Aurum, Hydratis, Silicea, Nitric acid, Thuja, and others, are presumed to exert upon such a condition modifying and, perhaps, positively curative effects. In selecting the remedy, other things being even, particular importance should be attached to the character of pain felt, to the mental symptoms, and to the so-called modalities.

ASTHMA.

BY A. K. CRAWFORD, M.D.

Synonyms.—Latin, Asthma ; French, Asthme ; German, Engbrüstigkeit ; Italian, Asma, Bolsaggine ; Spanish, Asma.

Definition.—A neurosis, exhibiting itself in paroxysms of difficult breathing, attended with wheezing, a constrictive sense across the chest, a cough, and probably some frothy expectoration. The paroxysm is due to the narrowing of the lesser bronchi by means of spasm of their circular muscular fibres. The term has been applied to many different forms of dyspnœa, and is still employed in all cases presenting the above characteristics, without reference to their source.

Varieties.—*Nervous or spasmodic asthma* is the form to which so-called nervous individuals are disposed, and its defining character is that there is no trace of any diseased condition when the attack ceases. This kind of asthma is referred to as *emotional*. It is the asthma which hysterical women have; a paroxysm of it may be precipitated by mental excitement, or it may occur in either sex when there is no evidence of hysteria, nor any known excitant. Opium eaters, too, are subject to it if their usual dose has not been taken.

Common or Catarrhal Asthma may be subdivided clinically into those spasms which are associated with acute, or with chronic, catarrhal affections. The peculiar feature of this variety is the constant irritative, congestive, or inflamed condition of the bronchial mucous membrane, and, in addition to the paroxysm noticed in the nervous variety, there is apt to be more or less habitual dyspnoea.

Hay Asthma furnishes a good example of the variety which occurs with an acute catarrh, although it oftentimes does not develop the kind or degree of spasm necessary to constitute a real asthma. Hay fever or hay asthma is a summer catarrhal affection, which occasions severe coryza, sneezing, cough, and difficult breathing, with much redness of the membrane of the eyes and nose. It occurs in individuals having a peculiarly sensitive mucous membrane, and in whom it may have been noticed, previously, that the inhalation of dust, of pungent odors, or of powdered ipecacuanha, would induce symptoms of acute catarrh. Whether some such substance may not be the immediate cause of an attack of hay asthma, or whether it is provoked by inflorescent particles emanating from the rag-weed or other plant, or whether it is caused by some imponderable specific poison, is not definitely known. But we do know that it recurs annually, that having had it once renders the subject liable to it each successive year, that it is an exceedingly exasperating affection, and that it stubbornly resists the influence of remedies. A similar condition of the bronchial mucous membrane, not confined to a season, but continuous and chronic in its nature, and accompanied by asthmatic attacks, was termed by Laennec:

Latant Catarrhal Asthma.—There does not appear to be any change in the physical condition of the mucous membrane, but it evidences the same irritability that is found in acute catarrhal states, and its tendency is to degenerate into some form of chronic catarrh. This form is the one most common in childhood. The children who have it are short-winded, and playing with their companions will induce dyspnoeic attacks. They take cold readily, and while the cold runs its course, the asthma and dyspnoea are augmented. They are subject to nightly exacerbations and daily remissions. With each successive cold the attacks of asthma increase in severity and duration, until it has arrived at the point of being a well-pronounced mucous catarrhal asthma.

Humid Asthma.—Asthma of the aged, or mucous catarrhal asthma, is the variety which begins with an acute catarrh. But when the fever has disappeared, the cough and expectoration persist. The dyspnoea which accompanies this condition is sudden in its onset, regular in its paroxysms, returns at night, and is worse in damp and cold weather.

Millar's Asthma is an old-fashioned term used to denote an acute form of asthma, either of a congestive or catarrhal nature. Even outside of its production by heart disease, sudden and extensive congestion of the bronchial membrane sometimes occurs, with distress in breathing. To this, as well as to cases of suffocative catarrh, and false and spasmodic croup, the name Millar's asthma was frequently applied; but these different affections are now treated of under the respective headings to which they belong, and the author's name has been omitted from the nosology of asthma.

Clinical History.—The paroxysms of dyspnoea in asthma, which constitute the chief feature of the complaint, are also found to recur periodically in many cases. They differ much in their severity and duration, as well as in the intervals between their recurrence. Some cases show the greatest irregularity in the return of the attacks, while others have them diurnally, weekly, fortnightly, monthly, or yearly, with the precision of planetary revolutions. Salter says that those who are subjected to diurnal paroxysms, have, usually, either bronchitis or disease of the heart; and it is not unfrequent that women suffer with asthma only at the monthly menses.

As would be inferred from looking over the varieties of asthma, there must be wide differences among them during the interval of the attacks. The phases which present themselves at such time, will depend greatly on the character and degree of progress of the associated complaint. Emphysema is present during the paroxysm in probably every case of asthma. In many, it is but temporary, abating with the subsidence of the attack, and, consequently, these patients do not suffer from it afterwards. But the majority of patients exhibit signs of its continuance, and complain, therefore, of shortness of breath, or dyspnoea, in the interval. In those who, when free from asthmatic attacks, still have a cough and expectoration, chronic bronchitis is associated with the asthma. Heart complications sometimes coexist with asthma, enlargement and valvular impairment being the ordinary changes noted. The result of this is that circulatory disturbances occur, and the degree of dyspnoea is proportionally affected.

Bronchitis and asthma are very intimately associated, and many of the asthmatic attacks are attended by a renewal of the bronchial affection; but sight must not be lost of the fact that bronchitis is of every-day occurrence without asthma, and that asthma sets in frequently unaccompanied by even a trace of the bronchial affection.

The one is a mucous inflammation, the other an occult neurotic disease, so that they are distinct maladies, and not dependent the one upon the other.

Asthma attacks only a small proportion of the human race, but it is not limited to any particular age,—the infant, the robust adult and the aged are alike liable to suffer from it. The relative number of cases increases from twenty up to fifty years of age, and Salter says about eighty per cent. of the whole number are males. The gouty diathesis is often seen to run parallel with the inherited tendency to asthma; especially in the case of women who are subject to asthma, a family history of gout is frequently clearly defined.

Causation.—It seems to be the general belief that heredity is a most potent and frequent predisponent of asthma, and that it is a constitutional disease. By far the greater number of persons who suffer from asthma, can point to its previous existence among their progenitors. But this alone is not sufficient to account for a large share of the cases found. Some condition, acting as an excitant, seems to be requisite to start asthma into existence. The causes which precipitate the attack are very numerous, and, in fact, appear to vary somewhat with each individual case. The inhalation of grain-dust, of sulphur-fumes, indigestion, constipation, mental emotions, the appearance of the menses, fatigue, physical exertion, meteorological disturbances, sudden changes in temperature, storms, mists, snow, a suppressed eruption, gastric irritation from sweetmeats, highly seasoned foods, the unaccustomed or the careless use of fermented liquors, etc., are all accredited with acting, under favorable conditions, as causative agents.

Symptoms and Physical Signs.—The prodromal symptoms of an attack of asthma are vague, and often wanting. Some patients are able, by means of some one indefinite sensation, or the appearance of some peculiar symptom, to predict, with certainty, the occurrence of an attack on the following night. Among these premonitory symptoms mention may be made of a slight headache, mental excitation, or depression and drowsiness, a slight feeling of oppression of the chest, flatulence after a meal, or indications of a little feverishness. These may last throughout the day, grow more marked as night comes on, and not until the patient is sound asleep does the attack set in. It is noticed that, in some cases, no previous symptoms occur; but the paroxysm develops suddenly and augments rapidly. In others, the onset is gradual, and several hours may be occupied before it attains to its height.

A premonitory sign observed by Salter, and one frequently met, is an itching sensation under the chin. The same peculiar, creeping, tickling sensation often extends down the sternum, and is felt between the shoulders.

It is in the black hours that the asthmatic attack usually occurs. The patient is suddenly awakened from a sound sleep with a sensation of suffocation, and immediately finds that he has violent dyspnoea. The erect posture, leaning forward, is chosen and retained throughout the paroxysm, and, with the head thrown backward, he fixes himself in that position by grasping and firmly holding a chair-back or mantelpiece. At the same time, the dilated eyes, the expanded nostrils, the open mouth, the blueish pallor of the face, the profuse perspiration, the look of extreme suffering, and the coldness of the extremities, all these give clear evidence of the intensity of the paroxysm, and of the distress of the patient. Respirations are often less numerous than in health, and each occupies a greater period of time than the normal. The inspiration is short and gasping; the expiration very much prolonged and wheezing; therefore the dyspnoea is expiratory in rhythm.

Sometimes a profuse flow of clear urine, like that passed in hysterical attacks, precedes the paroxysm a day or two, but usually it is not observed until the dyspnoea is developed. The patient cannot lie down nor stay in bed, but must be up, with doors and windows open, regardless of the temperature outside. This undue exposure for hours during the night to a chilling atmosphere, as is frequently the case, does not seem to affect the patient unpleasantly, while the fresh, cold air certainly gives temporary relief.

Ordinarily, the pulse is small, feeble, and sometimes intermittent, and, with the coldness of the surface, it is not very rare to see oedema of the lower extremities, which disappears with the attack.

Sometimes the commencement of the attack is marked by vomiting, and it may possibly continue while the dyspnoea lasts. The appetite is poor, the digestion slow, and, consequently, the patient is apt to be drowsy after eating.

During the attack a cough appears, even when it did not exist before. It is harsh and dry until the paroxysm lessens, when a profuse expectoration occurs which gives relief to the patient. The voice is hoarse and veiled, and a tracheal wheezing sound accompanying respiration can frequently be heard at some distance from the sufferer.

Complaint is made of certain painful spots about the chest, which, during the first attacks of asthma, are wandering and ill-defined, but later they become more constant and intense. They are considered to be pleuritic in character. Besides this there is often a sense of painful constriction at the base of the chest.

The expectoration is sometimes streaked with blood, or a regular hæmoptysis may be witnessed during the occurrence of the increase of the other symptoms. Sometimes the hæmorrhage appears independent of any general exacerbation, after the manner of its occur-

rence in phthisis. If its significance is misinterpreted, grave errors in prognosis may be made.

The remission of the paroxysm may be as sudden or as slow as its onset. It may not take place for several days, but usually the morning brings a great abatement, probably a total disappearance of the attack, with restful, peaceful sleep.

With the increase of the frequency and severity of bronchial inflammations, with the advance of emphysema, with the lessened intervals between the attacks of asthma, and the augmented force of the latter, very serious disorders of the circulatory apparatus develop, which increase the growing dyspnoea. The heart is found to beat irregularly; it is enlarged, and there is frequent palpitation. Œdema, previously noted, now progresses to anasarca, and ascitic accumulation ensues. These symptoms are usually referred to valvular lesions of the heart, but they can exist without such cardiac trouble, and are more properly the result of asthma itself and the lung-changes which accompany it.

The **Physical Signs** of a paroxysm of asthma are not many. Inspection tells of a chest that is held rigid at its utmost expansion. It is increased in size in every direction. The diaphragm is lowered, and the measurement around the body is increased. The shoulders are elevated, the back is rounded, and the neck is held stiff. While intense effort is being made to accomplish respiration, but little chest movement is observable. The upper portion is especially immobile, the lower alone giving any sign of action. Percussion gives an augmented resonance, particularly in the front regions of the chest, but it is not always equal on both sides. Throughout both lungs loud sibilant and sonorous rales are heard, as well as rattling of mucus and wheezing. There is no vascular murmur on account of the complete stagnation of air in the lungs. This extreme distension sometimes causes an air-cell to burst, and the presence of this extravasated air in the lung tissue is evidenced by a rubbing sound. The dry rales, emanating from the constriction of the smaller tubes, are constantly shifting, and are heard loudest over the posterior portions of the chest. The respiration itself is characterized by a short spasmodic or jerking inspiration, and a prolonged noisy expiration, the relative time occupied by the two acts being the reverse of that common to physiological respiration. As the attack subsides, a general exaggerated respiration is heard to precede the return to normal breathing.

Diagnosis.—Dyspnoea occurs to quite an extent in several different conditions of the system which necessarily present more or less similarity to asthma. Of these, two have received the name of asthma, viz.: *cardiac asthma* and *renal asthma*. If a patient suffering from the cardiac form has an exacerbation of breathlessness at night, it will usually be relieved by assuming the erect posture for a time, but such

a patient is never entirely free from oppressions of the chest. No wheezing is heard as in asthma, and there will be found physical signs of heart trouble, if looked for. Renal asthma is accompanied by much distress in breathing, not because the air cannot reach the blood circulating in the lungs, but because the blood is prevented from reaching the air in the cells on account of the spasm of the pulmonary arterioles. A rapid pulse will direct the attention to the heart, but finding no trouble there, symptoms of changes in renal texture must be immediately sought for. When children have capillary bronchitis, they experience much difficulty in respiration, and often labor exceedingly hard, but they breathe more frequently than in asthma; the pulse is accelerated, and the sub-crepitant rales are present in both lungs. In diseased conditions of the glottis and larynx, such as œdema, spasm, and paralysis, the locality of the distress referred to by the patient is very different, and the absence of chest symptoms and wheezing will aid in distinguishing them from asthma. Diaphragmatic trouble, whether rheumatic, paralytic, or of the nature of fatty degeneration, occasions severe dyspnœa. Respiration is carried on mostly by the superior part of the thorax; and, with the loss of power in this muscle, there is inability to aid in the performance of the act of urinating and of defecating. When a forced inspiration is taken, the epigastric and hypochondriac regions sink, and distend again with each expiration. If the diaphragm is paretic, Duchene says, galvanizing the phrenics will start it to proper action, and the abdominal movements will then be the reverse of what has just been stated. Da Costa speaks of a case of glandular swelling of the neck, coming on suddenly, and pressing on the trachea to such a degree that, with the attending difficulty in breathing and wheezing noise, the patient's complaint might readily have been mistaken for asthma. Pressure from tumors in the mediastinal space causes similar symptoms, but the dyspnœa is continuous with them.

But we are not likely to confound a case of spasmodic asthma with any other affection if we keep in mind its pronounced paroxysmal character, its suddenness of onset, its rapidly developed and extreme dyspnœa, its limited duration, its comparative or complete freedom from harassing symptoms during the interval, and the physical signs of temporary bronchial spasm, with its constant accompaniment—*wheezing*.

Prognosis.—An old saw has it that "asthma is a charter of a long life," but if so, longevity must be held in high esteem to be bought at such a price. It is true, death during an attack of asthma is rarely recorded, but the continuance of the affection by developing emphysema, dilatation of the heart, and dropsy, must necessarily tend to shorten life.

If humid asthma once fairly lays hold of a person advanced in

years, it persists without interruption until it has terminated the patient's life. But if a youth, attacked with the ordinary form, has it in a modified way, with long intervals of relief, and without organic disease of any kind, the prognosis is favorable. If a patient's strength has been impaired by reason of repeated and severe attacks of asthma, and he should then have pneumonia or severe bronchitis, the chances for recovery will be very limited. But asthmatic subjects are usually spared from both pneumonia and pulmonary tuberculosis.

Treatment.—If an attack of asthma has been provoked by any known condition, such as an undigested meal, or a constipated state of the bowels, this condition should be righted as speedily as possible. Dyspepsia is so commonly met with among asthmatics that their diet requires careful selection. They should, of course, eat regularly and moderately. Sloppy food, malt liquors, sweet pastry, and fats should be avoided; and the regimen must be confined mostly to beef, mutton, chicken, or eggs, with stale bread and boiled rice. A little coffee may be allowed at breakfast, and either whisky and water, sherry, or toast-water later in the day, if deemed advisable. Care should be taken to avoid much fluid for a time both before and after meals, and the same injunction should be put on mental or bodily exercise, especially for an hour after eating.

The remedies for asthma must be considered in regard to their adaptability to the spasm and to the interval. Resort will be had to various methods and substances by the patient himself, in order to relieve the severity of the attack, and if anything has been found by experience to afford any relief in former fits, it is best to acquiesce in its continuance. Some of the more common of these adjuvants to internal medication are the smoking of Stramonium, the breathing of Nitrate of potash fumes, or the inhalation of Chloroform, Ether, or Amyl nitrite; but while these often give temporary relief, they never cut short an attack.

The old school strongly recommend, at present, the use of Jaborandi or its alkaloid, Pilocarpin. It is claimed that a hypodermic injection of ten minims of a 2 per cent. solution of the latter, secures almost immediate relief to the patient in a paroxysm.

Remedies for the Attack.—The chief remedies are: *Aconite*, *Arsenicum*, *Bryonia*, *Ipecacuanha*, *Lobelia*, *Sambucus*, *Cuprum*, and *Hydrocyanic acid*.

Aconite.—When the accession of the attack has been induced by cold, dry air, or subjection to a foggy atmosphere.

Arsenicum.—For nightly paroxysms, with great restlessness and anxiety, and burning pains in the chest. There is perspiration of the whole body, with alternate hot and cold sensations, and prostration.

Bryonia.—In addition to the symptoms of the spasm, there is some bronchitis, and sharp pains around the chest, much worse by deep inspiration and by motion.

Ipecacuanha.—Is the remedy used most frequently, and is recommended by

all schools. The dyspnoea is very considerable, there is constriction of the throat and chest. The cough is constant, with rattling of mucus, nausea, and vomiting. The surface is cold and damp, and the face pale. The remedy is given when there is no immediate assignable cause for the attack.

Lobelia.—Is indicated for a paroxysm induced by gastric trouble. There is immense development of gas in the stomach, and little or no cough. The attack is often preceded by a prickling sensation all over.

Sambucus.—Is of service when the degree of dyspnoea is beyond that witnessed under Ipecacuanha, and the cough is less. The patient evidences extreme anxiety, the face becomes violet in hue, and asphyxia seems imminent. Loud sibilant rales accompany the dyspnoea. Sambucus is usually employed in the tincture.

Cuprum.—Is especially useful in the purely nervous variety of asthma. Its onset is sudden, the respiration is very spasmodic, is complicated with cramps and convulsive twitchings, and terminates suddenly. The attack may occur in conjunction with the menstrual epoch, or in consequence of emotional excitement.

Hydrocyanic acid.—Is recommended by Hughes for the class of cases which suggest Cuprum. He uses it in recent and uncomplicated asthma, when there is difficult and spasmodic respiration, with contraction of the throat, and feelings of suffocation.

Remedies for the Interval.—*Arsenicum*, *Nux vomica*, *Sulphur*, *Pulsatilla*, *Tartar emetic*, *Iodine*, and *Aurum*.

Arsenicum.—When this remedy is called into requisition for the paroxysm, it is frequently found to relieve also the habitual, wheezy, dyspnoeic state. The indications are: præcordial anxiety, with exacerbations at night; cough, accompanied by the expectoration of a transparent, frothy, viscid fluid. When chronic bronchitis, emphysema, or cardiac disease complicates the case, Arsenic is often of service. It is also to be kept prominently in mind when the asthma is a neurosis, probably alternating with some other nervous disorder, as well as when it depends on a repercussed eruption.

Nux vomica.—For irritable persons who are accustomed to drinking coffee or liquor. After the subsidence of an attack the tongue exhibits a thick yellow coating. There is a feeling of fulness in the stomach, with belching, and constipation. As Dr. Russell says of it, there remains a sort of physical memory of the struggle, and the patient feels that no liberties must be taken, either of diet or exercise. If the attack began with sneezing and fluent coryza, or if vapors of copper or arsenic started it, or if it is merely spasmodic, in consequence of a hypersensitive pneumogastric, Nux and Strychnia are most useful remedies. At times, both Nux and Arsenicum are prescribed in chronic cases, the first-named at night, the other in the morning.

Sulphur.—This remedy stands well in the treatment of asthma when skin affections alternate with the dyspnoea, but it is even a more powerful agent against the complication of the asthmatic with the gouty constitution. The attack is marked by sibilant dyspnoea, bluish lips, and it recurs once a week, usually in the night.

Pulsatilla.—For a case of asthma ill-defined in its onset; with an abundant catarrhal expectoration, vertigo, vomiting, prostration, and palpitation of the heart. It may have been due to deranged menstruation, hysteria, uræmic poisoning, or a suppressed rash.

Tartar emetic.—Has also great abundance of secretions, with rattling of mucus, and difficult expiration. It is specially recommended for old people and young children.

Iodine.—In the form of the Potassium iodide this remedy is in much favor among some old-school practitioners, and Bæhr points out its well-marked homœopathicity by its effects when taken for a protracted period. The attack usually occurs about midnight, lasts half an hour, and is succeeded by lassitude and an irresistible desire to sleep. The patient is nervous and restless during the interval, and the asthma appears to be entirely of the spasmodic variety.

Aurum.—For morning asthma, with bluish face and great palpitation of the heart; suffocative attacks, with spasmodic constriction of the chest. The accompanying symptoms are of involvement of the heart and pulmonary congestion.

Other useful remedies in the treatment of asthma are :

Belladonna.—When the attack comes on in the afternoon or evening, with congestion of the face and head ; worse in hot, damp weather.

Cannabis.—Is of use only in massive doses, and after thus using it once, may prove to be entirely ineffective in subsequent attacks. Its action is narcotic, and hence palliative. Given in the first attenuation it is said to be serviceable in humid asthma.

Chamomilla.—For children during dentition, and often for hysteric asthma, especially if induced by anger, and accompanied with flatulence.

Carbo veg.—For old and feeble people whose attacks come on after midnight, so severe that they seem to be dying. There is distension with wind and inability to raise it.

Digitaline.—For a purely nervous asthma, without accompanying lesions of the lungs, heart, or bronchi. The paroxysms are frequent and of comparatively short duration. Digitalis is a palliative even when right ventricle dilatation coexists. The attack is preceded by palpitations, and there is marked venous congestion of the head during the spasm, followed by violent headache. It is also useful in men debilitated by sexual excesses.

Kali bich. is recommended in "humid asthma," when the signs of mucus in the bronchial tubes far exceed the amount actually present. The gastric mucous membrane is simultaneously affected.

Moschus.—For asthma in people of a nervous, irritable, or hypochondriac disposition. There is a violent feeling of constriction in the throat, without cough.

Opium, or *Morphine*, in a low attenuation, will often give great relief without inducing narcotism. The respirations are slow and labored, the face is cyanotic, the sensorium depressed, and cough constant.

Pulmo vulpis.—Von Grauvogl used a first centesimal trituration of this remedy as a remedy in an old subject suffering with asthma humidum, and met with brilliant success.

Sanguinaria is recommended in hay asthma and in post-climacteric asthma. In the latter instance Dr. Ludlam gives it upon the following indications: severe dyspnoea, teasing, hacking cough, dryness in the throat, and an inclination to take a deep inspiration during the paroxysm.

Spongia has rendered some service in asthma due to phthisis, by mitigating the severity of the attacks. The spasm is marked by complete loss of voice, wheezing respiration, and contraction of the glottis.

Stannum, Plumbum, Zincum, Ferrum, Argentum have all been accorded a place among the remedies for asthma, but their indications are not always well defined, nor are they clinically proved to be reliable.

The following remedies may be consulted, as possibly indicated: *Apis, Asafetida, Bovista, Bromium, Calcarea carb., Causticum, Cistus can., Cocculus, Colchicum, Gelsemium, Graphites, Grindelia, Hepar, Hypericum, Kali carb., Lachesis, Lactuca vir., Lycopodium, Mephitis, Natrum sulph., Nitric acid, Nux moschata, Phosphorus, Sabadilla, Salicylic acid, Sepia, Silicea, Staphysagria, Sticta, Thuja, Veratrum.*

E. DISEASES OF THE PLEURA.

PLEURODYNIA.

BY A. K. CRAWFORD, M.D.

Pleurodynia or "false pleurisy" is a myalgia, or a rheumatic condition of the chest-walls, analogous to torticollis and to lumbago. It is unattended with fever, and with but little general disturbance of the system. The pain is oftentimes located in the left infra-mammary region, but there appears to be no tendency to involvement of the heart. The causative agents are those which are common to rheumatism elsewhere, such as: exposure to draughts, or to cold and wet weather. It is more often found in adults, and more frequently in men than in women. A gouty constitution may be considered a predisponent, and a previous attack of the disorder tends towards its recurrence.

The muscles subject to the attack are either the pectorals, intercostals, or the interdigitations of the serratus magnus with the external oblique.

The pain complained of is extreme, and is aggravated by every motion. Consequently, the side affected is held passive, and the act of respiration is thereby impeded. The patient shrinks from coughing or sneezing on account of the increase of pain which these acts occasion. When localized, the pain is often catching in character, and direct pressure on the spot makes it worse. Sometimes the broad pressure of the palm of the hand affords some relief. Both sides are frequently affected simultaneously, and the pain is quite apt to shift its position.

However much it may seem to resemble pleurisy, none of the physical signs of the latter affection ever appear in pleurodynia. It is differentiated from intercostal neuralgia by the greater area of pain presented, by its alternating with other myalgias, and by the absence of the painful points which belong to the neuralgic condition.

Treatment.—The list of remedies for this complaint might be lengthened indefinitely, but the following will be found particularly reliable:

Aconite is recommended to be given frequently and in a low dilution if there has been exposure to a cold, dry wind, and when some fever is noted.

Arnica when there is a bruised sensation. The pain is increased by motion, but still more by pressure. The patient complains of the bed being too hard. When there are doubts as to whether the pains indicate pleurisy or pleurodynia, Arnica will often clear up the case by curing it.

Actæa racemosa, or its alkaloid *Macrotin*, is especially adapted to women, when the pains resemble neuralgia, when there are menstrual disorders, and when there is a sense of faintness at the pit of the stomach.

Bryonia.—The pains are stitching and tearing. They are aggravated by move-

ment, and diminished by broad pressure and by lying on the affected side. It is especially useful in the rheumatic diathesis.

Colchicum.—In a combination of the gouty and rheumatic constitution; when acute attacks spring up, with palpitation of the heart, chilliness even when near a hot stove, and gastric disturbance. The pains are shifting, burning, or jerking in character.

Nux vom.—For hæmorrhoidal subjects and habitual drinkers. The patient cannot lie on the painful side.

Ranunculus bulbosus.—Hughes claims wonderful success with this remedy in pleurodynia, when the pain is so intense that the patient dare not move. Left-sided infra-mammary pain.

PLEURISY.

BY A. K. CRAWFORD, M.D.

Synonyms.—Inflammation of the pleura; from the Greek *πλευριτις*; Latin, *Pleuritis*; French, *Pleurésie*; German, *Pleuritis*, *Rippenfallen Entzündung*; Italian, *Pleuritide*; Spanish, *Pleuresia*.

Definition.—Inflammation of the serous membrane which covers the lungs, and which is reflected over the costal walls internally. The attack is marked by chilliness and fever, and is followed by knife-like pains in one or both sides of the chest. The lubricant which normally moistens the pleural surfaces, disappears at first. Afterwards, there is a greatly increased quantity of fluid exuded, and the chest wall distends proportionately. Accompanying these changes, there will be a dry cough, rapid, uneven, and shallow respiration, and a quick tense pulse.

Pathology.—In the chapter on pneumonia, the conclusion was arrived at that it was the pulmonary vessels alone which were involved in that affection. And now, in so far as the pulmonary pleura is concerned, it is known to be the bronchial vessels which are implicated in this inflammation, because of the anatomical fact that the subdivisions of the bronchial arteries ramify the sub-pleural tissue, and give sustenance to that membrane.

At times, pleurisy is described under the qualifying heads of thoracic, mediastinal, or diaphragmatic. This is merely an anatomical consideration, depending upon the locality of the inflamed surface, and not upon any difference in the character of the process.

Of much more practical use is the division of pleuritis into the acute, sub-acute, and chronic forms. By *acute pleurisy* is meant the inflammation which continues through the plastic exudative stage, but which only develops a slight amount of effusion. The *sub-acute* variety is that in which the effused serum is considerable, and easily determinable by physical exploration. The *chronic* is that in which absorption of the effusion does not take place. When this stationary fluid becomes purulent in character, it is ordinarily designated *empyema*.

True empyema refers to an accumulation of pus or of sero-puru-

lent matter in the pleural cavity, arising directly from the pleural surfaces, and is thus distinguished from *false empyema*, which derives its pus from a ruptured pulmonary abscess. Pus, in this situation, must find an exit, or the patient will decline under hectic fever. If there is a sufficient quantity to have compressed the lung, so that that avenue of escape is cut off, the confined pus will likely *point* in an interspace between two ribs, and discharge itself in this way. This purulent degeneration of the effused pleural fluids generally occurs in connection with the exanthematous and puerperal fevers, pyæmia, or from perforation.

The progress of the disease is marked by *three stages*, viz.; hyperæmia, effusion, and absorption. There is no clear dividing line between their occurrence, but each has its well-defined signs, and the terms are self-explanatory. The stage of hyperæmia is regarded as extending from the onset of the attack until the occurrence of an appreciable amount of exudation, which usually takes place within twenty-four hours. Then the stage of effusion is fairly at hand, and it is still counted such while the accumulation grows and while this remains stationary at its height. The time occupied in this process is sometimes quite short, the fluid being found to diminish in quantity immediately following its effusion. The third stage is marked by the physical signs of constant decrease of the amount of fluid in the pleural cavity. The time taken to absorb all the effusion is more variable than the preceding stage. Convalescence may be thoroughly established, and still part of the fluid remains unabsorbed. But, as a rule, an attack of pleurisy runs its course in from two to three weeks.

If, at the end of this time, the fluid effused shows no disposition to disappear, the disease is pronounced chronic, and the fluid tends to become more or less purulent in character.

In the *first stage* of the inflammation, the pleura presents a dry, roughened, and reddened appearance. The sub-serous tissue shows a greatly increased degree of vascularity, and spots of ecchymosis are not uncommon. The advent of the *second stage* is marked by the effusion of fluid into the pleural cavity. This fluid is generally serous at first, mixed with lymph-shreds, which float through it, or which settle when the liquid is quiescent. The effusion is sometimes purulent from the first, but as a rule, the pus, liquor, and cells, are a later development. In the second stage, the surface of the lung is coated over with a slimy plastic material, and the lung itself is forced upward and backward by the accumulated fluid. This pressure also forces the air out of a greater or less amount of lung tissue, and condenses it, so that it presents a flesh-like appearance when cut, to which the term "*car-nified*" has been applied. The anatomical changes incident to the *third stage*, or that of absorption, are more marked if the effusion has been of long standing. It is then we may find portions of the lung

still in a state of carnification, and so bound down by firm fibrous bands that it never returns to its normal condition, and is ever after impeded in its action. When such is the case, the chest wall becomes retracted, especially over the area of lost respiratory function and of adhesions. This altered chest wall again causes a lateral curvature of the dorsal spine towards the affected side, and a compensatory curve in the opposite direction in the lumbar vertebræ.

Clinical History.—Pleurisy is so frequently associated with pulmonary consumption, and is consequently so often linked with tuberculosis or some other constitutional cachetic state, that its onset in any given instance demands the closest scrutiny of the physician to determine its source and its significance. It is not nearly so tractable an inflammation as pneumonia, for while the latter has extensive exudations during its progress, its tendency is toward entire resorption and a return of the involved lung tissue to perfectly normal function. But with pleurisy it is very different. It tends toward the production of morbid products, of adhesions of new tissues, and entails, therefore, more permanent mischief.

Pleurisy is generally unilateral. The idiopathic variety of it is diffused, involving the whole or the greater part of one pleura. When the inflammation is circumscribed and sub-acute, the inference is that it is secondary to some other pulmonary trouble. Should both sides show symptoms of limited inflammatory action, the evidence is still greater that the pleurisy is merely symptomatic.

The fever may abate at the end of a week, and again start up after a time, adding more fluid to that already effused. This may repeat itself, and extend the duration of the disease over a period of some months, possibly until the patient is carried off with the trouble. Other cases present themselves, suffering from debility and shortness of breath, who give no history of the acute symptoms of pleurisy, but who are found with all the signs of advanced effusion present. This insidious and slowly developing form of the malady was named *latent pleurisy* by Laennec, and Niemeyer says that such cases generally terminate in pulmonary phthisis. Chronic pleurisy may continue indefinitely without the fluid becoming purulent, while some cases of either the acute or sub-acute variety rapidly develop suppuration. Where this occurs, the patient evidences it by the relief from pain, a rapid, compressible pulse, great anxiety and restlessness, and an evident tendency to collapse.

Causation.—The causes of pleurisy are not so easily determined as in many other acute affections. It is nearly always a secondary malady, occurring in connection with, or superadded to, some other morbid state. It may be spontaneous in its origin, and its source be beyond our ken, or it may be the result of cold and exposure; the latter is the least common of its causes. Injuries, either to the outer

chest-wall or piercing the cavity of the chest, will, oftentimes, set up pleuritis, but in army surgery, extensive lacerations of the pleural membrane have been witnessed, without inflammation following. It does frequently occur in patients suffering with Bright's disease, and happens in the course of acute articular rheumatism, as well as in the different zymotic, and typhoid, and typhus fevers. It adds itself to the history of pyæmia and septicæmia, and attacks gouty subjects. It may be said to be a concomitant in every case of phthisis pulmonalis; and, like the other serous surfaces in the body, when it is the seat of tubercular deposit, flashes of inflammation are constantly recurring. It frequently complicates cases of pneumonic inflammation, but in practice it is not met with so often as the lung-affection.

Symptoms and Signs.—The onset of pleurisy is marked by some degree of chilliness, often repeated, but seldom severe enough to be pronounced a chill. The fever following is not of a high grade. A dry irritating cough sets in, which greatly aggravates the sharp darting pain in the chest, or "stitch in the side." The latter is the most characteristic and constant symptom of the first, or dry, stage of pleurisy. This pain is increased by any movement made by the patient. It is for this reason that the sufferer employs abdominal respiration, breathes very shallow and rapid, and holds the ill side as passive as possible. There is usually some degree of tenderness of the thorax on pressure, and the patient lies on the well side.

The *physical signs* accompanying this stage are a diminished respiratory movement observable over the affected side; to the touch will be conveyed that peculiar thrill termed friction fremitus; to the ear, the vesicular murmur will sound feeble and jerking, and possibly a to-and-fro friction-sound may be heard.

The progress of the disease into the stage of effusion is noted by the disappearance of the pain and the abatement of the fever, but the cough still continues, and dyspnoea develops in proportion to the amount of serum effused. The patient now turns not on, but only toward, the affected side, and the complexion is apt to become dusky. The *physical signs*, in this instance, are characteristic. In looking at the chest it will be seen that movement has almost, if not entirely, disappeared, and the side appears more than ordinarily full. The intercostal spaces are level with the ribs, or even bulge beyond them. The vocal vibrations are absent. The area extending from the base of the chest to the level of the liquid in the pleural cavity will be found flat on percussion, but above that water-line we have increased resonance. This flatness is changeable according to the position assumed by the patient. Lying on the back may leave the whole anterior aspect of the chest clear, while the reverse will be the case if the patient lies on the face.

Two conditions may occur in which the shifting percussion sounds will not be found. One is where the exuded material is of such a con-

istence, and exists in so limited a quantity that it will not gravitate. The other is where former adhesions hold the fluid in circumscribed sacs, thus confining it and preventing its change of locality. The heart is often very much displaced by means of the distension of the pleural cavity of either one side or the other, and as the diaphragm sinks with the pressure from above, so do the liver and stomach become displaced downwards to the same degree. The ear can discover no breath murmur where effusion is present to any great extent. Bronchial breathing may be detected in the inter-scapular space near the spine. The normal voice-sounds fail to be transmitted, and are either absent or very feeble. No friction sound is to be heard. The well lung, or the healthy portions of the inflamed side, take on puerile respiration because of the extra work required.

The stage of absorption runs parallel with the gradual disappearance of the symptoms of the second stage, and with the return to health. The cough and dyspnœa subside, the temporarily displaced viscera return to their normal locations, and the patient is able to turn on either side without discomfort. Inspection and palpation make known the fact that the respiratory movements are re-appearing, and that vocal fremitus is again perceptible. The percussion dulness, in the erect posture, is found to diminish from above downward, until it entirely disappears. As the chest movements increase, the vesicular murmur, at first very weak and indistinct, becomes quite harsh and pronounced, followed later by normal breathing. During this period of harsh respiratory murmur bronchophony is to be heard, which gives way to exaggerated, then to normal, vocal resonance. The pleuræ, which have been separated in consequence of the effusion, on coming together again reproduce the friction sounds incident to the first stage of the disease.

These signs and symptoms pertain to both the acute and sub-acute varieties of pleuritis. The difference between the two resting entirely on the intensity and extent of the development of the malady, it is but a relative matter naming a case one or the other. But when an instance of the sub-acute form of pleurisy is met with, and the effusion completely fills the cavity of the chest, with its signs of distension, enlargement, immobility, percussion flatness, and absent murmur, the apex of the same side may emit a tympanitic percussion note, and, by auscultation, bronchophony and bronchial breathing will be heard in the same locality. Where this occurs it is not uncommon to find bronchial respiratory sounds transmitted all over the diseased side. The reasons for the first condition may be plain enough, for the last probably not quite so tangible.

A perfectly normal condition is not to be looked for on the subsidence of an attack of pleurisy. The most ordinary of the permanent changes, appreciable by physical examination, is a retraction of the

chest-wall over the base of the lung, some dulness on percussion, especially at the back beneath the scapula, and a correspondingly diminished respiration. This is the result of fibrinous adhesions and an excessive amount of plastic material not absorbed, or of a portion of condensed lung failing to unfold itself.

The *physical signs* attendant upon *empyema*, or the *chronic* form of pleuritis, are just such as belong to a well-developed case of the sub-acute variety. There is less likelihood in empyema to find a change in percussion dulness following a change of posture, because of the adhesions that are so common with the development of pus. Sometimes the cardiac impulse is transmitted through the purulent accumulation, and gives rise to the question of its being a case of thoracic aneurism. These cases have been called "pulsating empyemata." The presence of pus in the pleural cavity is of such moment that the knowledge of it should be in the possession of the medical attendant at the earliest possible moment. The development of symptoms of hectic fever, with night-sweats, remissions of the fever in the morning, and exacerbations in the evening, a puffy appearance of the face, the ends of the fingers assuming a club-shape, and, maybe, a trace of purulent matter in the sputa, will point, almost positively, to the fact of pus being confined in the chest. But if a doubt still remains, the hypodermic needle will settle the question.

Diagnosis.—The affections with which the dry stage of pleurisy is apt to be confounded are pleurodynia and intercostal neuralgia. In neither of these do we find fever or friction sound, and the pain of pleurodynia or myalgia is found frequently to shift its locality. It also usually involves both sides, and the chest is very tender and sensitive to external pressure. Intercostal neuralgia is most often left-sided, choosing preferably the nerves from the sixth to the ninth ribs. The pain is markedly intermittent in character, and anæmic individuals or women with pelvic disorders are its most common subjects. It is often diagnosticated by discovering the three painful points of Valleix. Over the track of the involved nerve a sensitive spot will be found at its exit from the spinal column, another in the line of the axilla at the angle of the rib, and a third over the terminal distribution of the nerve near the sternum.

During the stage of effusion, pleurisy bears some resemblance to acute pneumonia. Both are characterized by fever, pain, dyspnoea, by usually involving only one side, and by presenting dulness on percussion. But here the similarity ends, for the absence of the respiratory murmur, and of the vocal sounds and vibrations, in pleurisy, stand in wide contrast with the intense thrill, the bronchophony, and the loud tubular breathing met with in pneumonia. And no matter to what extent pneumonic consolidation may go, there is no bulging of the side, as in pleurisy.

If tubercular infiltration should suggest itself, it may be differentiated from pleurisy by the development of dulness and the other signs from above downward, and if the tuberculosis has advanced to any degree, the opposite lung will likely be involved. An enlarged liver or spleen may so press upward as to encroach on the base of either lung, and give percussion dulness over normal lung area. But by listening posteriorly, the respiratory murmur will generally be detected, and a deep inspiration will increase the extent over which it can be heard.

For the distinguishing signs between pleurisy and hydrothorax and pneumothorax, the reader is referred to the separate discussion of these topics.

Prognosis.—The natural tendency of simple uncomplicated pleurisy is to recovery. But if there is any chronic affection of the lungs, if the effusion is great, or if the patient has not had careful treatment, the result may be the reverse. In fact, the termination of pleurisy depends upon the gravity of the disease with which it may be complicated. Even in idiopathic pleurisy deaths have been recorded by apnoea from excessive effusion. In the chronic varieties the same thing may occur, although such cases are rare. When pleurisy is associated with Bright's disease of the kidneys, or other morbid conditions, it is apt to run a chronic course, and to terminate fatally by asthenia. Its coexistence with pericarditis greatly increases the gravity of the prognosis, and when complicated with tuberculosis, the super-vention of a fatal issue is only a matter of time. Yet, if the presence of plastic adhesions is certain evidence of inflammation of the pleura, many persons make good recoveries unwittingly, for the post-mortem table makes it appear quite a common affection among those who experienced none of the symptoms of the disease.

Treatment.—In the acute stage of pleurisy, when the lancinating pains are very severe, much benefit can be derived from the application over the side implicated of hot fomentations, hot linseed poultices, steamed hops, or mustard paste. But if after some hours the desired effect has not been produced by this means, securing immobility of the side affected by strapping it with adhesive plaster from the spine to the sternum, after the manner recommended by Roberts in his *Handbook of Medicine*, will afford relief.

In the effusive stage, even when the distension is very considerable, so long as life is not threatened by reason of the pressure obstructing respiration, the contents of the pleural sac should be let severely alone. But in case the patient suffering with chronic or empyemic pleurisy shows signs of depressed vitality, anxious and hurried respiration, weakened pulse, and livid countenance, the operation of paracentesis thoracis should be resorted to at once. In case the fluid to be thus removed is serous in character, the utmost precaution should be exercised to prevent the entrance of air into the pleural cavity,

else the bland serous fluid will readily become purulent. The best mode of accomplishing this operation with safety is, probably, with the pneumatic aspirator. It is a procedure very generally adopted, since Dr. Bowditch has shown how the dangers attending it may be avoided. He advises that the needle be inserted behind, in a line running perpendicular from the angle of the scapula, and two inches above the normal base line of the lung. Nor is it necessary to drain the cavity completely, for the removal of only a part of the fluid often stimulates the process of absorption sufficiently to secure the completion of the task by nature's method. Of course, where it is known that the accumulation consists of pus, the same care is unnecessary. After aspirating once, and obtaining pus, it is better, when the second evacuation is required, to make a free incision through an intercostal space, and to empty through a double drainage-tube. The tube should be left in situ and secured; then the pleural cavity can be irrigated each day with a solution of carbolic or salicylic acid, or of iodine, or with Condy's fluid.

In all cases where such depletion is going on, the patient should be fed rather liberally, and often some stimulant is required, not only to enable the patient to bear drain on the system, but in order that the process of absorption may become more active and perfect. The amount of liquid taken with the food should be restricted.

Aconite.—Simple acute pleurisy caused by exposure to cold, with the symptoms of chill, fever, stitch-like pain in the sides, dry cough, anxiety, restlessness, tossing about, and inability to lie on the right side. It not infrequently cuts the attack short in the first stage.

Bryonia.—Follows Aconite well when the disease is advancing through its regular stages. It is also the choice remedy when the disease begins with a low degree of violence, and shows early signs of effusion. It is specially useful in the secondary form of pleurisy of the plastic variety, and circumscribed in extent. The severe stitching pains are aggravated by every motion, the tongue is white, there is thirst for large quantities of water, and often the patient finds relief from lying on the affected side.

Cantharides.—The indications for the use of this drug in pleurisy have been furnished by E. Farvie, and its practical application to the disease in question is extolled beyond all else by Jonsset. He uses it in the 3d dilution usually, but if this does not produce rapid amelioration he descends to the 2d or 1st dilution, or even to the mother tincture. Its special symptoms are: a profuse serous exudation, dyspnoea, cough, and palpitations of the heart; a tendency to syncope, with heavy sweats and scanty urine.

Arsenicum.—Is to be given when there is great prostration and threatening collapse. The effusion is copious and rapid. It is well indicated for those patients who are weak and cachectic, malarial, or who are addicted to alcohol. An excellent remedy in empyema.

Sulphur.—Is said to follow well after Bryonia or Rhus tox. when absorption of the plastic material is slow. The pain is steady, left-sided, and in the lower portion of the chest, extending through to the shoulder-blade. Rheumatism or gout accompanies the pleuritic attack. The lips are bright red.

Senega.—Should be given in subacute or chronic pleuritis, when complicated with heart disease or phthisis, and when there is a marked tendency to anasarca.

Apis mel.—Is indicated when there is great dyspnoea; the patient is unable to lie down, and feels as though he could not draw another breath. The urine is scanty.

Joussel has employed it with excellent effect when *Cantharides* failed to produce absorption.

Arnica.—The pleurisy is the result of traumatism. There is a bruised feeling in the chest, as well as over the body generally. Nervous patients with cool extremities and hot head.

Aclepias tuberosa.—Very acute pain in the right chest; labored breathing, especially marked at the base of the left lung; dry and spasmodic cough.

Belladonna.—In pleurisy coexistent with the exanthematic, typhoid, or puerperal fevers. In plethoric or tuberculous subjects, with delirium.

Carbo veg.—When the fluid has assumed a purulent or ichorous character. Hectic fever, with sunken countenance, wasting, and prostration.

Colchicum.—Red and scanty urine, containing albumen. Gouty constitution, and sour-smelling perspiration which affords no relief.

Digitalis.—Wurmb, Fleischmann, and Baehr all recommend this remedy for pleurisy with abundant serous effusion. The last-named author says it ranks next to *Bryonia* for rheumatic pleuritis.

Hepar sulph.—When pleurisy has become chronic, and the exudation has been transformed into pus, this remedy, with *Arsenicum* and *Silicea*, is of marked value. There are intermittent paroxysms of hectic fever. The face assumes a yellowish-brown tint. In scrofulous and lymphatic individuals.

Iodum should be kept in mind as a possible help to Sulphur in securing absorption of a serous, or more particularly of a plastic, exudation.

Kali carb.—The violent and stitching character of the pains peculiar to this remedy point to its use in pleurisy. It is strongly indicated when the left side is affected, with heart palpitations, and aggravation of a dry cough about 3 A.M.

Mercurius is indicated when the secretion tends from the first to become purulent. There are frequent chilly sensations, followed by burning heat, and copious sweats, which do not relieve. This remedy has rendered good service in epidemic pleurisy, and also when syphilis, rheumatism, bronchitis, gastric or intestinal catarrh, or icterus, complicate the malady.

Phosphorus.—When there is a sense of constriction across the chest, with a dry, tight cough, worse in the evening, accompanying the pleural inflammation. When the heart or kidneys are implicated, and empyema occurs, it is a valuable remedy.

Rhus tox. may be given when the attack follows exposure to wet, or a strain, in the presence of the usual accompanying symptoms of restlessness, hydroa about the lips, and a red tip to the tongue. But *Rhus* seems better adapted to peritonitis under similar circumstances, than to pleuritis.

Occasionally, one or more of the following remedies may be called for in pleurisy, when a constitutional state or some specific symptoms appear in the case to indicate them: *Calcarea carb.*, *China*, *Ferrum*, *Helleborus*, *Kali hydriod.*, *Kreasotum*, *Lachesis*, *Laurocerasus*, *Lycopodium*, *Nitric acid*, *Nux*, *Sabadilla*, *Sepia*, *Spigelia*, *Squilla*, *Tartar emetic*.

HYDROTHORAX.

BY A. K. CRAWFORD, M.D.

This condition of dropsy of the pleura, or "water on the chest," is common to several diseased states, and is a purely secondary affection. It consists of an exudation of limpid, watery fluid within the pleural cavity. The amount of liquid varies from a few ounces to eight or nine pints, and it lacks the fibrinous quality of pleuritic effusions.

In hydrothorax there is no change in the epithelium of the pleura, and there are no false membranes or plastic adhesions formed. Other dropsies precede and coexist with it. It is habitually a two-sided affection. The diseases in which it is produced are those which involve the lungs, the heart, the great vessels, the liver, the kidneys, or possibly the pleura itself; and not unfrequently a constitutional or cachectic state of the system gives rise to it. The production of the fluid is generally the direct result of mechanical obstruction of the circulation, and of the abnormal thinness of the blood through deficiency of albumen. The physical signs are the same as those of chronic pleurisy. Sometimes the development of the fluid is so slow that the respiration is not perceptibly disturbed by it. But when its onset is sudden, and the amount very great, orthopnoea and its attendant symptoms will be witnessed. To differentiate it from the effusion of pleuritis, it will be necessary to bear in mind the lack of febrile movement in its history, its simultaneous double development, its advent after the appearance of dropsies elsewhere, the absence of pleuritic pains and friction sounds, and the presence of organic visceral disease.

Hydrothorax must be looked upon as a condition of extreme gravity, and one which usually proves fatal. It sometimes appears just prior to the fatal issue of the maladies named.

Treatment.—The best remedies for this lesion are such as prove serviceable in anasarca, viz.: Arsenicum, Apis, Apocynum, Carbo veg., China, Digitalis, Iodum, Jaborandi, Lycopodium, Mercurius, Phosphorus, Sulphur, Tartar emetic.

PNEUMOTHORAX.

BY A. K. CRAWFORD, M.D.

This lesion is characterized by the presence of air or gas in the cavity of the pleura. In the majority of instances in which this condition is found, it arises from ulcerative perforation of the pulmonary pleura extending from a tuberculous cavern. The remaining lesser number of cases of gaseous distension of the chest come from: traumatism, a penetrating wound, a fractured rib, or through the operation for the relief of empyema; rupture of an emphysematous vesicle or of a pulmonary abscess; a channel communicating with the œsophagus or a bronchus; gas generating spontaneously in empyema or gangrene of the pleura.

Its onset is usually quite sudden, and is marked by excessive dyspnoea. The patient exhibits great mental anxiety, the countenance assumes a pale and dusky hue, both the voice and the pulse are weak, and a cold moisture covers the skin. The chest, or rather one side of

it, presents a full and distended appearance, the interspaces of the ribs are either effaced or bulging, there is exaggerated percussion resonance, indistinct or absent vesicular murmur, lost vocal fremitus, and sometimes the amphoric voice and metallic sounds are heard by auscultation and percussion. The advent of air within the pleura is attended with excessive pain, indicative of the inflammation which is at once set up in this membrane. The result is that in the course of a few hours, usually, the pleuritis has exuded fluid into the cavity already containing air, and to this combined and complicated condition the name of:

Hydro-pneumothorax has been given. Now a new set of signs are developed from the union of pneumothorax with pleuritic effusion. The tympanitic percussion resonance is still present over the upper portion of the chest, but below, absolute dulness is found. A sense of fluctuation is perceived by both the patient and the physician when the chest is shaken, and if the ear is placed on it at the same time, a gurgling, splashing noise is heard, described by Hippocrates as the succussion sound, and which is distinctive of this disease alone. Accompanying these physical signs, the amphoric and metallic sounds are quite prominent. The chief one is the clear click or tinkle, as of water dropping in a well, heard with each inspiration and in the act of coughing.

Life may continue for many years, yet the prognosis must rest greatly on the fatality of the disorder causing the trouble. A cure is not impossible.

Treatment.—The therapeutics of phthisis, of pleuritis, of traumatism, or of empyema, may require to be consulted in different cases of this disease. Thoracentesis should be performed only when the symptoms are very urgent, and relief is absolutely necessary. The collapse which threatens the patient in the first onset of air entering the pleural sac must be met with active measures and stimulants.

HÆMOTHORAX.

BY A. K. CRAWFORD, M.D.

This is the term given to a hæmorrhage into the pleural cavity. The blood may come from the rupture of a vessel by injury, from a diffuse pulmonary hæmorrhage breaking through into the pleura, from an aneurism, or from a tuberculous or carcinomatous state of the lungs or pleura; occasionally, the effusion in pleurisy is hæmorrhagic.

It is accompanied with dyspnœa, the result of pressure on the lung, and the patient shows the usual symptoms of hæmorrhage, as pallor, thirst, pinched features, ringing in the ears, and faintness. The physical signs are those of pleuritic effusion, and pleurisy occurs secondarily in this affection as it does in pneumothorax.

Treatment.—If traumatism has occasioned the bleeding, the endeavor should be made to secure the injured vessel. If due to internal causes, the most that can be done in a general way is to keep the patient perfectly quiet. Nor can much more than this be accomplished with our remedies. Wurmb believes that, if *Arsenic* will produce no beneficial change in the hæmorrhagic effusion of pleurisy, nothing else will. The good effects of *China* for great loss of blood are so well known that it requires no special commendation here. The remedies used for external injuries under other circumstances, such as *Arnica*, *Calendula*, and *Hamamelis*, may be of service when the traumatic state occasions the hæmothorax.

TUBERCULOSIS OF THE PLEURA.

BY A. K. CRAWFORD, M.D.

Two kinds of tuberculosis of the pleura are distinguished: one occurs as an accessory lesion of pulmonary phthisis, marked by more or less inflammatory action; the other is a direct manifestation of tubercular deposit on the pleura, independent of a similar condition of the lung. The deposit is usually in the form of miliary granulations scattered over the surface of the membrane. Or, if it is secondary, the portion infiltrated will correspond with the locality of the lung lesion and on the costal surface opposite. When the tubercles congregate, the plaques generally occupy the upper and posterior aspect of the pleura. The tubercles tend to gray degeneration or to the development of a caseous state, but they nearly always preserve a consistent form.

Acute tuberculosis of the pleura, as well as the same disease of the peritoneum, or possibly of the meninges, is one of the common manifestations of acute phthisis. But chronic tuberculization of the pleura, or pleural phthisis of some authors, is more often an idiopathic malady. Reference is made to it in Laennec's writings, but most pathologists neglect the subject. Latterly it has been perfectly described by Barthez and Rilliet. They found it more common in children from three to ten years of age than in adults. They describe the tubercles as developing either beneath the pleura, or on its free surface. In the chronic form of tuberculosis they are nearly always intra-serous, in a state of yellow granulation, and ordinarily accompanied by inflammatory pseudo-membranous deposits. The serous membrane below the extra granulations is usually less inflamed than the portion surrounding them for the space of about one-eighth of an inch.

The commencement of pleural phthisis is generally very insidious and obscure. The signs accompanying this lesion are not well marked. By inspection, the diseased side may be noticed to be slightly depressed, preceded by some enlargement. The percussion resonance

is diminished without evidencing absolute dulness. The respiratory murmur is feeble, while bronchial breathing is more distinct than in health. Vocal resonance is augmented without attaining to egophony. These signs are more pronounced at the back of the chest, and are not modified by change of position. There is slight pain complained of, slight dyspnoea, and a cough without expectoration. The patient loses flesh, and is troubled with a remittent fever less marked than in phthisis.

The development of the disease is slow and progressive, unless it is complicated with other maladies. It is hastened very materially if phthisis coexists. Patients with tuberculosis of the pleura finally succumb to hectic fever and marasmus.

The diagnosis is certainly attended with many difficulties. The physical signs afford no absolute distinction between the chronic inflammatory, suppurative, and tubercular diseases of the pleura. But if to the general phenomena emaciation, hectic fever, and abundant night-sweats are added, these symptoms prove really diagnostic of tuberculosis, as compared with the pale and puffy face, the irregular chills, and the persistent anorexia of purulent pleurisy. In numerous cases thoracentesis will be the only means of clearing up all doubts and establishing the knowledge of the presence or absence of a liquid effusion.

CARCINOMA OF THE PLEURA.

Cancer of the pleura is usually a secondary affection, resulting from cancer of the lung or of the breast. The calibre of the affected lymph vessels of the pleura is greatly increased by the abundant deposit of spherical endothelial cells, forming a whitish mass, more or less solid; the lymph vessels are easily distinguished upon the pleural surface.

Of the forms most frequently found, the scirrhus and medullary deserve mention; the granulations of the former are small and hard, of the latter they attain considerable size, are softer, and, frequently, depressed at the centre.

Cruveilhier's "Plaques squirrhuses" are cancerous formations on the pleural surface, small lenticular bodies which vary in size from thickenings which can scarcely be seen to distinct papular elevations, the latter tending to the formation of pedunculated growths of the size of grapes, or even larger; these may occur singly or in clusters, suspended from the surface of the pleura. At a certain period of their growth they resemble drops of tallow or wax, and are described as "wax-drops."

Cancer of the pleura may give rise to neuralgia by pressure upon the intercostal nerves.

This affection is of limited clinical importance, and the duty of the physician, so far as treatment of the condition is concerned, is outlined in the chapter on "pulmonary cancer."

DISEASES OF THE ORGANS OF CIRCULATION.

A. THE HEART.

INTRODUCTORY.

BY PEMBERTON DUDLEY, M.D.

IN studying and in treating the diseases of the heart or the derangements of its function, it is essential that the position and local relations of the organ, its general and minute anatomy, and its mechanical and vital functions, should be clearly understood and constantly remembered. Equally important is it to know, so far as may be, the relationships which the heart sustains through its nerve connections, and its physiological position in, and relation to, the whole series of nutritive processes. All of the vegetative functions are dependent—one upon another—for the maintenance of their regularity and efficiency, and serious disorder of any one produces, sooner or later, some disturbance in one or more of the others. Between the heart and the other organs this mutual relationship is peculiarly close, because of the mechanical character of the cardiac function, and because of the imperative necessity for that regular and efficient blood-supply without which no organ can perfectly accomplish its vital task. Hence it is that those disorders which follow in the train of serious and continuous heart diseases are nearly always found to depend upon abnormal conditions of the circulation affecting organs more or less removed from the heart, and death, when it results from disease of this central organ, is almost invariably due to mechanical changes in the circulation of blood in distant parts. As affecting the opposite side of this relationship, it is known that disorders of certain of the other functions involve the heart in functional disorder or structural change, sometimes speedily, sometimes gradually. Some of these cardiac disorders are excited by *reflex* actions of the nerves involved, as when digestive, respiratory or uterine derangements induce palpitation or other irregularity of cardiac action. Some are of *mechanical* origin, as when excessive carbonization of the blood impedes the flow through the capillaries, or other obstructive agencies prevent its free egress from the ventricles, and the excessive effort thus required of the organ superinduces dilatation or hypertrophy. And some are essentially *nutritive*, as when disease of the kidneys impairs the nutritive quality, or disease of the coronary vessels diminishes the quantity, of blood

supplied to the heart-muscle, and functional debility or structural degeneration ensues as a direct consequence of the defective nutrition.

It thus becomes apparent that disease of the heart may exist either as a cause or as a result of maladies affecting other parts of the organism; and, considering the liability of these various parts to the disorders which are likely to react upon the cardiac function, there can be no wonder at the prevalence of heart disease in numerous forms.

The Structure of the Heart.—The heart is a powerful, muscular organ, somewhat irregularly cone-shaped, situated in the anterior portion of the thoracic cavity, the base of the cone occupying the median space, but looking upward, backward, and to the right, and the apex pointing downward, forward, and to the left. It is usually described as being “suspended”—it really is attached to the neighboring organs and tissues by means of the great vessels which spring from its base, some of which pass laterally to the lung on each side, while the aorta arches upward and backward to a quite firm attachment at the upper and posterior portion of the thoracic walls. The body of the heart is quite freely movable. It is inclosed in the pericardium, a fibrous sac, the lining of which is reflected over the body of the heart, and forms its closely adherent, external tunic. This reflected and lining pericardial membrane is serous in character, and secretes a watery, alkaline, albuminoid fluid, which lubricates the opposing surfaces and reduces the friction of the heart’s movements to a minimum. The sac usually is found, post-mortem, to contain from one to two drachms of this serous fluid, though a somewhat larger quantity is not regarded, necessarily, as an indication of disease. Externally, the pericardium is attached below to the diaphragm, anteriorly by the sterno-pericardial bands to the sternum, superiorly to the cervical vertebræ and hyoid bone, laterally to the mediastinum, and posteriorly by loose connective tissue to the bronchial and œsophageal tubes, etc. Paul directs special attention to the firmness and strength of the ligaments or bands which connect the pericardial sac with the third cervical vertebra, the hyoid bone, and the sternum above, and to the broad and firmly adherent base which rests upon the tendinous centre of the diaphragm below, and which together serve to render the sac “next to the pelvis, the least movable region in the human body.”* These points of fixation seem to determine a pyramidal shape to the pericardium, the base resting on the diaphragm, and the apex extending to the upper limit of the thoracic cavity,—not corresponding, therefore, to the position of the cardiac pyramid as already described.

Correctly speaking, the heart is an irregular triangular pyramid, not, however, resting upon, nor suspended from, its *geometrical base*, but

* *Diagnosis and Treatment of Diseases of the Heart.* By Constantine Paul. Wm. Wood & Co., New York, 1884.

lying upon one of its triangular sides. This side, which thus forms the *mechanical base* of the organ, rests upon the tendinous portion of the diaphragm, which, in this situation, is not quite horizontal, but is inclined slightly downward, forward, and to the left. The triangular portion of the cardiac surface which thus rests upon the diaphragm, is somewhat flattened, and is made up almost equally of the right and left ventricles, while the right auricle also enters into its formation.

The anterior surface of the heart is nearly vertical; it is also approximately triangular, and is somewhat flattened, so as to correspond to the opposing posterior surface of the sternum and costal cartilages. The base line of this triangle is nearly straight, and extends from the apex of the heart to the junction of the ascending vena cava. The apex, in the vast majority of adults, is found in the fifth intercostal space, from $3\frac{1}{2}$ to 4 inches to the left of the median line. Many writers mention this point as being a short distance within a perpendicular drawn through the left nipple; but actual measurements show that even in men the distance of the nipple from the median line may be as small as $3\frac{1}{2}$, or as great as $5\frac{1}{2}$ inches. A more reliable measurement for the diagnostician, therefore, is the one first given. In childhood the apex is sometimes found behind the fifth rib or even in the fourth intercostal space, while in old age it may be as low as the sixth space. The position of the apex is liable to great variation in disease, particularly in cases of hypertrophy, dilatation, etc., and constitutes, therefore, a most important element of diagnosis. The point of insertion of the ascending cava is the right inferior angle of the anterior cardiac triangle. This point is best located in the living subject by first determining, by careful percussion, the perpendicular outline of the heart, which runs nearly parallel to the right edge of the sternum and about one or one and a half inches to the right of the median line; then, defining in a similar manner the line between the resonance of the right lung and the dulness of the liver, and propagating these two lines to their intersection, we can locate the exact position of the right inferior angle. It will thus be found located a half inch or an inch to the right of the sternal junction of the right fifth rib. It will also be seen that the base line is not exactly horizontal, but inclines downward and to the left. In left ventricular hypertrophy the apex is usually depressed, and the obliquity of the base line increased. In right auricular hypertrophy, the obliquity is diminished, not so much by depression of the right inferior angle as by an increased convexity of the lower border of the auricle. Other changes in the form, volume, or weight of the heart also produce changes in the relative position of these lines and angles. These will be duly considered in their appropriate place.

The superior angle of the anterior cardiac triangle is located in the second intercostal space, about an inch to the right of the median line.

The two sides of the triangle which form this superior angle are both convex outwardly. The right inferior angle is slightly obtuse.

It is necessary, in the clinical examination of the heart, to remember that the organ is partly covered, in front, by the overlapping borders of the lungs. As a result of this circumstance, the character of the sounds elicited by superficial percussion over the covered portions of the heart will be greatly modified. A portion of the heart, however, comes into direct relation with the thoracic wall, only the two layers of pericardium intervening. This uncovered portion occupies a space known as the "area of superficial cardiac dulness." It is triangular in outline, and its boundary, beginning in the median line opposite the fourth costal cartilage, runs downward and outward nearly, or quite, to the cardiac apex (it sometimes happens that the apex is itself covered by the lung), thence along the base of the anterior cardiac triangle to the median line, and thence upward to the point of departure. This area, variable as it is in size and outline, furnishes better opportunity for studying certain of the heart's symptoms and conditions than do other portions of its anterior aspect. The space may be encroached upon by emphysema, or extended by cardiac hypertrophy or dilatation, but especially by pericardial exudations, dropsy, etc.

Luschka has made the location of the various portions of the heart the subject of special experimental research. He made a median section of a frozen body, and found on the *right* side of the section all of the right auricle, about half of the left auricle, and a small portion of the right ventricle; on the *left* side he found half of the left auricle, nearly all of the right ventricle, and the entire left ventricle.

Mensuration of the heart exhibits remarkable differences among different observers. This is not surprising when it is remembered that the volume of the organ varies under the different modes of death, and perhaps to some extent under the post-mortem conditions. Professor A. R. Thomas, in his well-known treatise on *Post-mortem Examinations*, gives the length of the normal heart as about five inches, its breadth (bilateral diameter) three and a half inches, and its thickness (anteroposterior diameter) two and a half inches. The weight is set down by the same authority as averaging nine and a half ounces in the male, and eight and a quarter in the female, though "in the robust, muscular male, it may be found to weigh as much as twelve ounces, and yet be normal in all its parts." Bizot, as cited by Schrötter (*vide* Ziemssen, vol. vi., p. 202), estimates the length at $3\frac{5}{16}$, breadth $4\frac{7}{16}$, and thickness $1\frac{1}{16}$ (?) inches in males, the average in females being somewhat less. Flint gives the average weight of the heart in the male as 10 to 12 ounces, and in the female 8 to 10 ounces.

Very much of the difference in measurements must, as already intimated, be ascribed to variation in the *phase*—systole or diastole—at

which death occurred, and, doubtless, much also to the arbitrary and ill-defined method of including or excluding the exceedingly variable dimensions of the auricles.

In the formation of the heart, the right ventricle has a somewhat different shape from the left, the latter being more nearly conoidal than the former. A transverse section through the left ventricle is nearly circular in its general outline, while that through the right is somewhat crescentic in shape. The right ventricle approaches nearly, but not quite, to the point of the heart, so that the apex is composed of the tissues of the left ventricle exclusively. This is doubtless the reason why left valvular murmurs are heard so much more distinctly at the apex than are those produced on the other side of the heart.

The walls of the left ventricle are considerably thicker than those of its fellow, in whatever portion they may be measured. Near the base of the ventricle the thickness exceeds half an inch on the average, while in the corresponding portion of the right ventricle it is scarcely more than one-fifth of an inch. Much, however, depends upon the general muscular development of the subject, and much more upon the *phase* in which the measurements are made. The auricles have much thinner walls, that of the left being about one-eighth, and that of the right about one-twelfth of an inch.

The size of the cavities is exceedingly important to the pathologist, particularly in estimating the amount of a cardiac dilatation or hypertrophy, and yet, unfortunately, our information on this point is exceedingly indefinite, and any figures given must be received with caution. Perhaps the most reliable data as to the *extreme* capacity of the ventricles are those obtained by Hiffelsheim and Robin, and quoted by Flint. These observers found the capacity of the left ventricle, when distended to the utmost, to be from 4.8 to 7 ounces, and that of the right about one-tenth to one-eighth greater. These figures, however, are of little real value to us, since the heart, either in health or in disease, is never distended to its utmost, but is expanded only moderately by its contained blood. The measurements given by Bizot, and corroborated by Ducastel, when reduced to fluid-ounces, are for males, left ventricle, about $2\frac{1}{2}$; right, about $2\frac{2}{3}$; females, left, 2; right, $2\frac{1}{2}$. Stated in general terms, it is generally considered that each ventricle discharges about two ounces of blood at each systole. There is little doubt that the capacity of the right ventricle is a little greater than that of the left (possibly due only to its greater distensibility), but the actual discharge must, on the average, be practically equal for the two chambers. The capacity of each auricle is a little less than that of its corresponding ventricle, and this difference is said to increase with age.

It is quite well established that the heart does not acquire its full development until the age of about thirty years, that it maintains its

size quite uniformly from that time until the age of sixty, and then increases again in volume slightly until death. At the period included between thirty and sixty years, the average weight of the entire organ, as shown by Ducastel's tables, is, in males, 308 grammes; and in females, 276 grammes. The average weight of the left ventricle is, in males, 173 grammes; and in females, 150 grammes. That of the right ventricle, in males, 72 grammes; and in females, 62 grammes. These tables, however, show a remarkably wide difference between the minimum and maximum weights, extending all the way from 205 to 580 for the entire heart, from 120 to 375 for the left ventricle, and from 45 to 130 for the right ventricle. As respects the weights and dimensions above given, we quote the words of Constantine Paul, as showing the value to be attached to them in post-mortem examinations:

"The average weight of the heart in the adult being 300 grammes,* I can be positive that hypertrophy existed if the weight exceeds this figure to any considerable extent. The volume furnishes perhaps a less certain means of judgment, because the heart may be arrested either in systole or diastole. Cruveilhier states that the heart is arrested in systole, and has a much smaller volume in all those who die a violent death or rapidly bleed to death. He adds that if the fingers be introduced into the hearts of such individuals, they may be dilated with surprising facility. In fact, the manner of death and the cadaveric rigidity notably affect the results.

"The thickness of the walls may also furnish sources of error. The heart of a child is found much more retracted than that of an adult; this is also true of those who have suffered a violent death or died of hæmorrhage. If this condition, accordingly, is not accompanied by an increase in the total weight, it does not signify hypertrophy."†

The valves, by which the course of the blood is determined, are dense, resisting curtains covered with folds of the endocardial membrane. The auriculo-ventricular valves are reinforced by means of the chordæ tendinæ springing from the papillæ, or directly from the ventricular walls, and attached to the free borders of the valve curtains. The cords prevent the sail-like curtains from being forced entirely through the openings, and thus they aid in securing the perfect closure of the auriculo-ventricular inlets. The pulmonic and aortic (semilunar, or sigmoid) valves are quite similar in structure, and are provided with a small, firm body, the corpuscle of Arantius, at the middle of the free border of each curtain, to secure a more effective closure of the outlets and prevent regurgitation. The valves are peculiarly liable to a class of diseases which affect their form, flexibility, elasticity, or mobility, and thus either cause obstructions to the free passage of blood, or admit of regurgitation.

* *l. c.*, 10.58 avoirdupois ounces.—D.

† *Diseases of the Heart*. New York. William Wood & Co. 1884.

The muscular structure of the heart's walls is sometimes described as occupying a position intermediate between the voluntary and the involuntary systems of muscular apparatus, *i. e.*, it shows the deep-red, highly-nourished, striated appearance of the skeletal muscles, and acts with their tremendous vigor and energy, while yet its movements are entirely beyond the control of the will-power, and exhibit a regular and unflagging rhythmical action to which the voluntary muscles are strangers, and which they could not long sustain. This leads us to a brief consideration of certain matters respecting the heart's function, in connection with which we shall allude, more particularly, to its supply of nutritive blood, and to its peculiar relations to the cerebro-spinal and lymphatic nervous systems.

The Functions of the Heart.—The systemic return-blood, flowing from the great veins, is received into the right auricle, and passes freely through the auriculo-ventricular opening into the right ventricle until both chambers may be said to be filled, yet not distended. At this moment the auricle contracts (auricular systole) with considerable force, impels an additional portion of the blood into the ventricle, and immediately relaxes again. Instantly the moderately distended ventricle contracts (ventricular systole) upon its contained blood, the auriculo-ventricular (tricuspid) valve closes with a snap, and the whole mass of blood is directed into the pulmonary artery through the pulmonic or sigmoid valves. With scarcely an interval of quiet, the ventricle relaxes (diastole) to receive its next charge, the elastic walls of the pulmonary artery react upon their contents, the sigmoid valve closes suddenly, and the volume of blood is driven forward into the lungs. The auricle, as already stated, relaxes (auricular diastole) at the beginning of the ventricular systole, and again is ready to receive blood from the great veins. The whole series of changes, together with a relatively long period of repose which intervenes before the next auricular systole, occupies, in the adult, a little less than one second. At the same time a precisely similar series of movements is taking place in the left side of the organ. The pulmonic return-blood flows from the pulmonary veins, down into the left auricle, through the left auriculo-ventricular opening (mitral valve) into the left ventricle, until both chambers are filled; the auricle contracts, drives a portion of its blood into the ventricle, and immediately relaxes. At this moment the distended ventricle contracts, the mitral valve instantly closes to prevent regurgitation, the aortic valve opens, and the blood rushes through into the great systemic artery; the ventricle relaxes, the mitral reopens to admit the succeeding influx; the distended but elastic aorta reacts upon its blood, the aortic valve promptly closes to prevent reflux, and the left ventricular blood is driven onward into the smaller systemic arteries by the combined force of the ventricular impulse and the more uniform pressure of the elastic aortic

walls. The two auricles contract and relax simultaneously, as do also the two ventricles. Indeed, so exactly synchronous are the corresponding movements of the two sides, that the sounds of the two sets of valves reach the ear of the auscultator as though produced by one. This, as we have briefly described it, constitutes a "revolution" of the heart, and includes a single filling and emptying of all its cavities, a single opening and closing of all its valves, a single contraction, relaxation, and period of repose of all its muscular tissue.

The auricular systole probably forces but a comparatively small amount of blood into the ventricle. The pressure exerted by it may impel the blood in large quantity backward into the communicating veins, since there are no valves in these localities to intercept its retrograde flow. This regurgitation, however, is not sufficient, in the right side of the heart, to create a perceptible impulse in the neighboring large veins, and whenever a jugular, brachial or hepatic venous pulse is observed, it is regarded as abnormal, and due probably to tricuspid regurgitant lesion.

The time occupied by the various parts of a cardiac "revolution" has been defined by Marey, Chauveau, and others, with mathematical precision. From repeated observations made by the first-named investigator it appears that—

1. The auricular systole occupies *two-tenths* of a revolution, and is followed immediately by the auricular diastole.
2. The ventricular systole begins immediately upon the completion of the auricular systole, and occupies *four-tenths* of the revolution.
3. The ventricular diastole, including the period of repose which preceded the next succeeding auricular contraction, occupies *four-tenths* of the revolution.

It is well known to physiologists, however, that although Marey, with his cardiograph, has been able to draw a sharp line between the contraction of the auricle and that of the ventricle, yet practically the systole seems to consist of a single gradual movement, which, beginning in the auricle, is rapidly propagated, like a peristaltic wave of contraction, down to the apex. The cardiograph simply measures the exact period during which systolic pressure is maintained upon the contents of each chamber.

As regards the true relation which the systole and diastole hold to the movements of the valves, the writer has always been careful to impress upon the student the fact that the auricular diastole has no causative relation to the closure of the auriculo-ventricular valves, and the ventricular diastole no influence whatever in causing the closure of the sigmoid valves. The fact that these phenomena occur synchronously has, to my knowledge, misled some into the erroneous belief that the one is dependent upon the other; whereas it is known that if the heart's action should be suddenly arrested in systole, its last con-

traction would still be followed by a final "click" of the sigmoid valves. The error, trifling in itself, perhaps, may lead to a misconception of certain causes which may modify the intensity of the valve sounds, as, for instance, a weakened ventricle in the one case, or a loss of arterial tonicity in the other.

The muscular fibres composing the cardiac walls have a twofold arrangement. In the first place, each side of the heart has its own muscular fibres, which exert no action upon the opposite side; and, in the second place, there is a layer of fibres which pass around both ventricles. The contraction of these latter must, of course, determine the synchronous action of the two ventricles, even if there were no nervous influence operating to produce it.

The mechanical force required to drive the blood through the distant systemic capillaries must be much greater than that necessary to carry on the smaller pulmonic circulation, and the greater thickness of the left ventricular walls is simply a natural adaptation to a greater requirement. This fact is mentioned here to show the perfectly normal and physiological nature of that process which leads to hypertrophy, or thickening, of the wall when any increased muscular force is continuously necessary to overcome abnormal resistances to the free circulation of the blood, *e. g.*, valvular stenosis, constriction or compression of the aorta, etc. It also serves to indicate what must be the natural results—anæmia, defective nutrition, etc.—in even distant organs when the heart's mechanical action is weakened by atrophy, fatty degeneration, diminished normal irritability, etc.

To the pathologist, an understanding of the physical changes which the heart undergoes at each revolution is essential, as it furnishes the key to an appreciation of those phenomena which, to the physician, constitute the chief elements in both physical and subjective diagnosis. These physical manifestations are: 1, hardening; 2, twisting of its apex; 3, increase of its antero-posterior, and decrease of its bilateral diameters; 4, shortening of the ventricles; 5, thrusting of the apex downward and forward, *i. e.*, in the direction of its axis, due, doubtless, to the bulging outwards of the thin walls of the heart's base, and to the distension of the great arteries by the ventricular blood; 6, tilting of the apex forward and to the right, due largely to the causes just mentioned, and to the increase of the antero-posterior diameter of the heart at, and near, the base of the ventricles. All these occur at the moment of the ventricular systole, and the twisting, the thrusting downward and forward, and the tilting forward and to the right, together, constitute the "impulse" or "beat" of the heart, by which its apical portion is pressed firmly and suddenly against the tissues forming the anterior chest-wall at each ventricular systole.

At each revolution of the heart there are also produced two distinct sounds, described by physiologists as a "long" and a "short"—a

“first” and a “second” sound. The first, or long, sound occurs synchronously with the ventricular systole, and its length corresponds very closely to the duration of the systolic movement, *i. e.*, about *four-tenths* of the cardiac revolution. The second, or short, sound takes place immediately after the close of the ventricular systole, and its length is not measurable by the unaided ear, being produced by the short, sharp “clap” of the pulmonic and aortic valves, and in tissues not capable of prolonged sonorous vibration. Perhaps it is safe to say that the perfectly normal second sound does not occupy much more than *one-tenth* of the heart’s revolution, although Flint ventures to estimate it at *three-tenths*. The timbre, or quality, of the sound is of vastly more importance to the practitioner than an accurate measurement of its duration, since changes in its quality under the influence of disease are always found to coexist with variations in its length, and are far more easily understood and appreciated. Between the first and second sounds there is a perceptible, though not a measurable, interval, and between the second and next succeeding first-sound, a much longer period of silence. The writer estimates the duration of the respective sounds and intervals as follows :

Duration of first sound,	4 tenths of a revolution.
Interval of silence,	1 tenth of a revolution.
Duration of second sound,	1 tenth of a revolution.
Interval of repose,	4 tenths of a revolution.

The cause of the second sound having been already mentioned, it remains to be said that the first sound has a manifold cause, comprising (1) the closure of the auricular valves at the very beginning of the sound; (2) the muscular contraction of the heart walls; (3) the movement of the heart in its impulse or “beat” against the thoracic wall; and (4) the rush of blood through the great arterial outlets. The last-named of these causes is not mentioned by some physiologists. The pathologist, however, becomes aware of its value by the marked changes in the sound produced by even the slightest narrowing of these outlets, or by the thickening or roughening of the valves over which the escaping blood is flowing.

The general causes of changes in the heart sounds, being purely mechanical in their operation, are not very difficult to understand, although, like other disease-symptoms, they are not unfrequently misleading. It is essential that we remember all the movements and phenomena occurring in the heart at the moment when the abnormality is observed, and, moreover, we must note the exact locality at which the unusual sound is heard in its greatest intensity. Then, having carefully studied all the coexisting circumstances of the case, an accurate diagnosis of the morbid condition can usually be arrived at.

Both the cardiac sounds can usually be heard over the entire præcor-

dial region, and, in certain directions, to a considerable distance beyond it. But there are localities at which certain elements of the sounds reach the ear with greater intensity than elsewhere, and at these points the qualities of these elements and their morbid alterations can be best studied. According to Guttman, and others, the sounds originating in the mitral orifice are best heard at, or a little above, the apex; those produced at the tricuspid opening, at the lower end of the sternum; those of the aortic opening, in the second intercostal space at the right edge of the sternum, and those of the pulmonary orifice, at a corresponding point at the left edge of the sternum. But there are numerous causes which, in disease, modify this general statement, and in practice these points of maximum intensity should be carefully sought out in each and every case examined. It should be mentioned that, in any case, the sounds which reach the ear when placed over the body of the heart, are rendered less distinct, during inspiration, by the encroaching borders of the air-distended lungs; also by the supine posture, which allows the heart to gravitate away from the ear and diminishes the force of the impulse, and also by any increase, either muscular, osseous or adipose, in the thickness of the intervening thoracic wall. Furthermore, their intensity is also modified by various morbid changes in and around the organ, all of which must be considered in their appropriate places.

Diseases of Nutrition of the Heart.—As the heart is peculiarly subject to diseases affecting its nutrition, a brief consideration of the physiology of that function, as it applies to the organ we are studying, becomes imperative. The most important of these diseases are hypertrophy, atrophy, degeneration, infiltration, etc.

The causes of the regular rhythmical movement of the heart will presently be considered. We are now concerned with the fact of its necessity. Other muscles, after periods of activity, take their long intervals of perfect repose. But a single and relatively brief period of rest of the heart is fatal to the organism. Its alternate contraction and relaxation is, and must be, incessant and unflagging. The contraction of a skeletal muscle forces blood out of its meshes, and thus impairs, for the time, the activity of nutrition in its own tissues. Is the same statement true of the cardiac muscle? This particular muscle receives its arterial blood through the coronary arteries from a point just above the ventricular outlet, and where, at the period of the ventricular systole, the pressure is enormous. It is plain that as this pressure represents the equal of the compressive force in the cardiac tissues, there can be no regurgitation of coronary blood. Lannelongue, however, has shown that during the ventricular systole a large proportion of the blood is driven by compression out of the coronary veins. But it may well be doubted if this compression seriously affects the quantity in the cardiac capillaries, else it would seem impossible that the

requisite irritability of its tissues could be maintained. The heart is fully as easily affected by a deficient blood-supply as is any other muscle. Obstruction of the coronary arterial trunks by a tumor, or a ligature, or a greatly diminished blood-pressure in the aorta, cutting off the coronary supply, may speedily result in heart-failure and sudden death. It is in this latter mode, undoubtedly, that numerous fatalities occur in rapidly exhausting disease, such as Asiatic cholera, etc., or in severe shock; the tension of the arterial coats becoming rapidly, or even suddenly, weakened, the blood-pressure in the aorta suddenly falling to a minimum, the heart is deprived of its nutritive supply, and cardiac failure follows as the certain result.

The Nervous Relationship of the Heart.—Concerning the nervous connections and relations of the heart, though, as yet, much is obscure, and many of the views held may prove erroneous, we possess sufficient positive knowledge to indicate that this organ has a nervous relationship strikingly unlike that of any other part of the organism. It has been amply demonstrated that the heart enjoys a remarkable independence of both the cerebro-spinal and the sympathetic nervous systems, and is capable of maintaining a somewhat regular and persistent action after being entirely cut off from anatomical connection with both. The simple and oft-repeated experiments by which this fact is demonstrated are laid down in all physiological text-books, and need not be described here. The constant and long-continued rhythmical action of the heart, removed from the body of a frog or of an alligator, was long supposed to be due to an irritability precisely like that which exists in all muscles. Subsequently, it was discovered that there are in the substance of the heart certain aggregations of ganglionic cells, possessing the properties of other nerve centres, and it has been shown that these cells exert a stimulating and controlling influence upon the heart's contractions. But even these do not account for the regular rhythmical cardiac movements, for it is shown that the apical portion of the heart contains no ganglion cells whatever, and yet a portion cut from near the apex of a frog's heart continues to contract and relax with more or less regularity for a considerable period. It is now generally held that the causes of the heart's continued and regular actions are threefold: *First*, that there is a cerebro-spinal, and also a sympathetic, communication (which has been amply demonstrated anatomically as well as physiologically) now quite well understood, and which will be further considered presently; *secondly*, that the cardiac ganglion cells, just mentioned, possess, somewhat like the cerebro-spinal and sympathetic cardiac nerves, a stimulating action upon the heart's function; and *thirdly*, that the muscular tissue of the heart possesses an independent power of rhythmical contraction—an irritability of a character peculiar to itself, and quite unlike that of ordinary muscles. As a result of this irrita-

bility, a portion of the frog's heart, destitute of ganglionic cells, will contract rhythmically, if constantly stimulated; but if some of the ganglionic cells are attached to the separated portion, rhythmic action goes on for a time without artificial stimulation. It is also evident that the contraction of one portion of the fibres acts as a stimulus to the contiguous fibres, and that in this way the peristaltic wave of contraction is propagated from base to apex, but that in the absence of a special stimulus a ganglionic excitation is requisite. This, with the known fact that contraction begins in the auricles, would lead us to the inference that the ganglion cells are chiefly located about the base of the heart, and this inference is confirmed by numerous investigators who have found these cells most numerous in the walls of the auricles and in the auriculo-ventricular groove, while, according to Bidder, there appear to be none in the substance of the ventricles.*

In addition to this intracardiac nervous system, the action of the extrinsic nerves must be briefly considered. These are partly of cerebro-spinal and partly of sympathetic origin, the former consisting of fibres reaching the heart through the great pneumogastric trunks. These two kinds of nerves unite in the cardiac plexus, from which numerous branches are given off to the heart, in whose substance they exhibit peculiar terminations, forming plexuses whose meshes are large enough to receive a muscle-fibrilla, and from which minute fibres enter the muscle-cells. (Ranvier.)

As the result of almost numberless experiments upon the pneumogastric nerves and their roots and branches, it is demonstrated that these nerves possess a function not seen elsewhere in the human organism, at least not in the form and manner in which it is here manifested, viz., the function of inhibition, the power to retard or arrest muscular contraction. If these nerves be divided, the heart's action is accelerated, while if they be galvanized, or otherwise stimulated, the cardiac movements are retarded notably, and in case the stimulation is sufficiently energetic, the heart's action is arrested in systole. It is also determined that the fibres possessing this inhibitory function are derived from the internal anastomotic branch of the spinal accessory nerve, that these fibres are efferent or centrifugal in function, and that the inhibitory function of these fibres, therefore, is direct, and not reflex, though it seems to be established that the function can be reflexly excited. This inhibition, or retarding function, can be temporarily augmented in various ways, as by emotions of fear or terror, by increased intracranial blood-pressure, by diminished supply of arterial blood to the pneumogastric centres (Yeo), as well as by certain drugs, such as Digitalis, Muscarine, etc.

On the other hand, it is found that stimulation of the sympathetic

* Yeo's Physiology. Presley Blakiston, Phila., 1884.

in the neck, or at any point in the course of the fibres toward the heart, causes a remarkable acceleration of the cardiac contractions. The duration of the systole is not increased, but as the revolution is very greatly diminished, there is little time for diastolic repose, the ventricles are but partially filled, so that the aggregate quantity of blood discharged into the arteries is not much, if at all, increased, and the arterial pressure is not raised much above the normal.

Of the centripetal or sensory cardiac nerves there are two to be described. *First*, the nerve of Ludwig and Cyon. It begins in the heart, and passes along the pneumogastric trunk, and into the medulla oblongata. Its irritation in the rabbit elicits cries of pain. *Secondly*, certain fibres discovered by Franck in 1880. These latter start from the endocardium also, and reach the medulla oblongata. Both these nerves appear to be sensitive to an excess of intraventricular pressure, and both are evidently designed to prevent or relieve such excess. One of them acts upon the cardio-inhibitory centre, diminishing the rapidity of the heart's action, and the other excites the vaso-inhibitory function, dilating the arteries, and thus diminishing the arterial pressure. Thus it seems that, so far as the nervous system can supply them, the heart's safeguards are perfect and complete.

This consideration of the function of the heart, with a direct view to the study of its pathology, would not be complete without a brief reference to some of the numerous modes in which the action of this all-important organ may be brought to a stand-still.

First of all, it is observed that, the heart's action being purely muscular, any form of degeneration which changes the character of the tissue must correspondingly weaken its walls, and this may go on until the debilitated and overworked organ abandons its functions from sheer exhaustion. In this manner is death to be explained in cases of fatty degeneration, with sudden arrest of the cardiac function. *Second*, the heart's action may be interfered with by immense accumulations of fat in or upon its walls, loading it down and constantly obstructing its free movements, or by extensive adhesions of its pericardial membrane. *Third*, pressure upon its external surface, *e. g.*, a pericardial dropsy or hæmorrhage, or an extensive pleuritic effusion, may so antagonize the diastole as to prevent the filling of its cavities from the great veins, and its action ceases for want of sufficient space and sufficient stimulus. *Fourth*, inability to completely empty its ventricles, because of obstructive lesions at the aortic orifice, or in the course of the aorta, or even in the systemic capillaries, may result in ventricular engorgement, enormous distension of the muscular walls, mechanical strain, and rapid and complete exhaustion. *Fifth*, obstruction to the influx of blood, as by the pressure of an aneurismal, or other, tumor upon the great veins, may rob the heart of both its nutritive and its stimulant supply, and sudden failure may follow. *Sixth*, anæmia, the

exhaustion of prolonged disease, or hæmorrhage, may so diminish the aggregate of blood as to diminish the intravascular pressure, and correspondingly diminish the natural stimulus to the heart's cavities. *Seventh*, the same causes, diminishing the pressure within the aorta, cut off the requisite and full supply to the coronary arteries, and the starved muscular tissue of the heart soon exhausts its contractile irritability. *Eighth*, rapid exhaustion of nerve power in exhausting diseases, shock of injuries or surgical operations, may paralyze the vaso-motor functions, diminish the blood-pressure, and *thus* deprive the heart of both food for its tissues and stimulus for its cavities. *Ninth*, incomplete aeration of the blood may gradually deprive the walls of the ventricles of their nutrient supply, until they are no longer able to accomplish their ceaseless task. *Tenth*, undue excitation of the inhibitory centres may cause sudden arrest of the heart in diastole. In these, and in numerous other, ways the action of the heart may be interfered with, and, of course, always with fatal effect.

B. DISEASES OF THE ENDOCARDIUM.

BY E. M. HALE, M.D.

ENDOCARDITIS—INFLAMMATION OF THE ENDOCARDIUM.

Synonyms.—(French) Endocardite; (German) Endocarditis.

Definition.—With the diseases of the endocardium we begin the study of the diseases of the heart itself. The endocardium is the lining membrane of the cavities of the heart, and forms its valves; an inflammation of this membrane is called endocarditis.

Varieties.—*Simple* endocarditis may be divided into acute, sub-acute, and chronic, but the distinction is of little practical value, and chronic endocarditis bears such a close relation to affections of the valves, that its study is best made under that head.

Ulcerative or *diphtheritic* endocarditis is another variety, and as the distinction here is more sharply defined, the study should be conducted under these two divisions.

SIMPLE ENDOCARDITIS.

Endocardial inflammation is generally localized on the valves and chordæ tendinæ. After birth it is generally limited to the left side of the heart, and in the rare cases in which the right side is involved, the left is involved also. Before birth the reverse is true; in the vast majority of cases in which fetal endocarditis has been observed, it has been confined to the right side. (Flint.)

Ætiology.—Primary or idiopathic endocarditis is rarely met with,

the disease occurring rather in complication with others; it may be secondary to pleuritis, pneumonia, and other febrile conditions, and is, as a rule, associated with pericarditis; in fact, an inflammation of the pericardium seldom fails to establish a sympathetic inflammation of the endocardium, then called endo-pericarditis. The principal disease with which endocarditis associates itself is acute rheumatism; and as trouble with the heart is closely connected with troubles of the kidneys, endocarditis often follows, or accompanies, the varieties of Bright's disease.

It is said that in non-rheumatic endocarditis the aortic valves are more likely to be the seat of inflammation than the mitral, the reverse being true of rheumatic endocarditis.

When the inflammation develops in the course of acute rheumatism, it is not from transference of affections of the joints to this membrane, but rather the result of a bad condition of the blood [claimed by some pathologists to be due to lactic acid, $C_3H_5O_3$], and hence it is often found in cases of pyæmia and septicæmia. Chorea, in its analogy to rheumatism, often carries endocarditis with it.

A modifying factor is the age of the affected person, endocarditis being more rarely found in young persons than in the aged.

Traumatic causes may set up endocarditis, but such cases are few.

Pathology.—As the disease is so seldom distinct, the ante-mortem examination is best studied through the symptoms, while the anatomical characteristics can be ascertained only by the appearance after death.

Fothergill says: "The first stage is that of injection redness, where the endocardium is injected with points of branch-like vascularity. This is rarely seen, in consequence of the fatality of endocarditis lying rather in its consequences than in its immediate results. This inflammatory condition must not be confounded with the mere staining of the endocardium after death." "The serous membrane swells and is thickened, especially the free edges of the valves." "On the surface of the endocardium are found vascular growths, villi, often in small aggregations, giving the appearance of warts. These must not be mistaken for mere fibrinous adhesions to the surface of the valves from deposit of the fibrin of the blood,—mere strings of fibrin, usually found on a surface over which the blood-current rushes. This endocardial inflammation is usually accompanied by inflammation of the muscular coat beneath it. The muscular papillaries are usually affected not only by the inflammation spreading over their surface, but also by their structure becoming involved, which leads frequently to irregular action, and to insufficient closure of the valve, especially during the early attack."

The endocardium is swollen, velvety, and, as has been noticed, red in the early stages, but as acute inflammation is apt gradually to

merge into chronic, this redness subsides, and the appearance may be opaque, not transparent, puckered and thickened by the growth of connective tissue. Calcareous changes may be noticed in the deposits, fatty degeneration takes place, and the formation of aneurisms is seen.

Symptomatology.—The symptoms of simple endocarditis are less distinctive even than those of pericarditis, and are inseparable from the symptoms of the disease with which it is associated, and the diagnosis of it should depend largely upon physical signs. Occurring generally in connection with acute rheumatism, its indications are merged into those of the latter affection. In a large number of cases there are no symptoms which attract attention particularly to the heart as the seat of the disease; examination, however, with a view to determine the presence or absence of phenomena which point to endocarditis, may elicit symptoms which are important in the diagnosis. These symptoms consist of pain referable to the heart, symptomatic fever, and excited action of the organ, or palpitation. Symptoms relating to the passage of blood through the heart do not belong properly to the symptomatology of endocarditis, but are due either to lesions resulting from endocardial inflammation or to accidental events, such as the formation of coagula. (Flint.)

Pain is very rarely a prominent symptom, and, as in other serous inflammations, is sometimes altogether absent. Even when it is present, it is not easy to refer it to endocarditis, except by taking into account other symptoms, and especially the physical signs. The pain is generally dull and obtuse, rarely sharp and lancinating. A feeling of uneasiness, hardly amounting to pain, is sometimes referred to the *præcordia*. The suffering which patients endure from pain in the joints is so much more severe that they will not be likely to mention the uneasiness in the heart unless you question them closely. If the pain in the region of the heart is so severe and acute as to cause complaint, the probabilities are that pleurisy or pericarditis is present, rather than endocarditis. The *fever* is not of any importance, for it is not distinctive of this disease.

Palpitation in endocarditis may arise indirectly from excitation of the muscular structure of the heart. The action of the heart may be irregular, as well as unnaturally excited. The *pulse* may not correspond with the action of the heart, for while the latter may be acting with increased force, the pulse may be weak. If these symptoms are observed during the course of acute rheumatism, we may safely suspect the presence of endocarditis, and a careful physical diagnosis should be made.

Physical Signs of Endocarditis.—Increased extent of dulness on *percussion*, due to tumefaction of the heart and accumulation of blood within its cavities, is considered by many as a physical sign of

endocarditis. Flint, however, doubts whether the cardiac enlargement often, if ever, exceeds the limit of healthy variations. He thinks if the heart is enlarged, there must have been a previous hypertrophy.

Palpation and Inspection will furnish evidence of excited action of the heart. The impulse is seen and felt to be more violent than in health, or out of proportion to the amount of febrile movement which exists. But the signs furnished by these methods of exploration will be of little value except as associated with other evidences of endocardial inflammation.

Auscultation will furnish the only positive proof of the existence of endocarditis, and this proof is the development of the endocardial murmur. This association has been substantiated by clinical experience, and particular attention should be given to its study. In all cases of acute rheumatism the heart should be first examined and its condition at the time carefully noted; if the heart is at first normal, and these changes are set up in a later stage of the disease, endocarditis may be confidently asserted. This *murmur* before referred to is usually soft, having the character of a bellows' sound. It is systolic, for it accompanies the first, or systolic, sound of the heart, but it will not always be found at the commencement of the disease. By some it is considered even rare in that stage. There are no certain data as to the period of the inflammation in which this murmur occurs. The time of its appearance is variable. This murmur is heard at, or near, the apex of the heart, and may be thus limited. As it is probable that the anatomical changes rarely involve valvular insufficiency, it is likely that this mitral murmur does not imply regurgitation from the ventricle to the auricle. Flint calls it a *mitral-systolic murmur*, probably the best name. The presence of this murmur is a sure diagnostic symptom, if it is in symptoms denoting cardiac inflammation, and if acute rheumatism coexists.

A murmur developed by endocarditis generally continues not only throughout the disease, but even afterwards. A mitral murmur *may* disappear, however, after recovery from rheumatism, when it was marked during the disease. This could occur only when the swelling of the valves diminished, and vegetations were washed away, leaving the surface smooth.

The *cause* of this murmur is due to a roughness of the endocardial membrane, produced by lymph, fibrin, and vegetations.

The *heart-sounds* themselves may be abnormally altered during endocarditis; reduplications have been observed; the first, sometimes the second, sound may be less distinct than in health, or the first may be wanting.

It will be found that the diagnosis of endocarditis does not depend upon symptoms, but almost entirely upon evidence developed by aus-

cultation, and looking at symptoms alone, this important disease may be overlooked, and the patient lose the valuable aid which might be afforded to prevent an organic disease. Consequently, where an organic trouble of the heart previously existed, endocarditis is apt to escape notice; and as endocarditis rarely occurs alone, while generally superinduced by pericarditis, the differential diagnosis should receive careful attention.

Prognosis.—The *prognosis* of endocarditis is generally favorable, so far as any immediate danger to life is concerned. The symptoms may continue and the condition become chronic, causing great inconvenience, and existing for a long time. Chronic endocarditis may be suspected if the patient continues to complain of pain and uneasiness at the heart, and if that organ continues unnaturally excited. But this disease, when chronic, so nearly simulates valvular disease, that the prognosis depends on the extent of the structural lesion. Should it lapse from an acute to a chronic state, the prognosis of complete recovery is unfavorable, though death is not always traceable directly to this condition.

Certain accidental events may occur during endocarditis which may seriously endanger life, namely: formation of fibrinous coagula; the detachment of vegetations or of masses of lymph, causing emboli; the admixture of disintegrated solid deposits; and purulent infection of the blood.

If we can judge by recorded clinical experience, in many cases of endocarditis recovery takes place without serious accident. The cardiac symptoms disappear. The patient, however, is exposed to the danger of valvular lesions in the future, unless, as far as can be predicted, the treatment has prevented such a result.

ACUTE ULCERATIVE ENDOCARDITIS.

Synonyms.—Diphtheritic, bacteritic, mycotic, sometimes puerperal and pyæmic, endocarditis are names applied to this form of inflammation of the endocardium.

Definition.—It is a distinct form of the disease, in which ulcers and diphtheritic exudations occur, micrococci are developed, and in which the blood becomes infected; in fact, there are usually the symptoms of severe blood poisoning; and though ulcers may occur in simple acute endocarditis, this definition is marked enough to establish a separate name, and as it may be primary and independent, it also demands separate diagnosis and treatment.

History.—The study of this disease has been done chiefly by Germans, such authors as Sibson and Hayden failing to define sharply, while Flint, Fothergill, Bartholow, and others, have drawn freely from the recent investigations of the Germans.

Ætiology.—The disease seems to demand a peculiar constitution,

"a depressed condition of the vital forces, due to bad hygienic influences," especially in youths, or in men from the age of puberty to forty. It also, like simple endocarditis, is closely associated with rheumatism, may develop from simple endocarditis itself, and is often found in connection with diphtheria, puerperal fever, or may be traced to an ulcerating wound in some part of the body, especially to wounds of the female genital organs—post partum.

But "the close analogy between the diphtheritic process and this ulcerous disease of the left heart, and the frequent coincidence of the two affections, renders it highly probable that the diphtheritic poison is the chief factor in its causation." (Bartholow.)

Pathology.—The morbid appearances are at first not unlike those of the ordinary disease—redness, injection of the tissue beneath the endocardium, red or gray granulations seen in rows or patches—but the process pursues a different course. The substance of the valve becomes swollen, soft, lustreless, at places on the edges or surfaces of the valves the epithelium is removed, the exposed part looks raw, ulcerous, and these ulcers may burrow, causing perforations or aneurisms. Fibrin or white blood-corpuscles may be deposited upon these granulating surfaces, and when they are washed off by the blood-current, they form emboli or plugs which produce cerebral or renal symptoms. The left side of the heart is chiefly affected.

Microscopically examined, these patches of ulcers and granulations prove to contain micrococci, which have been found at the same time elsewhere in the body, producing abscesses, and when coming from the right side of the heart and entering the lungs, suppuration ensues. The blood generally, becomes impure. Various organs become enlarged, whether with or without abscesses. Myocarditis and pericarditis may be set up. The valves and chordæ tendinæ may rupture; and "in the small intestine, swelling of the patches of Peyer and the solitary glands, and ulcerations which differ from those of typhoid in that they are not confined to the lower extremity of the ileum, are not opposite the insertion of the mesentery, and are not limited to the glands." (Bartholow.)

Symptoms.—In all cases of ulcerative endocarditis the symptoms of the heart and of the endocardium are greatly subordinated to the general or systemic symptoms; and for this reason it is often overlooked as a special disease, or confounded with serious lesions of other parts of the body. There are two types: pyæmic and typhoid.

There is a sudden chill (in the cases of acute rheumatism, during the puerperal state, or in valvular diseases), pointing to the heart, of course, and this begins both forms. Following is a high fever, the intervals being often markedly irregular. In the typhoid type there follow headache, vertigo, vomiting, slight pain in the præcordia, dry brownish tongue, constipation, and diarrhœa. Patient sinks rapidly,

and in four days is reached the condition seen in the second week of typhoid. As in typhoid, the abdomen is swollen, tympanitic, and the spleen is enlarged. Then we have delirium, followed by coma. The skin may be marked by purple spots. Albuminuria and hæmaturia set in, and we find involuntary passages of urine and fæces; there are usually coughs and dyspnoea. On auscultation, a loud systolic murmur, more marked in the mitral area; patient sinks into a comatose condition and dies, or dies suddenly through rupture of valves or chordæ tendinæ.

In the pyæmic type, often chills and fever, which give no relief; chills, as in pyæmia, being usually irregular. A completely prostrated condition follows. There may be jaundice, purple spots appear on the skin, or it may become yellow. Temperature may be 105°, pulse 140. Lungs may be affected; spleen enlarged. Symptoms of the kidneys, corresponding to those of blood-poisoning. Sudden abscesses form, painless when at rest. The patient sinks into a comatose state, and dies. Care should be taken that these general symptoms do not obscure any that may point to an affection of the heart.

Diagnosis.—When present in the course of acute rheumatism, endocarditis of the typhoid or pyæmic form should, with care, be distinguished from those diseases, by the history of the case, by study as the case advances, and as symptoms point more to heart trouble. In typhoid, the grave symptoms come on slowly, while in endocarditis they advance rapidly, and the latter may be distinguished, too, by the prolonged rigor and intermissions; but the circumstances in the case must give the greatest assistance.

Prognosis.—The prognosis is *always* unfavorable, no positive cases having yet been reported in which recovery from ulcerative endocarditis took place. Death usually results in about ten days, although in the typhoid form the development may be slower and the crisis occur at the end of three or four weeks.

Treatment.—There are two objects to be aimed at in the treatment of endocarditis. (1) To reduce the inflammation as quickly as possible in order that the valves may not be seriously injured, and (2) to prevent that loss of power in the heart-muscle which may lead to cardiac failure. I cannot agree with some authorities who assert that failure of the cardiac muscle *begins* with the disease. My observation is that such is not the case in acute endocarditis, unless occurring in cachectic subjects, or due to blood-poisoning, as in Bright's disease, pyæmia, or scarlatina. In idiopathic, or acute, rheumatic endocarditis, the first stage is characterized by an action of the heart, in which there are excessive force and increased blood-pressure. This can be seen in the hard pulse, the increased impulse of the heart, the arterial turgescence of the head, and other equally prominent symptoms. The medicines most appropriate for the first, or acute, stage are:

Aconite, *Veratrum viride*, *Belladonna*, *Bryonia*, *Convallaria*, *Digitalis*, *Cimicifuga*, and *Spigelia*.

Aconite, in its pathogenetic and pathological action, probably presents the nearest *similimum* to endocarditis. It is needless to give all the symptoms which may indicate it. The most prominent and characteristic are: the general febrile state, the high temperature, the acute pain with swelling of the joints, the great restlessness and anxiety, the fear of death, the small, hard pulse, which does not always accord with the action of the heart, i. e., the heart may be beating violently, and twice as often as the pulse. It is indicated when endocarditis is complicated with pericarditis, and when the stasis of the lungs is very marked. Its use should not be continued too long, but it should give place to some other remedy when the temperature is lowered to 100° F., and the action of the pulse and heart is modified.

Veratrum viride is equally important with Aconite, but the indications are quite different. The action of the heart is more violent, more forcible in its stroke upon the wall of the chest. The blood-pressure is stronger, the temperature higher, the pulse always large, hard, bounding, and unyielding, and this intense impulse is noticeable in the temporal arteries. It is better adapted to idiopathic endocarditis than Aconite. There are no distinctive symptoms of the chest which indicate it, for all remedies have the dyspnoea and oppression. As *Veratrum viride* is our greatest remedy in acute congestion of the lungs, so in endocarditis is it a powerful agent to prevent such a complication. Some cases of endocarditis are ushered in by a violent congestion of the brain and medulla that often masks the cardiac trouble. Here *Veratrum viride*, if given boldly, is certain to prevent serious injury to the cerebro-spinal centres. Like Aconite, it should not be continued too long. So soon as the pulse becomes softer, and the temperature lowers, it should be given at longer intervals, or discontinued. A *quick* pulse is not necessary to indicate this drug. I have lately treated two cases in which the pulse was 40 to 50, while the heart beat was 70 to 80, but the great volume and hardness of the pulse induced me to give *Veratrum viride*. While I find Aconite adequate in the lower dilutions (1st to 3rd), I give *Veratrum viride* in doses of 1 or 2 drops of the mother tincture, or of the first decimal attenuation, nor do I think it should be given higher if we desire its prompt curative action in this disease.

Cactus grandiflora may be imperatively called for when we have the sensation as of an iron band constricting the heart, with great anguish, dyspnoea, etc. It is indicated when, preceding or attending these symptoms, there is great pain in the occiput.

Bryonia, although supposed to be more useful in pericarditis, is certainly as often indicated in endocarditis. It corresponds perfectly to those varieties of acute rheumatism which are associated with inflammation of the endocardium. This membrane is structurally a serous membrane, and *Bryonia* has a specific affinity for it, causing in all serous membranes an inflammation resulting in effusion of serum, plastic lymph, or vegetations. No remedy is, therefore, more homœopathic to valvulitis with vegetations or thickening. The absence of the peculiar "sticking" or "stitching" pains is not a contra-indication, for it has been shown that even acute pleuritis may run its course without these pains, and so may pericarditis. It is the pathological condition of the patient and the concomitant symptoms, which should guide us in the selection of *Bryonia*. As swelling and vegetations on the valves occur very soon in the course of endocarditis, it is not always best to wait until Aconite or *Veratrum viride* are no longer indicated, but we may alternate *Bryonia* with one of them. A strict adherence to the dictum of non-alternation will be to lose valuable time. *Bryonia* has high fever, a very intense frontal or occipital headache, aggravation of the pain on slightest movement, dyspnoea, and valvular murmurs. These, and the character of the attending or preceding rheumatism, must be the indications for *Bryonia*.

Belladonna is an excellent remedy in acute pericarditis. It closely resembles *Veratrum viride* in the appearance of its symptoms. It has throbbing of the cerebral arteries, violent action of the heart, a hard pulse, engorgement of the capillary system, intense headache with delirium or sopor, aching in the cardiac region, taking one's breath away and causing anxiety, occasional intermittence of the pulse, injection of the conjunctiva, and, often, dilated pupils.

Digitalis may be homœopathic to endocarditis, but some explanation of its action may be necessary in order to understand when it is indicated. The primary

action of *Digitalis*, in large doses, is to quicken and intensify the action of the heart, increasing the force of its contractions and the pressure of the blood in the arteries. This increased force may go on until the ventricles are thrown into spasms of such tetanic nature as to arrest the heart in systole and to cause death. In this extreme condition the contractions of the ventricles become short and abrupt, rendering the pulse feeble and irregular, in fact, the same kind of a pulse which exists when the heart is feeble, and its muscle on the point of paralysis. But the condition of the heart, during the primary action of *Digitalis*, is the opposite of that which occurs during its secondary action. The opposite school consider *Digitalis* only a cardiac tonic, and declare it contraindicated in conditions of increased blood-pressure, as in concentric hypertrophy and inflammation. Homoeopaths, however, can use it with benefit during the acute stage of endo- and pericarditis, when the condition above mentioned, of spasmodic but incomplete contraction, is present, with the feeble irregular pulse. It is not indicated in the acute, but rather subacute, endocarditis, or, after the acute stage has subsided, and is followed by, or complicated with, spasm of the muscular walls of the heart. Other symptoms indicating *Digitalis* are: vomiting, vertigo, delirium, abnormal vision, rapidly increasing dyspnoea, spasmodic cough, with expectoration mixed (not striated) with blood, livid turgescient face, cannot lie down or be moved without anguish from dyspnoea. The dose must be small, not lower than the 2^d dilution, for larger quantities will cause intense aggravation when thus primarily indicated.

Convallaria (Lily of the Valley), one of the several new cardiac drugs, closely resembles *Digitalis* in its action. It is not supposed, however, to have such an intense primary action on the heart's muscle, but seems to have a greater affinity for the pneumogastric. It is indicated in acute endocarditis when the temperature has fallen, but the heart is acting too strongly, and there are present intense nervous erethism and dyspnoea, out of proportion to the severity of the cardiac disease. The dose should be the same as of *Digitalis*. (The tincture or fluid extract of the flowers should always be used.)

I shall only mention two other remedies for the first stage of endocarditis, namely, *Cimicifuga* and *Spigelia*. They are also indicated in the later stages, for they correspond to that condition of the heart known to be frequently associated with chorea. Dr. Fagge and Sibson, in Reynolds's *System of Medicine*, consider chorea, next to acute rheumatism, in its power to cause endocarditis and valvular disease. The peculiar pathological lesion, occurring in chronic endocarditis, is said to be "a row of minute granulations on the edges of the valves." But as acute rheumatism and chorea are often combined in the same case, it is difficult to separate the two kinds of endocarditis.

Cimicifuga is one of our most potent remedies in acute rheumatism, as well as for chorea. It is not so much the high temperature in acute inflammation which indicates this drug, as the violent pain in the large muscles. I have always believed it is more adapted to myocarditis than to endocarditis, but we rarely find a case of the former unconnected with the latter. If, with chorea, or intense muscular rheumatism, with violent aching pains in the parts affected, we have intense frontal headache, or headache as if the top of the head would be lifted off (a gloomy mood); severe aching in the eyes, pain in the left side, under the nipple, and down the left arm; and if the attack has come on after suppressed menses, *Cimicifuga*, in the lower dilutions, has always done me good service.

Spigelia, in its symptomatology, gives a perfect picture of chorea of the heart. It has "undulating motion of the heart, indistinct beats of the heart running into one another, tumultuous beating of the heart when sitting or lying, not synchronous with the radial pulse; spasms of the chest, suffocative attacks; trembling in the heart, great dyspnoea on the slightest motion; the impulse of the heart is violent and feeble by turns; purring murmur in the heart," etc. These symptoms often persist after the acute endocardial inflammation has passed away, showing how persistent is the chronic irritation. In these cases no remedy can rival *Spigelia*, and many brilliant cures are recorded from its use.

External applications are not without value in endocarditis. Rejecting absolutely the absurd and barbarous "anti-pyretic" measures taught by Ziemssen and the German school, I recommend warm poultices of flax-seed meal, or raw cotton. The chest must be kept warm, so that the cutaneous bloodvessels may be full, in order to keep as

much blood as possible from the heart. When there is great pain and distress in the cardiac region, a lotion of aconite, chloroform, and oil or vaseline should be rubbed upon the chest, and the cotton wool applied over it.

Rest is absolutely necessary, not only in the first stage of endocarditis, but in the later stages as well. Every motion of the body, especially if made by the patient, increases the anxiety and palpitation, and taxes the already overburdened heart to the utmost. Urination and defecation should be performed in the lying posture. When the patient's position must be changed, the change should be made by the nurses. When the powers of the heart begin to fail, these rules are imperative, for a large proportion of all the deaths during this disease have been caused by changes of position, such as sitting up or suddenly turning over in bed.

In the second stage of endocarditis, when the cardiac muscle begins to fail, and the swollen or obstructing valve impedes the free flow of the blood-current, the treatment should be changed. Such remedies as Aconite and *Veratrum vir.* are rarely indicated, especially in appreciable doses. If given at all, the high potencies must be used (from the 6th to the 30th). The extreme primary pathogenetic action of these two drugs is to reduce to a minimum the vital power of the heart.

Aconite is indicated when the patient is slowly sinking; the pulse is small and thready, the heart's impulse is almost imperceptible, only a fluttering; the skin is cold and clammy, and the patient is anxious, and his intelligence clear. Here, according to strict homœopathic indications, Aconite ought to rally the sinking vitality. In some instances I have known it to act favorably.

Veratrum viride has widely different symptoms. 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. But in these cases of cardiac failure, especially if rapid, I prefer to trust to medicines which are secondarily indicated, i. e., those which cause cardiac paralysis by their secondary effects. These remedies are *Digitalis*, *Convallaria*, *Adonis*, and *Amyl nitrite*.

Digitalis is indicated by a rapid, regular, feeble pulse, an irregular, feeble pulse, or a feeble, slow, and intermittent pulse. With this pulse, the heart may appear to beat violently, but it is action without force, and will end in failure unless given increased tonic. *Digitalis* is here our sheet anchor; but it must be given boldly, not in the dilutions, but in large doses of 5, 10, or 15 drops of the tincture every hour until the pulse and the general condition of the patient show that he is out of immediate danger. In sudden and alarming cases, *Digitaline* should be injected hypodermically, $\frac{1}{16}$ or $\frac{1}{8}$ of a grain every hour until improvement sets in. At the same time, the patient should not be allowed to make the slightest movement, not even to raise the head to take liquids from a spoon. The body and limbs should be gently rubbed with spirits or, better, Ammonia-water. In desperate cases, Ammonia or Ether should be used by hypodermic injection. In several cases which I have on record, I am satisfied that life was saved by the administration of Aromatic Ammonia and *Digitalis*, fifteen drops of the former to five of the latter, in a spoonful of milk or sweetened water—every half hour till reaction occurred.

Amyl nitrite will rally the failing heart almost instantaneously, almost bringing the patient from death, but it cannot be relied upon unless aided by *Digitalis* and stimulants.

Convallaria rivals *Digitalis* in its power to impart strength to a failing heart. I have used it successfully in desperate cases when *Digitalis* was not well borne, or

failed to exert its usual power. Besides the symptoms given under *Digitalis*, *Convallaria* is indicated by the intense orthopnoea, a dyspnoea which is terrible in its manifestations. The dose is the same as for *Digitalis*.

Adonis, in the hands of French and Russian physicians, is credited to possess properties equal to *Digitalis* and *Convallaria*, and *Casca* (*Erythrophleum*) has similar power as a cardiac tonic.

Caffeine, in doses of one to three grains, will often bring back the failing power of the heart, as I have on many occasions verified.

Quinine should never be used for this purpose, for it is a vaso-motor paralyzer, and its action in appreciable doses would be fatal. There is only one condition when it could be useful, namely: when the heart failure is periodic, intermittent, and due to malaria; and then it should be given only in the apyrexia and in moderate doses. I mention this dangerous quality of Quinine because I have known of several deaths caused by its use when given recklessly by allopathists in cases of endocarditis.

When endocarditis is due to the absorption of poisonous matters,—as in pyæmia, Bright's disease, diphtheria, or scarlatina,—those remedies which induce a similar toxic condition of the blood should, if possible, be selected. At the same time we should direct our endeavors to the object of eliminating such poisonous products of disease from the blood of the patient.

The chief remedies for this form of endocarditis are Arsenic, *Lachesis*, *Naja*, *Crotalus*, Phosphorus, and the Cyanuret of Mercury.

Arsenic is chiefly useful in this form, not so much for its power over the inflammation of the endocardium, as for its powerful action as an antidote to septic poisoning, and its homœopathicity to toxic paralysis of the cardiac muscle. It corresponds also to the rapid serous infiltration of the endocardium. It has a feeble, irregular pulse, slow or quick, great anguish and restlessness, cachectic appearance, cool pale skin, often bathed in cold sweat, orthopnoea, great thirst, etc.

Lachesis corresponds more closely than Arsenic to toxic or septic endocarditis. In persons poisoned by snake venom the integrity of the blood is soon destroyed—the secretions become septic in character, and violent inflammation of the heart occurs, runs a rapid course and ends suddenly in cardiac paralysis.

Crotalus comes next to *Lachesis* in virulence, and *Naja* is closely allied. For the differential diagnosis of these serpent poisons the practitioner must refer to the *Materia Medica*.

Phosphorus is closely allied to Arsenic. It corresponds more closely to combined nephritic and cardiac inflammation than any other remedy, also to those cases due to absorption of poisonous excrementitious matters—the products of malignant diseases. Again, when the cardiac inflammation is complicated with pneumonia, Phosphorus is indispensable; not so much in the acute stage, as when the disease assumes a nervous or typhoid character, and the vital forces are fast failing. It is homœopathic to that tendency to rapid dilatation which often rapidly develops itself during endocarditis.

Mercurius cyanuretum ought to be the best remedy for diphtheritic or ulcerative endocarditis, but we have no clinical experience to offer. Its symptoms have a remarkable resemblance to rapid heart-failure due to malignant cardiac disease.

The treatment of the consequences of endocarditis will be found under valvular diseases, dilatation, myocarditis, etc. I have purposely confined myself to the acute disease. I do not recognize chronic endocarditis, for all its manifestations, as described by various authors, should be classed under valvular diseases and other sequelæ of acute endocarditis.

VALVULAR DISEASES OF THE HEART.

GENERAL CONSIDERATIONS.

Diseases of the valves of the heart are of peculiar importance, not so much on account of the local disorder itself, as on account of the secondary troubles which are likely to appear in remote organs and which often lead to a fatal termination.

These troubles arise from the disturbed equilibrium of the circulation, which results from the faulty action of the valves. They are mostly congestive troubles, as bronchitis and emphysema, cerebral hyperæmia and apoplexy, chronic nephritis, and engorgement of the liver, etc.

Valvular diseases are also important because of their frequency, and on account of the effects of judicious treatment upon them. Their course is chronic and invariably progressive, unless arrested by proper hygienic and remedial measures. They do not recover spontaneously, but careful watching and skillful treatment will often keep them in check for years.

Any one of the four valves may become the seat of this affection; the greater liability lies with the valves of the left side of the heart, and most frequently it is the mitral or bicuspid valve that suffers.

The aortic valves are second in frequency of affection; the tricuspid and pulmonary valves are rarely involved.

The valves of the right side of the heart become primarily diseased in early life, and frequently before birth. Should, from any cause, an endocarditis begin during intra-uterine life, or shortly after birth, the affection is invariably limited to the right side of the heart, and consequently gives rise to stenosis or insufficiency of the valves of the same side. Valvular disease in children is almost always limited to the tricuspid and pulmonary semilunar valves, and, through imperfect compensation, usually destroys life at an early age. The explanation of this fact is found in the peculiarities of the foetal circulation.

Physiologists teach that during foetal life the blood from the ascending vena cava passes at once from the right auricle through the foramen ovale into the left auricle, without the formality of entering the right ventricle and the lungs. From the left auricle it passes into the left ventricle, and hence into the aorta and the systemic circulation.

The blood from the descending vena cava pursues a different course. It passes from the right auricle to the right ventricle, and hence through the pulmonary artery and the ductus arteriosus into the systemic circulation. During this period the right side of the heart has more work to do than after birth, there is greater pressure put upon it, and

this seems to determine the location of any inflammatory process that may arise.

It is not impossible for the right side of the heart to become diseased in adult life, but the cause of the increased blood-pressure must in such a case be sought for in some abnormal condition of the pulmonary circulation, usually due to mitral or aortic disease.

The majority of cases of valvular disease in adults are secondary to acute endocarditis, and this affection, in turn, is usually a complication of rheumatism, so that acute inflammatory rheumatism is, of all causes of serious diseases of the heart, by far the most prolific.

Other troubles, however, may excite an endocarditis, as, for example, the acute infectious diseases, pyæmia, puerperal fever, and diphtheria, and some chronic affections, such as nephritis, syphilis, alcoholism, atheroma, and, occasionally, violent muscular efforts. The latter factor is more apt to cause a rupture either of the chordæ tendinæ or of the valves, than to excite an inflammation of the endocardium.

Lesions of the valves are of two kinds, namely, obstructive and regurgitant. Sometimes the two conditions are found in the same valves, but it must be remembered that all diseases of the valves come under one head or the other.

The pathological condition in obstructive lesions, or stenosis, is one of thickening of the free borders of the valves, resulting most often from acute endocarditis.

This inflammatory process is most intense at the free border of the valves, probably because of their constant activity. In other situations motion aggravates an inflammation, and there is no reason why it should not do so in the heart. The valves are moving back and forth seventy times a minute during health; should inflammation begin in one of them, is it not reasonable to presume that the constant motion and effort to which it is subjected would increase the inflammation very materially?

During the inflammatory process there is some swelling of the valves, and after the acute stage has subsided, more or less hyperplasia of the tissues remains.

The thickened valves are not able then to open as fully as in health, and consequently offer more or less resistance to the blood-current. In some cases the thickening is so great, and the segments become so glued together, as only to leave an opening of the size of a quill or of a bristle.

Other changes are very likely to take place at a later period, usually of a degenerative nature.

In aged persons who suffer from endarteriitis and atheroma, atheromatous patches are apt to occur on the surface of the valve (aortic usually). These patches weaken the valve-segment, and cause a bulging which is called a valvular aneurism. Should this aneurism

burst, insufficiency of the valve and regurgitation of the blood immediately occur.

In a large proportion of the cases, vegetations spring up from the diseased valve. They are usually multiple, and by their rubbing against the heart-substance, or the walls of the large vessels, as the case may be, they are apt not only to cause irritation, but also to give rise to small vegetations at the points of contact.

The vegetations in time undergo calcareous degeneration, as does also the thickened valve; this chalky deposit may be so extensive as to form a firm "bony" ring around the valvular orifice, which is incapable of variation. It is remarkable that life can be maintained for a considerable period of time under such circumstances.

The pathological changes in insufficiency of the valves are practically the same changes which occur in connection with obstructive lesions, with only this difference, that in the former condition the edges of the valves retract, and hence complete closure of the orifice is rendered impossible.

A valve may be rendered insufficient without giving evidence of derangement in its own structure; under such circumstances the insufficiency depends upon some abnormal state of the heart-wall.

If, for instance, for some reason, the left ventricle should become dilated, while the mitral valve remained in perfect condition, the dilatation of the ventricle might be carried so far as to separate the attachments of the two segments of the mitral valve and prevent their free borders from coming in contact with one another; the blood would then be permitted to flow back into the left auricle during the ventricular systole.

Insufficiency, therefore, may occur in a perfectly healthy valve; stenosis, on the other hand, is always due to some abnormal condition of the valve itself.

When the two conditions are combined, the obstruction makes its appearance first. The hyperplasia is considerable, and at a later period this new tissue contracts, drawing with it the free border of the valve, and insufficiency results.

Valvular diseases, whether obstructive or regurgitant, give rise to secondary nutritive changes in the heart muscle. They are conservative changes on the part of nature, who makes an effort, more or less successful, to compensate for the results of the abnormal condition of the valves.

The first effect of a valvular lesion, be it obstructive or regurgitant, is to put a greater amount of work on the heart. This increased effort calls for increased strength, and this causes increased thickness of that portion of the heart upon which the extra labor is put. In other words, the wall becomes hypertrophied, and this condition is recognized as a "compensatory" hypertrophy. So long as it is possible in this

manner to supply the system with the normal amount of blood, the circulatory equilibrium is sustained, and there are no subjective symptoms of disease.

This condition may be maintained for years, and not cause inconvenience to the patient. As a rule, lesions of the aortic and mitral valves are well compensated for, while those of the pulmonic and tricuspid valves are not. The reason for this lies in the fact that the aortic valve has all the cavities of the heart to back it. Yet there is one lesion of this valve, insufficiency, that comes to an early end. Insufficiency of the mitral valve is compensated by the right side of the heart and the left auricle, while the pulmonic is sustained by the right ventricle and auricle, and the tricuspid simply by the right auricle.

Should, in any case, a cavity of the heart be over-filled with blood, as is the case in regurgitation, it dilates; at the same time the walls may undergo hypertrophy. But if, at a later period, the circulation in the coronary arteries should be interfered with, the hypertrophic condition would soon disappear, and simple dilatation would be the result. As soon as the dilatation begins to predominate over the hypertrophy, the equilibrium of the circulation would be destroyed, and symptoms of disease necessarily show themselves.

Symptoms.—The symptoms caused by valvular lesions are the effects of the disturbance of the circulation rather than of the diseased condition of the heart itself. In all valvular troubles the arteries are robbed of the normal amount of blood, while the veins are over-filled. This venous congestion soon produces changes in the organs of the body which interfere with a proper performance of their functions, render the patient more or less miserable, and often are the immediate cause of death.

Lungs.—Diseases of the aortic and mitral valves produce, primarily, an engorgement of the left auricle, and then of the pulmonary vessels. Pulmonary congestion gives rise to chronic bronchial catarrh, with the excessive secretion of mucus. This condition necessarily induces an obstinate and distressing cough, which is not relieved by expectoration, as most lung troubles are. Sometimes the congestion is so great that capillaries are ruptured and hæmorrhage into the alveoli occurs. Often the sputum is blood-streaked.

This condition also favors the development of pulmonary œdema in advanced cases, which often proves the immediate cause of death. Under all circumstances, breathing is rendered very difficult; sometimes the dyspnoea is so great that the patient cannot lie down without almost suffocating; the sufferer is obliged to sit up nearly all the time; he sleeps in the erect posture, or, rather, stooping over, with his arms resting on some support in front of him; this condition is called *orthopnoea*.

Liver.—The liver, at an early stage, suffers from the general venous

congestion. The increased amount of blood which the vessels are obliged to hold enlarges the organ considerably, and, in the course of time, gives rise to the pathological condition known as the "nutmeg liver." On section, the organ presents a mottled appearance which is due to engorgement of the inter-lobular veins (the radicles of the hepatic veins) and to a lighter zone around the periphery of the lobules. At a late stage of the disease the liver becomes shrunken and smaller than normal; this is probably due to atrophy of the hepatic cells. Of course, the symptoms of chronic congestion of the liver are present. The patients are liable to be more or less jaundiced, and to suffer from catarrh of the bile-ducts. When the organ is atrophied, ascites may result, as in cirrhosis.

Kidneys.—The kidneys soon feel the effects of cardiac trouble. The first change is in the circulation, consisting in a diminished quantity of arterial blood. As a consequence of this diminished supply, the urine becomes scanty and heavily loaded with the excrementitious salts. The relative amount of urea and of the urates is increased, and they usually form a heavy deposit as soon as the urine cools.

Combined with the lessened quantity of arterial blood, at a later period, there is venous engorgement which favors the transudation of serum from the capillaries into the tubules, and gives rise to albumen in the urine.

The kidneys are not apt to undergo any change of structure, but the congestion changes the appearance of the organs in a characteristic way. They become swollen and very firm, almost hard to the touch. The cortical substance, but more especially the medullary portion, takes on a dark bluish-red color which has suggested the name of the "cyanotic kidney." When examined microscopically, no change is found, as a rule, but sometimes there is increase of the connective tissue with degeneration of the epithelium—the cirrhotic kidney.

Brain.—The brain does not escape disturbance when the blood becomes dammed in the venous system. Passive congestion of this organ must occur, and it is accompanied in the later stages by œdema. The serum transudes and fills the ventricles, the cerebro-spinal fluid is increased, and chronic hydrocephalus results. The symptoms accompanying these conditions are: a tendency to vertigo and mental dulness; the patients are irritable and capricious; they are despondent and melancholy, but have not the mental anxiety concerning their condition which accompanies functional heart troubles.

In aged persons the bloodvessels of the brain are apt to become atheromatous, this condition giving rise to hæmorrhages and apoplexy. This is particularly liable to occur when the left ventricle is hypertrophied.

The occurrence of an embolus constitutes one of the most serious

accidents to the brain. A clot becoming detached from a vegetation, and entering the circulation, is very apt to pass into the left common carotid, and from there to find its way into the left middle cerebral artery, and to lodge in one of its ramifications. Such an event is characterized by a "stroke." The patient is stricken suddenly with unconsciousness, and as his senses return he finds that the right side of his body is paralyzed, and that he cannot speak.

Aphasia and hemiplegia of the right side result in typical cases of embolism, but there are occasionally atypical cases in which there is not unconsciousness, and only paralysis of certain muscles, or in which the loss of speech is the only sign of trouble.

The embolus shuts off the circulation to a limited area of the brain tissue, and unless collateral circulation is speedily established, softening and disintegration ensue. This event renders the paralysis permanent, so that, although the condition may in time grow better than immediately after the stroke, the entire use of the muscles is never regained.

Delirium sometimes occurs and is an unfavorable omen. Horrible dreams commonly disturb the little rest which the patient is able to get.

Dropsy.—The mechanical obstruction to the circulation and the accumulation of blood in the veins lead to dropsy. The increase of the blood-pressure favors the escape of the serum into the loose and yielding areolar tissues of the body, and dropsy occurs as soon as the pressure exceeds that exerted by the tissues. The first symptom of dropsy is a slight puffiness about the ankles at night, which disappears before morning. The dropsy occurs first in the most dependent portions of the body, but sooner or later becomes more extended, and in mitral and tricuspid diseases is liable to become general.

Ascites from obstruction to the portal circulation is common and may be great in amount. All the serous cavities contain serum when the dropsy becomes general, and we find hydropericardium, hydrothorax, ascites, as has been mentioned, and effusion into the ventricles.

The dropsical condition is likely to be a source of great distress to the patient. If the chest contains much fluid, breathing is interfered with, and may lead to a fatal termination. A large amount of fluid in the abdominal cavity may also interfere with breathing when the patient is on his back, by pressing on the diaphragm. The weight and the feeling of distension of the skin are painful when the oedema is great. Unfortunately, this condition cannot be cured. The processes under which the dropsy first developed, continue, and though the fluids in the tissues may be temporarily removed by medicinal and surgical measures, the relief is only temporary, the fluids again accumulating, and in larger quantities than at first.

The skin, in these affections, has a peculiar livid hue which distinguishes it from renal disease accompanied by dropsy. This is probably due to the fact that in the former class of cases the blood does not undergo such a profound change as in the latter; it does not become hydræmic.

Nature tries to relieve herself of the venous engorgement through the natural channels; thus it is that there is occasionally observed a serous diarrhœa, and usually increased secretions from other mucous surfaces; but these efforts are defective and unable to afford much relief.

LESIONS OF THE AORTIC VALVES.

Aortic Stenosis.

Ætiology and Pathology.—Aortic obstruction is not commonly a result of acute endocarditis, but is more likely to be seen in aged persons who are subject to endarteriitis and atheromatous changes in the aorta. The morbid condition is apt to involve the aortic valves, giving rise to atheromatous patches on the surface of the segments. Atheromatous ulcers are a frequent cause of aneurism and rupture of these valves.

One or two segments may be the seat of disease, but usually all of them are involved.

Acute rheumatic endocarditis is also a cause of aortic stenosis, but not commonly; this affection is more apt to limit itself to the mitral valve.

The ventricular surface of the aortic valves is a favorite place for vegetations to spring up. They may be single or multiple, and are prone to undergo calcareous degeneration. It is at this orifice that the "calcareous rings" are usually found. This condition was formerly called "ossification" of the valve, but microscopical and chemical tests prove it to be simply the deposit of calcareous particles in the substance of the valves and vegetations.

The rough surface caused by the vegetations favors the formation of fibrin, and oftentimes a clot of fibrin, clinging to the surface of the valve, has been mistaken for a vegetation. It is well at post-mortem examinations to examine all excrescences very carefully, in order to distinguish between a veritable outgrowth of tissue and fibrin. Fragments of these clots clinging to the roughened valves may become broken and be swept by the blood-current to remote organs, where they lodge and form emboli.

Aortic obstruction is the best compensated of all valvular lesions.

The powerful left ventricle becomes hypertrophied sufficiently to force the blood past the obstruction. As there is not an increased amount of blood in the cavity of the ventricle, it does not dilate, but remains simply hypertrophied. Even when the obstruction is very

great, the equilibrium is maintained, and no subjective symptoms are experienced. This condition of affairs may last for years, and the patient never know he has heart disease. But in old persons, and in the atheromatous condition, the affection may lead to regurgitation, or extend to the mitral valve, and there cause serious trouble.

Diagnosis.—The diagnosis of aortic stenosis is made solely on the physical examination.

Inspection reveals the action peculiar to hypertrophy of the left ventricle,—the heaving of the chest over the heart from the powerful blow caused during the ventricular contraction. The heart is somewhat enlarged, owing to the thickening of the ventricular wall, and consequently the area of cardiac dullness is increased in proportion. The apex is also displaced to the left and downward.

Auscultation is the positive means to a diagnosis. A murmur is heard most distinctly over the aortic valves, that is, at the right border of the sternum in the second intercostal space. The murmur is rather loud, rough or musical in character, and is systolic, thus masking somewhat the first sound of the heart-beat and extending to the second sound, which in its turn is rather faint.

The murmur is quite distinct, and has the characteristic that it can be traced along the arteries for some distance. Thus it can be heard over the subclavian, the carotids, etc. Care must be taken to differentiate between the anæmic murmurs and the “venous hum,” which are also encountered in this location.

Anæmic murmurs are louder in the neck than at the heart, and are sometimes so harsh as to be called *le bruit du diable*. They are always accompanied by an anæmic condition of the patient, and are usually noticed in young girls.

The pulse undergoes a marked change. The difficulty with which the blood is forced through the aortic orifice makes the pulse slow in developing, as is shown by the sphygmograph. At the same time it is hard, regular, and incompressible.

Prognosis.—This lesion, if uncomplicated, is as a rule thoroughly balanced by the ventricular hypertrophy. If the orifice be very small, however, cerebral anæmia is apt to occur, accompanied in some cases by apoplexy or syncope, and sudden death may take place from dilatation of the ventricle and paralysis of the heart from this over-distension.

Aortic Regurgitation.

Ætiology.—This disease often accompanies aortic stenosis. The processes that give rise to the latter may reach a point where the valves are rendered insufficient, and then the signs and symptoms of this condition appear.

One of the most frequent causes of aortic regurgitation is violent

muscular exertion, particularly of the arms and chest. It is a well-known fact that athletes, oarsmen particularly, are subject to heart disease, and this is the form to which they are liable. Blacksmiths, miners, and all laborers who use the arms excessively are liable to suffer in the same way.

It is interesting to study the development of the disease in these cases. Fothergill says on this subject: "The exciting cause of the low interstitial inflammation, with growth of connective tissue, is essentially the violence with which these valves are closed, or rather driven together, by the backward rush of blood on the aortic recoil. When, then, recoil is increased, so is the force with which these valves are closed."

In persons who tax their arms to the utmost, oarsmen, etc., during the period of exertion, the heart's action is very violent, and the blood is forced into the arterial circulation in greater quantities than during repose. At the same time the active muscles offer marked resistance to the circulation by powerfully contracting, and thus the larger vessels become engorged, and the increased blood-pressure, with the increased force of the aortic recoil, in time have an effect upon the valves.

Compensation.—The circulatory equilibrium may be established by compensatory dilatation and hypertrophy of the left ventricle. The cavity dilates from the increased quantity of blood which comes to it from the auricle and also from the aorta. This satisfactory condition cannot be maintained for any great length of time, as is the case in aortic obstruction, because the circulation in the coronary arteries is interfered with, and sooner or later the muscles degenerate, and then dilatation predominates over the hypertrophy. When this time comes, things go from bad to worse, the dilatation increases, sometimes to an enormous extent, the mitral valve may be involved, and the effects of the impeded circulation are shown in general venous congestion.

The character of the pulse is changed, and acquires peculiarities which suggest at once the nature of the trouble. In the first place, the increased power of the ventricular contraction forces the blood into the arteries with a bound, but during diastole the blood regurgitates and the arteries collapse. The impression conveyed to the finger at the pulse is like a ball rolling by in the artery. This peculiarity was first pointed out by Dr. Corrigan, of England, and is termed "Corrigan's pulse." Sometimes the disease is called Corrigan's disease by English writers, but more commonly it goes by its anatomico-pathological name.

The powerful ventricular contraction causes the arteries to pulsate visibly in nearly every superficial point of the body, and they can be distinctly felt even to the smallest arterioles. The Germans use this

as one of the means of diagnosis, and search for the peculiar pulse at the anterior tibial and dorsalis pedis arteries. This condition is most marked during the early period. Later, when dilatation predominates, the heart's action grows weaker, and the peculiar shot-like feeling of the pulse is not distinct.

Diagnosis.—The diagnosis, like that of all other cardiac affections, depends upon the physical examination.

Inspection shows the existence of the conditions observed in aortic obstruction, the bulging of the chest over the heart, and the heaving impulse given to the chest with every heart-beat. But the one characteristic feature of the disease is the visible pulsation of the superficial arteries. Whenever this is seen, aortic regurgitation is more than probable. Palpation is merely serviceable in recognizing the peculiar shot-like feeling of the pulse. Percussion reveals enlargement of the heart and consequent displacement of the apex. If the enlargement is very great, the lower end of the organ may be found as low as the seventh intercostal space, and the left border an inch or more to the left of the nipple.

In this disease auscultation furnishes most valuable indications. Where there is simple regurgitation without obstruction, a regurgitant murmur takes the place of, and follows, the second sound of the heart-beat. The ventricular systole is heard distinctly at the apex, but may be less pronounced than in health, and there is no abnormal sound until the aortic valves close. Then the regurgitant murmur appears and lasts during the greater part of the diastole; it is most distinct at the right border of the sternum in the second intercostal space. It cannot be traced along the course of the arteries of the neck, but may be heard at the apex of the heart, and sometimes may be traced for some distance to the left. In this respect it resembles the mitral regurgitant murmurs, for which it may be readily mistaken; but if care is taken to note the time when the murmur appears, and the point at which it is most distinctly heard, the differentiation is easily made.

In cases of combined obstruction and regurgitation, the two murmurs are present. The one, denoting obstruction, occurs while the blood is being forced past the obstruction, that is, during the ventricular systole, and is traceable along the arteries of the neck; the other, denoting regurgitation, occurs while the blood is flowing back into the ventricle, that is, following the second sound, and during diastole.

During the period of hypertrophy, a murmur is heard over nearly all the arteries of the body. Thus, the stethoscope applied to the femoral will reveal a *bruit* very like an aneurismal *bruit*, which is synchronous with the aortic murmur.

LESIONS OF THE MITRAL VALVE.

The mitral valve is particularly liable to disease, and to the physician its pathological conditions are most important.

While stenosis of this valve is relatively rare, insufficiency, or a combination of both conditions, is one of the most common organic troubles that come to the physician's notice. Unlike aortic lesions, the mitral disease is more apt to make its appearance early in life,—at any age when inflammatory rheumatism is prone to occur. The endocarditis which so frequently accompanies that affection, seems to have a special affinity for the mitral valve, while, on the other hand, atheroma, so potent a factor in aortic disease, is not apt to attack the mitral. The endocardial inflammation, by affecting the chordæ tendinæ, and spreading over the edges of the segments, may ultimately make of the original valve nothing more than a cone, protruding into the ventricle, with a slit-like opening at the apex. This is the so-called "button-hole" mitral.

The symptoms of both conditions are similar. The mechanical obstruction offered is practically the same in its effects upon the circulation and the remote organs. Of course, the first to suffer from the engorgement are the lungs, and the symptoms mentioned under that division of the general considerations appear.

The cough accompanying the congestion is of a dry, hacking character, and the feeling of "stiffness" of the chest is not relieved by expectoration.

There is abundant evidence that the nutrition of the lung is materially interfered with in many cases. It is not uncommon in elderly persons to have an emphysematous condition develop; in young persons the condition known as "brown induration" frequently appears. The latter consists of an increase of the interlobular connective tissue, an increase of the epithelium lining the alveoli, and the deposit of dark-brown pigment in them. Pulmonary infarctions are also occasionally observed.

The dyspnoea experienced is in proportion to the amount of congestion, emphysema, or œdema. It is always present, and is one of the most distressing symptoms. Cardiac asthma may develop under these conditions.

Mitral Stenosis.

Ætiology.—This condition is comparatively rare. It is sometimes observed, however, in young subjects as a sequence of acute rheumatism and of endocarditis.

It is not well compensated for, because hypertrophy of the left ventricle does not take place. Hypertrophy of the auricle occurs, but even under the most favorable circumstances not much assistance can be had from this source. The onward flow of the blood is interfered

with, and it accumulates in the lungs and, later, in the right ventricle, which becomes enlarged; still, it is inadequate to force the blood beyond the obstruction, and general venous congestion soon occurs. The prognosis is therefore worse than in mitral regurgitation. In fact, this disease usually reaches a fatal termination in a comparatively short time.

Diagnosis.—Inspection reveals nothing abnormal. Palpation reveals an epigastric impulse in advanced cases, but usually nothing abnormal.

On percussion, the area of cardiac dulness is found increased in those cases in which the right ventricle is enlarged. The diagnosis must be based upon the evidences furnished by auscultation. The murmur heard in this condition is *præsystolic*. It is generally a soft, puffing sound, which develops during the latter part of the diastole, and continues up to the first sound of the heart-beat. It is heard most distinctly at, or a little above, the left apex, and cannot be traced to the left, or heard at the back, by which it can be distinguished from the mitral regurgitant murmur. The sound itself is not constant. Being rather faint, as a rule, it may be readily overlooked, if the heart's action is rapid or tumultuous; but when the action is steady, it is usually present. The heart's action is very likely to be irregular; there will be two or three short, quick beats, and then one long, steady beat. The murmur may not be distinguished during the weaker, but may appear just before the stronger, beats.

The second sound of the heart-beat in both forms of mitral disease is increased over the pulmonic semilunar valve. This is due to the increased blood-pressure and recoil in the pulmonary artery.

The pulse may be small, irregular, and intermittent. These conditions are variable. Sometimes the pulse will be regular, but will vary in volume. Again, the irregularity and intermissions will be very marked.

Mitral Insufficiency.

Ætiology.—Mitral insufficiency is due to thickening and retraction of the valve edges, after endocarditis. It may also arise from deformity due to vegetations, to atheromatous and calcareous degenerations, or to dilatation of the left ventricle and the auriculo-ventricular orifice in certain cases of disease of the aortic valves.

It is compensated for by dilatation and hypertrophy of the left ventricle and auricle, and of the cavities of the right side of the heart. It seems at first thought as though the left ventricle would not be changed in structure by a lesion of the mitral valve, and this is true in the case of obstruction, but in the case of insufficiency the ventricle dilates on account of the augmented quantity of blood which is forced into it under increased pressure from the auricle. It becomes hyper-

trophic in order to be able to dispose of this amount of blood, which it propels both forward into the aorta and backward into the auricle.

Prognosis.—In this way the valvular disease is counterbalanced, and the trouble held in abeyance for a considerable period.

The pulmonary engorgement is the most troublesome feature during this otherwise satisfactory stage. It excites a cough and dyspnoea when any slight exertion is made.

Finally, as in all valvular diseases, the time comes when the dilatation predominates, when the heart is no longer able to pump the proper quantity of blood into the arterial system, and when the patient slowly sinks away.

Diagnosis.—Inspection reveals some prominence of the præcordial region, and displacement of the apex impulse to the left. Its beat is sometimes felt to the left of the nipple line.

Percussion reveals an increase in the area of cardiac dulness which is proportionate to the amount of the enlargement.

Auscultation is again indispensable to an accurate diagnosis. The murmur which accompanies this lesion is systolic, and usually takes the place of the first sound, and fills the interval between that and the second sound. It occupies the same length of time which is occupied by the murmur resulting from aortic obstruction, from which it must be differentiated. It is a firm, blowing murmur, heard most distinctly over the apex of the heart. It is diffused towards the axilla, and in most cases can be distinguished in the left interscapular space.

The murmur is lost as one listens towards the base of the heart, which is a cardinal point of difference between it and aortic obstruction.

The pulmonic second sound is intensified by the increased pressure under which the valves close.

DISEASES OF THE PULMONIC AND TRICUSPID VALVES.

Primary lesions of the valves of the right side of the heart are very rare, especially in adults. As was stated in the beginning of this chapter, these valves are apt to suffer from intra-uterine endocarditis, but after birth they are remarkably free from the baleful influences which affect the valves of the left side. Secondary changes, however, are not uncommon, especially in the tricuspid valve. These changes, as a rule, follow disease of the mitral valve, but they also are sometimes associated with aortic disease.

As soon as they become diseased, a train of congestive troubles arise in nearly every organ in the body. The liver, spleen, kidneys, brain, intestines, and the extremities soon feel the effects of the partial stoppage of the circulation, and, as compensation is entirely out of the question, matters go from bad to worse, and the patient soon succumbs.

Diseases of the Pulmonic Valves.—Cases of stenosis and insufficiency of the pulmonic semilunar valves are on record, but are so rare as to be among the curiosities of medical practice.

Insufficiency from overdistension of the pulmonary artery is the most common pathological condition. Its existence is made known by a systolic murmur heard at the left third costo-sternal articulation. It is not traceable along the large vessels of the neck, and the pulse has not the characteristics of aortic regurgitation, which also is accompanied by a systolic murmur.

But as both regurgitation and obstruction are so extremely rare, it is seldom that the general practitioner is called upon to diagnosticate them.

Diseases of the Tricuspid Valve.—Stenosis of this valve is an unknown condition; insufficiency, on the other hand, is the most common complication of mitral and aortic disease.

As soon as the condition is established, a long train of secondary congestive troubles immediately appear. The skin becomes markedly cyanotic, and presents an appearance characteristic of venous stagnation. The superficial veins of the neck pulsate visibly from the force of the ventricular contraction being transmitted backward. Dropsical effusions soon appear and become enormous, and death ends the patient's suffering.

The diagnosis is based upon the evidences furnished mainly by auscultation. A systolic murmur, soft in character, is heard at the apex of the heart, but most distinctly toward the sternum, and sometimes at the ensiform cartilage. The area of dulness is enlarged, and the apex is displaced. Sometimes a heaving impulse is seen to the right of the sternum, which is due to the efforts of the dilated auricle. Venous pulsations in the superficial veins of the neck are seen in this condition.

TREATMENT OF VALVULAR DISEASES OF THE HEART.

Formerly, when valvular lesions followed endocarditis, leaving the heart-functions in a very disordered state, the condition was called chronic endocarditis. We do not now recognize a chronic endocarditis. Endocarditis exists so long as the temperature is above the normal standard; after that, it is valvular disease simply.

The *treatment* may be divided practically into (1) *Hygienic* (2) *Medicinal*. The *Hygienic* treatment consists in so ordering the life, habits, diet, and exercise of the patient, that new attacks of endocarditis or valvulitis are prevented, that the process of compensation is not interfered with or arrested, and that dilatation is not induced or increased.

To this end, rheumatic subjects should avoid exposure to cold and dampness, should wear flannel of proper thickness through the year, and not indulge in such diet or beverages as tend to induce the acid

diathesis. The valves of the heart are left in such a state that their condition is easily aggravated. We cannot modify the abnormal conditions of the valves, except through the action of the heart. Thickening vegetations, or insufficiency, cannot be directly removed by medicines. We must prevent overstraining or irritation of the valves by directing our patients to avoid all things which will unduly excite or overtask the heart. Excessive muscular exercise, great mental excitement, the intemperate use of alcoholic drinks, of coffee, tea, etc., promote the progress of valvular lesions, and should be avoided. Fast walking, climbing, running, lifting should all be avoided.

After a time, however, if the patient has been careful in his habits, and lived quietly, the valves become less irritable and liable to injury. The walls of the heart become thickened, in order to overcome the obstacles to the free circulation of the blood through the heart. Then we have another trouble to avoid, namely: the *tendency to weakness and dilatation of the heart*. It should be understood that we must not seek to diminish hypertrophy, or the compensating thickening of the muscular tissue of the heart, for upon this *compensating* hypertrophy depends the safety of the patient. But we *should* strive to prevent thinning or dilatation of the walls of the heart, for this condition leads to nearly all the evils which we dread during the progress of valvular diseases. The hygienic directions given above will also prevent the dreaded dilatation. But we should not err in the other extreme. We should not compel the patient to live an inactive, sedentary life. Exercise, within certain limits, is highly important with a view to the preservation of the power of the heart's action. Patients affected with obstructive or regurgitant lesions will retain a compensatory vigor of the heart, and the tendency to dilatation will be postponed better by a judicious amount of exercise than by a life of complete repose. Active occupations, free open-air exercise, as a calling or for amusement, should not be neglected. Persons under the necessity of working for a living will do better to continue such work, unless too laborious and overtaxing to the heart's energy, than to live a life of inactivity. Inactivity of its muscular system tends to produce weakness of the heart and to form fatty degeneration, thus tending to the production of dilatation rather than the desired hypertrophy.

The *diet* also should not be too restricted. A healthy nutrition of the heart, and thereby its muscular vigor, requires blood rich in nutritive materials. A poor and insufficient diet tends to bring on the very evils we wish to avoid. Animal food should be advised in judicious quantities—not enough, however, to induce plethora. Liquids weak in nutritive elements, even water in large quantities, should be avoided. Fats—especially bacon, butter, and cream—may be used, unless we fear fatty degeneration. Only nutritious and easily digested

vegetables should be eaten, for indigestion greatly irritates the heart. Cheerfulness should be cultivated, and plenty of mental recreation indulged in.

Plethora should be avoided, and, when present, should be combated by lessening the amount of animal food, coffee, or rich soups; and if constipation be present, the moderate use of such waters as *Carlsbad*, *Congress*, or *Hunyadi* should be advised. *Anæmia* is the most unfavorable condition possible in valvular diseases. I have often been called upon to treat these diseases in anæmic persons in whom the anæmia was the sole cause of all the bad symptoms. With the removal of the anæmia, by a highly nutritious diet, a life in the pure, open air, and the judicious use of Ferrum, China, Aletris, and the Hypophosphites, all the abnormal symptoms disappeared, even when the valvular lesions remained in a modified form. It is well known that anæmia and chlorosis will cause cardiac disorders, and even valvular murmurs closely simulating organic disease.

Medicinal treatment of valvular disease, and its consequences, requires judicious discrimination. I do not desire to detract from the great merit and value of the modern medicinal treatment of valvular lesions by our colleagues of the opposite school. It is as much in advance of their treatment of twenty-five years ago as the therapeutics of Hahnemann were in advance of the practice of the dominant school in his day. But even now they deal in generalities; they do not discriminate closely between their cardiac remedies. When one potent remedy fails, they select another, hap-hazard, because they will not be guided by symptoms and special indications. The homœopathic school labors under many disadvantages, but in another direction. The number of our *proven* cardiac remedies is yet small, and those we possess have not been thoroughly proven by means of the modern aids to the diagnosis of cardiac action and cardiac disorders. There are many potent cardiac remedies used successfully by the opposite school, which are not used at all by our strict adherents who will be guided by symptoms alone. I shall take the liberty to freely advise the use of such remedies, giving as clear indications as possible, based on the clinical experience of the great authorities in allopathy and my own experience and observation. With our proven remedies we are able to palliate many symptoms and distressing conditions, without the use of narcotics, stimulants, or depletion, and we can use these palliative remedies without interfering with the continued use of the potent cardiac tonics which have been found so valuable by our colleagues.

The *general* treatment of the consequences of valvular lesions is based on the general indications (1) of favoring compensating hypertrophy, and (2) of preventing dilatation and cardiac weakness.

The first indication—namely: that of regulating compensating hy-

per trophy by (a) not allowing it to progress too rapidly, or (b) to progress too slowly.

The medicines which appear to me to possess some power to retard excessive hypertrophy, are: *Veratrum viride*, *Erythroxyllum coca*, *Cactus*, *Lycopus vir.*, *Kali bromatum*, *Aurum*, and *Glonoine*.

Veratrum vir., given in doses of $\frac{1}{16}$ th or $\frac{1}{32}$ th of a drop, regularly every three or four hours, for days and weeks, will lower the abnormal force and frequency of the heart's contractions. It matters not whether it acts on the cardiac ganglia or directly on the muscular substance of the heart, this retarding action takes place quietly and without producing any functional disturbance if the dose is kept within the proper limits. As soon as the force of the heart becomes normal, the medicine should be suspended. There are cases where Aconite can be substituted for Verat. v.

Coca has a similar action, but should not be used so continuously. Its sphere is rather in those conditions of cardiac irritation brought on by excessive mental or emotional excitement or physical exertion. In such cases a few drops of the tincture or of the first decimal dilution calms the palpitation, when its use should cease. Coffea (caffeine is one of the constituents of Coca) acts quite as favorably in some cases, in the third (*) dilution.

Lycopus virginicus has a sedative effect on the cardiac ganglia or vasomotor centre, and a calming action on the heart. Its use can be continued for a long time, if necessary. Its action on the circulation in Basedow's disease is proof of its power in hyperstimulation of the heart. When the rapidly progressing hypertrophy results in causing pulmonary hæmorrhage, this remedy is doubly indicated. The dose should range from 10 drops of the 1st dilution to 10 drops of the mother tincture.

Cactus grandiflora or *Cereus bonplandii* are both indicated in too rapid hypertrophy, where the force of the contractions is too forcible for the valvular lesion, and when the blood-current is forced too strongly into the brain and lungs, inducing cerebral and pulmonary congestion and hæmorrhage. Its well-known characteristic symptoms are the guides to its use.

Kali bromatum is best indicated when the distant and reflex irritations (intestinal, ovarian, and cerebral) excite the heart, causing it to flush too intensely the arterioles. A few doses of 5 to 10 grains, repeated every two or three hours, will have a very beneficial effect.

Aurum mur. is recommended by Klapka for "venous stasis due to palpitation," or the "congestion of the brain" due to the same cause. When such conditions occur in mitral disease (or functional disorder), Aurum is doubtless useful. It primarily excites and intensifies the force of the heart's contractions, and flushes with an active arterial congestion all the organs and tissues of the body. Its recorded symptoms give us a complete picture of this condition. The 3rd dilution is the best preparation in such cases.

Glonoine is to aortic valvular diseases what Aurum is to mitral lesions. It is primarily homœopathic to active arterial congestion of the brain, with dyspnoea, great pain in the chest and heart, almost equal to angina pectoris. I shall allude further on to its use, as secondarily indicated (falsely called antipathic). *Belladonna* occupies a position between Aurum and Glonoine.

It is evident that all the cardiac tonics are exquisitely homœopathic to rapid hypertrophy, but I confess that I have never been able to observe such curative action as we would naturally look for from the one chiefly indicated, namely: *Digitalis*.

Convallaria, **Adonis**, and **Caffeine** have not been sufficiently tested in attenuated doses to enable us to judge whether, like *Digitalis*, they will fail us in excessive force of the heart's action.

Climate.—In the condition of the heart above described, when the blood current is too strong, also in true hypertrophy, it is often necessary to advise the patient to change climate. I have often found such patients to do well in a southern location, between latitude 25°

and 35°, where the altitude is low and the atmospheric pressure is high enough to counteract the increased blood pressure.

The *second indication* in the treatment of valvular disease of the heart is to assist the heart in its attempts to accomplish *hypertrophy without dilatation, or complete compensation*.

Fothergil clearly explains how unaided nature often brings this about, namely: "Distension, which involves the elasticity of the muscular fibre itself, that is, extending beyond normal distension till the full length of the fibre is reached, and involving the secondary elongation of the fibres, or their elasticity, creates an impression in the cardiac ganglia. This is quite in accordance with what we know; it is merely the normal stimulus in excess. From recent experiments we learn that the heart possesses a sensory nerve, a fact which we would conjecture from the pain accompanying heart affections, and especially acute ones, and this nerve has been found to be a vaso-inhibitory nerve, *i. e.*, it arrests vaso-motor nerve action, and dilates the peripheral muscular extremity of the circulation, the arterioles. Thus is not only the tension of the arterial system lessened, and with it the opposition offered to the heart's more completely emptying itself at each systole, but this affects the arterioles of the coronary circulation, and thus a broader and more rapid stream of blood is furnished to the *heart itself*, and so leads to hypertrophy."

But, unfortunately, nature alone rarely accomplishes complete compensation, and when she fails, we get the two conditions described by Traube: (a) "hypertrophy with dilatation, or incomplete compensation;" and (b) "simple dilatation or no compensation."

I have already given the treatment of incomplete hypertrophy. I will now give the treatment of that most common sequence of valvular lesions—*simple dilatation or no compensation*. The condition of the muscular fibres of the heart's walls, in this condition, is one of weakness and flaccidity. The heart itself is not nourished, because it is actually starved. This may arise in some cases from an impoverished condition of the blood, and our first duty is to see that it is enriched by blood-making food, proper exercise in the open air where there is an abundance of oxygen and no malaria. If this can be done, we shall rarely be obliged to use Iron, Copper, Arsenic, and other hæmatic medicines.

Then follows the use of certain medicinal agents known as heart-tonics. These remedies act in the following manner: 1. They increase ventricular contraction. 2. They arrest the dilating process, and tend to institute a return to the normal size, and render more normal the general circulation. We know that dilatation takes its origin in incomplete systole, and a certain amount of blood remaining in the ventricular chamber, when the blood rushes into the veins; for the blood will pour into the ventricle as long as the pressure on the

ventricular wall is less than on the venous walls, *i. e.*, until the pressure in veins and ventricles is equal, and no further. But when the ventricle is imperfectly emptied, a compromise takes place in distension of the ventricle and engorgement of the veins, in exact proportion to the amount of blood already in the ventricular chambers. Thus, with dilatation we get venous engorgement, one source of distress and mischief, and imperfect filling of the arteries, another source of trouble; for the elastic arteries transmit only what is poured into them. If then a small bulk of blood is thrown into them at each ventricular systole, the supply of arterial blood to all parts is diminished, including the heart itself. Thus, dilatation has a tendency to perpetuate itself, by this imperfect blood supply, in spite of the beautiful nerve arrangement for increasing nutrition in distension. But when an agent increasing ventricular contraction is administered, a larger bulk of blood is thrown into the arteries and into the whole body, including the heart itself. These agents are of benefit in another way; they increase the periods of rest or sleep needed by the heart.

The medicines which are now well known to increase the power of the heart's contractions, cause the contractions to be more ample and slow, and regulate their rhythm, are the agents upon which we must rely to bring about perfect compensation, and thus make the circulation of blood as normal as possible and prevent the evils of valvular disease. These important agents are *Digitalis*, *Convallaria*, *Adonis*, *Caffeine*, *Squilla*, *Erythrophleum*, *Euonymin*, *Belladonna*, *Glonoine*, *Strychnia*, *Prunus virgin.*, and *Aurum*.

Digitalis has long been known as having a specific affinity for the heart. It was long supposed to be a direct cardiac paralyzer, and was given in fevers to depress the heart's force and action. But recent investigators have fixed definitely its place in therapeutics, and have proved that it is a cardiac tonic, but with a double action, like all other drugs.

Its primary action upon the healthy heart is to slightly quicken the number of beats, but only for a short time, when its real tonic action begins. The contractions of the ventricles become stronger, increase in force, and become slower, even to 30 or 40 per minute. Up to this time, its action is physiological and harmless, but soon the contractions become intermittent, and then irregular, but still very slow; the arteries are filled to their fullest capacity, and the blood in the veins returns with force to the heart. If the drug is continued, the contractions become less complete, because the cardiac muscle is becoming tetanized, and soon the heart closes firmly with a permanent tetanic spasm, which relaxes no more, and death ends the scene. But, if the drug action stops just short of tetanic closure, the symptoms come on in reverse order. An utter relaxation of the cardiac muscle follows, the ventricles become distended, beat irregularly, intermittently, sometimes slow, then rapid; the arteries are not filled, and there is venous stagnation. Its secondary effects are, therefore, similar to the secondary effects of valvular lesions, namely: distension, dilatation, and non-compensation. When we use *Digitalis* in such lesions, we are using it homœopathically, *not its primary* homœopathicity, but its *secondary*. It cannot be called *antipathic* to such conditions. By using it in physiological doses, we need not induce its ultimate toxic effects, but carry its action up to the establishment of normal physiological action. I need not give specific *symptomatic* indications. They are plainly enough given above. They are the symptoms which show that the heart is failing in power, that over-distension is causing dilatation, that the contractions lack in vigor, and are too rapid: that the arteries are not well filled, and the veins are too full of sluggish blood. These are all the indications we need, unless I call attention to the fact that this condition leads to

arterial anemia, and venous stagnation in the brain, lungs, liver, and kidneys, causing cerebral paresis, dyspnoea, jaundice, and dropsy from deficient action of the kidneys. All these remote conditions call for the use of Digitalis. The dose of Digitalis in such a condition of the heart, and other organs, will range from 15 drops of the *tincture* to 15 drops of the 1st dilution, rarely less, and these doses must be repeated as often as every 3 to 6 hours. A good trituration of the leaves (1st in 5 to 10-grain doses) is often better than the tincture; and Digitalin, in doses of $\frac{1}{100}$ or $\frac{1}{20}$ -grain, is equally efficient.

Convallaria.—Next in order to Foxglove, and perhaps superior in many respects, is the Lily of the Valley. In experiments on warm- and cold-blooded animals it has been proved that Convallaria primarily causes a *slowing of the heart's contractions*, with decided increase of the blood pressure; at the same time, it *augments the amplitude of the contractions*. This means that each contraction throws a stronger and larger current of blood into the arteries, and that every organ in the body is supplied with a larger quantity of arterial blood. In a further stage of its primary effects these powerful contractions are accelerated, with a greater increase of blood-pressure. Soon this stage ends in sudden diminution of blood-pressure and arrest of the heart's action. After death the ventricles are found firmly contracted, pale, and empty. The provings on man show that, during its primary effects, there are palpitations, intermittent and irregular pulse, congestions of the head and chest, and other similar phenomena. The secondary effects, due to hyperstimulation of the heart, are failure of the muscular power of the heart, irregular, feeble contractions, low blood-pressure in the arteries, and venous stagnation. Clinically, it has been found useful in all conditions of the heart, due to valvular stenosis or insufficiency, when the ventricles are suffering from over-distension, and dilatation begins; when there is incompleteness or absence of compensation, and the system suffers from deficient arterial blood-supply, and when there is venous stagnation. It is claimed by those who have used Convallaria largely, that it seems to act best in disease of the right side of the heart. This is my own experience during several years of observation. Digitalis, on the contrary, is more successful in derangements of the left heart. This gives Convallaria greater power over pulmonary congestions, dyspnoea, and orthopnoea. In fact, its most brilliant results have been in those terrible dyspnoeas which occur in valvular diseases of the right heart. Dr. Troetzki calls particular attention to its power in removing the torturing attacks of dyspnoea during compensation, also when the patient cannot take the least bodily exercise without producing palpitation. Associated with these symptoms there is a mental irritability, almost amounting to insanity. All this group of mental and physical symptoms are promptly removed or greatly palliated, in a few days, by Convallaria. My own experience is that, in women with functional or structural diseases of the heart, with great nervous irritability, horrible dreams, hysterical manifestations, Convallaria gives more relief than any other drug. Its power in removing dropsy due to cardiac disease is sometimes marvellous, but always in proportion to its restorative power over the failing heart. But all observers, myself included, have found that, if there was albuminuria present, its action as a diuretic was much less. If the heart disease is secondary to kidney trouble, it may act favorably in improving the condition of the heart, may restore its power and regularity of action, and increase the arterial blood-pressure in the kidneys, but, if these organs are damaged seriously, neither Convallaria nor any other remedy can cause an increased flow of urine. Convallaria has many advantages over Digitalis. (1) It rarely causes gastric or intestinal irritability; it rarely, if ever, causes vertigo and confusion of the head, and never irritates the bladder, in the doses required to bring about its curative action. (2) It has not the sudden toxic action supposed to be possessed by Digitalis. I do not believe that Digitalis, Convallaria, or any heart-tonic has any "cumulative" action so-called. When massive doses of any of them are given, there comes a time when the contractions become *tetanic*. This endangers or destroys life. But such an occurrence should never take place when the patient is under the care of a watchful physician, or in a patient of ordinary intelligence. When the pulse and the heart's beats become too hard, and tightness of the chest occurs, the medicine should be suspended for a time. Convallaria seems to possess the power of continuing its action for a week, or more, after its use is suspended, so there need be no fear of losing time by stopping its administration.

There are some important and practical facts connected with the comparative value of the preparations of this drug. It is said that all parts of the plant, flowers, leaves and root, contain the active principles of the plant. But I have not found the preparations of the root and leaves, to be of as much value as those from the flowers. I use and advise only a concentrated tincture or fluid extract of the *fresh* flowers. Of this I give from 1 to 15 drops every 3 to 6 hours, according to the gravity of the case. The

dose should be largest when the failure of the heart's power is greatest. Only in children and infants have I found the 1st dilution of sufficient power. Remember that heart-failure, over-distension, etc., are all secondary, and that the secondary effects of all cardiac tonics simulate secondary valvular troubles. Convallaria is only primarily homœopathic to abnormal excitation of the heart with abnormally high blood-pressure, as in plethora, hypertrophy with enlargement, functional neuroses, etc. In such cases it ought to prove curative in the attenuations.

Adonis vernalis.—This remedy, like Convallaria, comes to us from Russia, and like many of our best remedies was first used by the common people—as a remedy in dropsy and heart-diseases. Experiments were first made by Dr. Botkin. The experiments made on both cold-blooded and warm-blooded animals with different preparations of *Adonis* (infusion, and both aqueous and alcoholic extracts) showed that its action is to stimulate both the inhibitory apparatus and motor ganglia of the heart, to increase the contractility of the cardiac muscles, and to cause the contraction of small arteries in different parts of the organism, without affecting the vaso-motor centre. Under its influence in cases of *dropsy*, the cardiac contractions increase in force, the pulse becomes less frequent, more regular, and fuller, the urinary secretion increases from 200 to 2000 or 3000 cubic centimetres, and albumen and casts disappear from the urine. In cases where the *dropsy* was due to a disturbance in the compensation and activity of the heart, this remedy acted very satisfactorily. The heart-beat increased in force, and the size of the heart rapidly diminished; the heart-sounds and murmurs, especially the presystolic and systolic murmurs in stenosis, were more marked and distinct. The heart-rhythm was more regular and somewhat slower, therefore the pulse was slower, and in most cases fuller and slower. The urine increased from 300 to 3000 cubic centimetres, a tenfold increase of the watery element. All deposits disappeared, specific gravity diminished, and the urine had a very pale color. There was an absolute increase of the chlorides and urates, the body weight diminished, and the œdema decreased rapidly: the dimensions of the liver increased; cyanosis and dyspœna disappeared, and respiration became full and regular.

In the largest number of cases great relief was experienced at the end of the first day, complaints were less frequent, and in the course of a few days disappeared entirely.

These clinical results were obtained in hospital practice, where the cases were closely and carefully watched.

Adonis is indicated in cases of (a) *Endocarditis*, with *valvulitis*, when the heart-muscles are endeavoring to overcome the valvular obstruction, and need the aid of specific remedies to increase the tonicity of those tissues: or (b) when there is impending or actual dilatation of the heart, from a giving way of the muscular fibres. This condition is marked by diminished *force* of the heart's action, with lowered blood pressure everywhere, especially in the kidney, decreasing their functional activity.

It has been found equally potent in *secondary* heart disease, following Bright's disease, when we find a diminished action of the heart, pulse irregular or intermitting, passive venous stasis, dropsy, etc. A typical case from these hospital records is as follows: "A common laborer with chronic valvular disease, with dilatation. After the use of *Adonis* the heart diminished in size, the congestion of the lungs, well marked, almost disappeared, the œdema of the legs and ascites disappeared entirely, palpitation of the heart and dyspœna diminished so much that the patient was discharged from the hospital, and returned to work."

The dose of *Adonis*, when given in infusion (ʒi. of the herb to ʒiv. of water) is a tablespoonful every 2 hours in severe cases; in chronic, every 4 hours. The dose of the tincture is 5 to 10 drops, of the fluid extract 1 to 5 drops.

Adonidin, the active principle, is an amorphous powder of a very bitter taste; dose, $\frac{1}{32}$ or $\frac{1}{16}$ grain. By the above it is seen that *Adonis* is quite similar, if not identical, in its action on the heart, to *Digitalis* and *Convallaria*. The symptomatic differences have not yet been brought out by any physiological provings; but we can resort to it when, as is often the case, the two medicines above named fail to act favorably, or cease to give the patient relief. It is said to be more liable (than *Digitalis*) to cause gastrointestinal irritation, nausea, vomiting and diarrhœa—in large doses.

Caffeine, the active principle of Coffee, Tea, Guarana, Mattee, Kola, and other plants used as a beverage, was not known as a cardiac tonic until 1863, when Kaeschlakoff, of St. Petersburg, published his treatise on Caffeine in cardiac affections. Homœopaths know from our provings that Coffee is a cardiac stimulant, and it has been long prescribed by us in palpitations, due to mental excitement. In Allen's Encyclopædia of Materia Medica are published some sphygmographic tracings, but they do not give an adequate idea of its power over the contractions of the heart.

The earlier investigators of Caffeine, who observed its effects in toxic doses, which are similar to the toxic effects of Digitalis, wrongly decided that it was a cardiac depressant. Recent investigations, both in health and disease, have established the fact that Caffeine in moderate doses, a few grains daily, diminishes the pulsations of the heart, augments the vascular tension, augments the amplitude of the contractions, removes venous stasis, acts on the kidneys (even when they are badly damaged), and greatly increases the quantity of urine. At first, small doses were given, a fraction of a grain, carefully, and doubtful of the safety of larger doses. But lately, Drs. Dujardin-Beaumetz, Lupene, and Herchard have boldly given massive doses (from 5 to 30 grains daily), and claimed to have gained marvellous curative effects from such doses.

These doses may shock the sensibilities of those of our school who are wedded to the use of infinitesimals. To such I would say that the axiom with which Hahnemann opens his Organon should silence all such objections. The cure of our patients is our sole duty, and the size of the dose should be selected solely for its beneficial effect in disease. In no malady is this truth so important as in valvular diseases of the heart. While we may not cure our patients, we can render their sad lives comfortable if we lay aside narrow notions and use remedies in such doses as will give the best results.

Dr. Dujardin-Beaumetz says in his Clinical Lectures—"You will see veritable resurrections effected by this marvellous therapeutic agent, and this even in aged persons; therefore you ought to have these facts always in mind, and remember that in the asystolic period—period of cardio-plegia, as Gubler called it—when you have exhausted the remedial powers of all the cardiac tonics, you may still obtain signal effects with Caffeine."

I have verified the above statements in many desperate cases, when I have been called in consultation, in patients who seemed already at the entrance of the "dark valley," their hearts almost in a condition of ventricular paralysis, and who were being rapidly "drowned" by the rising tide of apparently irremediable dropsy. Under the use of a few grains a day (I have rarely prescribed more than eight), I have seen these patients get rid of their dropsical accumulations, their terrible dyspnoea, and with fairly beating heart, begin anew, and with hope, the journey of life. Even if we do not restore the damaged heart, it is surely something to calm and strengthen its pulsations, and relieve for a time the sufferings of our patients.

The methods of administration are various. We can use the decimal triturations, and get prompter effects than with the crude drug, for with a more minute division of its particles we get an augmentation of medicinal power, e. g., ten grains of the 1st will give us better effects than one grain untrituated. I have given it in sugar-coated granules of $\frac{1}{10}$ to 1 gr. each, which some patients prefer.

If we feel obliged to give larger quantities, as in treating cardio-plegia, it is best, according to Dujardin-Beaumetz, to give it largely diluted, for in its crude form such doses cause gastric distress. He advises the following formula:

R Caffeine,	. . . . .	7.00 (or grs. 105)
Benzoate of soda,	. . . . .	7.00 (or grs. 105)
Water,	. . . . .	250.00 (℥viii)

Each teaspoonful of the above contains 50 centigrams, or about $7\frac{1}{2}$ grains, which may be given two or three times a day. Instead of water, a mixture of syrup and aqua gaultheria or menth. pip. may be substituted to disguise the taste. It is only in desperate cases, however, that such large doses will be required.

Sometimes you will have patients, in advanced stages of heart disease with dropsy, who cannot bear any medicine on the stomach. You are supposed to have tried all our best remedies for gastric irritation and the cardiac failure, but with no avail. You feel that you cannot let your patient die without giving a trial to every possible means of relief. In such cases you can resort to hypodermic injections of Caffeine. The following preparation of Tanret's is the best:

R Salicylate of soda,	. . . . .	gr. xlvii.
Caffeine,	. . . . .	ʒi.
Distilled water,	. . . . .	ʒiiss

Dissolve with the help of heat. Inject 10 drops every six hours.

Remember, I am referring to *extreme cases*. In the majority of cases of cardiac non-compensation without dangerous symptoms, a few grains of the first three decimal triturations will be found amply sufficient to restore the heart to fair working order for a long period, aided by the use of such other remedies as are indicated by the condition of the patient.

Squilla has not been used by the homœopathic school in heart affections. At the time the original proving of Squills was made, no method of testing its effects upon the heart was in use. But if a careful study of these provings be made, it will be seen how closely its chest and respiratory symptoms compare with the bronchial and pleuritic troubles which are so often present in mitral lesions. Owing to the imperfect supply of blood to the lungs in the mitral disease, the lungs, and especially the bronchial mucous membrane, become congested; this causes a profuse flow of mucus (bronchorrhœa) or acute bronchitis; also œdema and venous stasis of the lungs; and even pleuritic effusion. The cough, in such cases, closely resembles the cough of Squilla, namely: loose, rattling, constantly harassing, day and night; sometimes loose, then dry, spasmodic, disturbing sleep; loose in the morning, dry in evening. The expectoration is either glairy or bloody, and is very difficult to raise, although a large quantity seems to be in the chest.

The allopathic abuse of this drug is fearful. They give it to "loosen the cough." They do not know that the bronchorrhœa, which they cause, is due to congestion of the lungs and bronchial mucous membrane, depending on cardiac weakness, and irregular action; and that many of the fatal cases of so-called bronchitis and pneumonia in children, are made so by the toxic action of Squill. If the patients did not vomit up most of the drug, the mortality would be greater. The pathogenetic action of Squills is not unlike Convallaria (all the *liliacæ*, in large doses, are more or less cardiac poisons). The primary effects of large doses of Squill is to cause increased force and more rapid contractions of the ventricles; the pulse is small and hard, wiry, then becomes irregular and very rapid, and finally ceases from tonic closure of the ventricles. During this time the pulmonary circulation is rendered imperfect, and there is present passive congestion. Hence the cough, mucous rales, bloody sputa, dyspnoea, pleuritic pains, profuse urine, etc. It is my conviction that nearly all the symptoms of the chest and urinary organs caused by Squill are produced by the action of this drug on the heart, and, except in a small class of influenzas, it is only indicated in chest affections *when cardiac disorder is present*. Many of the cases diagnosed as bronchitis, pneumonia and pleurisy, in children, are probably due to acute endocarditis, pericarditis, or chronic valvular diseases, which we now know are very common in early life. In acute cases, presenting the characteristic symptoms of Squill, it should be given in minute doses (3^d dil.), or the malady will be dangerously aggravated.

Per contra, in cases of cough, dyspnoea, bronchorrhœa and pleuritic affections of a neglected or chronic nature, when the symptoms often assume the character of the secondary symptoms of Squilla, namely: constant hawking, loose or dry cough, great oppression of breathing, movement, or lying down, aggravate; the face is pale and cold, hands and feet cold and blue, heart's action feeble, irregular, palpitating, but always *deficient in force*, urine scanty, red, painful and often bloody, this remedy will be found promptly curative in larger, but not pathogenetic, doses. I have found the 1st dilution, in doses of five drops every hour, or the 1st trit. in grain-doses, act with the happiest curative effect. In dropsy from valvular disease it should not be used empirically, but always selected by the ensemble of its symptoms. The domestic use of *Allium cepa*, in cases such as I have described above, often results in rapid cures, for the onion is but a mild Squill.

Erythrophleum is a plant found on the coast of Guinea. It is a unique poison to the heart, whose toxic effects combine those of *Digitalis* and *Cocculus*. Its primary effects are very similar to *Digitalis*, but just as the ultimate primary effects begin to appear, the Picrotoxin effects set in. The pathogenetic and clinical effects have not yet been sufficiently studied to enable us to use it with certainty. Professor See and others are now using it in heart affections in the Parisian hospitals. They find it very useful in cardiac asthma.

Euonymin.—The active principle of *Euonymus* has been found by experiments on animals to be a cardiac tonic, increasing the power and amplitude of the heart's contractions. I have verified this fact clinically in many cases, and its curative sphere of action is clearly defined in my mind. We know that among the sequelæ of valvular heart affections passive congestion of the liver and jaundice often hold a prominent place. We also know that idiopathic hepatic congestion and jaundice often cause a slow, weak action of the heart. In either of these conditions *Digitalis* has been used successfully when *Podophyllin* and *Mercury* were powerless. *Euonymin* is in these cases as near a general specific as we shall find, and when I meet with them I invariably and unhesitatingly prescribe *Euonymin* in the 1st or 2^d trituration, a few grains every few hours. Under its use the heart soon beats stronger and quicker, and more regular, the urine becomes lighter, and the bile in it gradually disappears; the stools soon assume a darker hue, and the jaundiced skin clears up. There are several kinds

of Euonymin, the green, light-brown and dark-brown. Experiments have shown that the dark-brown possesses greater medicinal power, while the green is almost inert. This accords with my personal observations.

Glonoine.—The homœopathic school are well acquainted with the use of this drug in congestions of the brain, where it is prescribed for its peculiar primary effects. I have alluded in a previous paragraph to its use in those active congestions which occur during the period when the hypertrophy is too rapid in its progress.

There is no record, however, of its clinical use in our school for cerebral anæmia, a condition to which it is supposed to be "antipathic," but which I consider secondarily homœopathic. I shall treat of its use in angina pectoris, where I compared it with its swifter analogue, Amyl nitrite.

Dr. Dujardin-Beaumez, in a recent lecture on new cardiac medicaments, mentions it favorably in *aortic disorders*, to which, he says, it is particularly applicable. He prescribes it for the cerebral anæmia which is such a distressing accompaniment of aortic lesions. This anæmia comes, he affirms, "from the trouble inflicted on the arterial circulation, and which manifests itself by pallor of the countenance, attacks of vertigo, lypothymia, and even syncope; we are called upon to mitigate the distress which attends these sorts of affections, whether this be in the form of symptomatic neuritis of the cardio-pulmonary plexus, a result of propagation of the peri-aortic inflammation to the numerous plexuses which surround that vessel, and thence to the peripheral nerves, or whether we are concerned with that veritable angina pectoris of which Huchord has so well explained the mechanism in his recent work, showing us that these horribly painful paroxysms of thoracic angor result from ischæmia of the cardiac muscle."

In aortic diseases, not only the vessels of the brain and lungs, but the coronary arteries are subject to paroxysms of extreme tension, due to vaso-motor spasm. Herard compares this with the condition of the arterioles in senile gangrene.

Now, to this condition Aconite, Secale, and Ustilago are primarily homœopathic, and we have clinical proof that Secale has been found curative in such cases. But these remedies, with the exception of Aconite, are not sufficiently rapid in their action to relieve the sudden and intense paroxysms. Amyl nitrite has been used successfully as a palliative, but it is open to the objection that its action is too ephemeral. Glonoine, however, acts in a few minutes, and the duration of its action lasts several hours. Granting that it is "antipathic," why should we not use it as well as Alcohol or Ammonia? In ischæmia of the brain and cardiac muscle, when the distress is like that of angina pectoris, the face pale and cold, with cold sweat, syncope, and almost impending death, a single drop of the first centesimal dilution will, in two minutes, flush the face, warm the skin, relieve the syncope and cardiac distress, and give us time to get a lasting specific action from Cactus or Convallaria. Glonoine arouses and energizes the beating of the heart, relaxes the coronary and cerebral arteries, and does it much more safely and surely than alcohol or any general stimulus.

Nux vomica and **Ignatia**, by virtue of the *Strychnia* which they contain, have a specific action on the muscular fibres of the heart. They act on the heart muscle, through the nervous supply proceeding from the cerebro-spinal centres. We have no more important and certain remedy than *Strychnia*, in all conditions of the heart when there is paresis or paralysis. In certain cases of dilatation with thinning of the walls and exhaustion from intracardiac pressure, the heart is often in a condition aptly termed cardio-plegia. In such cases neither *Digitalis*, *Convallaria*, *Adonis*, nor other specific cardiac tonics, seem to be sufficient to restore the tone of the heart's muscular fibres. Here *Strychnia*, by acting through different channels, will often arrest the impending paralysis, and increase rapidly the motor vitality of the heart. It does not seem to control irregular and intermittent action as well as *Digitalis* and its analogues, but it has more power over the contractions of each muscular fibre. Very often it becomes necessary to alternate *Strychnia* with *Digitalis*, or to give them in combination; and I do not believe there is anything illogical or unscientific in such combination of *differently* acting drugs. My experience with such a combination has been so satisfactory and brilliant that I could not be induced to reject it. I have for many years used a compressed tablet, made by Boericke & Tafel, each one containing *Digitalis folia*, or solid extract, gr. $\frac{1}{4}$ th, and *Strychnia*, gr. $\frac{1}{16}$ th. Of these, I prescribe one every 6 or 8 hours. Under their use the heart's action becomes regular and forcible, and unless the damage is irremediable, soon resumes its normal action and functions. In anæmic cases the Citrate of Iron and *Strychnia*, in doses of 5 grains of the 1st, is an admirable remedy.

Prunus virginiana, has long had the reputation of acting on the heart similarly to *Digitalis*. Although not as potent a remedy, it certainly will often regulate a weak heart. The best preparation is the "Detannated fluid extract," which

may be given in 15 to 30 drop doses. Several years ago, acting on the suggestion of Fothergil, of giving *Digitalis* with Iron in cardiac disorders with anæmia, and not finding any preparation which suited me, I directed the well-known chemists of Chicago, Chapman, Green & Co., to make a compound of *Digitalis* and Iron, in detannated fluid extract of Wild Cherry. Each teaspoonful contains grt. 5 of tinc. *Digitalis*, Ferr. phos., gr. i, and Wild Cherry ext., grt. 10. I have received great satisfaction from the use of this compound, and do not hesitate to recommend it to the profession. Dose: a teaspoonful three or four times a day.

I will now briefly allude to the more common sequelæ or consequences of valvular diseases.

Dropsy is the most important. This is due to deficient arterial tension in the renal arteries, and this condition is caused by deficient power in the heart. No so-called renal remedies, *i. e.*, drugs which act directly on the kidneys in a manner to induce profuse flow of urine, are of real value in cardiac dropsy. They can only act as mere palliatives, and often do more injury than benefit.

Only those remedies which act by increasing the regularity, force, and amplitude of the heart's contractions, are of any permanent value. These I have enumerated above. There are others, not mentioned, which have proved of great value, but full and recent investigations into their physiological effects show that they do not act directly and specifically on the kidneys, as was once supposed, but are really cardiac energizers.

Apocynum cann., *Asclepias syriaca*, Juniper, *Collinsonia*, *Stigmata maidis*, *Eupatorium purp.*, *Iberis*, and Benzoate of Ammonia, all act on the kidneys through the heart. These are so well known to our school, except two, that they do not require separate mention. Of the two, *Iberis* and *Stigmata maidis* need some comments.

Iberis amara was used long ago in dropsy with enlarged heart. I made some experiments on animals and provings in men, which showed that it acts like *Digitalis*, and clinical experience has shown it to be useful in some cases. It is not as certain in its action, however, as others of this class, and in the doses required to produce its specific effects on heart and kidneys, is not as well borne as others.

Stigmata maidis was first introduced and used as a sedative remedy in irritable conditions of the whole urinary tract. It was considered as an analogue of *Triticum repens*, but was soon found to have a wider sphere of action. Not only is it one of the most potent remedies in irritable conditions of the ureters, bladder, and urethra, but it is a powerful diuretic in renal disorders, unconnected with cardiac derangements. Still later, a recent French investigator, Dr. H. Dupont, has studied its action on the heart, and thus sums up the results:

- (1.) It renders the heart's action slower and stronger.
- (2.) It regulates the rhythm.
- (3.) The diuretic action is almost always manifested the very first, and goes on increasing up to the thirteenth or fourteenth day.
- (4.) In cardiac affections, with œdema of the lower limbs and general dropsy, this beneficial action is the most prompt and most evident.
- (5.) While the dropsy diminishes, and often disappears, the arterial tension increases, and the venous tension is reduced concurrently; the general condition becomes decidedly improved, and, in particular, the author mentions a subjective feeling of calmness and *bien être*, except there is pronounced dyspnoea, which it does not remove. (*Convallaria* has the same effect, and also removes the dyspnoea.) In hypertrophy and stenosis, *Stigmata maidis* always produces good results. The author thinks it acts more powerfully than *Digitalis*, and with about the same energy as *Convallaria*, but that it is to be preferred because it never produces unpleasant effects. When I read Dr. Dupont's report I could hardly believe that the corn-silk, so apparently inert, tasteless, and simple, could be capable of such profound influence, but I have verified the

truth of his assertions in several cases. Dr. H. uses an "extract"; he does not give the formula. I have found the fluid extract, in doses of 20 to 40 drops, three or four times a day, to be the effectual dose.

Copaiva has been found to diminish the dropsy in cases which resisted all other renal and cardiac remedies. I remember one case, apparently hopeless, where the resin of Copaiva, in doses of 1 grain (in pill), every two hours, run off an enormous anasarca in a few days. This same patient had a return of the dropsy in a few months, and Copaiva had no effect, but Caffeine, 3 grains every four hours, rallied the almost paralyzed heart, and caused a most enormous flow of urine, and gave a new lease of life.

Arsenicum, so generally recommended in all our routine text-books as a remedy for all kinds of dropsy, never was of any use in my practice. It certainly has no place in cardiac dropsy any more than China or Quinia

There are cases of dropsy from cardiac disease wherein all remedies will seem to be inert, and we are left apparently powerless. There seems to be an unknown factor in the body, which prevents the action of all medicines. What this factor is we should try to ascertain. Sometimes it appears to be the *liver*. Once in a case of this kind I happened on a remark of Stokes, that "after a mercurial, diuretics seem to act promptly." Acting on this hint, I gave the patient a few doses of Merc. dulc. 1^ʳ, and in less than a day the diuretic (*Asclepias* syr.) acted with great activity, In other cases I have had similar effects from *Podophyllin* 1^ʳ or *Iridin* 1^ʳ, and some German authors report similar results from the tincture of *Carduus marianus*. Another fact is that, when diuretics fail to act, a brisk hydragogue-purgative, like *Jalap* or *Elaterium*, will be followed by a condition which allows the diuretic to act.

This leads to the question whether we are justified in using hydragogues in cardiac dropsy. The testimony of the allopathic school is decidedly favorable, and many, eminent in our school, approve of them. My own experience is decidedly in their favor.

We should never allow sectarian bias to influence us in the treatment of the sick. The remedy which gives relief should be used, no matter what it is. I have treated many cases, in which neither cardiac nor renal remedies gave relief. The dropsy was enormous, and was rapidly drowning the great vital organs. Here the most magical relief was given by a single grain of *Elaterin* 1^ʳ or 2^ʳ, repeated every three or four hours. The amount of water expelled from the bowels under its use was enormous, sometimes amounting to two gallons per day. And most surprising was the physical and mental relief, and the actual increase of vigor and strength in the patient, after each evacuation from the bowels. In fact, when *Elaterin* is imperatively called for, I have never seen any prostration induced. *Bitartrate of potash* often has a very happy effect, in such cases, but its action is not as certain, yet I have seen enormous dropsies run off by the administration of this medicine, in doses of 1 drachm, repeated every four or six hours. The dose is best given in a glass of lemonade.

In bad cases, in which a cure is impossible, all the above means will

fail. We must then resort to *scarification* or *puncturing* the lower extremities, or sloughing will occur. Punctures with a hare-lip pin or hypodermic needle are preferable. To prevent erysipelas, wrap the limb, after puncturing, with flannels wrung out of warm water. *Dyspnœa* is one of the most obstinate as well as most distressing symptoms of weak heart with dilatation or non-compensation. When it is due to venous congestion, the cardiac tonics, Digitalis, Convallaria, and Adonis will relieve. In pulmonary œdema, the sitting posture relieves, or Chloral hydrate in doses of 5 to 10 grains every few hours. Aromatic ammonia should be given for rapid stimulation. If it is paroxysmal, Cannabis indica, Grindelia, Arseniate of antimony, Lobelia inflata, or *Quebracho*, will give relief. Of this last-named medicine but little was known at the time I mentioned it briefly in my *New Remedies*. But it has been the subject of an exhaustive study and clinical observation by a Spanish physician (Moriasi y Lorrion), of the Princess Hospital staff, Madrid. He claims for it, in dyspnœa, a superiority over all other remedies. It causes a diminution of the number of cardiac pulsations and of respiratory movements, and it augments the force of the heart's contractions. It, therefore, acts on the heart similarly to Digitalis. Dr. M. calls it, "the Digitalis of the lungs," for it strengthens and regulates the respiratory movements. He says its continued use is not dangerous, nor does it cause unpleasant symptoms, except in massive doses, when headache, vertigo, and dimness of vision occur. He gives 2 to 4 grammes of the tincture (30 to 60 gtt.) at a dose, in simple syrup, every two hours. I prefer smaller doses, repeated every half hour or hour (10 to 15 drops in syrup).

Sometimes all these remedies will fail in *dyspnœa*, and we are obliged to resort to some preparation of Opium to give temporary relief. Hypodermic injections of Morphia are well borne by many patients, who get from them a relief from sufferings worse than death. Begin with $\frac{1}{16}$ grain of Morphia mur. If this seems to cause "sinking of the heart," as they term it, add to each dose $\frac{1}{32}$ grain of Atropia. In several cases when Morphia was not well borne, relief was obtained from *Codea phosphate*, in doses of $\frac{1}{4}$ to $\frac{1}{2}$ grain. A single injection at night often turns the night of agony into one of comparative comfort. After seeing instances of such relief, no humane physician will feel like rejecting its use.

Cough may be exceedingly troublesome, and may be constant or paroxysmal. For the former, *Lachesis*, *Naja*, or *Apis* is often sufficient. The latter form requires *Belladonna*, *Hyoscyamus*, or *Lactucarium*. Rare and obstinate cases require Morphia $\frac{1}{16}$ grain, or *Codea* $\frac{1}{16}$ grain.

Sleeplessness, or sleep interrupted by horrible dreams, waking in fright or great distress, is usually controlled by *Hyoscyamus*, *Cimicifuga*, *Monobromide of camphor* (gr. i), *Grindelia*, *Cannabis indica*, *Coffea*, or *Bromide of sodium* (20 gr.). Some patients can only sleep

in a sitting posture, with the head bent forward on the back of a chair, with the head supported by a sling, as recommended by Walshe.

HEART-CLOTS.

Synonyms.—Thrombosis of the heart, Fibrinous coagula within the heart; French, Thrombose cardiaque; German, Gerinnungen im Herzen.

Definition.—By heart-clot is meant the formation of a blood-clot within the heart; a mass of fibrin or coagulated blood deposited in the cavities of the heart during life.

Looking at this condition from a pathological, not from a physiological, standpoint, we must distinguish heart-clots formed during life, which lead to various symptoms of disease, from the natural post-mortem heart-clots which, except in rare cases, present themselves in the normal heart when an examination is made. These latter, or *passive*, coagula are formed sometimes just before death, bringing on the death struggle; or after death, when the functions of life cease to be performed. They are found chiefly in the auricles, may occupy all the passages of the heart, and sometimes extend into the large pulmonary artery and other vessels. They are of a black or reddish appearance; or appear as masses of hard fibrin, whitish, translucent, containing serum, or there may be the two kinds found together. But the distinguishing characteristic lies in the fact that they are independent of the surrounding structures; there may be a slight adhesion, resulting naturally from the moisture of the parts and from the jelly-like nature of the fluids, but they are not truly adherent; they have not been formed by a process of growth, and are easily separated from the endocardium.

The real pathological blood-clots, which alone are discussed under *thrombosis of the heart*, are formed some time before death, are not the result of natural coagulation, and are to be found *away* from the track of the blood currents.

Ætiology.—The cause of thrombosis of the heart is due to a condition of the blood which may favor coagulation if suitable circumstances (like the stasis in the right ventricle and the rough surface of the cavities of the heart) are present, or which may retard its own action; or it may be due to local causes, defect or disease in the heart itself, by which the formation of coagula may be facilitated. The vegetations in endocarditis may give rise to a thrombus; and a deposit of fibrin, once started, makes easy the further development of the condition. If the heart has some organic disease which admits of but a slow and feeble action, a thrombus is easily formed, which may itself be directly the cause of death, though not the primary trouble.

Pathological Anatomy.—These clots are to be found especially in the recesses of the heart's cavities, where the blood current is not

regular,—in the appendices auricularum between the columnæ carneæ; the cavities on the right side seem the commoner seat of thrombi, though the left auricle and ventricle often are affected. There are two varieties of this ante-mortem clot; in the first, which resemble those post-mortem, the cause is traced to a hæmorrhage, when the system is weakened, as in childbirth, or to the shock of a surgical operation; in the second variety the clot bears the appearance of age; if it is cut through, it appears laminated “like an onion;” the face surface is smooth and rounded, while the deep surface adheres more or less tenaciously to the endocardium; they project from their lodging places like knobs or balls; in the interior it is less solid than on the outside, and contains often a fluid, puriform substance of bad odor.* The color of the interior is irregular, sometimes white, yellowish, sometimes spotted with red or black spots.

Symptomatology and Diagnosis.—The coagulum once formed, it continues to grow, gradually involving the structures to which it is attached, preventing the free action of the valves or of the chordæ tendineæ; they may gradually obstruct the passage of the blood by filling up the cavities or an orifice; sometimes, however, these thrombi may be partly reabsorbed, when the system asserts itself, or fragments may break off and be carried into the arterial system—as emboli. (See section on Emboli.)

The objective symptoms of heart-clot are indefinite, and resemble rather the symptoms of the last stages of chronic heart disease. When the coagulum is the result of hæmorrhage (*i. e.*, formed suddenly) the most striking symptom is exertion in breathing, as if the air admitted to the lungs were not sufficient; this is not the case, however, for the clot forms in the right ventricle, prevents the passage of the blood, and the lungs lack their usual quantity of blood to aerate. The pulse is reduced, but rapid; there is faintness and irregular beating of the heart; respiration is full; we have a sonorous sound in breathing; the patient is agitated, and *craves for air*; the veins are swollen, and cyanosis is marked. When the thrombosis is gradual, the symptoms appear slower, and when the left chamber is affected they are less pronounced; we find distress, pain in præcordia, restlessness, irregularity in heart movement, pulmonary congestion, etc., but the few well-marked characteristics are so nearly related to those of chronic heart trouble, that the physician can prescribe only in a general way.

Prognosis.—The prognosis is most unfavorable, death being merely a question of time; partial absorption may assist in reducing the danger, but it is of rare occurrence; all we may hope to do is to secure a postponement of the end. The case may last from a few days to six weeks.

* This liquid may have been absorbed from outside the mass, or it may be the result of disintegration from within.

Treatment.—It is evident that there can be no treatment for a clot once formed in the heart. But we can adopt a treatment which may prevent the formation of clots, and possibly assist in breaking down a clot while in process of forming.

It is said that the introduction of alkaline salts into the blood tends to prevent its coagulation. Of these, the Ammonia-salts are most potent. These salts are also of themselves stimulants, and aid in keeping up the tone of the muscular tissues.

In the treatment of all diseases of the heart we should be on the alert to detect any symptoms of failure of its muscular power, for in this failure is the greatest danger of the formation of blood-clots. It is equally so in hæmorrhages from any organ, for with the loss of blood comes a tendency to failure of the power of the heart.

The remedies, then, to prevent heart-clot are those which prevent heart-failure. They are *Digitalis*, *Convallaria*, *Adonis*, *Strychnia*, *Atropia*, *Caffeine*, *Nux vomica*, *Ignatia*, *China*, etc.

At the risk of inviting criticism, I must insist that we cannot use successfully medicines primarily homœopathic to heart-failure (like Aconite, Veratrum, etc.). The difficulty to overcome is one that demands powerful cardiac tonics, *i. e.*, tonics by their first action.

In pure cardiac failure, symptoms are of little value in the selection of the drug. I would recommend from my own experience and observation, as well as from the testimony of the best authorities, that a combination or alternation of certain cardiac tonics gives us the best prospect of success.

I know of no more powerful and efficient means to attain this end, than the alternation of *Digitalis* (5 gtt.), and *Strychnia* ($\frac{1}{16}$ gr.), *Convallaria* (5 gtt.), and *Ignatia* (1 gr.), or *Adonis* (5 gtt.) and *Nux vomica* (1 gr.). In some conditions I have substituted, temporarily, *Atropia* $\frac{1}{16}$ grain or *Caffeine* 1 gr., for the *Strychnia*. These should be continued—2 or 3 hours apart, or oftener—until the heart's action becomes regular and strong, or as nearly normal as the condition of the heart will permit. I advise this practice not on theory, but from actual clinical experience.

A favorite prescription in my practice, and one that will sustain the heart's action as long as there is any vitality in it, or arouse it from profound paresis, is as follows:

R	Spirits Ammon. Aromatic,	. . . . .	ʒi.
	Tinc. Digitalis,	. . . . .	ʒss.
	Hall's Solution Strychnia (1 gr. to ʒi),	. . . . .	ʒii.
	Syrup,	. . . . .	ʒiiss.
Mix.	A teaspoonful every hour or two (until the heart's action is restored).		

This is heroic treatment, but such treatment is required when cardiac paralysis is imminent.

I always give the Aromatic Spirits of Ammonia when I fear the

formation of heart-clots. One teaspoonful in nine of water, with a spoonful of glycerin or syrup, is not disagreeable; and I know of nothing so grateful to the sinking patient, who feels its stimulating influence with each dose. A teaspoonful can be given as often as every five or ten minutes in bad cases, or as often as the case seems to require. It antidotes none of the above named remedies, and can be given with all.

Together with these medicines, the patient must be placed in a condition of absolute immobility; any movement of the body may thwart our efforts.

The hands and feet and chest should be kept warm by mustard applications, or hot water simply. (Rubber bags filled with hot water are excellent.)

Food should be given at brief intervals, not solid, but in the form of hot milk, coffee, beef-tea, or peptonized beef extract.

All these means should be persisted in until the circulation is established and auscultation shows that the heart beats with sufficient force to convey the blood current through the valves with normal force.

ANEURISM OF THE HEART.

Definition.—Cardiac aneurism is properly a pouch, like a circumscribed dilatation, occurring in one or more of the anatomical divisions of the heart. (Flint.)

This term "aneurism of the heart" was, at first, improperly applied to any or to all dilatations of the cavities, "whatever its cause or its character," but examining the definition of general aneurism (*q. v.*) as applied to the heart, we see that dilatation is too general, for the circumscribed cavity must be distinct from the auricles or ventricles, though, of course, directly connected with either of them, and the contents of this cavity must be something more than the normal blood fluid in transitu.

Description.—The cardiac aneurism occurs most frequently in the left ventricle; a few cases, only, have been found in the other chambers. The size may vary greatly; sometimes it is not larger than a small nut, sometimes larger than the heart itself. The contents are generally the same as those of other (arterial) aneurisms, condensed fibrin, various coagula. Often there is a calcareous deposit. This sac looks like a rounded and projecting tumor, or, in one case, "it assumed the appearance of a sac winding round the base of the aorta" (Quain). Or the aneurism is seen only when the heart is exposed from the inside. The cavity may be merely a depression, shallow or deep, containing deposits or fibrin; or the opening may be very small, hardly large enough to admit a finger, widening according to the size of the tumor itself. This neck may be hard or smooth, regular or irregular. The walls may be continuations of the centric walls of the heart, beginning inside

with the endocardium, and ending bounded by the pericardium, or the muscular substance may have entirely disappeared.

Ætiology.—The most prolific cause of cardiac aneurism is change in the substance of the heart itself, whereby resistance to the blood-pressure is diminished, and the walls are allowed to give way. This gradually bulges outwards till a size as above described is formed. This weakness of the heart's substance may be due to acute or chronic inflammation, to fatty degeneration, or to growths of various kinds. It is easily seen how any inflammation should destroy the strength of the walls, and especially when the endocardium is ruptured, how an aneurismal sac should result. Or, in an inflammation, pus may be formed, which, when discharged, leaves a depression easily converted into a proper aneurism. When any growth turns soft, an aneurism may be formed in the above manner; or, where fatty degeneration is in process, the weakened tissues may give way to the blood-pressure, and the cavity thus formed be, in time, converted into a true aneurism. Syphilitic myocarditis may also give rise to an aneurism.

However, the subject practically belongs to the discussion of morbid anatomy.

Little can be said concerning the diagnosis before death, or in regard to any positive symptoms which could lead to a careful selection of remedies homœopathically. The patients are usually of advanced age, the occurrence of an aneurism in young persons being the exception.

Aneurism primarily caused by an inflammation is called acute, though all pursue a more or less chronic course. Death may result from obstruction of the heart's action, from burrowing into the walls of the heart, or into another cavity, or from sudden rupture, by which death is brought about by mechanical means.

Symptomatology.—According to all authorities, the symptoms are not to be distinguished from those of myocarditis, for in any case a grave disturbance of the heart is all that can be noticed, and no physical signs are distinguishable.

C. DISEASES OF THE PERICARDIUM.

PERICARDITIS.

BY PEMBERTON DUDLEY, M.D.

Synonyms.—Inflammation of the pericardium; French, Pericardite; German, Herzbeutelentzündung.

General Character and Varieties.—Inflammation of the pericardium may be diffuse or circumscribed, acute or chronic. It may affect at the outset either the visceral or the parietal portion of the membrane, and from a circumscribed beginning may extend until it in-

volves the entire serous surface. In a majority of the cases in which a post-mortem examination reveals the true condition of the parts, the inflammatory action is found to have been coextensive with the membrane, but it is not at all unlikely that there are very many cases in which the lesion is less extensive, the symptoms less severe, and recovery takes place without the patient, or even the physician, having been aware of the nature of the malady. Indeed, it is not doubted that a circumscribed pericarditis may, and often does, run its course without the production of pain, or of any other marked symptom. It is unsafe, therefore, to undertake even an approximate estimate of the relative proportion of circumscribed and diffuse cases, since even the existence of so many cases is undiscovered either before the death of the patient or subsequently.

When the inflammatory action is circumscribed, it is more likely to be located on the surface of the auricles and about the base of the heart, or around the origin of the great vessels than elsewhere, although any other part of the pericardial surface may be affected in the first instance. One of the reasons why many cases of circumscribed pericarditis are free from pain as a symptom, is due to the fact that the seat of disease is at a part where the friction of the opposing surfaces is almost *nil*, the base of the organ furnishing perhaps the most marked illustration of this statement.

The disease may run a brief course and terminate favorably, constituting the *acute* type of the malady, or, on the other hand, it may continue indefinitely, constituting what some have termed *chronic* pericarditis. It seems, however, that between these two forms there are few points of essential difference, save in their severity and in their duration. There is, says Bauer, "no sharp boundary line between the two categories."

The tendency, almost invariably manifest, to the formation of exudations at some stage of the disorder, gives rise to still another classification dependent upon the character of the exudation, which may be *fibrinous*, *sero-fibrinous*, *purulent*, or *hæmorrhagic*. This classification seems to be a perfectly legitimate one, since the character of the effused fluid does not always depend upon varying degrees in the intensity of the morbid action, but quite frequently seems to be determined either by some constitutional predisposition or else by the quality of the cause which superinduces the attack. Especially is this true of the purulent and hæmorrhagic forms of exudation.

Ætiology.—As regards the causes which may induce pericarditis, it cannot be questioned that the pericardium is liable to the same fortuitous circumstances as other tissues, and, like them, is subject to inflammations of both *traumatic* and *idiopathic* origin. As a consequence of its deep situation, however, and the protection afforded by the bony and muscular thoracic parietes, as well as because of the

special care of the individual over the vital thoracic organs, we find that traumatic pericarditis is of quite rare occurrence.

Traumatic pericarditis, when it does occur, is quite commonly the result of penetrating wounds of the chest, or the lodgment of foreign bodies in the pericardial or adjacent tissues. A violent blow upon the chest walls, with extreme concussion, or a crushing weight, resulting in more or less extensive laceration, are also regarded as among the mechanical causes of pericarditis either by direct injury to the part itself or by extension of inflammatory action from some injured neighboring tissue.

Idiopathic pericarditis constitutes the type in which, with but rare exceptions, the disease presents itself to the general practitioner. Of this form there are two ætiological varieties, the primary and the secondary. *Primary idiopathic* pericarditis is that form in which the attack occurs as a primary disorder, and not as a mere localized manifestation of a more general malady, nor as a result of the suppression of morbid action in some other portion of the body. This variety of the disease is quite rare, and some writers appear to be in doubt whether the few cases met with may not after all be secondary, *i. e.*, due to some undiscovered disorder. As indicative of its comparative rarity, Duchek reports but one case in a total of eighty-nine, and Bamberger found but five primary cases in an aggregate of sixty-three (Ziemssen). Yet it would be absurd to suppose that the pericardial membrane may not be liable, like the peritoneum and the pleura, to congestion and inflammation under the influence of a chill, the sudden suppression of a secretion, or, in fact, from any other of the causes usually assigned as the precursors of serous inflammations elsewhere.

The causes capable of producing the *secondary* variety of idiopathic inflammation of the pericardium are quite numerous, and seem, in some instances, to be quite destitute of essential similarity. This is, perhaps, equivalent to saying that the *modus operandi* of the production of these secondary forms is not at all understood by the pathologist, and such a statement would embrace an unfortunately large measure of truth. The more common causes are acute articular rheumatism, fatty degeneration of the kidneys, and other forms of renal disease, scarlatina, diphtheria, variola, and measles, typhus, and even typhoid fevers, erysipelas, pyæmia, also cancer, tuberculosis, scurvy, etc. It is also a frequent accompaniment of severe pleuritis, pneumonia, hepatitis, and inflammation of other neighboring organs. Besides these, there appear to be others of a more obscure character.

By far the most common of these causes is acute articular rheumatism; indeed, so liable is pericarditis to supervene in the course of this complaint that the discreet physician is ever on the alert to detect the signs of its inception, not only in severe cases of articular inflammation, but also in its lighter forms, though it is true that the

cardiac inflammation seems more frequently to occur when the rheumatism is severe than when it is less so. It does not seem that the disease of any particular joint, or class of joints, is more prone to excite the cardiac inflammation than others. "Pericardial inflammation does not occur in chronic articular rheumatism, nor in rheumatic inflammation of a single joint, nor in muscular rheumatism, nor in gout."^{*}

When pericarditis supervenes in the course of an acute articular inflammation, its beginning is most usually observed during the second week; less frequently between the fourth and seventh days; but it may occur either later or earlier. The invasion of the pericardium may occur coincidentally with that of the articulations, or it may begin in the cardiac tunic first, and appear in the articulations afterwards. Indeed, it is held that rheumatic inflammation has been known to begin and end in the pericardium without attacking the joints at all.

So far as clinical and post-mortem observations have extended, the proportion of cases resulting from chronic disease of the kidneys does not exceed one in fifteen or twenty, fatty degenerations appearing to be the most prominent of the renal conditions likely to give rise to pericardial trouble. Pleuritis, pneumonia, and peri-hepatitis are far more prolific sources of the malady than the one just mentioned, while numerous cases of inflammation of the heart's muscle, or even of its lining, may eventuate in an attack upon the external coat of the organ. Cancerous cachexia and tuberculosis are less frequently a cause of the disease we are considering, than might be supposed.

Reports are on record of pericarditis occurring endemically, but these cases seem to have been due to an unusual prevalence of those maladies which so frequently give rise to inflammatory processes in the pericardium. In one such, reported by Hubert, it was evidently due to the prevalence of pleuro-pneumonia among the soldiers of a garrison. The exudations in these cases were frequently found to be of a purulent character.

The disease is more prevalent in middle life than either in childhood or in advanced age, a fact obvious enough when the character of its exciting causes is considered. When the disease occurs in childhood or early youth, it is quite often the outcome of either pleuritis, pneumonia, scarlatina, or measles. The writer remembers to have seen one case following a severe attack of whooping-cough, in which a post-mortem, made by Dr. C. S. Middleton, of Philadelphia, revealed a number of circumscribed pulmonic abscesses, the pericardial inflammation having been followed by a rapid and profuse sero-fibrinous exudation.

^{*} Bauer. See Ziemssen, vol. vi., p. 557.

The relative mortality in pericarditis is a matter exceedingly difficult to establish. According to four different reporters, quoted by Bauer (*op. cit.*), the percentage of fatalities varied from 12.5 to 16.2 per cent. This was under allopathic treatment. What the mortality rate is under the homœopathic method, we have no means of knowing.

Pathology and Morbid Anatomy.—It has been already mentioned that inflammation may attack either layer of the pericardial membrane; generally, however, it seems to prefer the visceral portion and the region of the origin of the great vessels; even when both layers have been involved throughout their entire extent, it is not uncommon to find that the greatest intensity of the morbid process has seemed to centre about the base of the heart and on the visceral layer.

The morbid change begins as a simple hyperæmia, the surface becoming congested and exhibiting the fine network of vessels so often seen in other situations in the early stages of the inflammatory process. Doubtless here, as elsewhere, the disease may be checked, and the parts again return to their normal condition; but otherwise, its intensity augments rapidly, a dark-red color overspreads the surface, the membrane swells and thickens, and exudation speedily supervenes, particularly on the visceral layer, and preferring the base of the organ as its seat, but soon covering the entire space involved in the inflammation. This exudation, adhering to the serous surface, may form, at first, only a thin, delicate layer, like the "bloom" upon the surface of a purple grape, and through which the deep-red color of the serous membrane is still distinctly visible. More frequently this fibrinous layer acquires considerable thickness, and presents an uneven, rugous surface on which ridges, papillæ, and other prominences array themselves in every possible shape and order. This appearance has been likened to the rugous surface of a piece of "tripe," and, more accurately by Laennec, to two flat surfaces spread with butter, pressed together, and then pulled apart. The exudation is both adhesive and elastic, as a consequence of which, numerous small round strings or broad flat bands are formed, stretching across the space between the visceral and parietal layers, sometimes dividing this space into closed compartments, large and small, in which portions of the thinner, serous exudation which follows may be imprisoned. The color of this adhesive exudation is usually either yellowish or reddish-white.

The exudation is composed largely of a fibrino-plastic matter, derived from the pericardial capillaries. As a consequence of its organizable nature and of the inflamed condition of its serous, underlying surface, it speedily manifests a tendency to take on a permanent existence. Newly-formed, minute bloodvessels, communicating with the serous plexus, make their appearance in the plastic layer, which becomes more firm, and steadily takes on the characters of a more

complete organization. This process involves not only the general layer, producing a pseudo-membrane, but extends throughout the length of the trabeculæ or cords stretching from layer to layer. In case the two pericardial surfaces are in contact, organized adhesions are thus formed between them, and cases are not unfrequently met with in which the pericardial sac has been thus nearly or entirely obliterated by the agglutination of its opposite walls. Much more frequently, however, the adhesions are limited in space, or the incoming watery, serous exudation, which so generally follows the fibrinous, may so distend the sac as to prevent adhesions from forming at all, and this is doubtless aided by the constant movements of the heart within its pericardial chamber. At times, the thinner fluid seems to dilute or otherwise change the character of the fibrinous mass, as to render it unorganizable, in which case it is liable to undergo destructive metamorphosis, and take on a purulent character. Moreover, the original exudation is found to contain numerous migratory, nucleated cells from the serous vascular plexus, these being most numerous in the deeper portions of the exuded layer. The abundant out-pour of cell-elements frequently so changes the physical characters of the exhalation that rapid disintegration follows, and the case becomes one of *purulent pericarditis*. It is not believed that the effused substance is ever originally purulent in character, like that so often seen in the peritoneal sac, but that the pus formation is always secondary. It is quite certain, however, that various constitutional causes of pericarditis, such as pyæmia, typhus, active tuberculosis, etc., can exert a marked influence in determining the abundant cell-formation which leads to this secondary result.

Following out from this point the general subject of *purulent pericarditis*, there are one or two other explanations to be offered respecting the existence of pus in the pericardial cavity. The purulent destruction of the pseudo-membrane is sometimes accompanied, according to Rindfleisch and other observers, with a destructive action upon the serous surfaces also. This destructive process has been known to involve material loss of sub-serous tissue, and even to perforate the wall of the sac. Wyss mentions a case in which the disintegration made its way also through the rib and established a fistulous outlet through the chest walls. On the other hand, pus may find its way into the pericardium through the parietal membrane from a pulmonary abscess or other purulent accumulation pressing against its external surface.

Not unfrequently it is observed that the exudation exhibits a slight admixture of blood, due simply to an unusually high grade of inflammatory action. Alcoholic intoxication is said to cause this condition, which is doubtless purely mechanical in its origin. But there are other cases of *hæmorrhagic pericarditis* in which the extravasation of

blood has a far graver significance, being the result of serious constitutional predisposition, particularly the scorbutic diathesis, or of severe acute diseases, as scarlatina, variola, etc.

It occasionally happens that the fibrinous formation is not followed by any considerable amount of serous effusion. Such cases have been, rather erroneously, denominated "dry" pericarditis. Generally, however, the serous out-pour follows closely, rapidly, and abundantly, so much so indeed as to subject the parietal layer to considerable distension, and the heart itself to a dangerous degree of compression. This serum consists of the watery elements of the blood, holding in solution certain of its mineral salts, with usually a small portion of its coloring principle. Its color, however, may vary from a pale amber to a bright yellow, from an exceedingly delicate greenish hue to a dark brown, or from a pale pink to a deep hæmorrhagic red. Most frequently we find it to have either a decided yellowish or greenish color, although a brown tint is by no means uncommon. The various degrees of red or pink are due, as might be supposed, to extravasation from the delicate newly-formed vessels of the fibrinous layer already described. The effusion, if free from hæmorrhagic admixture, is generally transparent. When, however, as is sometimes the case, it exhibits more or less opacity, the fact is due to the presence of large numbers of cells that have found their way into the fluid, either directly from the vessels or from the plastic exudation, or which have been produced in the course of a pus-formation going on in the fibrinous mass. Not seldom it contains floating, detached flakes of plastic substance. The distension of the sac obliterates the friction of the heart in its impulse, and aids in preventing adhesions between the layers of pericardium or rupturing those already formed. Its pressure has been known to produce a thinning of the parietal layer, though generally such an amount of pressure would result fatally long before this more gradual change could be effected in the fibrinous tissues of the sac wall, and the usual fact is that the inflammation affects both the serous and fibrous laminæ, and produces an actual thickening.

In making post-mortem examinations of those who have died of pericarditis with extensive serous effusion, we shall find that as the body lies in the supine position the heart sinks, from its greater specific gravity, and the fluid accumulates above it. There may be instances in which adhesions prevent this relative position from occurring, and these connecting bands may be found to change the position of the apex beat.

We come now to the consideration of the steps and processes subsequent to completion of the effusion, and which constitute the terminal changes of the inflammatory action, presupposing that life has continued throughout its course. And first, as to the more serous or

watery effusion; its absorption through the general serous surface, and doubtless also by the vessels new-formed in the pseudo-membrane, may take place quite promptly and rapidly. Sometimes, however, the inflammation falls to a lower grade of severity, and persists in its continuance, forming a chronic pericarditis, in which case the effusion may disappear in part, but not often entirely. These cases are complicated by a liability to frequent exacerbations with re-effusions of serum, additional plastic exudations, and an increased danger of either a hæmorrhagic or a purulent involvement, with, sooner or later, a fatal ending.

The absorption of the fibrinous exudation is not so simple a process, but in many cases it seems to disappear almost entirely. At any rate, it is not uncommon to meet with cases in which nearly all traces of its presence subsequently disappear. The substance in these cases undergoes a fatty degeneration, and in this condition is gradually absorbed. In connection with the fibrinous formation, and especially with the plastic adhesions, there is often a new development of connective tissue, this evolution changing the character of the serous membrane itself, so that where the two layers are brought into a close and permanent adhesion their serous character is lost, and their separation, even by the scalpel, becomes next to impossible. This development of connective tissue, it must be understood, does not involve a transition in the fibrinous exudation, but is dependent upon the cells therein contained, and probably also upon the fully formed tissues of the pericardium itself. The fibrinous mass is afterwards changed by fatty metamorphosis, and absorbed. The new connective tissue thus formed is sometimes the subject of still further unfavorable changes, particularly *calcification*, the dense fibrous layer becoming in exceedingly rare cases a coat or shell of calcareous infiltration, inclosing the heart in a resisting wall.

Hæmorrhagic exudations are also frequently absorbed, particularly when the hæmorrhage has been but slight, and mingled with a large amount of serous or fibrinous exudation. The grave character of these cases consists but rarely in the extent of the hæmorrhage, but usually in the nature of the pre-existing condition which has determined the character of the whole morbid process. Purulent accumulations are of still more grave import, yet it still ends in absorption and recovery. In such cases it would seem the watery portions are directly absorbed, and the thickened purulent mass takes on a fatty degeneration, and is thus taken up without seriously endangering the patient. In some instances the purulent masses become encysted, and remain indefinitely without involving danger to life.

It could scarcely be possible that, in the majority of severe pericardial inflammations and effusions, the subjacent muscular structures should escape involvement. For not only do we find that the

fibrous pericardial layer often takes part in the morbid process, especially when the disease exhibits a chronic tendency, but the subsequent connective tissue proliferation involving this layer may extend inwardly as well as outwardly; and Virchow has demonstrated this condition in the muscular layers near the pericardial surface. It is believed that the pressure of the effused fluid may so far interfere with the nutritive circulation in the cardiac tissues as to superinduce fatty degeneration, which, perhaps usually involving only the outer portions of the structure, may in some cases pervade the entire thickness of the muscle. According to Wagner, about fifty per cent. of his post-mortem examinations revealed this myocarditic lesion in relation with pericardial inflammation and effusion. These changes in the muscular structures, and its consequent weakening, often lead to dilatation and subsequent hypertrophy, and thus may be the beginning of one of the long series of grave functional disorders likely to impair the patient's health irretrievably.

Pericarditis has also been assigned as a cause of endocarditis, and Desclaux has demonstrated by experiment that the latter can be induced by the former. It is quite doubtful if in the numerous cases in which the two diseases run a coincident course, the external inflammation can be safely considered the cause of the internal, since it happens that the same primary causes which generally originate the one, can also give rise directly to the other. Particularly is this true of acute rheumatism and of pyæmia.

Symptomatology.—One of the most marked characteristics of pericarditis consists in the uncertainty of its subjective symptoms in the earlier stages. It is not at all uncommon for the disease to make very considerable advances, or even, in some cases, to run its complete course without having been suspected to exist either by the patient or his physician. The symptoms which in some cases are violent and agonizing, in others may be almost unnoticed or altogether lacking. It has been only through many disastrous experiences that the medical profession have learned the need of extreme watchfulness in all forms of disease liable to pericarditic complication, and never to depend upon the patient's sensations alone, as warnings against its insidious invasion.

In cases of primary pericarditis the early symptoms may be not at all pronounced; and when some other primary disease develops a secondary pericardial inflammation, even an extensive one, there may be no chill ushering in the morbid complication, no increase of pulse, no added rise of temperature, no spontaneous pain, no sensitiveness, perhaps, even to local pressure. These negative indications, rather let us say: these utter absences of *all* indications, in the presence of a possible, yet unseen, peril, have made the wise physician solicitous and vigilant.

The first indication that presents itself in some few cases, is only a

sense of oppressive languor, incapacitating the subject for energetic activity; and even this may not appear until hours or days have elapsed. In other instances, however, the signs of intense and grave morbid action are sufficiently numerous, intense and significant. Among these we may here catalogue the following, viz.: pain, sensitiveness to pressure, quickened pulse, increased temperature, anxiety, pallor, hiccough, vomiting, insomnia, perhaps delirium, and these to be followed later, when effusion shall have supervened, by dyspnœa, orthopnœa, dangerous syncope, etc. Yet this whole series could scarcely be accepted as evidence of pericarditis, unless corroborated by the friction murmur elicited by physical examination. These symptoms we propose to consider briefly in successive order.

Pain.—Although pain may be lacking in the beginning of the complaint, yet there are cases in which it constitutes a predominant symptom. Generally, however, it is not violent. In primary pericarditis it is felt in the lower portion of the præcordial region and extending from the sternum to the apex, or nearly so. This pain may be of a dull character, but not unfrequently it is lancinating and severe, while from its central point the pain radiates downward and outward to the epigastric and left hypochondriac region, upward to the left axilla, and even down the arm. This pain is often spontaneous, though coughing and deep inspiration, as well as pressure over the præcordial space, aggravate it. From the first two of these aggravating causes, but chiefly from the peculiar character of the pain itself and the direction of some of its radiations, it has been thought by some to be pleuritic rather than pericardial. Others claim to have observed it in the absence of pleuritis.

A far more frequent symptom is a dull painful pressure in the præcordial region; and this accords with the view of numerous histologists who have been led to doubt if the serous pericardium is acutely sensitive like the pleura and peritoneum. Rochefontaine and Bourceret, however, in a paper read before the Paris Academy of Sciences, October, 1877, have claimed to demonstrate experimentally that the pericardium in disease is quite acutely sensitive, both in its external surface and in its thickness (Paul). The dull pressure, just mentioned as existing in the præcordial region, is also felt in the epigastrium, where it is increased by pressure made upon the external surface by deep inspiration and by bodily movements. Under the influence of general muscular movement, the aggravation may be sufficient to enforce absolute quiet on the patient's part, especially if, as sometimes happens, dyspnœa is also induced. These pains in the præcordium and epigastrium are also sometimes radiating.

There are two other localities in which pain, particularly on pressure, may be sought. One of these is above the edge of the clavicle, between the two origins of the sterno-cleido-mastoid muscle, and the other in

the angle formed by the lower border of the costal cartilages and the xiphoid process, on either side, but chiefly on the left. The first-mentioned of these is over the trunk of the phrenic nerve, and the other at the level of their termination. The pains, when they exist, are held to be due to irritation of these nerves.

Fever.—The indications of the presence of fever are to be received cautiously. The increase of temperature is usually not very great, and if the primary causative disease has been attended with febrile disturbance, it may be that no noticeable increase of temperature will occur; indeed, the experience of numerous observers furnishes united testimony to the occurrence of a decided fall of temperature in febrile diseases, when pericarditis has supervened. In acute cases, occurring in advanced life, Charcot reports this phenomenon: typhoid fever has, in two cases cited by Brouardel, shown a remarkable depression upon the development of a pericardial inflammation, and Lorain noticed the same change of temperature when a secondary pericarditis developed in the course of acute rheumatism. Paul mentions these cases, and attaches value to their significance, as possibly adapted to aid the physician in learning of the approach of a disease which otherwise might not be so soon detected. The same author makes note of another peculiarity of temperature, namely: that sometimes while the general surface is "very hot, the limbs are notably cold."

It sometimes happens that where no marked fever has previously existed, as, for instance, where a pericardial inflammation develops in the course of a chronic disease, there may be a marked rigor, followed by high temperature. The same is true, as already intimated, of the primary type of pericarditis. When the disease runs a slow course, the temperature is usually not much above the normal. In the case of young children, as when pericarditis follows advanced convalescence from scarlet fever, there is usually some return of febrile heat, and in all cases this is true in the later stages of pericarditis whenever it happens that the exudation takes on a purulent character.

The acceleration of the pulse is sometimes a very noteworthy indication. It may reach, in adults, a rate of one hundred and twenty per minute, and in young children a still greater rapidity. The increased rate, however, is not usually of long duration, and by the time the effusion process is well under way, it may have returned almost to its original condition. Later on in the disease there may be a retardation of the pulse, due to cardiac exhaustion from the pressure of the effused fluid, or from the muscular lesions in connection with the too frequent extension of the inflammation into the subpericardial tissues.

The acceleration of the pulse cannot be regarded in precisely the same light as a similar condition occurring in other diseases. It is to be remembered that the morbid process going on upon its serous

surface must, for the time, greatly increase the excitability of the subjacent muscular tissue, and this alone must account for much of the pulse acceleration, especially when it is not attended with a rise of temperature. When actual inflammation of the muscle occurs, the pulse is usually accelerated, and the increased rate persists. When either the respiratory or the circulatory function is disturbed by the pressure of the effusion, these disturbances constitute additional causes of the quickened pulse-rate.

Disturbances of Cardiac Rhythm.—These consist either of occasional intermittences, or of irregularities in the length of the revolutions. They may occur in the early stage, in which case they usually are only temporary, or later on, when they are due to either functional exhaustion from pressure in impaired cardiac nutrition, or to advanced inflammation or degeneration of the muscular tissue. Irregularity in the inhibitory function is also believed to be concerned in its causation.

Palpitation is often complained of, both in the earlier and later stages. A marked peculiarity of this symptom is the pain induced by each impulse. Closely related to this symptom there will be observed—

Anxiety and Dyspnoea.—The anxious expression and pallor are noticed in connection with the painful palpitation, as well as in the dyspnoea of the later stage. The disordered respiration comes on gradually. The pain at the beginning of the attack may itself induce a quickened breathing, and an established inflammation extending over the whole surface may excite marked reflex disturbances of both the costal and diaphragmatic functions. As the effused fluid accumulates, the respirations continue hurried and become deep and labored. Gradually the accessory cervical and external pectoral muscles are summoned to aid the intercostals and diaphragm, the anxious expression deepens, the chin is elevated, the alæ nasi dilate with each inspiration, the eyes assume a glaring expression, and every movement betrays the intense craving for air which the lungs, however efficient in themselves, can no longer supply to the asphyxiated tissues. Usually, the patient is unable to breathe at all when in the recumbent posture, and particularly when lying supine or on the left side. Nearly always, he sits leaning forward, except when the intense restlessness prompts some change of position in the vain hope of obtaining relief. One case is on record (quoted in Ziemssen) in which the only attitude the patient could maintain with present safety was on the hands and knees. If this condition continues, the skin becomes mottled, then cyanotic; a cold clammy perspiration bathes the surface, evidences of heart failure or of general collapse begin to manifest themselves, and death comes to the relief of the patient. The dyspnoea may be due to gradual loss of ventricular energy, resulting from the increasing

pressure, or from inflammation or degeneration of the muscle-tissue, or it may be due, in other cases, solely to pneumogastric irritation.

Orthopnoea is regarded by Paul as an important symptom. Bauer (*vide* Ziemssen, vol. vi., p. 602) explains it as "specially due—in addition to the usual causes—to the fact that the mobile fluid lies more unfavorably in the horizontal position of the body than in the sitting posture," since in this position "it presses upwards and backwards so as to exert considerable pressure upon the auricles and origins of the large vessels. Moreover, the pressure upon the lungs is greater in this position, and for the purpose of avoiding this effect upon the right lung, the patient prefers to lie upon his left, rather than upon the right side."

Syncope, or fainting fits, is not a very uncommon symptom in connection with the development of the affection, and seems to be associated with other evidences of irregularity in the circulation, and when one portion of the surface is hot while another portion is cold.

Insomnia may perhaps, as some writers assert, be due almost exclusively to the pericardial pain. It will be found, however, that in this disease, as in the first stage of pneumonia and in incipient typhoid fever, insomnia is often present, even in the absence of pain, and is not unfrequently of a persistent and intractable type.

Cough, Hiccough, and Vomiting.—All of these may be present in the first stage; as a rule, however, the latter is most apt to appear after serous effusion has taken place. The cough is usually short, hacking, and dry, somewhat like that of an incipient bronchitis, though at times accompanied with a viscid, frothy expectoration. The hiccough is often obstinate and painful. It is excited evidently by the inflammation to which the phrenic nerve is exposed in its passage across the pericardial membrane to reach the diaphragm. Vomiting generally occurs, when it occurs at all, in connection with the effusion and the dyspnoea, but it is also met with where neither of these conditions exists, and in cases in which it must be ascribed to influences reflexly excited, or else determined by the same condition as that which induces the singultus.

Renal Symptoms.—As a consequence of the elevated temperature on the one hand, or of the diminished cardiac energy on the other, the renal excretion should be expected to exhibit marked changes. The decrease in the aortic pressure, with the general venous stasis, induces congestion of the kidney, and the presence of albuminuria may be noted even where no nephritic complication has either preceded or accompanied the pericarditis. It is now well understood that the mere presence of albumen in the urine, under such circumstances, is not indicative of serious renal disease. Other changes are also noted, particularly the lessened volume, the high color, and the increased specific gravity of the excretion, and the brick-dust sediment

deposited on cooling. One of the commonest signs of extensive serous effusion anywhere is a falling off in the volume of the renal excretion, accompanied, usually, by an increased desire for liquids.

Physical Signs.—Notwithstanding the well-marked character of some of the subjective and objective symptoms already described as occurring in the first stages of a pericarditis, no single one of them, and no combination of them, can be regarded as conclusive evidence of the existence of the disease, unless corroborated by the presence of physical signs, and especially by the *friction murmur* presently to be considered. If any disease, even acute articular rheumatism, runs its course without the development of this murmur over some portion of the pericardial space, the supervention of pericarditis may well be questioned, whatever the other symptoms may be.

The physical signs of a pericardial inflammation and effusion are elicited chiefly by palpation, percussion, and auscultation. Inspection and mensuration may also be resorted to as aids and as confirmatory methods. The symptoms or indications, thus obtained, are pericardial friction murmurs, diminution of intensity in the normal cardiac sounds, abnormal prominence of the præcordial region, distension of the intercostal spaces, increased mobility of the position of the apex beat, depression of the apex beat, diminished energy of the impulse, friction fremitus, increase in area of absolute dulness, increase in area of relative dulness, change of location of dulness from change of posture, etc. Some of these we will now consider.

Pericardial Friction Murmurs.—A pericardial friction murmur in the earlier stage of the disease is the only pathognomonic symptom; without it, the diagnosis remains subject to at least some doubt. The murmur possesses quite a number of characteristics, and by means of some one or more of these it can be with certainty distinguished from endocardial murmurs or other thoracic sounds. It may be heard over any portion of the pericardial triangle, and may be co-extensive with it. It is both systolic and diastolic in point of time (there may be a presystolic friction murmur at the base of the heart, due to the movements of the auricles). It possesses the "to-and-fro" quality, conveying to the ear the sensation of *coming and going*. It is superficial; it is increased by pressure of the stethoscope. It is not propagated beyond the border of the pericardial triangle (except at the lower border where the solid liver conducts it for about one-half inch below the base line of the triangle). It is varied by a change of posture.

According to the best authorities, the pericardial friction sound is not caused by mere inflammation of the pericardial surfaces; its production requires the fibrinous exudation. The varying timbre of the murmur seems to corroborate this statement, and the fact that præcordial pain, fever, rise of temperature, and increased cardiac excitation often precede the friction murmur, is confirmatory evidence. The

friction sound often begins at the base of the cardiac triangle, and gradually extends upwards along the sternum. Sometimes it originates at the base of the heart and near the origin of the great vessels, this being the portion of the serous surface at which fibrinous exudation so often begins. When the murmur has been fully established by the extension of a diffuse fibrinous pericardial exudation over the entire surface, it will be found quite easy to mark out its exact boundaries upon the surface of the chest, and when this is done it will be seen that it coincides exactly with the boundary of the pericardial space, as we have studied it anatomically, except that at its lower border it overlaps it about half an inch, being propagated in this particular direction by the solid and sound-conducting left lobe of the liver.

The murmur varies in quality from that of a faint abrasion to that of a rough scraping or rasping. As it is often heard, it is described as resembling the creaking of new leather (*bruit de cuir neuf*). There may also be variations of the sound in various parts of the præcordial region, depending upon differences in the character of the opposing surfaces, and in the nature of the frictional movements. An important peculiarity in the murmur—one which materially aids us in distinguishing it from a valvular murmur—is its long duration, not only persisting during the systolic and diastolic action, but, as Skoda has pointed out, prolonged into the intervening period, so as to cover almost the entire period of the revolution. Occasionally, the sound may be systolic only, or diastolic only. In such cases it is usually longer than the systole or the diastole, as the case may be.

Pericardium murmurs can be modified by various causes. A change in the patient's posture will often cause an increase or a decrease in a sound already existing, or may even cause the appearance or disappearance of a murmur. The manner in which these changes are brought about is so obvious as not to require explanation. Again, we have already mentioned that pressure over the præcordial space increases the intensity of the friction murmur. A similar effect is often noticed resulting from an intra-thoracic pressure during inspiration. This has been usually ascribed to the increased friction between the opposed surfaces from contraction of the diaphragm, though the lateral increase in the volume of the lung tissue has always seemed to the writer to be a far more reasonable explanation. It must always be remembered that endocardial troubles are liable to occur in the progress of pericarditis, and that strong valvular murmurs occurring in connection with those produced by the pericardium may sometimes lead to a faulty diagnosis.

The discontinuance of the pericardial murmurs may occur in three ways: *first*, by an accumulation of effused fluid, pressing apart the rubbing surfaces; *second*, by the formation of adhesions, preventing

frictional movements; and *third*, by the re-absorption of the fibrinous exudation. When its cessation is caused by the incoming serous effusion, the sound usually diminishes first at the lower part of the præcordial space, and the effect gradually extends upwards. Cases do occur, however, in which the murmur is not entirely obliterated, even by a quite extensive accumulation. As the effused fluid is re-absorbed, there may be a return of the friction murmurs, though in much less intense form.

Fremitus.—When the friction is of a rough, rasping, or grating quality, it gives rise to fremitus or thrill. The vibrations can be perceived by pressing the fingers into the intercostal spaces, or by making moderate pressure with the hand over the heart. The effect has been said to resemble that produced by the crackling of parchment. The patient should be in the semi-recumbent posture. It is much better appreciated by the ear than by the sense of touch, the latter method adding little, if any, to our knowledge of mechanical causes and conditions of its production. It is by no means certain, even when we would most expect to find it.

As the effusion of serum supervenes upon the condition which has given rise to the pericardial friction murmurs and fremitus, the walls of the sac are distended, the visceral and parietal layers separated, and the two above-named signs are either greatly moderated in intensity, or obliterated entirely. The presence of the effused serum, particularly if in large quantity, superinduces a new series of signs, of almost equal diagnostic importance.

Protrusion of the Præcordial Portion of the Chest-wall.—This sign is found to occur in cases of extensive effusion, and particularly in quite young persons, in whom the parts are still soft and yielding, although it may occur also later in life. Pericardial effusion as an accompaniment of mollities ossium,—a not unlikely occurrence,—will exhibit this condition in a marked degree. The effect is in all cases produced by the pressure of the pericardial contents, and consists in an outward convexity or arching of the costal cartilages, or in chronic conditions, favoring it, even of the ribs also. In connection with this change in the shape of the rib, there may be a lifting up of the ribs affected, which will further increase the visible effect, and which is easily ascertained by comparative measurements of the two semi-circumferences of the chest. It may happen that the intra-pericardial pressure is transmitted through the left lung to the general pleural surface, and so cause a *general* elevation of the left ribs, almost as in normal inspiration, and lead to the erroneous diagnosis of a pleuritic effusion, a mistake that might be favored by the effect of the pressure upon the percussion resonance of the lung itself. Neither must it be forgotten that cardiac dilatation and hypertrophy are both

capable of producing the same præcordial protrusion as does pericardial distension.

This change in the contour of the thoracic walls may be prevented in several ways. The firmness of the ribs and cartilages may be too great to admit of such a curvature taking place. Or the lungs may yield to the lateral pressure sufficiently to prevent any great mechanical effect from being exerted anteriorly, or adhesions may, by their arrangement and strength, preclude the possibility of very great distension in that particular direction. The bulging, when it does occur, is usually central at the lower portion of the præcordium, and between the apex and the sternum.

Distension of the intercostal spaces has been noticed, though it is not a constant symptom, even in the presence of an extensive serous accumulation. It may result in weakening the affected intercostals, thus adding somewhat to the respiratory complications.

Increased fulness of the epigastrium is sometimes present. It is caused by the depression of the diaphragm by the weight and distending force of the fluid above. In connection with this sign, there may be a slight downward displacement of the liver.

Increased Mobility of the Apex Beat.—The distension of the pericardium admits of more free and extended movements of the heart, and it is consequently found that changes of the posture of the subject result in greater degrees of displacement of the heart than when the sac is in its normal condition. Adhesions, however, may operate so as effectually to prevent these changes in the position of the apical impulse. When the diaphragm is much depressed, the apex may be found as low as the sixth intercostal space.

Weakness of the cardiac impulse is observed in the great majority of cases. It is due to two causes: *first*, the presence of the fluid in large quantity, distending the sac and allowing the heart to gravitate away from the chest-wall, and the intervention of the fluid between the apex and the stethoscope; and *second*, the weakness of the heart's action induced either by the pressure of the surrounding fluid, or by other changes in its muscular tissue, occurring in connection with the pericarditis. Generally these two causes concur to produce the effect. This also may be prevented by certain fibrinous adhesions, preventing the gravitation of the heart backwards from the anterior wall of the thorax.

Increase of the Area of Absolute Dulness.—The serous distension of the pericardial sac, and especially the increase in its bilateral diameter, presses back the overlapping edges of the lungs, and thus increases the area of absolute dulness. When adhesion has occurred between the pericardial and costal pleuræ, the increase of the area will be more marked, but it often happens that there is little

change in the position of its outlines, even when the effusion is very abundant.

Increased Area of Relative Cardiac Dulness.—This is a more constant and, therefore, more reliable, indication than the preceding. Even when the edges of the lungs are not displaced by the distended sac, the deeper portion of the lungs may be forced aside to make room for the encroaching fluid. In health, the cardiac dulness extends to the left no farther than the extreme point of the heart; but when the sac is stretched to its utmost with fluid, the dulness may extend far to the left of the apex. When the area of relative dulness is found thus protracted beyond the apex, it constitutes undoubted evidence of extensive effusion. At the same time, the dulness is usually projected upward; it may be as high as the second rib, or may even extend higher yet toward the apex of the pericardial pyramid. From this highest point the left border of what was once the pericardial "triangle" now curves outward to, or beyond, the left nipple, to reach the extreme limit of the area of dulness beyond the cardiac apex. The right border may also be forced over even to the vertical mammillary line, and the "triangular" or pyramidal form of the sac no longer exists. The distension downward is less marked.

How much fluid must be contained in the pericardium in order to be discoverable by percussion, is a question exceedingly difficult to answer. Bauer estimates it at about 100 cubic centimetres (2.8 fluid ounces). Yet he says, "many circumstances may conspire to render this approximative measurement worthless" (Ziemssen).

Diagnosis.—In attempting to arrive at a positive diagnosis, which shall include not merely the question of the existence or non-existence of pericarditis, but shall also embrace an adequate idea of the special and characteristic features of each case, there are numerous and serious difficulties to be encountered. Some of these difficulties arise in the heart and pericardium, and some have their origin in the lungs, pleuræ, and other neighboring structures.

The mere fact of the presence of pericarditis can usually be detected by the frictional murmur alone, supposing always that the examination is made before adhesions or profuse serous exudation shall have obliterated this important sign. Owing to the fact that pericarditis is sometimes unaccompanied with high fever, pain, or any other alarming symptom, the attention of the physician may not be asked to the case until even serous effusion begins to produce its distressing mechanical symptoms, and then it may be utterly impossible to detect the slightest friction murmur. In such a case the diagnosis can usually be made out, and the case distinguished from hydro-pericardium—*i. e.*, mere effusion without previous inflammation—by the history of the patient, which will, in most cases, show some pre-existing disease likely to develop a pericarditis, together with either the pecu-

liar weight or pressure over the præcordial region, or else the physical signs which indicate pericardial adhesion or which hint at the presence of cardiac weakness. The sum total of the patient's symptoms, even without the friction murmur, usually constitutes a picture distinguished from that of an uncomplicated hydro-pericardium. It does not always happen, however, that the friction murmur is completely obliterated even by an extensive serous transudation of inflammatory origin, while in pure pericardial dropsy such a murmur is never produced.

The diagnosis of the character of the exudation is quite another matter. True, the friction sounds indicate quite conclusively the presence of a fibrinous exudation, and the discontinuance, partial or complete, of these sounds, determines at once the fact of absorption, adhesion, or serous effusion. As between these, the discrimination is usually easy, percussion and palpation enabling us to determine the presence or absence of effusion extensive enough to preclude the likelihood of pericardial friction, and the general symptoms of extensive adhesions (to be hereafter described), helping us to decide between the other two.

Hæmorrhagic and purulent accumulations may not give rise to physical, or other, objective signs of a distinctive character; yet we may often obtain reliable data on which to base pretty confident conclusions of the presence of blood or pus. If the primary morbid cause of the pericarditis has been such as to favor hæmorrhagic exudations and extravasations, we shall rarely be justified in rejecting the diagnosis of blood accumulation without very clear contra-indications. The diseases showing a special tendency to produce the hæmorrhagic form of pericardial exudation are morbus maculosis, scurvy, scarlatina, measles, and small-pox of the hæmorrhagic type, and the hæmorrhagic tendency in typhoid fever. Besides these, degenerative diseases of the coronary vessels are far more likely to result in rupture of the vascular walls during the continuance of a pericardial hyperæmia or inflammation than at other times. The presence of pus in the sac, inducing superficial destruction of the visceral surface, forms an additional factor in the causation of pericardial accumulation of blood. So, also, cancerous and tuberculous conditions should be mentioned as causes of the same unfavorable complication. Absolute certainty in the diagnosis is, however, exceedingly difficult of attainment.

The presence of pus in the sac is equally difficult to diagnosticate with positive certainty. There are certain diseases, of course, in which we should always suspect a purulent character in a supervening pericardial effusion. Of these, pyæmia and the proximity of abscesses or extensive ulcerations are formidable examples, and it is well known that the liability to purulent transformation of the fibrinous or fibrino-serous exudations is much increased by a lengthened period of in-

flammatory action. In Ziemssen, vol. vi., p. 608, special attention is called to the fact that in this last-mentioned condition we are likely to find also evidences of cardiac muscular enfeeblement. There are no special physical signs indicating that the pericardial contents are purulent in character. Where the fluids become ichorous in character, we may have subsequent symptoms of general blood involvement.

The liability to confound the increased area of dulness with that produced by cardiac hypertrophy is not very great, except when the effusion is not abundant. An extensive effusion presents an outline of dulness not at all resembling that of a hypertrophied heart. The feeble apex-beat, its frequent disappearance when the patient lies supine, and, perhaps more than all else, the rapid supervention of all these signs, as against the slower and more gradual appearance of a hypertrophy, form quite conclusive elements of diagnostic distinction.

In collapse of the tissue of the lungs the overlapping edges will be retracted, the anterior surface of the heart more extensively uncovered, and the area of absolute dulness increased correspondingly. This condition may be mistaken for a pericardial effusion with displacement of the pulmonary borders. But a collapse of the lung would also cause a lifting of the diaphragm by atmospheric pressure, and an elevation of the cardiac apex—a condition of things which, in an extensive pericardial effusion, is likely to be reversed. If the edges of the lungs be immovable, owing to pleuritic adhesions, the pericardial distension cannot cause any extension of the absolute dulness, but the area of relative dulness can still be enlarged. This is one of the reasons why expert diagnosticians usually rely more upon the relative than upon the absolute dulness. But probably the complex problem of all is present when left pleuritic and pericardial effusions coexist. In such a case the counter-pressure in the left pleural cavity may prevent the distension of the pericardium in that direction, and both it and the heart may be forced over to the right. The displacement of the impulse and of the sounds and murmurs will then have to be taken in connection with all the other signs and symptoms in an attempt to form what must, in such cases, be an uncertain diagnosis, unless the pericardial distension to the right should be sufficient to reveal the true condition.

Differentiation between endocardial and pericardial murmurs ought not to be very difficult, even an endocardial double murmur (*i. e.*, a systolic and a diastolic murmur combined) does not convey to the ear the sensation of a "to-and-fro" movement like the sound of pericarditic friction. Moreover, these valvular sounds are not increased by pressure, not modified by changes of posture, and not heard with equal distinctness over every part of the præcordial region. Again, one or both elements of the endocardial double murmur may be transmitted beyond the pericardial space, along the course of the great vessels, while the pericardial murmur is not.

Prognosis.—Previous to the discovery of the physical signs of pericardial inflammation, the disease was thought to be of a most formidable nature, the fact being that the character of a large proportion of these cases which terminated in recovery was not suspected. In more recent times it is known that the percentage of mortality is not high, and that many of the unfavorable cases owe their fatality either to the primary disease or to a condition that originated the pericarditis, or to some complication of the secondary disease, rather than to the pericarditis itself.

We have already stated that the disease may terminate without passing beyond the stage of fibrinous exudation. It is, indeed, likely that it can come to a favorable end with the hyperæmic stage and without even an exudation of any kind, though, of course, this is a proposition not easy of demonstration because a mere hyperæmia could not be diagnosticated with certainty, since it gives rise to no physical signs, and because its subsidence would leave no abnormalities to be discovered in a subsequent post-mortem examination. But when the disease establishes itself firmly, even then it may run its course and terminate in a few days, or at most in a month or six weeks. In numerous cases, however, the complications are such that a longer period must elapse, ere all the parts involved can be restored to their original integrity. The cases which terminate in recovery within two or three weeks are those only in which the fibrinous exudation has not been very abundant, since the re-absorption of this substance cannot be so rapid as is sometimes the case with the serous effusion. It is not uncommon to have such cases recover completely, if we may judge by the disappearance of all the symptoms, in a period of from one to two weeks. These favorable cases include those which occur in the course of acute conditions, as articular rheumatism, uncomplicated scarlatina, and other eruptive diseases, pleurisy, etc., though so speedy and favorable an issue is not to be expected in all such cases. The beginning of the absorption process is often accompanied by a rise in temperature, and, in case of a rapid absorption of serous fluid, an increase in the volume of urine.

The direct causes of a fatal termination are quite varied in character. The general tendency, so far as the mere inflammation is concerned, is towards recovery, except in the presence of extreme debility from some other cause. But a very extensive effusion may cause dangerous disturbances of both respiration and circulation, simply by reason of the mechanical pressure. The more direct manner in which this is accomplished is by preventing cardiac diastole, and thus inducing venous congestion; by compression of the lungs, interfering with both the air-supply and the blood-supply to that region; and by diminishing the aortic pressure, with consequent debility, or actual degeneration of the cardiac muscular tissue, with, sometimes, sudden

heart-failure. There are other ways in which the fatal result may be brought about less directly, though, in a certain class of cases, with scarcely less certainty.

Probably the most dangerous complication, as well as one of the most frequent, is direct involvement of the myocardium in the morbid process. This, however, is rather a part of the disease than a mere complication. In these cases the unusual excitation of the hyperæmic stage may be followed by inflammation of a high grade, with rapid and fatal degeneration. This danger must be a factor in the prognosis of every case of pericarditis, and when it does not immediately result in death, it very frequently runs into chronic forms of heart disease, from which complete recovery is well-nigh impossible and a long lease of life at least very improbable.

Other dangers in the course of the disease are the liability to hæmorrhage and to purulent inflammation. The first-mentioned complication may occur rapidly, the patient succumbing speedily. The causes of these dangerous hæmorrhages have been already mentioned. Or the exudation may itself be hæmorrhagic, due to a scorbutic influence or to the nature of the primary disease, as heretofore described. When the exudation is purulent in character, death usually follows quite speedily, although not in all cases. The cause of the purulent condition, however, must sometimes be recognized as exercising a large influence in bringing about the fatal termination. Of this we may find a striking illustration in puerperal pyæmia, or in diffuse and extensive pulmonary or hepatic abscess.

When pericarditis takes on a chronic form, as it not unfrequently does, particularly when the primary cause is itself of a chronic or constitutional nature, the prognosis is always unfavorable. True, the finale may be long deferred, but the disease runs a course which perpetually keeps the patient in imminent danger. The exudation of serous fluid sometimes increases and diminishes alternately and repeatedly. If exudation of a fibrinous character exists, adhesions may be multiplied, and through all the process purulent and hæmorrhagic complications may occur at any time. In addition to this, myocarditis and myocardiac degeneration commonly follow, and from this, heart-failure may suddenly cut short the wearisome history at any moment. Or, dilatation, with compensatory hypertrophy, may follow upon chronic pericarditis, with all their train of morbid changes, sufferings, and dangers.

The prognosis then must be based upon a variety of considerations. First, upon the primary cause of the attack. If it be a scorbutic or hæmorrhagic diathesis, or if it be tuberculous, or carcinomatous, or suppurative, or pyæmic, the prognosis can rarely be favorable. If, on the other hand, the attack should be of acute rheumatic origin, or due to some other acute, but mild and uncomplicated, disease, the general

prognosis is favorable. *Secondly*, the extent of the inflammation. A circumscribed pericarditis, especially if not extensive, is not usually considered a cause of great anxiety unless complicated with some other condition of more dangerous tendency. A diffuse inflammation, on the other hand, is likely to result in more extensive effusion, and consequently in greater danger from mechanical pressure. *Thirdly*, the character of the exudation. Thus the fibrinous form is not unfavorable, unless extensive adhesions or purulent transformations complicate the condition. The serous form is probably equally favorable, its unhopeful element consisting in its volume rather than its quality. The hæmorrhagic form requires an unfavorable prognosis when it is the natural outcome of a grave primary disorder, as it usually is. When depending on rupture or erosion of vessels, its unfavorable character will largely depend upon the quantity of blood escaping into the sac. The purulent form demands an unfavorable prognosis always. *Fourthly*, the complications. These are not of necessity unfavorable indications, though they always add to the anxieties and perils of the cases. There is one complication which always renders the case dangerous, and its recovery a matter of the gravest doubt; viz., myocarditis or myo-degeneration. *Fifthly*, the age of the patient. Diffuse pericarditis occurring in infancy or in old age is exceedingly dangerous. In infancy, the cases are usually fatal; in old age, not unfrequently so. The period of least danger is said to be in early adult life.

THE TREATMENT OF PERICARDITIS.

BY E. M. HALE, M.D.

I must premise by saying that, as pericarditis is generally of rheumatic origin, the treatment, to a large extent, is that of rheumatism. But if we confine our efforts to the treatment of rheumatism alone, we shall not be able to cope successfully with the condition of the heart caused by it.

There are, then, two indications to be met:

- (1.) To remove the rheumatic inflammation.
- (2.) To retain the power of the heart.

To meet the first indication, the following remedies are indicated: Aconite, Belladonna, Bryonia, Cimicifuga, Francesca (Manaca), Colchicum, Kali iod., Spigelia, Squilla, Ranunculus, Verat vir., and Sulphur.

To meet the second indication, the true cardiac remedies,—which have no influence on the rheumatic condition,—namely: Digitalis, Convallaria, Adonis, Cactus, Caffein, and Coca, are most useful.

The first and most essential indication in rheumatism is *rest*, as ab-

solute as possible. Joints and muscles in a state of absolute rest recover sooner than when motion is permitted. The heart cannot be put into a condition of *rest*. It must move; but we can greatly restrict its movements by enjoining complete bodily and mental quiet, and the use of certain remedies. The whole body can be kept quiet, by our personal influence in advising the patient, and giving reasons for such advice. Joints and muscles should be enveloped in raw cotton, and sometimes rendered immovable by splints.

I have rarely found the use of external applications of any value in rheumatism. Warmth from hot water, poultices, hops, etc., sometimes seems grateful to the patient, but the "liniments," made of strong oils and irritants, should not be allowed. If medicinal substances are applied, they should be made of the medicines useful in each case. Lotions of Aconite, Belladonna, Bryonia, or Opium can be prescribed. Alkaline lotions have been lauded, and even acid embrocations have been praised. (Fuller strongly praises diluted vinegar.)

Aconite is one of the most useful remedies for pericarditis. Its symptoms are closely similar to the acute form of the disease. If used in the rheumatism which precedes it, the cardiac inflammation will often be prevented. Its chief indications are the high fever, high temperature, rapid and strong action of the heart, hard, wiry pulse, quick, 130 to 150, the great restlessness, mental anxiety, quick, anxious respiration with oppression of the chest. In this stage Aconite should be given in the 1st dilution until the restlessness and anxiety and temperature are lessened, and then changed to a higher dilution, 3rd to 6th, when the following symptoms obtain: the beats of the heart become weaker, irregular, intermitting, or unequal, and at the same time the pulse is small feeble, slower, and *not* synchronous to the beats of the heart; the temperature is lower, while the respirations increase. These symptoms (says Bæhr), are peculiar to Aconite, and occur only in diseases of the heart. If, however, Aconite does not remove these symptoms of impending heart-failure in a short time, it will be necessary to resort to *Digitalis* or some other true cardiac remedy.

Digitalis has symptoms closely resembling those of Aconite, but they do not occur in the same order of sequence. Digitalis primarily increases the tonicity and force of the heart until it causes its death in tetanic contraction. Aconite excites and irritates the heart (primarily) until it causes death from paralysis in diastole. I do not believe that, practically, Digitalis is of any value in pericarditis, in its primary inflammatory stage, for it does not cause inflammation of the heart. In the article on *Endocarditis* I have fully given my views of the sphere of action of all the cardiac remedies. Suffice it to say in this place that Digitalis is useful only when the muscular power of the heart is failing, and when Aconite fails to afford relief. It is indicated by the irregular and unequal and intermittent pulse, the excited but weak action of the heart (which often simulates *force*, but is not), the rapid respiration, oppression of breathing, cyanotic appearance of the face and lips, and a general venous stasis. In this condition only the 1st dilution, or 1st trituration of the leaves, is of any value, and these, in quantities of 5 to 10 gtt. or grs., must frequently be repeated, until decided improvement sets in.

Bryonia is, next to Aconite, the most useful remedy in pericarditis. No remedy so closely resembles in every particular the rheumatic diathesis (as pointed out by Dr. Rutherford Russell). It has a specific affinity for serous membranes; it causes the acid condition of the blood; it causes all the pains so characteristic of rheumatic fever, and the products of the rheumatic inflammation (serous and plastic effusions). We do not find in its pathogenesis the symptoms of pericarditis as fully pictured as those of pleurisy, nor is it necessary. It corresponds to the pathological condition, and that is often a better indication than symptoms. The "stitching," stabbing pains need not be present, for, as in some cases of pleurisy, they are notably absent. The severe frontal headache, the inflammation of joints, the scanty, acid urine, the acid sweat, the aggravation from motion, and often the gastric symptoms,

thirst, dryness of the mouth, and brown coating of the tongue, are the leading indications.

Belladonna may be indicated in the acute stage by its well-known symptoms, but especially by the cerebral congestion, the delirium, the congestion of capillary system, etc.

Colchicum is indicated in cases having an undoubted rheumatic or gouty origin. Recent experiments show that poisoning by *Colchicum* develops symptoms very similar to rheumatism or gout. It causes many symptoms similar to *Aconite* and *Bryonia*. The old school have nearly abandoned its use on account of the injury and prostration caused by the drug. But we can take its symptoms and pathology and prescribe it in small doses with benefit. The following symptoms appear to me to indicate it. The fever is not high, and is attended by perspiration, hot moist skin, and throbbing of the vessels, but the heart's action is weak, and the pulse is intermitting and quick. There is also vomiting and purging, with coated tongue and thirst. In some cases of rheumatism the poison appears to attack the intestines, and causes all the symptoms of dysentery (enteritis). I have known several cases to occur during pericarditis. Here *Colchicum* would be clearly indicated.

Asclepias tuberosa has many symptoms which indicate it in subacute pericarditis.

Ranunculus.—All the species have in their proving many symptoms which point to their probable usefulness in rheumatic affection of the heart.

Veratrum viride.—This powerful remedy is often indicated for a short time at the onset of pericarditis in plethoric persons with large muscular development and rigid fibre. The action of the heart is very violent and forcible, lifting the chest with great, heaving pulsations. The lungs and brain are actively congested, cerebro-spinal congestion is present, the pulse is hard, full, and bounding. In such cases from one to five drops of the tincture every hour, meanwhile closely watching its effects, will often bring on a favorable crisis. I think it a better remedy in idiopathic than in rheumatic pericarditis. As soon as the violent action of the heart, and the cerebral and pulmonary congestion and high temperature, are relieved, substitute for it *Bryonia*, or some other indicated remedy. *Veratrum viride* also corresponds to another stage of the disease, rarely met with, it is true, but sometimes seen. The pulse becomes very slow and full; synchronous with the heart's action; vomiting, great weakness; movement does not quicken the pulse much; violent clonic spasms. Here a few drops of the 3^d every hour will soon bring up the pulse to its normal standard.

Verat. alb. has been recommended for "violent dyspnoea, constricted sensation in the throat, short dry cough, convulsive motions of a clonic character, cold perspiration, and great thirst; tumultuous but weak action of the heart, with weak, irregular pulse." These symptoms indicate paralysis of the heart, a condition in which I should feel safer in prescribing **CAFFEIN**.

Franscesca uniflora ("Manaca").—This remedy, which comes to us from Brazil, is well worthy our careful study and thorough investigation. It has long had a place in the Brazilian Dispensatory, and is largely used in domestic practice among the Spaniards and the aboriginal tribes. Early travelers mentioned this "wonderful specific" for acute and chronic rheumatism, and recount its magical effects upon themselves. It is used largely to-day in the hospitals of South America, and, of late, in those of New York and Philadelphia.

It seems, from a study of its effects, and a few pathogenetic symptoms, to resemble *Bryonia* and *Cimicifuga*. It causes "intense headache, like a band around the head, with symptoms of cerebral congestion; pain in the back of the head, neck, and spine, of a lancinating, sticking character; aching terribly all over, with great heat over the body, followed by profuse sweat, with subsidence of all the sufferings." These effects are from large doses of the decoction, such as is used by the Indians, and large doses of the fluid extract, prescribed by physicians. The group closely resemble an acute attack of rheumatism.

Allopathic physicians, on this account, assert that it is contra-indicated in acute rheumatism, and because they cannot believe that small doses will cure. They claim it is much more successful in sub-acute and chronic rheumatism, probably because aggravations from the drug are not as common. Those interested in a study of the remedy I refer to the *Therapeutic Gazette* (Detroit, 1881, 2, 3 and 4).

My own experience fully confirms the claims for its great power and efficacy. I know of no remedy whose action is so prompt, certain, and curative. It not only alleviates the pain in a few hours, but prevents its return, and the extension to other joints

and tissues. Our treatment of rheumatism has not been such as to shed much lustre on our school, but with a judicious use of *Manaca*, and its sphere better defined by provings, we shall be able to reach greater success in this disease. In acute cases the dose I have found successful is a teaspoonful of a solution made by mixing one drachm of the tincture to ten ounces of water, repeated every hour or two.

In chronic cases, marked by stiffness, lameness, and great pain on sudden or continued motion (*contra Rhus*), the dose can be varied from five drops of the tincture to five drops of 1- dilution, every two or three hours. I expect brilliant results from it in rheumatic affections of the heart.

Cimicifuga, owing to its specific affinity for muscular tissues, should be better indicated in rheumatic myocarditis than in pericarditis. But it certainly has some affinity for the serous membranes, for it has been used successfully in all forms of rheumatism of the joints as well as the muscles. In medicinal doses it favors the elimination of urea. It is considered to be particularly indicated when the rheumatic attack is sudden and severe. 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 eyeballs (*Spig.*). The heart's action is not only violent, but irregular (*choreic*). Great depression of spirits, gloomy and taciturn. The pains are described as aching, stitching, benumbing, or coming on in sudden shocks. I think it has no action on the effusion of plastic material or serum, like *Bryonia*. I advise the lowest dilutions.

Kali hyd.—The Iodide of potassa is useful only during the period of effusion, when the rubbing sounds are present, or when serum is rapidly collecting. It is indicated in the great dyspnoea from excess of tough bronchial secretion or pericardial effusion. I have seen the best effects from the iodides when given alternately with *Digitalis*. It is indicated in weakness of the cardiac muscle, from embarrassed action owing to pressure from effused fluid. The Iodide of ammonium is often more active than the potassium salt. In order to get its specific action, it must be given in doses of at least five grains every four hours. In some cases I have found it to act better in alternation with *Convallaria* than with *Digitalis*. *Sulphur* follows *Kali iod.*, and rivals it in pericardial exudations.

Kalmia latifolia has not been used in pericarditis rheumatica as much as it merits. It is a remedy but little inferior to *Aconite* in the inflammatory stages. It causes tumultuous, rapid, and visible beating of the heart; paroxysms of anguish about the heart, dyspnoea, fever, stitches, and rheumatic pains in the region of the heart. It is not known to have any influence over the exudation, and in this as well as other respects resembles *Cimicifuga*.

Squilla is a remedy little known in cardiac diseases, but one destined to occupy an important place in their treatment. It has a decided affinity for serous membranes, causing inflammation and exudation of lymph and serum. A study of the incomplete pathogenesis given us by *Hahnemann* will show symptoms surprisingly like pleuritis and pericarditis. Cases of poisoning show a still greater similarity. Its botanical relationship to *Convallaria* and *Lilium tig.* is quite suggestive.

Spigella should not be neglected in pericarditis. It is best indicated in the non-rheumatic variety. Its symptoms must be studied by consulting its pathogenesis, and are too extensive to be given here. *Lilienthal*, in his *Therapeutics*, gives the best resumé of its cardiac symptoms.

The indications for the use of the true cardiac tonics are given under endocarditis. They are to be used always in connection with the rheumatic remedies, when the pericarditis is of rheumatic origin. It is seldom that they are of great value alone, except in the later stages of that malady. They have no influence over the inflammation, none to arrest exudation or to remove the collection of serum (or hydro-pericardium). They act solely on the nervous supply of the heart, and govern its movements, regulating its rhythm, imparting strength to its pulsations, and enabling it to overcome the tendency to failure or cardioplegia. They remove the local and general dropsy solely by

increasing the blood-pressure in the arteries, and by removing the venous stasis. They are not specific diuretics, but cause the dropsical effusions and infiltrations to be carried off by the kidneys, only by acting on the heart and through the circulation.

It sometimes happens that all remedies fail to remove the serous effusion in pericarditis. In such desperate cases paracentesis has been resorted to with success. The operation has been performed with good results by several surgeons of both schools. Full directions for this procedure are to be found in the latest treatises on surgery.

HYDROPERICARDIUM.

BY PEMBERTON DUDLEY, M.D.

Synonyms.—Hydrops pericardii; Hydrocardium; Pericardial dropsy; Dropsy of the heart; (French) Hydropericarde; (German) Herzbeutelwassersucht.

It is only in comparatively recent times that hydropericardium has come to occupy a place entirely distinct from that of the serous exudation of pericarditis. Now it is well known that it is a purely mechanical transudation of serum from the pericardial sacs, occurring independently of inflammatory action, not due to an altered condition of the serous surface, but to an altered intravascular pressure.

The pericardial sac is nearly always found to contain a greater or smaller amount of serum, the quantity varying from two and a half to three and a half fluidrachms (Flint). It may, however, be increased to two or three ounces, as will be presently shown. It is held by some recent authorities that no accumulation of this fluid exists normally during life, and that the entire quantity found in the sac is transuded during the death agony or subsequently, and the fact is cited that the longer the autopsy is deferred, the greater will be the accumulation of fluid. While there can be no doubt whatever that the prolongation of both the death agony and the delay of the autopsy appear to have a decided bearing upon the quantity of pericardial fluid found, yet we do not by any means accept the view that all this fluid is thus produced. Colin and others found a greater or less accumulation in all their cases of animals experimented upon, in which the observations were made either immediately subsequent to instantaneous death or during life. The quantity found in the pericardial cavities of horses, opened immediately after death from hæmorrhage, varied from two and a half to three and a half fluidounces. Here the conditions above mentioned, to which the presence of pericardial fluid has been ascribed by recent authorities (Bauer, *vide*

Ziemssen, vol. vi., p. 665), namely coronary venous stasis and post-mortem transudation, are entirely eliminated. Another argument against the view advanced by Bauer, and others, is found in the presence of correspondingly large quantities of fluid in other serous cavities opened during life by accident or in the course of surgical operations, such as the synovial sacs, the cavity of the tunica vaginalis, etc.

We are disposed to accept Flint's estimate of the quantity present during healthy life, viz.: two and a half to three and a half fluidrachms, as approximately correct, and the addition of even a much larger amount, one to three fluidounces, as generally due to conditions accompanying or following the death agony, and not usually to be regarded as evidence of a pericardial dropsy, as that term is ordinarily employed. It should be mentioned here that there are particular forms of death in which transudation is more rapid than in others, among which suffocation or asphyxia, valvular diseases of the heart, pneumonia, etc., may be specified.

Ætiology.—Hydropericardium is never a primary disease, but is always a mere symptom of some other morbid condition. It may be either part of a general dropsy, or a localized effusion, dependent on a locally acting cause. When it comes on as part of a general dropsy, it is most frequently in those cases which result from cachectic troubles, as from hydræmia arising from any cause, but especially from Bright's disease. When it constitutes a purely local symptom, it is usually produced by stasis in the coronary veins, or by atheromatous disease affecting the coronary arteries. It has been suggested that it may occur in consequence of collapse or shrinkage of any of the intrathoracic viscera, the change of volume generating a vacuum which is filled by transudation from the pericardial vessels superinduced by atmospheric pressure. This opinion, however, is not well sustained.

Symptomatology and Diagnosis.—From what has been said respecting the symptoms and diagnosis of pericarditic serous effusion, there are numerous conditions arising in the course of a true hydropericardium which scarcely need special discussion. The presence of the fluid is probably never detected during life, unless it accumulated to a considerable amount. When the discovery of its presence is finally made, one of the first questions which forces itself upon the medical attendant is whether it is a purely dropsical effusion or a serous exudation which has occurred in the course of an undiscovered pericarditis. If the physician's previous examinations of the case have been such as to warrant the conviction that the effusion has not been preceded by a frictional pericardial murmur, the question of its character is not very doubtful. The careful physician, however, will inquire further as to the previous occurrence of præcordial pains or pressure, fever, etc., and particularly as to the pre-existence of acute rheumatism, or other disease likely to induce secondary pericarditis.

The absence of these indications will fully justify a diagnosis of hydropericardium.

The physical signs are almost exactly like those observed in the inflammatory form of pericardial exudation. As the fluid accumulates, the area of absolute, and that of relative, cardiac dullness on percussion are both increased. The pressure or weight of the fluid depresses the diaphragm and interferes with its movements, and diminishes correspondingly the freedom of respiratory movement in the abdominal muscles. There is also a striking difference in the præcordial dullness in the sitting and recumbent postures, the fluid in the latter position gravitating toward the posterior portion of the thoracic cavity, and permitting the borders of the lungs to encroach farther into the præcordial region. While in the sitting posture, the fluid changes its position and presses the edges of the lungs backward. The apical impulse presents changes similar to those described under pericarditis, *i. e.*, it loses its force in two ways: *first*, by the intervention of fluid between the heart and thoracic wall, and, *secondly*, by the enfeeblement of the heart's action, due to mechanical compression, and the obstruction to the supply of venous blood to its cavities. There is also a marked pulse-symptom—a diminution in the height of the pulse *wave*, caused by the diminution of the venous supply and the cardiac debility. We must also mention as common signs venous engorgement, cyanosis, and diminished renal excretion, often attended with thirst and without fever. There are also the same respiratory and reflex symptoms as in extensive pericarditic exudations; *viz.*, dyspnoea, orthopnoea, anxiety, nausea and vomiting, etc. The intensity of some of these symptoms will be modified greatly by the rapidity of the effusion; the slower the fluid accumulates, the less severe will the symptoms usually be. Finally, as to the physical signs, it must be said that they are more constant in hydropericardium than in effusion following pericarditis, in all those particulars in which they can be modified by adhesions, since this latter complication is not liable to arise except in the presence of inflammation.

Prognosis.—It is usually the case that hydropericardium arises from disease of a grave and incurable character, and hence the prognosis is in all such cases unfavorable. When the dropsy occurs in connection with a general dropsy, the prognosis will of course be unfavorable, since in almost all such instances the pericardial complication does not supervene until the præexisting condition has rendered the case almost hopeless. In pericardial dropsy caused by hydræmia from parenchymatous nephritis or other forms of kidney disease, grave apprehensions are to be entertained.

Fortunately, the cases are not all of so grave a nature. Many instances occur in which a perfectly curable hydræmia may give rise to a pericardial dropsy, and in such cases there is every probability that

when the primary cause is cured, or has otherwise ceased to exist, the dropsical fluid may be reabsorbed, and that this favorable process can be hastened by appropriate treatment. The same statement can be made respecting hydropericardium resulting from diseases of adjacent organs, as the lungs, liver, etc., the question of recovery depending in these cases largely upon the character and the duration of the primarily acting cause.

The *treatment** of dropsy of the heart is in all respects the same as the treatment of serous effusions as the result of pericarditis.

It is therefore unnecessary to go over the same ground. Suffice it to mention that the most appropriate remedies are doubtless *Arsenicum*, *Arsenite of Gold*, *Arsenite of Copper*, *Apis mel.*, *Bryonia*, *Asclepias*, *Kali carb.*, and *Kali hyd.* These are homœopathic to the local effusion. Should the condition of the heart be such as to induce general anasarca, from failure of the functions of the kidneys, then we must use *Digitalis* and its analogues whose properties, power, and method of use are fully set forth in the article on Endocarditis.

HÆMOPERICARDIUM.

BY PEMBERTON DUDLEY, M.D.

Definition.—Hæmorrhage into the pericardial sac.

We have already alluded to hæmorrhagic exudations in pericarditis arising from scorbutic diseases and others of a similar nature. Even in pericardial inflammation of a less grave character, extravasations may take place from the newly formed vessels of the fibrinous layer. We now come to consider, very briefly, hæmorrhage into the pericardial cavity occurring independently of pericardial inflammation.

Hæmorrhage into the pericardium takes place, *first*, from wounds penetrating the pericardium or the heart itself; *secondly*, from rupture of the heart-walls, as from cardiac aneurism; *thirdly*, from aneurisms of the aorta opening into the cavity; *fourthly*, from rupture of the coronary vessels. Abscesses of the lungs may also, as already mentioned, open into the sac, and may, of course, discharge into it blood as well as pus.

Pericardial hæmorrhage is usually and rapidly fatal. The sudden abstraction of a considerable quantity of blood from the central organ of the circulation is instantly felt in the nerve centres, and the quick and energetic compression of the heart by the confined pericardial blood, and the acute anæmia and paralysis of the cardiac muscle together make quick and terrible havoc with the vital functions. It

* By E. M. Hale, M.D.

may happen, however, that the accumulation of pericardial blood takes place slowly, in which case the fatal result may be for a time deferred. If the patient fortunately survives the immediate effects of the loss of blood and of the mechanical interference with circulation and respiration, an inflammation of the serous membrane follows, with death sooner or later, except when the hæmorrhagic effusion has been quite limited, and does not recur.

A pericardial hæmorrhage will present the same dulness on percussion as a serous effusion of equal extent. A sudden hæmorrhage is not so voluminous as a more gradual serous effusion, simply because the sac resists a sudden distending force, but gradually yields to a more prolonged pressure. The hæmorrhage, therefore, even from a cardiac or aortic aneurism, is not usually much more than a pint in quantity. The prognosis in all cases is, of course, in the highest degree unfavorable.

ADHESIONS OF THE HEART AND PERICARDIUM.

BY E. M. HALE, M.D.

“The discovery of adherent pericardium during life is in some cases impossible, at least doubtful or difficult; but in others, and these are amongst the most important cases, its existence may be ascertained on reasonable and well-definable grounds.

Pathology and Diagnostic Points.—“When the adhesions are partial, or when the heart, though completely adherent, is small, not bound by external adhesions to the anterior walls of the chest, and is covered to the natural extent by the lungs, their expansion being free and unrestrained, thus the varying relations of the heart and lungs to the chest is quite natural, and the diagnosis of the adhesions is impossible. If the adherent heart be enlarged, and is not attached to the lower half of the sternum and the cardiac cartilages, by combined pericardial and pleural adhesions, so that the action is automatic and the passive or inspiratory movements of the heart are scarcely or but little interfered with, the inspiratory expansion of the lungs is freely permitted, and the diagnosis of the adherent pericardium may be difficult, obscure or impossible.

“When, however, the heart is, as usual, enlarged, being often affected with valvular disease, the adhesions may be short, fibrous and binding; and the front of the organ may be affixed to the two lower thirds of the sternum, and the adjoining cartilages by pleuro-pericardial adhesions, so that the automatic and respiratory movements of the heart and the inspiratory expansion of the lungs are restrained; thus the discovery of the adhesions during life may generally be made by a

careful study of the physical signs; its diagnosis being made more firm and easy, in proportion as the heart is more enlarged, and more firmly affixed to the anterior walls of the chest.

“When the adhesions are long and loose, and the heart is free from valvular disease, and from any other influence tending to cause enlargement of that organ, the size of the heart is usually natural.

“When pericardial adhesions are associated with valvular disease, the heart is always enlarged.

“It is the natural effect of pericarditis for the inflammation to spread from the pericardial to the pleural surface of the fibrous sac. When, therefore, the pericardium becomes adherent to the heart in those cases, it becomes adherent also to the walls of the chest as part of the pericardium. These pleural adhesions often occupy an extensive space in front of the chest, and may extend from the second left cartilage to the sixth, from the manubrium to the upper half of the ensiform cartilage, and from the right border of the sternum to the apex of the heart to the left of the nipple line, as in the cases referred to in former pages, and there described.

“When the adhesions are short and powerful, and when, being pleuro-pericardial, they bind the walls of the heart extensively to the walls of the chest in front of them, a great and constant strain is put upon the ventricles; for they cannot contract upon themselves to expel their contents, until they have dragged the sternum and cartilages powerfully inwards. The ventricles thus expend their force in two directions, one towards the interior to expel their contents, resisted in doing so by valvular incompetence, the other from the exterior, to compel the part of the chest which is united to them like a solid buckler to share in their contraction. Under these influences, the ventricles tend to undergo a change in form, and to become flattened out, the one in front of the other.

“When the adhesions, being extensive and pleuro-cardial, are not short and close, but of moderate length, and do not, therefore, bind the sternum and cartilages to the heart like a buckler, they do not seriously embarrass the commencement action of the ventricles; but during their contraction the ventricles begin at length to draw upon the walls of the chest, and in the course of the systole they drag these walls inwards.

“When the adhesions are, as usual, longer and less solid, the ventricles contract more after their wont, and retain, more or less perfectly, their power. The right ventricle is usually enlarged as well as the left, but not always, for the size of the ventricles is necessarily influenced by the size of the valvular affection. When that affection is mitral, or mitral aortic, the right ventricle shares the labor and enlargement with the left ventricle; when the aortic valve is alone affected, the left ventricle is often alone enlarged; and when there is mitral

obstruction, the enlargement may affect merely the two auricles, that of the ventricles being somewhat moderate.

"The ventricles, when the pericardium is adherent, tend to enlarge outwards in every direction, and especially upwards to the manubrium, as well as downwards to the epigastric space, to the right and to the left. The great arteries are lifted up on the top of the ventricles into an unusual position, and are crowded into the narrow space at the top of the chest, almost as high as the root of the neck.

"When the adhesions are dense, strong, and contracted, they sheathe the whole heart in a tight, tough envelope, which grasps the auricles and ventricles, prevents their free expansion, and forcibly removes the organ.

Symptoms.—"A steady retraction of the lower half of the sternum during the whole of the systole of the ventricles, and the sudden starting forward of the lower half of the sternum at the beginning of the diastole, with a return shock or blow, was observed in my own case, published in 1844, and in one of Skoda's, given in 1852.

"A drawing inward of the cardiac intercostal spaces during the systole was first observed by Heim, and afterwards by Dr. Williams, by Skoda in three cases, and by Cejka in three more.

"This sign, which is sometimes present in other cases, renders the existence of adherent pericardium probable, and especially if this sign is still present when the patient draws a deep breath; but if it is followed by a diastolic shock, the diagnosis of that affection is certain. The existence, indeed, of a diastolic back stroke taken by itself pronounces that the heart is adherent. A double movement of the systolic impulse, first forward with a heaving motion, then backwards with a forcible retraction. The outward pressure, equal in every direction, of the blood contained in the ventricle during its contraction, naturally forces forward the walls of the chest in front of it at the beginning of the systole. During the continuance of the systole, the adherent sternum resists the contractions of the heart, but in the struggle the bone yields, and is drawn forcibly inwards by the active ventricle. A non-diminution of the region of pericardial dulness and of the impulse; an absence of change in the position of these signs when the patient lies on the left side. This non-diminution of the area of pericardial dulness and of this impulse is, undoubtedly, a valuable sign of adherent pericardium; in one case, however, the impulse below was exceedingly strong at the end of expiration, and in another the upper and lower borders of the impulse probably descended during a deep inspiration. This is indeed different from the diminution of the extent of dulness and impulse, and, what is still more important, from a bodily transfer during a deep breath of the seat of the dulness and impulse from the cardiac cartilages and the fifth space near the nipple, to the epigastric region, including the ensiform car-

tilage and the adjoining seventh costal cartilage; another case illustrates in its own manner the other point just referred to—the non-shifting of the seat of the impulse when the patient lies on the left side.

“These, as far as I know, are the only signs of adherent pericardium; but there are certain other signs, that, without ranking in precision with those just named, have their significance. The drawing inward during the systole of the space between the ensiform cartilage and the seventh costal cartilage was noticed by Sander in a case of adherent pericardium; and in another case it was observed that the tip of the ensiform cartilage was retracted during the contraction of the ventricle.

“There is a great variation in the extent, force, character, and position of the impulse in adherent pericardium. It may be imperceptible, feeble, heaving during the systole, and very extensive; tumultuous, and very irregular; strong, and very greatly extended either upwards or downwards. Violent action of the heart has been observed over the whole front part of the chest.

“The apex-beat is, as a rule, feeble, even when it extends from an inch to an inch and a half to the left of the nipple line, being felt in the sixth space. Gairdner points to this restraint of the apex as a probable element in the diagnosis of adherent pericardium. At times, an extinction of the second sound is a unique sign of adherent pericardium. The inspiratory movement of the abdomen at its centre was equal to that at its sides; although in health the central movement is from two to three times as great as the lateral movement of the abdomen.” (Extracts from article on “Adherent Pericardium,” by Francis Sibson, M.D., F.R.S.)

As to the effects of adhesion upon the heart, we find the most conflicting opinions. Hope asserts that it causes hypertrophy with dilatation, others that it causes atrophy, while some authors assert that, unless adhesions are very extensive, no change is caused. I find few, if any, subjective symptoms recorded; if any, they are those which we have in atrophy or hypertrophy.

The *treatment*, therefore, must be based on the condition of the heart. If the heart is atrophied, its action will necessarily be weak; if dilated, the same condition will be present. In the absence of subjective symptoms, painful sensations, etc., we must select those cardiac tonics which seem best adapted to each case. As a full account of such remedies has been given under Endocarditis, the reader is referred to that article.

If subjective, painful, or reflex symptoms are complained of, we must consult the *Materia Medica*, and select the remedy which seems best indicated by the symptoms. I have treated only two or three cases in which I could, with any certainty, diagnosticate adhesions of

the pericardium, and in these the symptoms were met by Arnica, Cimicifuga, Rhus, Cactus, and Bryonia. Applications of Arnica and Belladonna, in the form of either lotions or plasters, give some relief, but as we are powerless to remove the adhesions, we cannot hope to do more than palliate the unpleasant symptoms and preserve the force and rhythm of the heart.

TUBERCULOSIS OF THE HEART.

BY E. M. HALE, M.D.

EXTRACT FROM ARTICLE BY THOMAS BEVILL PEACOCK, M.D., F.R.C.P., IN
"REYNOLDS'S SYSTEM OF MEDICINE."

History.—Laennec, when alluding to accidental products, says that he had only three or four times met with tubercles in the substance of the heart, and when speaking of chronic pericarditis, he remarks that a tuberculous eruption may sometimes be developed in the false membrane, and may thereby convert the acute into chronic disease, as frequently happens in pleurisy and peritonitis, and he states that he has met with two cases of the kind. In this passage, Laennec indicates the form in which tuberculous deposits are found in the heart; in one form they take place in the substance of the organ, in the other on the surface, in connection with inflammation of the pericardium. The former is certainly a very rare condition. Louis says that in 112 dissections of phthisical persons he did not meet with a single instance of tubercle in the substance of the heart. Rokitansky also speaks of the extreme rarity of the affection, and in the record of 116 post-mortem examinations of persons who had died of phthisis, which I have analyzed, I do not find more than two or three cases in which tubercle is said to have been found in the heart. The recorded instances of such deposits being at all of serious importance are few in number.

Pathological Anatomy.—The first writer who alludes to cases of the kind is, I believe, Dr. Baillie, who, in his *Morbid Anatomy*, says that he "once saw two or three scrofulous tumors growing from the cavity of the pericardium, one of which was nearly as large as a walnut. They consisted of white soft matter, somewhat resembling new cheese," and he adds that "the pericardium is a very unusual place for any scrofulous affections;" and in his dissections, in alluding to the same case, he further says that both lungs were studded with tubercles, and the right in a state of suppuration in places.

Tubercular deposits in the pericardium bear a close resemblance to the similar disease of the arachnoid, pleura, and peritoneum. They may be of very small size, mere specks, or may attain the dimensions of a cherry-stone, filbert, or walnut. In consistence they are gener-

ally soft, and they are usually of a grayish or yellowish color. The deposits are situated beneath the serous membrane, and in some cases masses are found more deeply imbedded in the substance of the ventricles, and which were exposed freely on section. The tubercles in the heart and pericardium occur under the same circumstances as those which attend similar affections in other parts of the body; they may be found in both sexes, at all ages, but more commonly in the early part of life.

In several of the cases of tubercle in the pericardium the evidences of the effusion had been observed during life. When such signs arise in persons who are obviously tuberculous, and especially if they assume the subacute form and are not attended by any large amount of liquid effusion, there may be suspected a connection with tuberculous deposits. It must, however, be borne in mind that pericarditis, having no relation to tubercle, may occur during the process of phthisis; the inference as to the tubercular origin of such cases is, therefore, by no means decisive.

Treatment.—It is evident that the treatment of tuberculosis of the heart must be the same, in general, as the constitutional treatment of tuberculosis. We cannot expect to cure such a condition, but we have the means of giving relief to the patient, as in pulmonary tuberculosis, by the selection of those remedies which are indicated by the subjective or painful symptoms.

CANCEROUS DEPOSITS IN THE HEART.

BY E. M. HALE, M.D.

This is of more common occurrence than tubercle.

The cases of cancerous deposits in the heart may be classed in four series :

First. Cases of primary cancer, in which the disease exists only in some part of the organ. They are of extremely rare occurrence.

Second. Cases in which the disease occurs coincidently and probably simultaneously in the heart and in different parts of the body, and especially in parts adjacent to the organ. This form, though still rare, is more common than the first.

Third. Cases in which the disease first appears in points adjacent to the heart,—the bronchial or mediastinal glands, the lungs, or the glands around the larynx in the neck,—and thence spreads so as to involve the pericardium and the large vessels at the base of the heart or the auricles. Cases of this kind are not uncommon, though less frequent than those of the next series.

Fourth. By far the largest portion of cancerous disease of the heart occurs secondarily to the deposit of cancer in some distant organ. Of

forty-five cases analyzed, twenty-one were of this description, the primary disease being situated in different instances in the eye, the cheek and bones of the face, the lower lip, the breast and axillary glands, the ribs and pleura, the abdominal organs, the inguinal glands, the uterus, vagina, labia, penis, and testis, and the upper and lower extremities.

The heart may be affected by cancer in different forms. Thus, of the cases collected, seven are reported to have been cases of scirrhus, four of melanosis, twenty-five of encephaloid. The deposit may assume also the form of distinct masses or tubera, or it may be infiltrated with the tissue, or it may occur on the surface.

Cancerous deposits in the heart do not appear to be generally productive of any special symptoms by which their presence can be detected during life. In some cases, where there was disease of the adjacent organs, there were signs of pressure on the large vessels and of interference with the circulation of the blood; and in three or four instances the formation of the deposits on the surface of the heart occasioned inflammation of the pericardium, which was recognized by the usual signs during life.

Most usually, however, there are no symptoms by which the affection of the heart is indicated, and the condition is only detected on post-mortem examination.

The *treatment* must be purely symptomatic and palliative, although, if we are sure of our diagnosis, we may try Conium, Condurango, Arsenic, etc.

D. DISEASES OF THE HEART MUSCLE.

BY E. M. HALE, M.D.

MYOCARDITIS.

Synonyms.—Carditis, Interstitial myocarditis; (French) Myocardite; (German) Myocarditis.

Definition.—Inflammation of the muscular fibres constituting the walls of the heart, as an acute infection, with interstitial serous infiltration, and degeneration of the muscular fibres.

Varieties.—The several attempts at classification which have been made result in dividing this disease of the myocardium into the conditions called acute and chronic; but the latter may be the same condition as the growth of fibroid tissue, and will be included under that head; while the former, though running a distinct course, may result in a sub-acute or partial myocarditis, which has an indefinite course and an indefinite result.

Ætiology.—The causes, even when the physician is confident of

having made a correct diagnosis, are most often obscure. Myocarditis may occur in connection with endocarditis or pericarditis, following, and contemporary with, acute rheumatism, or independent of such affection; in the majority of cases the cause is too obscure to allow of a definite statement. Whether cold, exposure, sudden and violent exercise, or trauma, such as blows on the chest in the præcordial region, may be exciting causes is by no means satisfactorily demonstrated.

It occurs more frequently in males than in females, and generally in persons under twenty-five years of age.

Pathology and Anatomical Characteristics.—The connective and muscular tissues are both involved in most cases. When the muscle alone is affected, use is made of the term parenchymatous endocarditis. This inflamed substance is injected, swollen, softened; extravasation is noticed, and it is pale and of a reddish-gray color. The tissue may become degenerated, forming pus, which accumulates in small masses, gradually leading to the formation of an abscess. Leucocytes are found between the muscular fibres; sometimes the inflammation, though moderate in intensity, is diffuse in extent, involving the endocardium within, or the pericardium without. The muscular fibres swell; fatty degeneration and atrophy follows, and the case passes into the chronic condition, if the patient live. In the case of the formation of an abscess there may be produced a fistulous opening, pointing either outwards or inwards, or connecting two of the cavities, or rupture may occur. The heart itself may be ruptured, giving rise to fatal hæmorrhage. Sometimes the pus becomes cheesy, hardened, encysted, or calcified.

A local inflammation is more common in the walls of the left ventricle, near the apex, and rarely occurs in an auricle.

Symptoms.—There are no positive symptoms of myocarditis; nothing certain can be ascertained beyond the fact that the heart is in some way affected. Fothergill says: "Like all affections of the heart wall, there is not a prominence of objective symptoms, and palpitation is not usual, while the subjective symptoms are those common to all cardiac failure." There are found restlessness, acute dyspnoea, pain in the præcordium, palpitation, the heart's action growing irregular, more frequent, and sometimes ending in complete failure. A corresponding pulse is noticed. Pale, anxious, cyanotic countenance. Distress of mind, sometimes delirium in young subjects; disturbance of stomach, with vomiting (Quain). A sudden development of cardiac weakness, after a transient stage of excitement. Sometimes all symptoms are wanting till the sudden outbreak which denotes a rupture. Perhaps there may be found an increased area of cardiac dulness. But taking it all in all, nothing can be ascertained during life beyond the fact that there are signs of weakness in the heart.

Diagnosis.—With the present limited state of our knowledge, myocarditis cannot be recognized with certainty. Its existence may be suspected when the symptoms of cardiac weakness and failure occur less sudden than in rupture, and more sudden than in cases of acute degeneration, especially when pyæmia is present.

Cardiac abscess has never been positively diagnosed.

Termination and Prognosis.—As already stated, abscess and rupture may result from the acute condition, or fatty degeneration from the chronic. The prognosis is unfavorable, though recovery may take place; it is, indeed, quite probable that in cases occurring in connection with endocarditis or after acute rheumatism, recovery frequently takes place.

Treatment.—It is difficult to give a specific treatment for myocarditis because it is intimately connected, in the majority of cases, with endo- or pericarditis. In cases of an idiopathic character, we might find in *Arsenic*, *Phosphorus*, *Lachesis* (and other serpent poisons) the nearest homœopathic remedies.

Arsenic particularly causes rapid failure of muscular power, disintegration of muscular tissue, and extravasations, etc., into the substance of the heart.

Phosphorus is nearly allied to Arsenic, causing abscesses, muscular paralysis, hæmorrhages, emboli, etc.; also rapid fatty degeneration.

Lachesis and its analogues *Naja*, *Crotalus*, and others causes a very complete picture of myocarditis, with all its essential symptoms. They are especially indicated in cases due to pyæmia or septic poisoning.

If due to *phlebitis*, *Hamamelis* would be strongly indicated, and in appreciable doses. A poultice, saturated with the tincture or distilled extract, may be applied externally, in addition to its internal use. *Absolute rest* to the heart should be enjoined, the danger of heart failure being greater than in endo- or pericarditis. The extremities should be kept warm. The patient must be kept in the recumbent position all the time, not rising for urination, defecation, or any other purpose.

The condition most to be dreaded is *heart failure*, even from the beginning. In some cases, during the first stage, *Aconite* or *Verat. alb.* may be indicated, but should be used carefully, in an attenuation not lower than the 3^r. In those cases in which the *dyspnœa* is most distressing, and the pulse weak, irregular, and collapsing, *Convallaria* will prove a valuable remedy, in doses of 3 to 5 drops of the 1^r dilution, frequently repeated.

We cannot hope to cure a *general* carditis; only those cases in which the disease is circumscribed are supposed to recover.

Diffusible stimulants should be used in order to keep the blood from accumulating in the heart, thus increasing the danger of heart failure. Of all such stimulants, I know of none equal to Aromatic spirits of Ammonia, given in syrup or glycerine, in doses of 10 to 15 drops every hour, or oftener. Alcohol is the worst of all so-called

stimulants in such cases, for it paralyzes the vaso-motor system and favors the tendency to cardiac congestion. Equally dangerous is *Quinine*, for it rivals Alcohol as a vaso-motor paralyzer.

Should a partial recovery take place and the heart be left in a paretic state, with probable tendency to fibroid tissue-degeneration, *Hydrastis*, *Arsenite of Antimony*, *Ferrum*, and *Iodoform* would be indicated.

ATROPHY OF THE HEART.

BY E. M. HALE, M.D.

Definition.—The old writers called this “phthisis,” but true, or simple, atrophy means a reduction not only in size, but in actual weight of the heart, or a reduction of one cavity in relation to the organ as a whole.

Sometimes it occurs that the heart-walls are thinned, and hence the weight as a whole diminished, causing a species of dilatation; the existence of such a condition has been denied by some authorities; nevertheless, dilatation is the principal feature, and this condition should be considered under that head, if at all.

Varieties.—Chomel (Reynolds) recognizes two kinds, congenital and accidental.

A heart unusually small from birth is generally well marked, often appearing with no other characteristic of disease. Hereditary cause has not been traced. Women are the more common subjects. Though persons having an abnormally small heart may be otherwise well formed, it is in a majority of cases associated with conditions signifying a general arrest of development, especially at the age of puberty, and particularly a concomitant lack of development in the sexual organs.

Accidental, or acquired, atrophy may result from local or general causes, the prominent among the latter being chronic wasting diseases, such as phthisis, cancer, marasmus, syphilis, etc.

With reference to phthisis, in 171 cases at the Brompton Hospital, Dr. Quain found that the heart was below the average in 54.4 per cent. In typhoid and febrile diseases, protracted in their course, and leading to great tissue waste, atrophy of the heart may result, but there is no evidence of direct connection between these diseases and cardiac atrophy; the waste is merely common with that of the rest of the body, owing to a lack of sufficient nutrition.

Partial atrophy is referable to insufficient blood supply from vascular disease or local blood pressure, or to fatty infiltration.

The local causes of atrophy are those which influence directly the local nutrition, such as pressure upon the heart by pericardial adhesions, tumors in that region, crowding the heart into unfavorable positions, compression by fatty tissue, and other like causes. The same

condition results by interference with the circulation in the coronary arteries, from causes similar to those just named, or from malformations, or from diseases of the vessels themselves.

Pathology.—In simple atrophy the heart presents a general and uniform diminution in weight and size, as regards both its walls and cavities. In local atrophy some one cavity is proportionately smaller than the others. Care, however, should be taken to get the actual size and weight of the heart, not depending upon its apparent condition post-mortem, for the ventricles may have stopped in systole, and the blood have been expelled, thus presenting a deceptive smallness.

In color, the heart may be normal or pale, sometimes of a brownish tinge. The pericardium may look "like a withered apple" (Laennec), while the coronary arteries may be tortuous and prominent. The walls are tough and firm, if the atrophy is not due to the presence of fat; microscopically, the primitive bundles are seen to be lessened in size; the fibres are fattily degenerated. Pigment of a reddish-brown tint may also be noticed.

Symptoms.—The symptoms and signs of atrophy of the heart are those which might be expected to result from diminished size and power of that organ. The characteristic phenomena are those of feeble circulation; the physical signs are chiefly diminished area of præcordial dulness, a feeble impulse, the apex-beat being above and within the usual situation; diminished area of audible sounds, and a small, weak pulse.

Diagnosis.—The diagnosis is difficult during life; chief reliance should be placed on general weakness with diminished area of dulness, after care has been taken to eliminate from causes of weakness any other marked conditions, and when there is associated with it some one of the causal signs already given.

Prognosis.—The prognosis is unfavorable, as little can be done to remedy the condition; it depends, however, greatly upon the disease to which the atrophy is secondary.

Treatment.—If it were possible, in the present state of our knowledge, to accurately diagnose atrophy of the heart, and its causation, we might treat it with some degree of success. For example: if it be really *congenital*, and found to exist in childhood, the diet and hygiene could be so regulated as to favor the increase in the size of the heart by increasing its nutrition. Then, by the use of such medicines as *Ferrum phos.*, *Digitalis*, *Aurum*, *Iodum*, *Iodoform*, *Cod-liver oil*, and *Oleum Sabal serulata*, the heart might be stimulated to increased action and nutrition.

In those cases referred to by Parrot, which are due to a simultaneous arrest of the growth of the heart and of the sexual organs at puberty, similar hygienic means could be adopted. Besides a more nutritious diet, general massage and electricity applied to the ovaries and uterus would tend to assist in the sexual development. Early marriage would

tend to the same result; so would a residence in Colorado and California, where the air is pure, rich in oxygen, and of such rarity as would stimulate the cardiac action. Certain medicines lead to the same results, namely, *Calcarea phos.*, *Ferrum phos.*, *Aurum*, *Phosphorus*, *Cannabis ind.*, *Iodum*, and the two nutritive oils above mentioned.

When *cardiac atrophy* is the result of, or the concomitant of, *wasting diseases*, such as *phthisis*, *syphilis*, *chronic suppuration*, *diabetes*, etc., the remedies should be directed to the cause, and its removal brought about, if possible.

Narrowing of the coronary arteries, if structural, can not be removed by medicines. It is possible that a narrowing might be caused by spastic contraction, due to some abnormal condition of the vaso-motor system. If we knew this to be the case, some good results might be brought about by the careful use of China, Quinia, Alcohol, Glonoine, Nitrite of Amyl, pushed to the extent of normal dilatation of the coronary arterioles. If the *atrophy* were caused by compression from *pericardial* effusion, remedies which would remove the deposit or exudation, namely, Iodide of Potassa, Iodide of Baryta, Iodoform, and Sulphur, should be prescribed.

If from *pericardial adhesions*, we can only hope to prevent atrophy by a treatment tending to increase the power of the heart, thus assisting it to overcome the obstruction to its free action.

The above recommendations are only suggestive, and must be, to a great extent, theoretical; but even such treatment, judiciously followed, often results favorably in many diseases.

Until we *know* that atrophy of the heart has been caused by drugs, we cannot adopt any specific homœopathic treatment.

HYPERTROPHY AND DILATATION.

BY E. M. HALE, M.D.

Enlargement of the heart is a term which embraces abnormal increase of that organ, as regards either volume or weight, or, as is commonly the case, increase in both volume and weight.

Increase in the weight of the heart and increase in volume are different forms of enlargement, either of which, although they are usually associated, *may* exist independently of the other. The heart may exceed the limits of health as regards weight, from an increased thickness of its walls, the normal volume being retained.

This is a condition sometimes found after death, although in the vast majority of cases in which the weight is augmented, the volume exceeds the healthy limit.

On the other hand, the volume of the heart may be abnormally great, the cavities being enlarged, while the thickness of the walls is

so far diminished that the normal weight is retained. The latter form of enlargement is also a very rare occurrence, the organ generally increasing in weight when its volume is greater than in health. Abnormal increase of the heart in weight, due to morbid thickness of the muscular walls of the organ, constitutes the morbid condition called *Hypertrophy*. Abnormal increase of the heart in volume, due to unnatural size of its cavities, constitutes the morbid condition called *Dilatation*. These names, hypertrophy and dilatation, thus denote different forms of enlargement of the heart which exist sometimes separately, but usually together.

A well recognizable classification has been adopted by most writers, to be used when the condition of hypertrophy is most prominent; this classification is set down below. In order to make the subject clear, we will consider the two general conditions under separate headings.

HYPERTROPHY.

Synonyms.—French, *Hypertrophie du Cœur*; German, *Hypertrophie des Herzens*; Active aneurism of the heart (*Corvisart*), Uniform enlargement of the heart, distinguished from dilatation (*Burns*); *Hypersarcosis cordis* (*Lallemand*).

Definition.—In a general sense, hypertrophy means an increase in the size and weight of the organ, “due to an excessive development of some one of the constituent elements of its walls;” but in an exact sense, it is an over-growth of the muscular tissue only. An increase in connective tissue substance or in the fatty tissue is spoken of as “false hypertrophy,” and an abnormal increase in either the endo- or peri-cardium is more properly referred to under those heads.

Varieties.—The classification mentioned above is as follows:

I. Hypertrophy exists, in some cases, without any alteration of the cavities, the latter remaining normal. This has been called pure or “simple hypertrophy.”

II. The cavities are sometimes found to be diminished in size below the limits of health. This has generally been admitted as a variety of hypertrophy, although its existence, as a morbid condition, has been questioned. It has been distinguished as concentric hypertrophy, or hypertrophy with contraction. “*Cruveilhier* and *Budd* pointed out that the condition called concentric hypertrophy is the result, not of hypertrophy, but of a powerful contraction of the organ, suddenly arrested, as it were, by death.” “*Rokitansky* acknowledges the rarity of the concentric hypertrophy, yet thinks it does sometimes occur; it is said to have been found in the right ventricle in some cases of congenital malformations” (*Quain*).

III. The variety occurring much more frequently than the others is characterized by the coexistence of dilatation to a greater or less extent; this is called eccentric hypertrophy, or hypertrophy with dilatation.

"Hypertrophy may affect only one compartment of the heart, or more than one, but the organ is seldom enlarged throughout. The ventricles are much more frequently hypertrophied than the auricles; the left ventricle more frequently than the right,—but the right auricle more frequently than the left, for the left auricle shows the change very seldom.

These subdivisions, although based on distinctions which are valid, are yet more or less embarrassing, but they are consistent with the different morbid conditions of the heart as determined by examinations after death, although not accompanied by any marked diagnostic criteria by means of which they may be positively discriminated at the bedside during life.

In cases of hypertrophy the cavities may, or may not, exceed their normal capacity; if the hypertrophy be neither simple nor concentric, it should be studied as hypertrophy with dilatation whenever the former predominates over the latter. The symptoms and signs enable the diagnostician to determine, often with positiveness, the *existence* of hypertrophy, which may be either simple or predominant over a co-existing dilatation; but to discriminate *between* the cases in which the hypertrophy is simple and those in which it predominates over a co-existing dilatation, is a problem in diagnosis by no means easily solved.

Ætiology.—Generally, if not invariably, enlargement by hypertrophy, which is now taken to mean over-nutrition, hyperplasia, increase in the muscular substance of the heart, is the result of prolonged abnormal force of the heart's action. It is difficult to account for this form of enlargement, except as caused by augmented muscular power for a long period; and generally there are obvious reasons present to account for this enlargement. The mechanism is the same as in the familiar examples of certain voluntary muscles becoming disproportionately developed when inordinately exercised. The muscles of the arm of the blacksmith are strikingly in contrast with the muscles of the lower limbs; and the reverse is true of pedestrians and dancers. Involuntary muscles, aside from the heart, also present examples. For instance, the muscular substance of the urinary bladder may become enormously hypertrophied when the power of contraction of this organ has been for a long time increased in consequence of obstruction to the expulsion of the urine.

Clinical observations show that in most cases of enlargement of the heart by hypertrophy, there are prior morbid conditions which stand to it in a causative relation, and hence, it cannot be too strongly insisted upon that hypertrophy is almost perfect compensation; but when dilatation is co-existent, the condition passes into the more general class, and we must seek the cause in some abnormal (morbid) circumstance; it may be impossible to separate hypertrophy and di-

latation in their causation ; in fact, it is probable that dilatation generally precedes hypertrophy (Fothergill).

In strict language, hypertrophy cannot be said to have any predisposing causes, for it is a healthy reaction against a morbid influence; so we look for exciting causes, adapting Dr. Quain's classification. (Lumleian Lectures, 1872.)

The three divisions are I. Nervous; II. Physical; and III. Nutritive.

Nervous causes are, of course, such emotional conditions as produce palpitation and heart disturbances: excitement, anger, the various passions, or stimulants, as coffee, tea, coca, tobacco, alcohol.

Physical causes are overwork, undue exertion, irregular calls upon the heart for enormous blood supply, especially in strained or cramped positions, impediment to the action of the heart or to the circulation of the blood and valvular lesions, pericardial effusions, diseases of the bloodvessels, as atheroma, and by displacements, deformities of the spinal column; hypertrophy may result from chronic Bright's disease, or from an aneurism which offers resistance to the flow of blood; or from diseases of the lungs, causing hypertrophy of the right heart. It follows, naturally, upon dilatation, in a compensatory effort; hence, plethora may induce hypertrophy; pregnancy, also, though generally the heart, like the womb, becomes normal by involution. The changes occurring during puberty may cause temporary enlargement.

Any nutritive advantages may cause hypertrophy, taking into account the local nutrition and the condition of the blood; rich food (nitrogenous), iron, etc., favor development in muscular structure, and as this increases, the coronary arteries enlarge, so that the heart has increased blood supply.

Directing careful attention to the mode in which valvular obstructions give rise to hypertrophy we shall be led to consider the development of the affection in the different anatomical divisions of the heart, respectively, taking them up in the order of their greater relative liability to enlargement.

The left ventricle is oftenest enlarged, caused by stenosis of the aortic valves, for the opening is both narrowed and stiffened, thus demanding an increase of force which leads to hypertrophy. To this may be compared the loss of elasticity and the roughening of the inner coat consequent upon old age. Aortic regurgitation often induces great enlargement; indeed, it is in this condition that the heart becomes so wonderfully enlarged as to merit the name of *cor bovinum* (one heart weighed 40 oz.). Aortic aneurism (as mentioned) may lead to hypertrophy.

Next in liability to enlargement is the left auricle—from the causes produced by mitral insufficiency. A regurgitation of blood at each ventricular systole distends the auricle again, which has thus to do

double work, and hence, naturally enlarges; this results not only in hypertrophy of the left auricle, but also in engorgement of the lungs and hypertrophy and dilatation of the right heart.

Next comes the right ventricle, which may become both dilated and hypertrophied in any primary lesion, causing pulmonary obstruction, but especially when the origin can be traced to the left heart. In emphysema, fibrosis, and consolidated lung, the impediment to the circulation induces hypertrophy of the right ventricle; this condition may reflect upon the right auricle; but though disease of the pulmonary orifice and tricuspid stenosis are both rare, yet tricuspid regurgitation is not unfrequently the result of right ventricular hypertrophy, "and this, in its turn, causes dilatation—generally with hypertrophy of the right auricle. General systemic venous obstruction follows; and Hope says that venous retardation may work backwards through the capillaries to the minute arteries, the consequent increased resistance in which may induce left heart hypertrophy."

Pathological Anatomy.—True hypertrophy implies the enlargement of the heart-walls, due only to increase in the amount of the normal muscular fibres; according as this increase is manifest, is the hypertrophy noticeable. There is no growth of new tissue different from the normal heart muscle. Some histologists claim that the individual fibres are enlarged, but it has never been accurately demonstrated. There may be (the so-called *false* hypertrophy) an increase of the connective tissue element between the muscular fibres, but this, when excessive, instead of strengthening the heart's action, may weaken it. In this form, the color is lighter than the normal red, a "gray hue." A true hypertrophied heart is somewhat darker and redder than the normal organ, and is firm in its consistency. There may be hypertrophy of only the wall of but one compartment, the other walls being abnormally thin. In examining a heart, care should be taken to see whether the organ as a whole is enlarged, owing to mere dilatation, or whether there is actual thickening of the walls themselves. Simple hypertrophy usually precedes, to a small extent, that condition with dilatation. The left heart is more often affected, as has been stated, and the ventricle particularly, from the normal thickness, six or seven lines, to one or one and a half inches. The parietes are more apt to enlarge than the divisions between the cavities. The right ventricle is generally thickest at its base, and runs from normal (two and a half lines) to an inch. The columnæ carneæ of the right ventricle are particularly apt to enlarge, but when dilatation occurs they stretch and grow thin. "The substance of an hypertrophied left ventricle can generally be torn with ease, while that of an hypertrophied right ventricle is tough and leathery." Twice the natural thickness is the extreme for auricular hypertrophy, and the auricles are usually dilated. In marked hypertrophy, the organ is generally tilted up, as to its apex,

it becomes more globular, and there is a change in form. The coronary arteries are enlarged.

Symptomatology.—The special physical signs of cardiac hypertrophy are, by all means, the most important, but these will be discussed under the head of diagnosis; it should consequently be remembered that hypertrophy of the simple kind is quite apt to exist and the patient remain quite ignorant of it until some acute disturbance brings it on, and I do not much doubt but that some hypertrophic changes are normal in advancing old age. General symptoms are most frequently mingled with, and confused by, those of concomitant, cardiac, or other, symptoms, and pure idiopathic hypertrophy of an exaggerated type is rare. The only rational symptoms, therefore, are those indicating increased force in the heart's action. Among these may be grouped the undue rush of blood to various parts. When to the head, we have cephalalgia, flushing of the face, throbbing epistaxis, vertigo, etc.—referable especially to the left ventricle; when the rush of blood falls upon the lungs, it causes dyspnoea, cough, hæmoptysis, and denotes pulmonary engorgement, due to hypertrophy of the right ventricle.

In cases in which the pulmonary obstruction is sufficiently great, the blockade may be referred to the systemic system, influencing the liver and the portal circulation—these rarer symptoms being caused by right heart enlargement.

“Of the powerful action of the heart, the patient would be conscious when his attention was directed to it, and it would be apparent from the movement of parts of the body and the dress. In general, the digestive and assimilative functions would not be expected to offer any marked symptoms of disorder; the muscular strength would not be impaired, nor the functions of secretion or excretion interrupted” (Flint).

Palpitation is a common symptom in all organic disease of the heart, and is often very marked in cardiac enlargement; bodily or mental excitement may bring this on, in cases of hypertrophy with dilatation especially, apart from other functional disturbances; and this grows alarming when dilatation is marked. Hypertrophy gives a pulse strong, full, and tense, less compressible than normal, and dwelling under the finger, due to the increased force in the ventricle which contracts stronger and requires more time for it. (The reader should refer to the chapter on Physical Diagnosis to distinguish between the pulse in ventricular hypertrophy, and that in mitral stenosis and insufficiency, in aortic regurgitation, and other affections of the valves.)

The eyes may be bright, shining or bloodshot, owing to increased general pressure.

Diagnosis.—The few systematic symptoms given should always be taken into account in making a diagnosis of hypertrophy, but special

attention should be paid to the physical signs of enlargement of the heart, elicited by examination. Dr. Flint, in his *Diseases of the Heart*, gives the following excellent summary :

1. *Percussion*.—"The area of the superficial cardiac region is extended beyond the range of healthy variation. The degree of dulness within this area is greater than in health, and the sense of resistance more marked. The limit of the deep cardiac region—in other words, the boundaries of the heart—are generally defined by careful percussion; the dimensions of the space which the heart occupies being thus ascertained with precision, and the form of the organ delineated on the chest. Enlargement of the right or left ventricle is sometimes determined by the extent of the area of dulness at the base of the heart, on the right or left side of the sternum." [When this area of increased dulness is increased, especially towards the left, sometimes as far downwards as the eighth rib, and as far towards the right as within an inch of the axillary line, we may presume there is hypertrophy of the left ventricle. When dulness is towards the right, the right ventricle is affected, and when dulness extends upwards, we may infer that there exists trouble in the auricles.]

2. *Palpation*.—"The apex of the heart is moved to the left of its normal position, and is lowered, the extent of variation, in either respect, being proportionate to the degree of enlargement, provided extrinsic causes may be excluded. The area within which the apex-beat is felt is extended beyond the range of health. Abnormal impulses are felt in two, three, or more, intercostal spaces, the additional impulses either synchronous or alternating with the apex-beat, in some instances referable to the auricles, although due to the ventricular systole; and, when felt in the epigastrium, due to the action of the right ventricle." [When the apex-beat is very forcible, and extending downwards, the left ventricle may be suspected.]

3. *Auscultation*.—"The respiratory murmur is not appreciable within the superficial cardiac region in tranquil breathing, and is sometimes wanting when the breathing is forced; it is feebler over a larger area within the præcordia than in health. The boundaries of the heart are defined by abrupt cessation, or notable diminution of vocal resonance; and the augmented space which the organ occupies, in the way determinable in corroboration of the evidence afforded by percussion." [If the impulse is very strong, sufficient to move the head of the auscultator when the stethoscope is applied, described as a slow, heaving motion, and the systolic sound less clear, and more muffled, as the muscular sound is excessively pronounced, the left auricle is involved. If the impulse seems very superficial, it is the right ventricle.]

4. *Inspection*.—"Abnormal projection of the præcordial region in some cases; the projection is considerable, if the enlargement take place in early life. The movements of impulsion determined, which

are also ascertained by palpation, movements are sometimes seen which are not perceptible to the touch, especially movements which commence by depression with the systole of the ventricles. Alternate movements of intercostal spaces are often apparent to the eye, which are imperfectly ascertained by palpation.

5. *Mensuration*.—"Prominence of the præcordia is greater than the corresponding portion of the chest on the right side; in some cases it is apparent on inspection, but is determined with precision by diametrical measurements. Mensuration is also employed in determining with accuracy the dimensions of the superficial and deep cardiac regions, the position of the apex-beat relatively to the nipple, median line, etc."

Physical Signs Distinctive of Hypertrophy.—1. *Palpation*.—Abnormal *force* of apex-beat, denoting not merely excited action of the heart, but augmented *power* of the systole, the impulsion being prolonged and strong. A strong impulse in the epigastrium in cases of hypertrophy of the right ventricle; the impulsions are sometimes communicated to the lower part of the sternum, and extending more or less over the site of the liver. A strong heaving movement of the præcordia, in distinction from the shock, more or less violent, due merely to augmented functional activity of the ventricles.

2. *Auscultation*.—Increased intensity of the aortic second sound, and especially of the element of impulsion of the first sound, in hypertrophy of the left ventricle, rendering the first sound dull and prolonged as well as abnormally *intense*; exaggerated intensity of the pulmonary second sound, in hypertrophy of the right ventricle, especially if associated with obstruction to the pulmonary circulation. Augmentation of the tricuspid valvular element of the first sound in some cases of hypertrophy of the right ventricle.

Dilatation may be distinguished from hypertrophy by the evidences of feeble circulation; by irregularity and intermittency of the heart's action; and by the feebleness and diffuseness of the apex-beat.

In establishing a diagnosis of hypertrophy, care should be taken to eliminate all signs of pleuritic or pneumonic affection, which might mask or simulate these signs of the heart.

Complications and Prognosis.—As simple hypertrophy is a compensatory process, it may go on for a long time unnoticed, and no other form of disease may arise from it; but when dilatation is added, the usual symptoms of palpitation, dyspnœa, congestion of veins, and disease of arteries, etc., may result. Cerebral hæmorrhage is not infrequent, as in Bright's disease. Acute febrile diseases seem to take hold easier when hypertrophy is present; the kidneys may suffer, and, as a natural consequence of increased action, there may be serous effusions into the cavities and subcutaneous areolar tissue.

Simple hypertrophy, if the cause be removed in time, is not dan-

gerous, and long life need not be interfered with. When other complications are set up, as valvular or pulmonic lesions, the case grows more serious; but when this hypertrophy is itself secondary to degeneration of arterial coats, when dilatation is advancing, and especially in Bright's disease, the prognosis is extremely unfavorable.

Treatment.—The treatment of this condition of the heart has already been discussed in the article on Valvular Diseases, where the subject of unequal, or of excess of, compensation was mentioned. But for the sake of completeness, some general indications will be given. The following considerations, relating to the object of treatment, are so well given by Dr. Gowers, in Reynolds's *System of Medicine*, that no apology is necessary for quoting them entire:

“The judicious management of hypertrophy depends on the recognition of the fact that it is sometimes purely beneficial, usually welcome as a substitute for its too frequent associate, dilatation, and rarely directly prejudicial. No universal rule for the treatment of hypertrophy can, therefore, be laid down, since the proper course may be sometimes to foster its occurrence, sometimes to lessen its excess, or, failing that, to prevent its increase.

“Hypertrophy of the heart being the result of two factors, nutritive activity and increased work, its increase may be, to some extent, prevented, and its amount diminished, by lessening each factor in its production. The nutritive activity of the heart can be lessened only by diminishing that of the general system by low diet, bleeding, etc. But to attempt this while the causes of hypertrophy continue, is to substitute dilatation for hypertrophy. The system has been advocated, however, in conjunction with causal treatment, from the time of Bertin. It may be questioned whether the causes of established hypertrophy can ever be sufficiently reduced to permit the safe employment of ‘antiphlogistic’ measures. Moreover, they can rarely be necessary. We see in the voluntary muscles that reduction of work is invariably followed by reduction in size of muscle. Every analogy suggests that cardiac hypertrophy will rapidly subside when the condition which excited it has lessened or ceased. It is not often that this result can be proved to occur in the case of the heart, but instances are not infrequent in which it seems to take place. The reduction of the causes of hypertrophy, *i. e.*, the working of the heart, to a minimum, constitutes, then, the main object in the treatment of hypertrophy. This work is partly of a constant, partly of an occasional, nature. The normal work of the circulation must be carried on; the permanent organic cause of the hypertrophy can rarely be lessened; but the occasional addition to the heart's work involved in violent muscular exercise, increased frequency of contraction from alcohol or emotion, increased obstruction from remediable states of blood or local inflammations, may all be to a large extent removed. Rest of body and

mind is, therefore, the first and most essential element in treatment. All exercises which quicken the pulse must be absolutely forbidden. Emotional tranquillity must be as far as possible secured. The utmost temperance in food and alcohol should be enforced. A fair amount of nitrogenous food, and a very little light wine with it, constitute the best diet. If food is well taken without alcohol, the latter may often, with advantage, be prohibited. The digestive organs should be carefully attended to. Nothing disturbs the action of the heart so readily as a distended stomach. Food must be moderate in amount, and every cause of transient plethora removed. The secretions must be carefully regulated, and impaired action of the kidneys or the skin must be supplemented by mild purgation or diuresis. Local inflammations, bronchitis, etc., must be carefully guarded against, and, when they occur, removed as speedily as possible.

“Too often, however, the amount of obstruction which can by these means be removed bears but a small proportion to the total against which the heart has to contend. Can this permanent obstruction be further reduced? To some extent the work of the heart can always be lessened by reduction in the total quantity of the blood. This formed an important element in the old system of treatment, and it was partly with this object that frequent and repeated bleedings were recommended. Their condemnation in the present day is superfluous. It may be doubted whether occasional leeching, which still finds advocates, is justified by its ultimate results, although its immediate effect is to give relief to the heart. Restriction of fluids has been suggested. It is, at any rate, a harmless measure; but the rapidity with which urinary secretion regulates the volume and density of the blood renders it doubtful whether more than a very transient effect is produced.

“It will be gathered from these statements that the conditions under which an attempt at the removal of hypertrophy is indicated are very rare. Whenever the hypertrophy can act immediately on the causal resistance, its influence is always, on the whole, and sometimes entirely, beneficial. Only when the over-action of the heart is primary, or is due to a cause which has ceased to operate, is it to be attacked directly. In the rare instances in which violent exercise has called out persistent hypertrophy, or some obstruction has been removed, the condition may call for immediate treatment to reduce its effect. Where the obstruction is situated far from the heart, and degenerated vessels are interposed which have to bear the full force of an over-acting ventricle, as in Bright's disease, the question also sometimes arises of the chances of evil from vascular rupture, on the one hand, and from a weakened heart on the other. The certain, slow, but sure evil of a weakened heart will generally counterbalance the possible catastrophe, and any attempt to lessen the cardiac strength will be avoided.”

From these considerations and reflections it will be seen that the treatment may be divided into *Hygienic* and *Medicinal*.

1. *Hygienic*.—The hypertrophied heart is already doing too much work; it does not *sleep* enough; in other words, its periods of rest are not enough to balance its periods of labor. The first hygienic indication therefore is to lessen its action without decreasing notably its strength, at least not until the causes of the hypertrophy have been removed. A person possessing an abnormally hypertrophied heart, *i. e.*, too large a heart for the work to be done, should adopt a quiet life, almost as quiet as if he had dilatation, for in the former condition all active exercise, especially sudden, severe exercise, surely increases the enlargement and the increase of the number and power of the muscular fibres. All athletic sports are to be forbidden and all exciting emotions avoided. The more quiet the heart is kept, the more is hypertrophy held in check.

The *nutrition* of the heart must be curtailed, and all foods which rapidly make blood and muscular tissue avoided. Meats, alcohol, coffee, leguminous foods, carbonaceous and fatty foods must be prohibited. A cooling and non-stimulating diet of cereals, vegetables, rice, soups, fruits, milk, bread, etc., should constitute the aliment of the patient.

Climate should be considered. High altitudes, where the air is light and the atmospheric pressure is small, should be selected. The high region of Colorado, the Rocky Mountains, and certain portions of California, are most favorable to patients with hypertrophy. The prairie regions of the Western States, the low valleys of the Eastern, Middle and Southern States, especially when malarious, are badly suited to such cases. The heart works easiest where the atmospheric pressure is smallest. Sea air is not, as a rule, beneficial to cases of hypertrophy. In such climates, patients with hypertrophied hearts are more liable to cerebral congestion, with apoplexy and epistaxis; to pulmonary congestions, with hæmorrhages; to hepatic congestions with bilious attacks, jaundice, etc.

2. The *medicinal* treatment must be cautious and conservative. We must avoid reducing the force of the heart, as well as increasing its power and the blood-pressure. Even the allopathic school have abandoned the blood-letting so much in vogue previous to twenty years ago. Bleeding will give temporary relief, but increases constantly renewed necessity for the bleeding, and finally weakens the heart beyond recuperation. Homœopaths, as well as allopaths, should be cautious in the use of Aconite, Gelsemium and Veratrum viride. Judiciously used, they will give relief, not only temporary but permanent.

Aconite is best indicated in concentric hypertrophy when the area of dulness is not large; the beats of the heart are short, hard, forcible, showing great power, but small amplitude of contraction; the pulse is small, hard and incompressible. The

mind is anxious, and there is great restlessness of body and mind. The attenuations from the 1st to 6th should be selected, according to the age, sex and other conditions.

Gelsemium.—This remedy I have rarely found useful in true hypertrophy. In a few cases it has acted admirably where the capillary system was congested.

Veratrum viride is doubtless our most potent, as well as our safest, remedy when the force of the heart is enormous and the blood-pressure becomes dangerous. The area of dulness shows the muscular tissue of the heart to be greatly increased; the contractions are powerful, the beats large, *heaving*, and the pulse bounding and hard, rapid or slow. In such cases there is danger of cerebral or pulmonary apoplexy and hæmorrhage. The dose in such cases may safely range from one to five drops of the tincture to the same quantity of the 1st dilution, repeated every hour or two, and stopped as soon as the pulse becomes softer. If the arteries are atheromatous, larger doses are required than when the arterial coats are elastic. I have never seen bad results from such doses when properly watched, while the beneficial effects are always soon observed.

Cactus grandiflora and **Cereus Bonplandii** are next in value to *Veratrum viride*. They are indicated for nearly the same physical symptoms, but the first has one characteristic symptom which always calls for it, namely: the "*sensation as of an iron band constricting the heart.*" The 1st to 3rd dilution will be found most appropriate.

Kalmia has many symptoms common to all the above, and in certain cases will be found palliative.

Aurum, 6th, has been found useful by Klapka.

Glonoin is exquisitely homœopathic to the violent action of the heart, with intense cerebral congestions; great blood-pressure in the inner and outer arteries of the head, with throbbing, pressing, bursting pains, but should never be given lower than the 3rd dilution. Its close analogue, *Amyl nitrite*, might be tried in the same dilutions. The "*cardiac tonics,*" *Digitalis*, *Convallaria*, *Adonis*, *Squill*, *Asparagus*, *Nux vomica* and *Coca* are primarily homœopathic to hypertrophy with abnormal strength of the heart; but, as asserted by me in another place, I have never been satisfied with their action in such conditions, in minute doses. If prescribed at all, the dose should not exceed in quantity the 3d or 6th dilution. I make exception in the case of *Coca*. In cases where the enlarged and powerful heart has been excited by emotions or undue active exercise, a few doses, sometimes a single dose, of 15 drops of the tincture often give quick relief. In this respect it resembles *Coffea*, which in the 3rd dilution will often gain equally pleasant results.

Having considered the treatment of pure hypertrophy, we will proceed to the

Treatment of Hypertrophy with Dilatation.—This condition of the heart may be said to begin as soon as *normal* hypertrophy ceases. Dr. Fothergill, in his chart showing the nature of the changes in hypertrophy (page 79), gives the following diagnostic differences:

Pure Hypertrophy.—"No irregularity, palpitation occurring only when hypertrophy is still insufficient. No loss of power and no subjective symptoms. Pulse strong and incompressible. No loss of rhythm in pulse or heart beats."

Hypertrophy with Dilatation.—"Palpitation easily induced. Often a halt in rhythm at distinct intervals, increased in frequency by exertion. Power limited. Subjective symptoms more or less marked. Pulse rather full than strong, and compressible."

Fothergill claims that hypertrophy needs no treatment, because it is a purely compensative process. He would not interfere even if apoplexy threatens. So far as he refers to the treatment of his school, his assertion is proper enough, for the medicines he would use would injure the heart's integrity rather than preserve it. He makes one curious

exception. He would use *Digitalis* in *small* doses, when there was "excessive but irregular action." A homœopathic procedure which he is not honest enough to admit.

He admits, however, that during the continuance of hypertrophy we should watch carefully for the slightest sign of a failing heart. The first sign, he says, is always *palpitation*. So impressed is he with the importance of this sign that he says, "It must be borne in mind that in *hypertrophy of the heart, palpitation is always an evidence that the hypertrophy is insufficient, not that it is excessive.*" He does not here allude to that *excessive force* which is *not* palpitation, and of which I have treated above. I am inclined to believe that in this matter Fothergill is correct.

If, therefore, we find *palpitation* to be present in hypertrophy, we should change our treatment to suit the impending *incompetence*. Here the remedies I have mentioned in pure hypertrophy may still be used, but in smaller doses, for this tendency to *failure* is a condition to which they are *primarily* homœopathic. We shall find that *Aconite, Gelsemium, Veratrum viride, Cactus, Cereus, Veratrum album, and Arsenic*, when given in minute doses (3d to 6th), will give just as good results as when given in larger doses, in excessive hypertrophy. I need not enumerate the symptoms indicating their use. It is sufficient to say that the symptoms are nearly opposite to those which indicate them in hypertrophy—the two most prominent being *palpitation, with failing force and loss of rhythm*. But the remedies upon which we must rely in the majority of cases of hypertrophy *with dilatation*, are those I have already mentioned and classified as "cardiac tonics." *Digitalis, Convallaria, Adonis, Cactus, Prunus virginian., Asparagus, Squills, Erythrophleum, Nux vomica, Ignatia, Strychnia*, will be indicated, and the dose will lie between the crude drug and the 3d dilution; or at about the 1st. (*Strychnia* not lower than 2^d trituration.)

It must be remembered that as soon as the dilatation is in excess of the hypertrophy, or as soon as the heart begins to fail, there is always a danger of *structural degeneration*, confined, perhaps, at first to single muscular fibres. Our object is to build up the remaining fibres before they begin to degenerate. This cannot be done by medicines alone—however closely they are affiliated. The hygienic surroundings and habits of the patients must be changed. The diet must be gradually made more nutritious. Meats, eggs, cream, and pure wine may be allowed in moderation. And if, notwithstanding this diet, the slightest *anæmia* shows itself, *Iron, Copper, Manganese*, and other hæmatics should be given in small doses, not forgetting, however, that *Hydrastis, Helonias, Aletris, Ignatia, Nux vomica*, and the mineral acids, all act sometimes to enrich the blood by increasing the proper digestion and assimilation of food.

DILATATION.

The arrangement adopted for the classification of this affection of the heart is in general one corresponding to that used in treating of hypertrophy, namely :

Simple dilatation, in which the cavities are enlarged, the walls at the same time remaining normal.

Active dilatation, in which the cavities are enlarged, while, at the same time, there is a compensating growth of the walls of the heart, thus being eccentric hypertrophy, but looked at from another standpoint.

Passive dilatation, in which the cavities are enlarged at the expense of the walls, which latter, consequently, are thinned. This is the usual form. However, it must be remembered that dilatation and hypertrophy are nearly always connected ; it is, indeed, a question whether one does not necessarily imply the other ; but the treatment is to differ as the hypertrophy or the dilatation predominates. It must be remembered, also, that hypertrophy is always a compensatory process, at times functionally normal, as during pregnancy and puberty, but when we find that even the hypertrophy induced is not sufficient to compensate for the growing dilatation, and that weakness, in such cases, *not* strength, is indicated, we must treat this *weakness* manifesting itself in dilatation, and not the hypertrophy. Hence, we see that in the first class, or in simple dilatation, there is, or undoubtedly will be immediately, a compensating hypertrophy. The second class, active dilatation, we found was the same as eccentric hypertrophy, and consequently these two divisions are best studied as manifestations of hypertrophy. In the third class, passive dilatation, we find a condition which means manifestly weakness, a dilatation which overshadows any compensatory hypertrophy, however much attempt there may be in this direction on the part of the system, and consequently this alone needs to be studied under this head.

Ætiology.—Dilatation (passive) implies that the yielding heart walls are not strong enough to resist the pressure from within ; if only a limited portion of the walls be involved, it constitutes an aneurism ; to that condition in which a complete cavity is, or all the cavities are, involved, the term passive aneurism has been applied.

The dilatation may be due to actually defective heart walls, or to abnormal blood-pressure, though the walls be in their usually healthy condition. In the former case, the trouble in the heart wall may be due to fatty, or other, degeneration, or to textural disease, already at work, though not visible. In the latter case, the abnormal blood-pressure may arise from an obstruction to the circulation, which the heart is unable to meet, or from undue rapidity of action, implying greater expenditure of force.

Other, we may say mechanical, causes bring about this condition ;

such as "obstructive disease at the aortic orifice, when resistance is offered to the free discharge of blood from the left ventricle;" regurgitant disease of the aortic orifice; the effect of continued violent excitement, either nervous or muscular.

Where there is valve disease, there is apt to be a dilatation also, the particular cavity affected depending on the particular valve, though the right ventricle is most likely to manifest weakness, being much feebler than the left. Hence, it is better to go to the original source of the lesions, and to study in this connection the effects of valvular diseases. The chief fact to be noticed is that dilatation is a sign of weakness, and the result of weakness, and should be looked for in anæmic persons, those displaying impaired constitutions, weakened by exhaustion of the sympathetic by excessive smoking, by long debauches, and by neglect of proper hygiene.

The *temporary* dilatation of acute febrile disease is due to a natural weakness of the heart's walls.

Pathological Anatomy.—As it is a question whether dilatation is ever found alone, unassociated with hypertrophy, the examination can be merely relative, as is the treatment, and the condition of the patient is to be largely the governing factor.

Should the walls seem unusually thin, the cavities greatly expanded, the trabeculæ wasted, or the orifices enlarged, dilatation may be stated to have been in excess of any compensating hypertrophy. The auricles should be the chief cavities observed, as they are most prone to dilate.

Symptoms.—Dilatation means weakness, and this condition is the radical sign and symptom distinguishing it from hypertrophy alone, or from hypertrophy with dilatation.

The heart's power is diminished; blood is retained in the pulmonary artery and in the aorta. "The results of dilatation of all the cavities are that the efferent vessels are in a condition of ischæmia, while the afferent vessels are abnormally full." (Bartholow.) Cyanosis, constant hyperæmia of peripheral veins; palpitation of heart; low temperature; deficiency of arterial blood supply to the brain, and such concomitant symptoms as vertigo, faintness or syncope, ringing in the ears, etc. The system is cachectic, nourishment poor, energy insufficient, elimination defective; all general disorders of the system may finally be set up. The pulse is irregular, the heart's action feeble; the pulse *may* be unequal; the extremities are cold, and lividity may be noticed.

The symptoms and signs of general dilatation of the heart will be found to vary within certain limits, according to the stage at which it is examined. Thus, at an early period of its history, when, however, characteristic features are sufficiently pronounced, the patient will exhibit languor of body and mind; the extremities, ordinarily of a slightly

livid tint, will be chilled and benumbed; the pulse, small and regular, may intermit at long intervals; respiration is normally shallow and readily quickened by exertion, and the patient is easily put out of breath by physical effort or mental excitement. There is a constant hemming or teasing cough, accompanied by scanty serous expectoration and a proclivity to catching cold, which constitutes the patient's principal infirmity. On these occasions there is great embarrassment of breathing, which may amount to orthopnœa; the pulse is quick, feeble, and it may be irregular, the conjunctivæ injected with dark blood, and the features generally livid and somewhat puffed.

In the ordinary condition of the patient, secretion and excretion are performed with regularity, although the liver is somewhat engorged and the patient may be troubled with hæmorrhoids.

The appetite, however, is indifferent, and digestion is slow; and from time to time, as shown by foul tongue, eructation and anorexia, the stomach suffers derangement of function, either as a consequence of some slight indiscretion in regard to food, or in damp and foggy weather without any such provocation. On such occasions the urine precipitates a copious sediment of lithates. The extent of præcordial dulness is horizontally increased, if not masked by emphysematous lungs. The impulse of the heart is feeble, diffused, and occasionally intermittent; and a direct point of apex pulsation can rarely be detected. The præcordial region, viewed in profile, will generally exhibit indistinct fluctuation in one or more intercostal spaces. The sounds of the heart are sharp and distinct, the first resembling the second in brevity and pitch, but varying as to clearness and intensity according to the state of the cardiac walls; it is feeble and low toned, though well defined, when the walls are fatty or otherwise softened, but clear and ringing when tissue change does not exist. The pulsation of the heart is quickened by even the slightest movement of the body, and on such occasions it is attended with throbbing of the carotid arteries, and visible fluctuation of the external jugular veins.

When general dilatation has attained its maximum, respiration is shallow, labored, and protracted, and usually accompanied by a loud wheeze; there is complete orthopnœa and impending suffocation when the patient assumes the recumbent posture even for a moment. The features, especially the lips, the tip of the nose, and the lobes of the ears, are livid, the conjunctivæ congested and somewhat jaundiced, and the eyelids and face generally bloated; surface and breath cold; the feet cold, puffed, and congested. The pulse is slow, feeble, intermittent, and irregular. Præcordial dulness extended laterally, but difficult to be defined with accuracy, because the anterior borders of the lung, which are usually emphysematous, overlie the præcordium to some extent. The heart pulsates at the ensiform cartilage; its action is feeble, flapping, irregular, and barely perceptible to the

hand; and if it be not entirely overlain by the edges of the lungs, a fluctuating movement of its anterior wall is perceptible in one or more of the intercostal spaces, at the end of expiration. The sounds are faint, but sharply defined, and high pitched, and if the walls be thinned but not softened, the first sound closely resembles the second in rhythm as determined by the cardiac impulse or carotid pulsation. Fine crepitant rales are audible over the bases of the lungs, which are somewhat dull, and the chest generally is either non-vibratile or very feebly so. There is constant teasing cough, accompanied by thin mucous and frothy expectoration, frequently tinged with blood.

Anasarca and serous effusion into the cavities of the chest and abdomen quickly supervene, the latter being usually the immediate cause of death. In such case the mode of death is by coma, resulting from combined operation of retained renal and pulmonary excreta. Another mode of death is, however, not unfrequently exemplified in this affection, namely, that by thrombosis of the right side of the heart and pulmonary artery.

The conditions upon which this accident, for as such it may be regarded, depends are partial stasis of the blood by failure of contraction in the right chambers of the heart, and by impairment of respiratory and nutritive attraction arising from feeble respiration and arrested tissue-change.

The symptoms which indicate its occurrence are a sense of præcordial oppression, gradually increasing to a point of great intensity, and attended with tumultuous but feeble action of the heart; great dyspnoea and craving for air; restlessness and sighing; the patient starts from his slumber with great alarm, and is entirely deprived of refreshing sleep; the pulse is quick, weak, irregular, and fluttering, or all but entirely suppressed at the wrist; the surface is cold, damp, and livid; respiration is rapid, full, and labored, but manifestly ineffectual, although air freely enters the lungs, and loud rhonchi or wheezing sounds are heard all over the chest. The carotid arteries pulsate with great violence, and the jugular veins are turgid and fluctuating. The most characteristic symptom of this condition is, however, the *besoin de respirer*. The arms are thrown out and extended; the covering is flung off the chest; the patient begs that fresh air may be admitted, and declares he is being suffocated, although the chest moves freely and extensively, and there is abundant circulation of air in the chamber, and, as judged by auscultatory evidence, in the lungs also. In this condition death usually occurs quite suddenly on the patient's making the slightest exertion, such as that of sitting up; it is the immediate consequence of the impaction of a mass of fibrin in the tricuspid orifice or the pulmonary artery, by which the circulation in the lungs is mechanically arrested, the systemic arteries emptied, and the veins gorged with blood.

As the physical signs of hypertrophy with dilatation were given, together with those distinctive of hypertrophy, it is well here to add those signs which will enable us, in connection with the above symptoms, to determine when dilatation exceeds the hypertrophy. I copy from Flint.

1. "*Percussion*. The transverse dimensions of the space occupied by the heart greatly exceeding the vertical, the form of this space corresponding to the wedge-like or square form of the organ when the dilatation is excessive.

2. "*Palpation*. The apex-beat is devoid of abnormal force, and in some instances suppressed. Absence of heaving movements of ribs and præcordia.

3. "*Auscultation*. The element of impulsion of the first sound is deficient or absent, and the sound is short and valvular, in these respects resembling the second sound."

Prognosis.—"There is no doubt that some degree of dilatation of the heart, and more especially of the right ventricle, may arise, either from overexertion or from functional disturbances, and in connection with pulmonary disorders; but such dilatation is for the most part temporary or remediable, and only by continuance of its cause becomes established and a matter of serious importance, but the presence of dilatation in connection with other diseases becomes grave, and they or this trouble, may gradually lower the patient's vitality, and thus hasten his death. Dilatation of the cavities is much more rapid in its course and important in its results than hypertrophy, but passive dilatations are more serious than the active form. The heart is weakened, the tissues become diseased, and death may be sudden by rupture or by paralysis, or in attacks similar to angina pectoris."

General dilatation of the heart is least promising where the organ has undergone change of structure; it is of unfavorable augury in proportion to the extent and degree of tissue change which the heart has suffered. That of fatty degeneration is the most serious, because the least amenable to treatment; it is likewise the most liable to terminate in sudden death by thrombosis or rupture.

That form of affection which is secondary to hypertrophy from valvular lesion or from renal diseases is likewise proportionately more serious than that of primary origin, because of the retrogressive tissue-change which it implies, and the formidable mechanical resistance which, in either case, the heart, thus weakened by tissue-decay and by thinning of its walls, has to overcome in carrying on the circulation.

General dilatation from anæmia or from excessive labor and inadequate nutrition is, on the other hand, the most promising form of the affection, and susceptible not only of improvement, but of cure under appropriate and persistent treatment. Dilatation from "typhoid softening" is usually met with in typhus fever or consecutive to it, and is

likewise amenable to treatment. Unless the system can be greatly strengthened, and dilatation thereby greatly reduced, the hope of recovery should not be too strongly encouraged.

Treatment.—Although the treatment of dilatation has been in a manner given in the article on *Valvulitis*, the lesion is of such importance that it seems best to go over the ground again, and, perhaps, more thoroughly.

We will suppose that the physician has had his case in charge for some time, and has done all he can to remove the *causes* of the dilatation, or that he sees his case for the first time, and finds dilatation has obtained to a greater or less extent.

Here it is evident that the main indication is to preserve the integrity of the muscular tissue of the heart from further dilatation, and, if possible, to build up that tissue and augment the power of the organ.

Two methods are to be adopted: *Hygienic*, which includes *dietetic* and *climatic* treatment; and *medicinal* treatment. Medicines are quite powerless to bring about restoration, unless the hygienic surroundings are rendered healthful. If the patient is exposed to the influence of *malaria* (marsh miasm) or *sewer gas*, he must be removed out of the reach of these depressing agents. He should never breathe an air loaded with "crowd-poison," that terrible poison generated by crowds in unventilated rooms or public halls. He should never breathe in that deadlier poison carbonic oxide, which generates in unventilated rooms, or close, filthy streets, or rooms filled with tobacco-smoke.

Tobacco and *tea* should be absolutely forbidden, for both tend to paralyze the nerves which supply the innervation of the heart. Coffee is not as bad, for whatever chemists may tell us of the chemical similarity of Theine and Caffeine, they are almost antagonistic in their effects on the heart. Cocoa and chocolate are better than tea, if they are well tolerated by the stomach. The *diet* should be very nutritious, but easily digested. Milk, eggs, oysters, fish, and all meats, except ham and salt pork and salt fish, may be eaten. Good bacon is not objectionable. Pastry is prohibited, but simple, plain puddings may be allowed. A small quantity of good claret, Burgundy, Tokay, or Hungarian red wine, diluted with water, and drunk with the meals, may be allowed. If the stomach is weak, the digestive functions unable to do their work well, thus preventing complete assimilation of food, the artificial digests, *pepsin* and *pancreatin*, should be used. In some cases I have advised peptonized milk and beef extracts with great benefit, especially in severe cases. Murdock's Liquid Food will sustain the failing power, even in desperate cases. Beef-tea may be used as a pure *stimulant*, not a food, for it is in no sense a food.

The *clothing* is a matter of vital importance. A weak heart cannot keep the body warm. The surface and extremities are cold, and the

blood which does reach them is carried back to the heart *chilled*, and chills the heart. Flannel, wool, or silk and wool underwear should be worn summer as well as winter, and they should fit the body and extremities *closely*, not allowing the cold air to get under them. Hands and feet, wrists and ankles, should be kept very warm. Ice-water or cold articles of food should be avoided. In no disease is the homely axiom that "heat is life, cold is death" more true.

Climate is an important factor. The climate for the weak and dilated heart should be *dry and warm*. It is difficult to get these two conditions together. But the high lands of California, Colorado, North and South Carolina in summer, middle Florida and the valleys of upper Georgia and Tennessee in winter, fulfill these indications. The climate of Nassau, some parts of Mexico, and Texas, may combine the two. The *lighter* the air, the less work the heart has to do. An air rich in *oxygen* is a tonic to the heart.

The **emotions** have much to do with the condition of the patient. All such emotions as hope, joy, content, with domestic happiness strengthen the heart. Grief, sorrow, melancholy, homesickness, and discontent depress it.

Exercise should be moderate, in the open air, if possible, when the air and elements are favorable. A too sedentary life tends to weaken the heart, already weak; while any sudden, powerful, or prolonged exertion is not only injurious, but in some cases may lead to rapid, even sudden, failure of the heart's life.

The **medicines** to be used in dilatation of the heart may be divided into four *classes*.

(1.) Those which are eminently restorative to the wasting of the heart-muscles. They act by enriching the blood, either by their direct hematic powers, or by increasing the digestion and assimilation of food, viz.: *Ferrum, Cuprum, Nux vomica, Ignatia, China, Phosphoric acid, Muritic acid, Nitromuriatic acid, Aletris, Helonin, Hydrastis, Lacto-phosphates, Hypophosphites, Cod-liver oil*, and the *Chalybeate mineral waters*. These, together with a proper diet, will do much to prevent the dilatation from progressing, and build up the tissues. The special indications for their use need not be given here.

(2.) Those which are homœopathic to wasting of the tissues, atrophy, etc., namely: *Iodine*, and its salts; *Bromine*, and its salts; *Phytolacca, Acetic acid, Arsenic*, etc.

Iodine, when long continued in large doses, causes wasting of muscular tissues all over the body, also of the glandular tissues. It is eminently homœopathic to idiopathic dilatation with thinning of the heart-walls. It is homœopathic to the peculiar impoverishment of the blood which attends some cardiac affections. The *Iodide of potash* is sometimes better than Iodine, especially if there is a syphilitic taint in the blood. *Iodide of iron* is often better than Iron alone, in dilatation with chlorosis or anæmia. (The 2^d or 3^d trit., or 3 to 5 drops of the syrup, is the proper quantity.)

Arsenic, although primarily increasing the apparent *plumpness* and *appearance* of health, in those who take it for some time in appreciable doses, does not really enrich

the blood, or give good muscular growth, for as soon as its use is stopped, they rapidly emaciate, the plumpness proves to be anasarca, and the dyspnoea which appears, proves that the innervation of the heart and lungs has been greatly impaired. It is secondarily homœopathic to paresis and dilatation of the heart, and in small doses is one of our greatest aids in its restoration. In some cases the *Iodide of Arsenic*, *Arsenite of Antimony*, *Arsenate of Gold*, or the *Arsenite of Strychnia*, give better results than the Arsenic alone.

Phytolacca causes alterations in the nutrition of the system similar to the Iodides. It has been observed that birds which eat the berries become greatly emaciated. The provings show many points of similarity to Iodine and its salts.

Acetic acid in large quantities has been known to decrease the bodily weight to the greatest emaciation, attended by muscular wasting, and impoverished state of the blood. Yet this acid, in small quantities, has been known to remove chlorotic conditions, improve nutrition, in fact, cause a directly opposite condition to its pathogenetic effects. It may not be necessary to give it as a medicine (i.e., in dilutions), but we may allow small quantities with the food.

(3.) The medicines which are primarily homœopathic to cardiac paresis and deficient innervation are *Aconite*, *Gelsemium*, *Veratrum album*, *Veratrum viride*, *Helleborus niger*, *Kalmia*, *Hydrocyanic acid*, *Chloral hydrate*, and *Quinine*.

We do not know, however, that they are capable of causing, directly, dilatation of the heart. If they do cause this condition, it is not by any wasting action on its muscular tissue, but by causing deficient innervation which leads to it. While I have the fullest belief in the power of this class to revive the failing nervous energies of a weak heart, I think they are best indicated as curative agents when no dilatation is present. In cases when the heart is striving to resist dilatation, and fails to attain the condition of compensation, as in valvular disease, all and each of these medicines may aid our efforts in preventing dilatation. But in the condition of actual dilatation I do not believe they will prove more than palliative, if, indeed, they are of value at all. I am obliged to say that this opinion is not theoretical, but is based on considerable experience in the treatment of cardiac diseases. It is not that the law of *similia* is deficient, but that these remedies do not cover the totality of the symptoms, and unless a medicine conform to this rule, it is not a complete *similimum*, and consequently not curative.

(4.) This class comprises those medicines which are secondarily homœopathic to dilatation and weakness; their first effect in massive doses is hyperstimulation of the muscular and nervous energy of the heart. Their ultimate primary effect is death of the heart in tetanic spasm. When not fatal, the reaction from the primary poisoning is a failure of the innervation and nutrition of the heart. If any group of muscles is greatly overstimulated and overworked, the result is secondary wasting and paralysis, and the heart is no exception to this law.

The remedies belonging to this class are *Digitalis*, *Convallaria*, *Adonis*, *Caffeine*, *Coca*, *Secale*, *Squilla*, and *Erythrophleum*. These are the most potent. There are others which have a similar effect, but in a less degree, not being as dangerous or injurious in their action. Of these, *Asparagus*, *Asclepias*, *Stigmata maidis*, *Juniper*, *Euonymus*, *Prunus virginian*.

and *Prunus cerasus*, *Apocynum*, and many others. I have already given the special and general indications for these medicines in the article on *Valvular Diseases*, to which I refer the reader.

It remains to mention the medicines best adapted to the treatment of the *sequelæ* of dilatation.

Cerebral anæmia is best removed by *Caffeine* 1^ʳ, *Coca* ʒ, *Ferrum*, small quantities of alcohol, and an abundance of good food.

Congestion of the liver, *i. e.*, that passive condition caused by a weak heart, when the arteries of the liver are *unfilled*, and the veins *turgid*, require *Digitalis*, *Adonis*, *Convallaria*, and *Euonymin*, in appreciable doses, because they are capable of causing the heart to force more blood into the empty arteries, and push the blood along the turgid veins. Under their use, the enlargement of the liver and the jaundice will disappear. We may often aid them, by alternating with one or the other some specific hepatic medicine like *Mercury*, *Podophyllin*, *Iridin*, *Chelidonium* or *Chionanthus*.

The Dropsy.—Cardiac dropsy is a result of a failure of the heart's power. The kidneys become anæmic of arterial, and congested with venous, blood, and the secretion of urine is arrested. *Renal remedies* are of palliative value only in cardiac dropsy, and, if pushed to any extent, they may injure the integrity of the kidneys. If there is any muscular tissue left in the heart, the dropsy may be removed by the bold and judicious use of *Caffeine*, *Digitalis*, *Convallaria*, *Adonis*, and *Squills*. They may be greatly aided by *Stigmata maidis*, *Juniper*, *Apocynum*, *Asclepias*, and *Asparagus*, but these latter (except corn-silk) cannot be trusted alone.

Dyspnœa has, in my hands, yielded more readily to *Convallaria* than any other remedy. Dr. See, of Paris, prefers *Erythrophleum*. Others prefer *Quebracho* (see *Valvular Diseases*). Dr. See advises *Convallaria* with *Iodide of Potassa* in some cases. Small doses of *Tartar emetic* often give relief when the dyspnœa is partly due to accumulated mucus in the bronchi. *Ipecacuanha*, for the same condition. *Lobelia* has given good results, but in large doses it is a cardiac depressant. *Arsenic* has rarely been of benefit in my hands. *Grindelia* will sometimes act admirably; so will *Euphorbia piluifera*, an Australian species. In desperate cases, when it seems there must be death if no relief comes, *Chloral hydrate*, 5 to 10 grains every hour, has given palliative results. *Morphia* or *Morphia and Atropia* combined, will palliate the terrible suffering in incurable cases. Sometimes, the *Aromatic Spirits of Ammonia* will act well when all other palliative remedies fail.

I mention these palliative measures to be used in incurable cases, because it is the duty of the physician, when he cannot cure, to save his patient all the suffering possible, and this without the slightest regard to pathies or schools. In this condition, when we know that death is only a little way off, all drugs are at our command, and we

are faithless to our trust if we do not use those which will "smooth the pathway to the grave."

FATTY OVERGROWTH OF THE HEART.

BY H. R. ARNDT, M.D.

Synonyms.—Fatty hypertrophy, Fatty infiltration; French, *Hypertrophie graisseuse du cœur*; German, *Fettige Infiltration des Herzens*.

Definition.—An abnormal growth of fat upon and within the substance of the heart, mechanically interfering with the proper performance of the functions of the organ.

Ætiology.—Fatty overgrowth of the heart seems to be a local expression of a general constitutional tendency to obesity, which, in many cases, is hereditary. Whatever tends to produce obesity tends to produce fatty infiltration of the heart. The habitual use of fat-making diet, as starchy, saccharine, and fatty substances, and the free use of alcohol in any form, but particularly of malt-liquors, are important ætiological factors. A sedentary, inactive life predisposes to the same condition, and recovery from a tedious acute disease, necessitating long confinement and a period of enforced inactivity, not infrequently is followed by obesity and fatty infiltration of the heart. This condition, according to reliable tables prepared by Quain and Hayden, is very much more common in men than in women, and is rarely found in persons under thirty years of age. As exceptions to these general rules, it may be stated that Kerkering noted the existence of excessive fatty overgrowth in an infant only two years old; and Quain mentions one case in a table of twelve "in a person who was described as being thin."

Pathology.—Whenever an abnormal amount of fat exists in the heart, it is found lying between the muscular fibres, separating them from each other, encroaching upon them, and gradually thinning and weakening the muscular walls of the organ. The deposit of fat is most abundant on the external surface, and grows less and less as the surface is left; thus, the outer surface presents the largest amount of fatty growth and the smallest number of muscular fibres, while the inner surface presents the smallest amount of fatty deposit and the largest number of healthy muscular fibres. Small fatty tumors are frequently seen beneath the endocardium, and in cases in which the fatty deposit is not uniform or excessive, streaks of fat, yellowish in color, may be observed lying between the muscular structure.

The presence of this foreign matter necessarily creates pressure upon the muscular fibres, which become distorted and, at times, suffer fatty degeneration; it also interferes with nutrition, and mechanically hinders the performance of the physiological function of the heart.

Symptoms.—The symptoms of fatty growth on the heart very closely resemble those of fatty degeneration. If the fatty deposits are confined to the surface of the organ, serious harm may not result, and the condition may even go unrecognized; but if the substance of the heart is involved, we get weakness of the organ with vertigo, coma, dyspnoea, pain, and other symptoms discussed as due to fatty degeneration, the case terminating fatally, from failure of the heart's action or from rupture. Death usually occurs suddenly.

Diagnosis.—The diagnosis of fatty growth of the heart is exceedingly difficult; we may conjecture its existence from the physical signs and the constitutional symptoms which indicate fatty degeneration occurring in very obese persons. The differential diagnosis, if made, is, however, more a matter of personal satisfaction to the physician than of practical interest to the patient.

The *treatment* of fatty overgrowth on the heart will be considered in connection with the treatment of fatty degeneration of the organ.

FATTY DEGENERATION OF THE HEART.

BY H. R. ARNDT, M.D.

Synonyms.—Fatty metamorphosis of the heart, Greasy degeneration of the heart, Softening of the heart; (French) *Dégénérescence du Cœur*; (German) *Fettige Metamorphose des Herzens*.

Definition.—Fatty degeneration, as defined by J. Mitchell Bruce, is a process by which protein elements are converted into granular fatty matter. Fatty degeneration of the heart refers to such a process in the heart, the muscular fibres gradually disappearing, and eventually being replaced by fatty matter. This change depends upon interference with proper nutrition of the fibres, and is the result of various morbid conditions tending to disturb the normal nutritive process.

Ætiology.—Any condition, local or constitutional, which interferes with the nutrition of the heart-fibre, eventually leads to fatty degeneration of this organ. The promptness with which this effect is produced depends somewhat upon the existence of the *predisposing causes*, among which *inherited tendency, age, sex, and habits of life* stand prominent.

It seems fairly well established that members of certain families are quite likely, sooner or later, to suffer from this affection. It is evident that this predisposition must depend either upon some inherited peculiarity of the muscular fibre itself, in itself tending to fatty degeneration, or upon a family tendency to constitutional diseases which act as an exciting cause by interfering with the nutrition of the heart-fibre; the latter presumption seems most likely to be correct. Age is an important factor. At a time of life when the general tendency of

the entire body is toward degeneration, we are justified in looking for such changes in the ever busy heart-muscle. The great majority of cases occur in the latter half of life, and of them a very large proportion in advanced old age. Young persons and children, however, are not exempt, and even foetal life is not entirely free from it. Men are more frequent sufferers than women, in proportion of about two to one; according to Ponfick, an exception should be made in favor of cases resulting from anæmia, a condition more frequently found in women than in men. Persons engaged in sedentary occupations are said to suffer readily from fatty degeneration of the heart, and statistics show that the lower walks of life furnish a large percentage of sufferers from this condition; fat people, merely on account of their tendency to the accumulation of fat, are not especially predisposed to softening of the heart.

The exciting causes, as has been stated, embrace all those various local and constitutional affections which interfere with the proper nutrition of the heart-fibre. Whenever the bloodvessels of the heart become subject to pressure, as from the existence of foreign growths, or when vascular obstruction exists, due to disease of the vessels themselves or as the result of embolism, the blood-supply to the muscular structure is lessened, and degenerative changes occur; these changes are limited, as pointed out by Quain, to that portion of the heart which is supplied by the affected vessel. Tumors, fibroid or fatty, may press directly upon the muscular fibre itself, leading to the same result. A condition of congestion or hypertrophy of the walls of the heart necessitates an unusually free blood-supply, which taxes severely the carrying capacity of the vessels, especially when the latter are compressed by tumors or subject to alterations in the structure of their coats; the supply becoming insufficient, the integrity of the muscular fibre is soon lost, and fatty degeneration results. Gowers (*Reynolds's System of Medicine*) refers to Jenner, who considers that the chief cause of congestion of the walls of the heart is "dilatation of the right side of the heart and obstruction, consequent on the distension of the auricle, to the escape of the blood from the coronary sinus. Hence, fatty degeneration of the heart is frequent in emphysema, long-continued pleural effusion, and diseases of the left side of the heart, which overload the right chambers."

Among the constitutional exciting causes, *anæmia* holds very prominent place. Any condition which results in a lessening of the total normal amount of blood, such as a profuse hæmorrhage, or which lowers the nutritive properties of the blood, threatens the integrity of the heart-structure. The experiments of Tschudnowsky and Perl, made upon dogs, show conclusively that the sudden loss of a large amount of blood has most disastrous consequences upon the heart, leading to fatty metamorphosis of the walls of the heart, and even of the blood-

vessels. This fact shows the peculiar danger of menorrhagia, or violent flooding during or after confinement, especially in women already anæmic or suffering from cardiac hypertrophy.

Fatty degeneration also occurs in certain specific fevers, and by a majority of observers is held to be the result of a coexisting, more or less violent, carditis. According to Quain, the tissues of the heart, during these fevers, become softened, and under the microscope present "a granular appearance, which is believed by some pathologists to be an incipient stage of fatty degeneration." That fatty degeneration may result from inflammatory action is a well-established fact. Wagner, for instance, examined thirty-five cases of severe pericarditis and found that one-half of them showed extensive fatty degeneration. The extent of the degeneration depends upon the violence and duration of the inflammation. On the other hand, it is maintained that the same type of degenerative change occurs when there is absolutely no evidence of inflammatory action in the heart, and when blood-poisoning is evidently the prime factor. Laennec calls attention to the fact that fatty degeneration of the heart occurs particularly in cases marked with "putridity." Among the febrile diseases which most commonly excite fatty degeneration of the heart, mention is to be made of malarial fever, typhus, typhoid, yellow fever, diphtheria, measles, etc., and of that class which is characterized by extensive formation of pus, as variola, erysipelas, etc.

Of the chronic diseases, those which lower the standard of vitality, or which lead to alterations in the blood, may become exciting causes; extensive suppurations, cancer, and certain diseases of the kidneys belong here.

Several poisonous substances have the power to produce fatty degeneration in the heart as well as in the liver, kidneys, and in other parts. To this class belong phosphorus, arsenious acid, sulphuric acid, lead, antimony, and alcohol.

Anatomy and Pathology.—Fatty degeneration always begins in the protoplasm of the cell, gradually involving the nucleus and the nucleoli. At first, small numbers of fat-globules, clearly defined, never coalescing, and separated, throughout the various stages of their development, by thin layers of protoplasm, are seen about the nucleus; their number gradually increases, until they fill the entire cell, rendering the nucleus first indistinct, then wholly invisible; the cell, in the mean time, enlarges until it attains to several times its former size, and its original cylindrical, or flat, or round form, becomes uniformly spherical. The cells now are called "granular corpuscles," a term of somewhat recent origin which has taken the place of the "inflammatory corpuscle" of older writers.

In the heart, this degeneration first appears as minute, black granules in the striated fibre, gradually increasing in size, but rarely ex-

ceeding that of a blood-globule. They are arranged in rows, "like strings of pearls," in the longitudinal axis of the primitive fibrillæ; in due time the transverse striæ also become indistinct, and are finally lost. If the degenerative process advances far, nothing is seen but fatty detritus. The arrangement of the granular corpuscles, however, is by no means uniform. They may be arranged, as stated, longitudinally in quite even rows; or they may appear scattered promiscuously through the affected tissues; numbers of the primitive bundles may contain large amounts of the granules, while others have preserved their structural integrity; even a separate fibre may be studded with granules at some portion, while it is perfectly healthy in other portions.

To the naked eye, tissue thus affected presents a whitish-yellow appearance, or of an ashy-gray color. Laennec compared the color to that of "a dead leaf." Discolorations of a yellowish-brown are not infrequent, and are due to the action of the coloring-matter of the blood-corpuscles upon the tissues, a frequently occurring condition in fatty degeneration of the heart which depends upon acute febrile diseases.

The fibre itself becomes brittle, the diseased structure flabby and soft, and, if the degeneration is well advanced, it tears easily, in fact, as Quain states it, as easily as wet brown paper. In certain cases, particularly cases in which hypertrophy of the part antedates fatty degeneration, the organ has the appearance of firmness and solidity of structure, but the tissues have, nevertheless, lost their integrity, and break down from slight causes, as pressure from careless handling.

Quain, one of the best authorities upon the subject, describes a condition of the fatty heart in which it resembles boiled liver, and calls attention to a granular appearance of the cut surfaces, which is not unlike the gray hepatization of lung-tissue.

The affected part at times has a greasy appearance or "feel," and, if placed upon paper, may leave upon it an oily, greasy stain, although the actual amount of oily matter present may be little, if any, more than the amount of fat found in the healthy heart.

The size of the fatty heart may be enlarged, normal, or even below normal. Quain and Hayden have found the heart enlarged in two-thirds of the cases of fatty degeneration examined by them. It is well to bear in mind the relation of hypertrophy to fatty degeneration, and the fact that the "looseness" of the structure would naturally tend to convey the impression of an actual enlargement, even when an enlargement does not exist.

Usually, fatty degeneration of the heart takes place in limited and well-defined areas, distributed here and there, possibly connected by well-marked lines of degenerated tissue, the whole giving to the organ a mottled, spotted appearance, visible on section or through the endo-

cardium. But the entire organ may be uniformly affected, as occurs in cases of fatty degeneration resulting from acute disease. The left ventricle suffers more frequently than the right, in proportion of two to one, and the columnæ carneæ and the inner layers of the muscular walls show the traces of the degeneration more clearly than other structures. The depth also to which the degenerative process extends into the heart-wall is not the same in all cases, and seems to depend upon the primary disease of which the fatty degeneration is the result; thus, fatty degeneration following pericarditis is superficial, that resulting from certain chronic affections is more likely to involve the deeper structures. When the fatty metamorphosis depends upon a diseased condition of a bloodvessel, cutting off, or lessening greatly, the supply of nutritive fluid, the affection is limited in extent of territory, is clearly defined, and, usually, well-marked in character.

Calcareous salts may be deposited in the heart-muscle as one of the incidents of fatty degeneration; but such cases are very exceptional. Coats (*Glasgow Medical Journal*, 1872) describes one case in which petrification of the fibres, without change of form, had taken place, and one in which the fibres were dotted with small spherical bodies of calcareous matter.

While all authorities agree that fatty degeneration means practically starvation of tissue, and even death, the utmost differences of opinion exist concerning the nature of the process which is really responsible for the changes produced. Rindfleisch (*A Text-book of Pathological Histology*, American edition, by Lindsay & Blakiston, 1872) says: "The chemico-physical process which lies at the basis of the fatty degeneration of the cells, is not indeed known with sufficient perspicuity. In the mean time we may set aside the opinion that the fat-globules can attain the interior of the cells by intussusception; the fact that muscle, in which we recognize a medium degree of fatty degeneration, nevertheless does not exhibit a greater percentage of fat than does the normal, controverts this. The possibility only remains that the fat-globules originate in the interior of the cell. But are they to be regarded as the production of a disturbed exchange of material of the cell, or as the products of decomposition of the cell-substance? The view seems mostly to recommend itself that we are investigating phenomena the opposite of those which accompany the cell-formation. As we know from the composition of the yolk, the formative material of the cells consists of albuminates, which are abundantly mixed with fats. We further know from the chemical analysis of muscular fibres that they contain a not inconsiderable amount of *invisible fat*, so that we have reason to accept an amalgam-like combination of fat and albuminates in the cells. Fatty degeneration is a 'reparation' ('Wiederscheidung') of this amalgam, in which the fat again appears free and in large globules in the protoplasm. That

an appreciable enlargement of the cell occurs herewith is explained by this that the same amounts of fat and albumen, in order to exist separately, take up a greater space than in their former interpenetration."

The fact that in case of advanced fatty degeneration the amount of fat contained in a tissue is very largely in excess of the normal quantity, has led to a search for additional evidence bearing upon this point. And while the views expressed by Rindfleisch are warmly advocated by many eminent pathologists, it is now generally held that this remarkable excess, in advanced cases of fatty degeneration, is also in part due to a change in, or transformation of, the protein matter, or to the entrance into the fibre of fat from without.

It is evident that so serious a disorder of so important an organ as the heart must give rise to very important and characteristic effects. The entire circulatory system necessarily becomes deranged, and the nutrition of all the organs of the body suffers keenly, producing marked symptoms which will be duly considered hereafter. The irreparable injury done to the fibre leads to dilatation of the heart, and very frequently to rupture of the organ.

Symptomatology.—The symptoms of fatty degeneration of the heart are rarely sufficiently pronounced and characteristic to lead to the prompt recognition of this serious affection; in fact, cases have occurred in which extensive degeneration had existed, evidently for some considerable length of time, and had led to a fatal termination without giving rise to disturbances of a sufficiently grave character to arouse the suspicion of the patient or physician. The nature, too, of the symptoms observed depends largely upon the nature of the primary disease of which the fatty degeneration of the heart is a sequence, and their clearness is often greatly disturbed by coexisting affections producing a train of morbid phenomena which only too often overshadow the expressions of the affection of the heart.

In a general way, it may be stated that the constitutional symptoms depend upon insufficient blood-supply, and even in the earlier stages express a marked depression of the physical and moral sphere. The patient at first experiences a general indisposition, muscular weakness, coldness of the surface and of the extremities, with occasional irregularity in the action of the heart, and, later, oppression of breathing. The appetite becomes impaired, digestion proceeds without vigor, and the mental state becomes one of habitual depression. The pulse becomes intermittent and irregular, weak and slow, and if its irregularity, which is almost constant, disappears for a time when the patient seems in the enjoyment of comparatively good health, it is reproduced at once by trivial causes, such as passing emotions. (Quain.)

Kennedy calls attention to a rapid pulse which increases with age, and which he considers often an indication of fatty degeneration of

the heart. Faintness not unfrequently occurs, brought on by slight effort, such as walking up-hill, or climbing stairs; it may be merely a passing sensation, or result in complete syncope, probably the result of cerebral anæmia; the occurrence of severe vertigo, and even convulsions, not however followed by evidence of lesion in the brain, has been noted in cases. As anæmia of the brain may result from the inability of the weakened heart to supply this great nerve-centre with the needed amount of blood, so may we find anæmia of the spine, giving rise to characteristic disturbances, as formication and numbness. These attacks of faintness and of actual loss of consciousness are very commonly accompanied with a sense of impending death, and, indeed, death frequently occurs at such times. Respiration is usually affected, varying from a scarcely noticeable feeling of discomfort, with unconscious sighing, to a suffocative feeling, readily brought on by any moderate exertion, more especially by walking up-hill. The "Cheyne-Stokes dyspnœa," of which mention must here be made, Gowers (*Reynolds's System of Medicine*, vol. ii., p. 817) describes as follows: "It is characterized by recurring series of respiratory acts, first increasing and then decreasing in intensity. In the intervals breathing seems to have almost or entirely ceased; then slight respiratory movements are noticeable, which gradually become deeper and deeper, until an acme of very deep and labored breathing is reached, after which the respirations gradually become shallow until they subside into the same apparent apnoea, which is again broken by the gradual onset of another series. In the classical case recorded by Cheyne, the cycle included about thirty respirations, and lasted a minute. In most of the other cases recorded it has occupied a shorter time." Hayden has found the pulse unchanged during the paroxysm. The same writer also emphasizes the fact that this form of dyspnœa is not diagnostic of fatty degeneration of the heart, but is also found in valvular disease with dilation, in atheroma of the aorta, in certain affections of the nervous system, particularly when coexisting with diseases of the heart, and that it depends probably, as suggested by Walshe and others, upon a lowered sensibility of the respiratory centre in the medulla oblongata. The pulse-beat is usually light and feeble, with an occasional wavering quality; its beat is slower than that of the heart, if the force of the latter is not sufficient to send the blood onward with sufficient vigor. As these symptoms develop, more or less pain in the region of the heart or in the sternum may exist, not usually sufficient to cause much distress; at times, the pain becomes neuralgic, and extends into the arm, or even into the shoulders, and, in exceptional cases, paroxysms of intense pain are experienced, which closely resemble angina pectoris. During the later stages the countenance and surface of the body becomes pallid, and the ankles and feet become puffy; but no general dropsy occurs, nor does the urine show

abnormal constituents save when albumen is found in cases of primary dilatation.

The heart itself presents no pathognomonic, and hardly any strongly diagnostic, symptoms. If dilatation exists, the area of dulness on percussion is correspondingly increased. Since the degenerative process itself tends to weaken the heart, the *force* of its beat necessarily decreases as the integrity of its muscular wall is lost; hence, in place of a firm contraction, the beat is sluggish, badly defined, almost hesitating, resembling, as Stokes has it, the slight, general impulse of an aneurism rather than the normal impulse of the heart. Naturally, this lack of force leads to modifications of the heart-sounds. "The sounds of the heart are weakened in correspondence with the weakness of the impulse. The first sound, to which the contraction of the heart directly contributes, is that which presents the greatest change. It is usually toneless, shorter, and relatively high-pitched, and may become almost, or even quite, inaudible at the apex, only the second sound remaining. The first silence is longer than normal, in consequence of the shortening of the first sound. The second sound is also weakened in consequence of the deficient distension, and therefore deficient recoil, of the aorta and pulmonary artery. When the first sound is shortened and raised in pitch, it may resemble the second. The sounds of the foetal heart are then closely simulated, especially if the heart acts rapidly. When the degeneration is local, the sounds may be modified locally, just as the impulse. In the acute degeneration of fever, Stokes observed that the first sound might be lost over the left ventricle when it was still audible over the right, in cases in which the post-mortem examination showed the left ventricle to be the more affected. Walshe has observed a similar alteration of intensity in chronic disease under similar circumstances. . . . Stokes believed that a systolic basic murmur might exist during the early stage of the degeneration. Other observers have noted the occurrence of an apex murmur due to regurgitation, and have ascribed it to fatty degeneration of the papillary muscles." (Gowers.) The rhythm of the heart is inclined to be irregular, and may present no abnormal features as to rapidity or slowness of movement; if it deviates markedly from the normal, it is more often rapid in movement; but cases are on record in which the heart gave but forty, thirty, and even less, beats per minute, a condition, as pointed out by Adams, which is almost limited to this affection.

Diagnosis.—A positive diagnosis of fatty degeneration of the heart is not only very difficult, but practically impossible. Presumptive evidence in favor of fatty metamorphosis of the heart is found in the existence of those conditions which are recognized as exciting causes, and of symptoms which are known to indicate a constitutional tendency to fatty degeneration in any part of the body. Among the

latter mention may be made of characteristic changes in the blood-vessels of aged people, and of the arcus senilis, a crescent-like opacity in the upper and lower segment of the corneal circumference; the arcus senilis, however, is not of the diagnostic value of the changes in the bloodvessels which may be detected by a skillful diagnostician, and it often exists in the absence of cardiac affection.

The physical signs have been described as a part of the symptomatology of the affection. They are by no means pathognomonic, since they offer no valuable guide to differentiation between fatty degeneration and simple hypertrophy and dilatation of the heart. Of the physical signs, the one of most value is the weakness of the first heart-sound, to which attention has already been called.

Duration and Prognosis.—The duration of this condition, and the chances of a favorable or unfavorable termination, depend almost wholly upon the nature of the primary cause. When occurring in connection with, or depending upon, an acute disease, there is considerable immediate danger of an untoward and sudden termination; this immediate danger overcome, the patient may recover largely, if not entirely, from the effects of the local injury. If, as in cases of alcoholism, the cause of the difficulty can be wholly removed, the prognosis is favorable. In the aged, fatty degeneration may exist for many years without giving serious inconvenience; and while the eventual termination is quite sure to be fatal, a restful and contented state of mind, with abstinence from much physical exertion, will, for a long time, protect the life of the afflicted person. Fatty degeneration of the heart resulting from loss of blood terminates fatally within a few days or a few weeks from the occurrence of the hæmorrhage. If the degeneration of the heart is only one part of a general degenerative process, associated, for instance, with extreme anæmia, loss of appetite, and great physical prostration, the prognosis is decidedly discouraging.

Death from fatty degeneration of the heart is more frequently sudden. Of eighty-three cases collected by Quain, sixty-eight died suddenly; syncope, rupture of the heart, and coma, in the order of their mention, are the immediate causes of death.

The tendency of Chloroform to seriously depress the action of the heart, and the evident danger therefore arising from its administration to persons in whom the existence of fatty degeneration of the heart may be suspected, has been repeatedly pointed out by Quain, and confirmed by himself and others.

Treatment.*—*Fatty heart* is defined as “a growth of fat on the surface and in the substance of the heart, in quantity sufficient to interfere with its functions.” Thus it will be seen that the *treatment* of

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fatty heart is essentially the treatment of obesity, for it has no relation to true *fatty degeneration* of the fibres of the heart.

If, on examination, the heart is found structurally sound, if the pulse be strong and regular, if auscultation and percussion show it to be free from hypertrophy, dilatation of the valvular lesions; the aorta healthy, as shown by the quality of the cardiac sounds in the ascending aorta, and the character of the respiration; if the kidneys are free from disease, as shown by careful general and microscopical examination of the urine; under these circumstances the treatment may be advised as follows: *Active exercise*, especially that which quickens respiration and consumes heat-producing tissue; the use of dumb-bells, Indian clubs, "Swedish movement cure" processes, etc.

The *diet* should be restricted to wholesome nitrogenous food, and the use of hydrocarbons, fat, and sugar be prohibited. Milk and malt liquors must be forbidden. No full meals, *i. e.*, to *satiety*, should be indulged in. Cold or tepid *baths* should be taken frequently. The bowels should be kept open daily by the use of Carlsbad, Kissingen, Congress, or Hawthorn waters, for these waters have a large influence in preventing the deposit of fat, while they do not reduce muscular strength. The "Banting system" involves no little danger to the integrity of structures and organs, especially those subject to periodic and frequent distension, such as the heart and arteries, by the attenuation and weakening of their walls which necessarily follow the *rapid* removal of interstitial and superficial fat. The adipose tissue should be *gradually* removed. The slow sipping of *hot water*, ℥viii. (temp. 90° to 100°), thirty minutes before each meal, has a notable effect in reducing adiposis if the diet is regulated as above mentioned. The drinking of natural *sea water*, four ounces after each meal, has been known to cause similar reduction of fat. The use of the extract or infusion of *Fucus vesiculosus*, a species of seaweed, has been attended by excellent results (see *Therapeutics of New Remedies*). Calcareo carb., Graphites, Lycopodium, and Ferrum phos., in minute doses, antidote the tendency to adiposis. The use of the Iodides and Bromides, or Acetic acid, is not a safe practice, for, while the fatty deposits may be removed, the muscular structures may be seriously injured.

The *treatment of fatty degeneration*, when the muscular fibres are destroyed by a process of disintegration, and their place supplied by oil globules, requires very different treatment. Any *treatment* of this form of degeneration is of very doubtful value. We cannot build up new muscular tissue in the place of that destroyed. The most we can hope for is to arrest the retrograde metamorphosis. At least this is the opinion of the most eminent writers. What therapeutical discoveries may do to assist us in the treatment of this disease we do not know. In the matter of *diet* and *exercise* we should pursue a course opposite to that advised for *fatty heart*. The diet should be very nutritious;

fatty food is *not* objectionable. Even cod-liver oil may be used with benefit. So may malt liquors in moderation, but *alcohol* cannot be allowed, especially in the form of brandy, whiskey, gin, or strong wines. The red wines and Tokay or Rhine wines may be allowed. The digestive processes should be kept in good order, and the blood enriched by blood-making food, and the use of chalybeate waters, Ferrum, Helonin, Aletris, Columbo., Gentian, Ignatia, Nux vomica, China, and all those remedies which favor complete assimilation of food, and by their action on the nerve-centres increase the tonicity of muscular tissues.

The question here arises, of great importance to our school of medicine: *Are there medicines which are strictly homœopathic to fatty degeneration?* The answer is *yes*. Then the question occurs: *Are these medicines curative?* This cannot yet be answered in the affirmative, because not sufficient clinical experience has been collected to allow of an answer either way. The following drugs have been known to cause fatty degeneration of the *heart* and of other organs: *Phosphorus* (Wagner, Habershon, Schraube, and others); *Arsenic* (Salkowsky and other toxicologists); *Plumbum* (Salkowsky and other toxicologists); *Antimony* (Salkowsky and other toxicologists). The *acids*, *phosphoric*, *nitric*, *sulphuric*, *oxalic*, *tartaric* (Koch, Rokitsansky, Lewin, Tangel, Wagner, and others). *Alcohol*, *Chloroform*, and *Ether* (many authorities). *Iodoform*. Dr. Hoepff found in post-mortem examination in four cases of death from Iodoform-poisoning a condition of fatty degeneration of the *heart*, liver, and kidneys. The process was only beginning in some, but far advanced in others. The author then instituted a series of experiments on rats, guinea-pigs, and rabbits, administering to them, subcutaneously, injections of Iodoform in oily solutions. In every case he found parenchymous inflammation of the heart, liver, and kidneys (*Allgem. Med. Central Zeitung*, Aug. 8, 1883).

Now, at a superficial glance, all these drugs *appear* to be homœopathic to fatty degeneration. But we must look deeper into their action before we decide. Does this morbid action depend on a true medicinal, dynamic, and specific influence? Or is it a chemical action? If it can be proved that the former is their *modus operandi*, then they are really homœopathic. But if this change is caused by a chemical, or chemico-physiological, action, then they are not truly homœopathic, in the sense understood by Hahnemann.

Phosphorus has been used successfully in many heart affections. Dr. *Cl. Mueller* highly recommends it in chronic affections of the heart, *Buechner* recommends it in diseases of the right heart, in connection with morbus Brightii. Singularly, Dr. Quain (*Dic. of Medicine*) recommends Phosphorus in fatty degeneration of the heart! I can find no record of its use in this disease in our literature, but I am inclined to believe that it is truly homœopathic to this disease.

Arsenic is recommended and successfully used, by both schools, in chronic cardiac diseases. It presents a large array of symptoms which point to degeneration of the hearts structures, and appears to be truly homœopathic to its condition.

Plumbum is recommended by Bæhr (Therapeutics), who gives a large array of symptoms indicating its use, which present a good picture of fatty degeneration; but he gives no clinical proofs of its value.

Antimony presents us with cardiac morbid symptoms similar to those of Arsenic. The Arsenite of Antimony has been recommended by French physicians as a cardiac tonic, but I can find no clinical experience relating to its use in our school.

Iodoform has lately been found to be a "heart-tonic" in small doses. "Prof. Testa (*Giornale di Med. e. Ter. di Messine*) has reported some observations made by him on the curative effects of Iodoform in organic diseases of the heart. He has studied the subject for several years, and has observed the effect of the drug in a number of cases. The remedy is not directed against the lesions themselves, but rather against the effects produced by them. He gives the drug in pill form, every two hours, until one grain is taken during the day. Its most marked effect is to *diminish the number of heart-beats while it increases the arterial tension.*" Now it may be that we have in Iodoform a specific homœopathic remedy to some cases of fatty degeneration. In the Iodine-pathogenesis we find many symptoms of this disease. Iodine, like Arsenic and Phosphorus, will cause degeneration in all the organs of the body, accompanied by deficient innervation of the general system. I have given Iodoform in many diseases, in doses of $\frac{1}{4}$ to $\frac{1}{16}$ grain, for months, and have never observed other than restorative effects. Under its use the general nutrition increased, and the heart's action improved in a decided manner.

The action of the *acids* in causing fatty degeneration is suggested by Fothergill to be chemical. He thinks they act by "depriving the nitrogenized tissues of their ammonia, and thus leaving the other constituents as fat." Virchow found the blood positively acid in all pyæmic or septic conditions. It may be that the development of certain acids in the blood tends to fatty degeneration of the heart. If such be the case, the internal use of ammonia might be of value to prevent or arrest that condition. But aside from *curative* agents, there are at our command many *palliative* measures. The same hygienic rules should be followed as those laid down in the treatment of *dilatation*. The remarks relative to pure air, climate, etc., are equally applicable to this disease.

Of palliative or restorative remedies, I know of none that equal *Strychnia*. It matters but little whether we give this agent in the form of Nux vomica or Ignatia, if we give enough to get the specific physiological (*not toxic*) action of the drug. *Strychnia*, like Digitalis and others of its congeners, acts upon the heart, but unlike Digitalis, it acts on that organ not by direct stimulation of the intercardiac ganglia and the branches of the sympathetic, but through the spinal cord. In its ultimate action it tetanizes the heart and the muscles of respiration. It is a *spinal* cardiac tonic.

In medicinal doses it not only strengthens the remaining muscular fibres of the heart in fatty degeneration, but it strengthens the respiratory muscles and regulates their action. It relieves the *dyspnœa* in this disease more than any other remedy. It is not as potent to regulate the *rhythm* of the heart as are Digitalis and Convallaria, but it is a safer remedy to increase the working power of the heart. The dose need not exceed one grain of the 2^d trituration, and one grain of the 3^d, repeated three or four times a day, will, in some cases, be amply sufficient. In cases in which the *rhythm* is impaired, and we find great

irregularity, intermittency, with weakness of the heart's contractions and the respiratory muscles (apnoea), I have seen the best results follow the use of the tablets of Digitalis and Strychnia heretofore referred to. (Each tablet contains $\frac{1}{10}$ grain of the leaves or extract of Digitalis, and $\frac{1}{100}$ grain of Strychnia.) One may be given every four or six hours until relief is obtained, and then three times a day for weeks.

The heart's beats in this disease are sometimes phenomenally *slow*. In such cases I have found Veratrum viride 3^r of value, if the pulse was *large and full*. When the pulse is *small*, *Laurocerasus* is better indicated. *Picric acid* in one case quickened the pulse (of 50) and removed other symptoms found in its pathogenesis. *Sanguinaria* is indicated for very slow pulse with vertigo. *Digitalis*, the stock-remedy for slow pulse, has not been of any benefit in my hands, unless the pulse was intermittent. *Strychnia* quickens the pulse when slow and very weak, with cold extremities, etc. The *syncopal* attacks are best relieved by the horizontal posture and the cautious use of Nitrite of amyl or Glonoine, especially when anginal pain is present, or by Aromatic Spirits of Ammonia, when cold sweat and persistent faintness occur. The patient must be cautioned to avoid all such efforts as straining at stool, lifting weights, pulling on boots, running upstairs, or standing too long on the feet. Many sudden deaths occur from such efforts. Chloroform or Morphia should never be used. The sighing respiration (Cheyne-Stokes breathing) is best palliated by Atropine 3^r.

The *muscular tremulousness*, mentioned by Fothergill, I have frequently seen in cases under my care. Some cases I have relieved by Calabar 3^r, others by Zinc phosphide 2^r, and some by Cocculus 3^r. I am sure that the use of Coca in some form has greatly benefited many cases of this disorder, and I would advise its use in the form of an infusion of the leaves, if good leaves can be procured, instead of coffee or cocoa. Tea and tobacco should be absolutely prohibited when there is even a suspicion of the presence of fatty degeneration.

ADVENTITIOUS PRODUCTS, CYSTS, Etc.

We here include all morbid growths not generally treated by themselves. The first, and perhaps most frequent, is

Cancer, or carcinoma, sarcoma, epithelioma, melanosis. It occurs rarely in any case, and though perhaps occurring primarily, an original cancer can generally be located in some other part of the body. Middle life has the largest per centum, and males show a greater proportion than females.

Anatomy.—There is no particular locality for cancerous growths, though the right heart has been more generally affected; the external

surface seems preferred to the endocardium, and the adventitious growth should easily be distinguished from the normal heart muscle, though in every case section and the microscope should be brought into play. Cancer may cause endocarditis or ulceration.

Symptoms.—There are rarely any special symptoms attainable; only general constitutional disturbances are noticed, and the necessary symptoms of præcordial pain, dyspnœa, and angina-like seizures.

Diagnosis.—Diagnosis of cancer of the heart has never been made during life, though the occurrence of heart disturbances during the course of cancer in another part may indicate that the heart is involved. Death is certain and may be sudden.

Lymphoma has been met with in cases where this disease was general; it is of no interest whatever, save from an anatomical standpoint.

Non-malignant tumors are also very rare, and are of mere pathological interest.

Cysts.—The occurrence of true cysts in the myocardium is doubtful (Quain), and hydatids, hæmatomata, etc., are of purely speculative interest from a pathological point of view, as they have never been diagnosed during life.

RUPTURE OF THE HEART.

Rupture of the heart may occur from an injury of any kind, as a blow or a fall, or from a wound, but it may result also in hearts previously affected, as by fatty degeneration, abscess, etc. It never occurs spontaneously when the heart is healthy, but a predisposing cause would be found in a thin or atrophied condition of the heart's walls, or from softening.

Out of one hundred cases reported by one author, seventy-seven were found to have undergone fatty degeneration, and to show the influence of *age*; of these one hundred, sixty-three were above sixty years old. An exciting cause may be some great mental or physical effort.

The left ventricle most often is the seat of rupture, and then in the apex. After this follow the right ventricle, right auricle, and left auricle.

The torn part presents different characters in different cases. Sometimes the rupture may be complete, sometimes incomplete; when complete, the hole is so small as barely to admit a probe, or is as much as an inch in length, and jagged, as if one layer of fibres had given way after another. A partial tear may occur, resulting afterwards in complete rupture, but it is not easily decided whether the rupture took place from within outwards or from without inwards, or during

systole or diastole; however, the probabilities are that rupture is caused by centripetal pressure during systole.

Incomplete rupture may be confined to the inner surface, or it may occur in the substance of the walls, and any irregularity depends on whether the rent is across the fibres or longitudinally with them; when the rupture occurs in an abscess, it is rather a perforation than a rent. The pericardium generally contains an effusion of blood, surrounding the heart with clot and serum, as much as thirty ounces in one case.

Rupture is doubtless the result of a strain upon the muscular walls, but in cases there may be softening with thinning of surface on the internal side (chiefly the left ventricle), which gradually insinuates itself between the muscular walls till it results in sudden rupture or in perforation.

The symptoms are those of collapse, where death is not immediate, coldness, small, irregular pulse, fainting, pallor, perhaps vomiting, breathlessness, palpitation, and generally intense suffering. The greatest physical signs are increased lateral dullness, from the distended condition of the pericardium, dull, muffled sounds, or none at all, and diminished impulse.

The termination is certain death, although, according to the circumstances of the lesion, it may result immediately or not for several days. The rupture *may* be partially closed by a clot, if the effusion is great, owing to return pressure offered by the pericardial walls.

It is possible that rupture, partial or even complete, may happen, and no knowledge ever be gained of it, for there are many recorded instances where the heart has been wounded, complete recovery following; and there are at times found conditions on the heart-walls which might indicate a previous lesion, with no evil consequences beyond the scar.

E. NEUROSES OF THE HEART.

BY E. M. HALE, M.D.

ANGINA PECTORIS.

Synonyms.—Breast-pang, Syncope anginosa; French, Angine de Poitrine; German, Brustbrauene.

Definition.—The name angina pectoris (from ἀγγω, I strangle—pectus, the breast, a strangled feeling of the *breast*) hardly warrants the attempt at an exact definition, apart from the ideas which may be derived from the picture of the symptoms, for it is not a disease in the strict sense of the word; it has no accurate pathology, no localized lesion, and even the very symptoms have such broad limits that they are often the object of dispute. Its character has elements of func-

tional, organic, and especially of nervous irregularities, and the highest authorities can exhibit nothing more than a few isolated facts in favor of one theory or another. Gairdner (*Reynolds's System of Medicine*) says merely, "this group of symptoms." Perhaps the most concise definition, and the one expressing the tendency of modern views, is furnished by Quain (*Dictionary of Medicine*): "An affection of the chest, characterized by severe pain, faintness and anxiety, occurring in paroxysms; connected with disorders of the pneumogastric and sympathetic nerves, and their branches; and frequently associated with organic disease of the heart.

History.—The history of angina pectoris presents many interesting points to the student, especially him of homœopathy, for it shows what a vast amount of literature may be written on one subject, and of how little practical value the struggle among the pathologists is when we see them confining all their attention to the *cause* of a group of symptoms, omitting, in the dispute, the chief importance of the symptoms themselves as a guide to what may result in a cure or, at least, in an amelioration.

The first man to make an especial study of these symptoms, and the one to whom we owe the use of the name, is Heberden, who, in 1796, treated of this affection under the title of "De dolore pectoris" in his *Commentaries*, though he had previously described it, his first communication on the subject (to the College of Physicians) being in 1768. From that date to the present, the affection has enlisted the attention of such men as Dr. Parry, Dr. Latham, M. Trousseau, and many others, each advocating his own theory, but seldom advancing much our knowledge, excepting through individual cases, till we come to Dr. R. Quain, who, perhaps, sums up the result of modern investigation, leaving its pathology still very vague and indefinite. Another interesting feature in the history of angina pectoris is the array of celebrated names whose cases are cited to illustrate the peculiar symptoms. Seneca, Lord Clarendon, Dr. John Hunter, Dr. Chalmers, Dr. Arnold (of Rugby), are said to have been sufferers, and from the sensations described by them, and others, we may pick out the few symptoms necessary to diagnose angina pectoris, if that name must be used of some affection which presents us nothing objective as a guide.

Causes.—These are either predisposing or exciting. Among the former should be noted the fact that a predisposition to angina pectoris may be inherited; that is, a patient may have handed down to him a temperament which is nervous, susceptible to impressions, and characterized by a highly *developed* condition of "the nervous element, associated with certain habits of life, sedentary employment, high living, etc.," predisposing to such attacks.

The advantage of sex seems to be on the side of women, for they are seldom the sufferers from this disorder, most all cases on record having

been in men ; the age of a person, if not a predisposing cause, is certainly a factor in the liabilities, for persons advanced in years, of fifty, or more, more often complain ; cases in young persons are rare. Quain says, " the peculiar diathesis in which lithic acid predominates in the system "—" that which gives rise to neuralgia of various parts," is more open to attacks of angina pectoris.

Of exciting causes may be mentioned : disease of the tissues of the nerves themselves, or which may have a direct mechanical effect, such as the pressure of a tumor or of an aneurism. Organic disease of the heart is a great exciting factor, and many have tried to prove that angina pectoris is always traceable to such a lesion. The mental condition has a great influence, as undue excitement or great anger, a celebrated instance of the latter being that of John Hunter, who died suddenly after a passionate dispute in St. George's Hospital. It has been noticed that attacks are more frequent in the open air, when it is cold, and when there is a strong wind blowing in the face ; exertion, too, seems to act as an exciting cause, though this is, by no means, the rule, for often the attack comes on during sleep, when lying down, and when in a state of perfect quiet. A low condition of blood, as in malaria, or such agents as tobacco. Also, irritation of the nerves, as of the branches of the fifth, by means of the pneumogastric and sympathetic. Trousseau tried to connect angina pectoris with epilepsy, even called them identical, but though it is true that epileptic patients often have such attacks, yet, on this theory there is no explanation for the symptoms occurring in those to whom the suspicion of epilepsy has never been attached.

If we examine the pathology of angina pectoris we are likely to be utterly bewildered. I would refer for a minute study of this question to the same article in Quain's *Dictionary*, in which he enters carefully and exhaustively into the anatomy of the nerves distributed to the heart, and of those in connection with them. But the affection in general is, undoubtedly, a form of neuralgia ; the character of the pain proves this. It has been ascribed to spasm, but a spasm of the heart, lasting as long as an ordinary paroxysm of angina, would destroy life ; besides, the heart's action is seldom, if ever, arrested.

The pathological relations of angina are interesting. Flint says, " it involves, in a large proportion of cases, the existence of some organic affection of the heart and aorta," but, he adds, " the lesions found do not agree invariably in any appreciable morbid alterations." Valvular lesions may be present or absent. Calcification of the coronary arteries is sometimes present ; here, again, pathologists have tried to establish a necessary connection, but without sufficient proof, for changes in these arteries have been noticed without the occurrence of symptoms of angina. The converse is also true. Symptoms of angina have existed without visible alteration in the coronary arteries as demonstrated

by post-mortem examination. Fatty degeneration has been observed, and in *Reynolds's System of Medicine* it is half hinted that later microscopical investigation can nearly always discover some progress towards fatty degeneration which earlier investigators might have easily overlooked.

It has been asserted that a weakened heart is essential to this disorder, but this theory is disputed by both Flint and Jones, though somewhat supported by Gairdner, who adds, "I am able, from personal experience, to say that no organic disease has appeared to me more frequently to assume the symptomatic character of angina than *aneurism*; and I am also prepared to state, as the general result of inquiries extending over many years, and particularly directed to this subject, that even small aneurisms arising very near the heart, and especially such as project into the pericardium, or compress, in any degree, the base of the heart itself, are much more apt to give rise to angina-like symptoms than much larger tumors in more remote positions." "The attention of physicians in cases of supposed angina pectoris should therefore always be very minutely directed to the state of the arterial system as a whole, and more especially to any evidences that may exist of irregularities in the sound or impulses of the arteries near the heart, or of the aorta near its ascending portion."

While it is not believed that a weak heart is a *necessary* condition, it is more than probable that a condition is often present which is similar to myalgia elsewhere in the body; in other words, cardiac myalgia may simulate, or coexist with, angina.

Collecting then our knowledge on the subject, we may sum up by saying that the symptoms of angina pectoris compose a neurosis of the heart which may result from uncomplicated nervous affection, or which may arise from complication with organic disease of the heart or its closely connected bloodvessels.

The post-mortem appearances are of too contradictory a character to serve as a guide; the heart may be filled with blood or it may be empty; there may be severe organic lesion, or none worthy of note.

Symptomatology.—The affection is characterized by paroxysms of intense pain, emanating from the region of the heart, and extending in various directions, often into the left shoulder and down the arm, accompanied by indescribable anguish, a sense of suffocation, and a *feeling of impending death*. "A sense of dissolution, not a fear of it." The pain radiates into both sides of the chest, into the back, upper extremities, generally the left, but not always, and sometimes extends into the lower extremities. The pain in the upper extremity does not always extend into the hand, sometimes it ends at the shoulder, at other times at the elbow, and the pain is occasionally felt only in the forearm. It commonly seems to follow the course of the nerves, and is felt all over the affected extremity, even to the ends of the fingers.

The pain is attended by a feeling of numbness, or as if the limb were paralyzed; a rare symptom is pain and numbness in the testicles. Hyperæsthesia, or tenderness, where the pain is felt, has been observed.

This is one of the affections which is purely paroxysmal, a strong proof of its immediate connection with the nervous forces and centres. The patient is seized suddenly, often during motion, as walking up hill, or against a strong wind, or in turning in bed.

From the first instant of attack, *all motion seems impossible*. The patient *seizes hold of some firm support*, or fixes himself in some way immovable, until the paroxysm passes off.

Besides the pain, the feeling of suffocation alarms the patient, and he feels as if death were imminent. Dyspnœa is not always present, but the breathing is often suspended for an instant, or restrained by an act of the will, for fear of increasing the pain, but the *ability* to expand the chest and to breathe regularly is not impaired, hence a symptom of true orthopnœa. Speaking is often impossible or difficult, as it seems to aggravate the pain.

Palpitation is often present; the action of the heart in some cases is intermitting and irregular; the pulse strong or feeble, and sometimes *very slow*. The countenance is pale, and expresses terror, anxiety, and distress, a death-like complexion and haggard features suddenly taking the place of an appearance of health. Lividity is sometimes observed. The surface is cold and bathed in sweat, which is cold and clammy. The faculties of the mind remain unaffected, or nearly so; after an attack a sense of prostration is present, and, as after other nervous attacks and spasms of the heart, there is a free secretion of pale, watery, limpid urine.

The paroxysms differ in frequency of occurrence, duration, and severity; and though generally coming unannounced, may be preceded by "symptoms of nervous irritation in the left side of the face and head, as well as down the arm."

A special sensation in the chest has been sometimes noticed, where "it seemed to be bulged out in a convex prominence, which suddenly terminated in the lower end of the sternum in a sharp depression." This sensation of irregularity about the chest is quite common.

The paroxysms may occur every few hours, days or weeks, but years may elapse between them; sometimes very mild at first, they may increase in severity, or may be very severe at the first attack. They may often subside as suddenly as they commenced, or they may disappear gradually.

It is an erroneous idea that they occur only after some physical or mental excitement, for the attacks often come on at night during sleep.

I have known persons who were thus affected rendered so fearful of

going to sleep as to make life almost insupportable ; in one case a fearful dream seemed to the patient to be the exciting cause.

While death rarely occurs during the first attack, the disease is rendered chronic, and finally terminates fatally, although the death is modified by the cardiac or other lesions which usually accompany these symptoms.

Diagnosis.—The diagnosis is made from the symptoms, the most prominent of which, as has been stated, are great pain ; the sense (as distinguished from fear) of sudden death ; dread of being moved ; and unwillingness to breathe, with ability to do so, orthopnoea. Careful attention should be paid to a thorough physical examination.

Prognosis.—The prognosis depends largely upon the condition of the heart. If that organ or the aorta be in a state of structural disease, the prognosis is far more unfavorable than if the disorder is purely functional in character. If organic disease is present, we cannot assure the patient of exemption from the recurrence of the attacks, while if not connected with lesions, years may elapse before another paroxysm occurs. Paroxysms of angina pectoris sometimes cause sudden death. In such instances “the action of the heart is arrested by a morbid agency, affecting it through the pneumogastric nerves, in the manner in which irritation of these nerves, or the electrical current, produces this effect in experimental observation.” (Flint.)

The danger is in proportion as the action of the heart is *feeble, irregular* or *retarded during the paroxysm*. But if the action of the heart be but little or not at all disturbed, sudden death is not to be feared. Organic disease, rather than functional, suggests a sudden fatal termination.

Even if organic disease is present, judicious homœopathic treatment often cures, and, as a rule, is greatly successful if the affection is purely functional or neuralgic.

Treatment.—In the treatment of angina pectoris we cannot be guided by pathological notions. If we know organic disease to be present in the patient, it will not guide us in prescribing during the attack, although it may aid us in prescribing during the interval, for the purpose of preventing future attacks.

There are two classes of medicines to be used : (1) Those which diminish the severity of the paroxysm, and which are capable of arresting it. (2) Those which will postpone or prevent the recurrence of the attacks.

As to the treatment during the paroxysm, it is rarely the case that a physician can get to his patient in time to be of much service. The paroxysm is generally over, or the patient is dead, before the physician can reach him. Although I have treated many patients for the disease, I have never seen but two in the paroxysm.

Amyl nitrite.—The most important remedy known for the immediate relief of the paroxysm is Nitrite of amyl. This drug was first recommended by Dr. B. W.

Richardson, and successfully carried out on a basis of careful clinical and experimental observation in angina pectoris by Dr. Lauder Brunton. The theory upon which Amyl was recommended, was that it relieved the spasmodic tension in the arterioles, not only of the heart, but of the system generally.

In typical cases of angina the proofs are all on the side of this theory, namely: during the paroxysm there exists a vaso-motor spasm not only of the arteries of the heart, but of all the arterioles of the body. When Amyl is inhaled by a healthy person there occurs, in a few seconds, a quickened circulation, tumultuous action of the heart, quick respiration, the pulse will run up from 70 to 140, the face and whole body will become red and flushed, and the pulsations of the heart will be felt in the neck, head, and other parts.

The indications for its use are said to be this condition of vaso-motor spasm, i. e., coldness of the body, low pulse, agonizing pain in the heart and down the left arm, orthopnea, etc. From two to five drops on cotton, or on a handkerchief, or even from an open vial, generally gives relief in a few seconds, and shortens the attack, "strangling it almost in its birth." Its inhalation should be suspended as soon as the effects of the drug have fully appeared and the pain is arrested. Patients on whom it acts favorably, should carry the drug about their person, either in vials previously filled with absorbent cotton, or in the form of pearls de Amyl, small glass globes each containing 5 drops, which can be broken in the hand, or on a handkerchief, when needed.

There are, however, some curious discrepancies about the value and indications of Amyl. Dr. Madden, who cured himself of angina by the continued use of Amyl, thought it at first contra-indicated in his case, because his face was flushed during the paroxysm. But, all other means failing, he resorted to it with signal success. This perhaps would show that the vaso-motor spasm may have been confined to the coronary arteries. Dr. Madden noted the following effects during its inhalation: "Bronchial irritation causing cough, quickened circulation, sense of great fulness in the temples and burning in the ears, violent commotion in the chest, tumultuous action of the heart, quick respiration. The angina pain died out first in the chest, next in the left upper arm, last of all in the wrist where it is usually very severe. When the pain had ceased, there was generally for some time a strong involuntary tendency to suspension of breathing, each prolonged pause being followed by a very deep inspiration."

In cases, not of typical angina, Amyl does not act so favorably. In one case of "aortic insufficiency," and one of "aneurism of the first part of the aorta, pressing on the right ventricle and pulmonary artery," the Amyl aggravated the symptoms, producing alarming collapse, without any of its usual effects of flushing, etc. However, it is a remedy of such value that we cannot dispense with it.

Glonoine, or *Nitro-glycerin*, is a drug which possesses powers almost identical with Amyl. The chief difference appears to be that, while the effects of Amyl are manifested in three to five seconds, and last not over fifteen minutes, those of Glonoine are manifested in about three or five minutes, and often last five or six hours. The symptoms of both, when they appear, are closely similar. In angina pectoris Glonoine has been used successfully. Dr. Lauder Brunton, in a paper contributed to the St. Bartholomew Hospital Reports, 1876, says it is valuable in almost all heart diseases, and "particularly in angina pectoris," also in weak, dilated and fatty hearts. Professor Grabowski lately introduced it into the Krakauer Clinic, and reports that "in angina pectoris its effects were simply marvellous, and the efficient action of the drug could not be compared with that of any other known remedy." He uses a 1-per cent. solution, in doses of five or six drops.

Professor McCall Anderson, of Glasgow University, says: "My experience, so far, of the comparative merits of Nitro-glycerin and Nitrite of Amyl is that, while the former acts more slowly, it seems to be more permanently beneficial." He reports a case of angina-like pain when walking, referred to the region of the stomach. Ten drops of a 1 per cent. solution (1st dil.), three times a day, effected a cure. When the pain was on, a dose of 10 drops would arrest it.

In a late number of the *Therapeutic Gazette*, Dr. Farquar, of Zanesville, Ohio, reports a case of angina pectoris, the paroxysms coming on regularly at night, between 2 and 6 o'clock. The attacks were typical, and the pain violent and excruciating. He cured this case with Glonoine in doses of $\frac{1}{16}$ th of a grain, three times a day, in the form of pills. They caused, however, several pathogenetic symptoms, namely: loss of vision, pain and fulness in the head, weakness in the lower limbs, and extreme susceptibility to noise.

Dr. Hering introduced this remedy in 1874, and gave us an extensive pathogenesis, but I cannot find any record of its use in angina, except by Kafka, who prescribes it in connection with Aurum, guided by the "congestion of the head," which we know

does not occur, except in some rare forms of angina. The following symptoms of Glonoine, relating to the chest and heart, give a good picture of some cases of angina: "Dyspnoea, oppression of the chest: pain in chest, like *tension*, with frequent inclination to deep respiration; contraction of the chest, as if chains were being placed around it, and tightened more and more; constriction and oppression of the chest, with perceptible palpitation; constriction of the chest, as if it were screwed together; sharp stitches in the region of the heart; great anxiety in the region of the heart; shocks in the heart, with pricking pains in the hands and arms; when stooping, stitching pains in the heart, so violent that he feared to bend forward." In some, the face was hot and flushed; in others, pale and cold. Like Amyl, it sometimes causes collapse. I imagine that Glonoine can cause a kind of angina by its primary action, and another variety by its secondary action. This double action will be a guide to us in the selection of the dose. Should we find cases, like Dr. Madden, with "flushed face," etc., the indication would be to give the 3d dil., or higher, while in typical cases, with complete arterial vaso-motor spasm, the 1st dilution would be indicated, frequently during the paroxysm, and three or four times a day during the intermissions, keeping just within its pathogenetic action.

The use of *Chloroform* was once highly recommended, and its use has often been of signal service in arresting the paroxysm. But the paralyzing influence of this anæsthetic on the cardiac muscle has led to its virtual dismissal from the list of remedies. If used at all, it should be mixed with Amyl nitrite (5 gtt. to ʒi) and given cautiously. *Ether* is much safer, and has often been used successfully.

When the paroxysm comes on only at night, and the pulse is habitually quick and weak, the old recommendation of Heberden, to give, on going to bed, a dose of Opium (30 drops of McMunn's Elixir with a teaspoonful of Aromatic Spirits of Ammonia) may be resorted to, *provided*, the best selected remedies of our school have failed to prevent the paroxysm. But if Opium is given, care must be taken that the patient is free from uræmia, bronchial or pulmonary congestion or œdema, or from fatty degeneration of the heart.

Professor Gairdner (Reynolds's *System of Medicine*) says of the treatment during the paroxysm: "In my own experience no remedial agencies have appeared more powerful than warm pediluvia with mustard, and fomentations at the same time to the arms and thorax, as hot as they can be borne. With these, and with Ether and other diffusible stimulants, I have been able to dispense with the use of large opiates in doubtful cases, or when they seemed to be contra-indicated." *Chloral hydrate* is open to the same objections as Chloroform, but there are on record some extraordinary cases where this drug, in massive doses (ʒii to ʒiii), has been singularly efficacious; I cannot, however, recommend its use.

The electric and galvanic current has been recommended, but no reliable clinical experience has yet been reported.

One of the chief duties of the physician who is present during a paroxysm is to exert a powerful moral influence on the patient and his friends in attendance. He should assure the patient positively that he *will not die*, for this will aid in dissipating the deadly fear which often precipitates the patient's death. Keep the patient *absolutely quiet*, and the attendants busy, but free from excitement.

We now come to the *radical or inter-paroxysmal treatment*. This will be guided by the ascertained pathological condition of the heart, if any exists or can be discovered. If *fatty degeneration*, valvular disease or aneurism exist, they should be treated with properly selected remedies. If the disorder be typical or vaso-motor, the remedies must be selected in accordance with the law of *similia*.

Generally speaking, tranquillity, both of body and mind, especially the suspension of all occupations, or even amusements, that tend to overstrain the heart or hurry the breathing; very moderate daily exercise on level ground, and only to such an extent as is necessary for preserving the bodily tone or for good digestion; the avoidance of all manner of food tending to flatulence, and the regular but strictly moderate evacuation of the bowels, either spontaneously or by the mildest laxatives, are measures of hygiene so obviously suggested by simple prudence as to require hardly more than a passing allusion. It is not by any means certainly ascertained whether the subjects of angina ought to use alcoholic stimulants in any measure habitually, or to reserve them for the critical period of the attack. I incline to the latter opinion. Venereal excitement has probably in all cases an unfavorable influence.

The use of tobacco in great excess has been specially investigated as a cause of angina by M. Beau; but although I have frequently observed palpitation and intermission in the heart's action in smokers, it has not occurred to me to observe true angina thus produced. It will be obviously right, however, to discountenance any indulgence of this kind which is even doubtful as to its effects upon the heart's action.

If the patient is decidedly gouty or rheumatic, and the urine shows persistently, or even frequently, a tendency to deposit lithic acid crystals, and acid dyspepsia is present, it will be well to send him to some *alkaline* springs of this country or Europe—and have him drink the water regularly, and in proper quantities, until the acid diathesis is changed. If a visit to springs is not convenient, the Citrates or Benzoates of Potassa and Lithia should be prescribed for the same purpose.

Arsenic of all medicines appears to have the widest reputation for the radical treatment of angina, especially when there are no structural changes, unless we except fatty degeneration, and the disease is neuralgic in character. It is further indicated if there is some impoverishment of the blood; if the neurosis is hereditary, or due to marked malaria. The homœopathic indications for Arsenic are: "he can only breathe very gently, with the chest stooping forward; the least motion causes complete loss of breath; oppression and stitches in the præcordial region, with anxiety and fainting; arrest of breathing when getting out of bed, or change of position in bed, or walking against the wind. Other symptoms indicating Arsenic in angina are numerous, and will be found in its pathogenesis. Favorable results have been obtained from daily doses of the 30th, or of the lower attenuations three or four times daily.

Arsenic has been used successfully by the allopathic school, and Dr. Anstie has prominently recommended it in the form of Fowler's solution, beginning with three minims, and gradually increasing the dose up to ten minims three times a day. He complains that "some neurotic cases cannot tolerate such doses, and on that account it

has to be suspended." Had he had the slightest glimmering of the truth of the law of *similia* he would have taken this *intolerance* as an indication that it was *decidedly* indicated, and had he tried the $\frac{1}{100}$ of a drop, persistently, his success would have been more brilliant. In decidedly malarial cases the Arseniate of Quinia (Chin. ars.) will be found very efficacious.

Digitalis comes next in importance. When this drug is given for a long time in small doses, or in massive doses at short intervals, certain violent symptoms, once called "cumulative effects," occur. They arise from a tetanic contraction of the heart, with something like spasm of the cardiac and general arterioles, thus closely simulating certain cases of typical angina pectoris.

It is symptomatically indicated when there is present the abnormal action, absent, small, irregular, or intermittent or slow, pulse—with great anxiety and oppression of the chest, with tendency to syncope and vertigo, with anguish and pain under the sternum or in the epigastrium—with pain down the left arm. It is indicated also when there is present valvular disease of the heart, or dilatation. I advise the first decimal dilution, or the corresponding trituration of the leaves, three to five drops, or grains, three times a day during the intervals, or if the paroxysms occur often. Digitalin in the third decimal trituration, one grain three times a day, is a very reliable form of administration.

Cuprum is indicated in those rare cases in which the pulse is *very slow*, either during the paroxysms or habitually, and the spasmodic orthopnea is prominent. When it is difficult to differentiate between Arsenic and Cuprum, as is often the case, the *Cuprum arseniosum* may be substituted.

Crotalus, Lachesis and Naja are indicated by their peculiar symptoms.

Aurum mur. has been advised by Kafka when there is "hyperemia in consequence of stagnation of blood in the heart;" a very faulty indication, yet a study of the symptoms of gold will show it to be useful in certain cases in which Glonoine is indicated during the attacks.

Cactus is certainly indicated in angina-like attacks by its "constriction-symptoms," both in neurotic cases and in those with valvular disease.

Cocoa has been successful in warding off certain angina-like attacks brought on by mountain climbing or rapid walking.

Oxalic acid was found to be efficacious when all other remedies failed. Dr. P. Dudley, who reports the case, gives these characteristic symptoms: Difficulty of breathing; jerking inspiration, and sudden and forced expiration, as though the patient made a sudden effort to relieve himself of intense pain by expelling the air from the lungs. Oppression of the chest, especially towards the right side; pain on expiration; sharp, darting, or lancinating pains in the heart and left lung; also in the anus; jerking pains like short stitches, confined to a small space, lasting for a few seconds. Numbness and weakness in back and limbs; peculiar numbness of whole body, approaching to palsy; coldness and complete loss of power of motion in the limbs. Movement excites and aggravates pain; periodical remission for some hours or days.

Convallaria is often superior to Digitalis in this disease. The great dyspnea on the slightest exertion, intense pain in the heart, point both to vaso-motor spasm and paresis of the pneumogastric. It is equally useful in cases complicated with valvular disease. Adonis and Casca will doubtless be found useful in this affection.

Strychnia has been used successfully in those cases due to spinal paresis. I have cured several presenting all the symptoms of angina, in persons suffering from spinal exhaustion. The dose was $\frac{1}{100}$ grain, four times daily, continued for weeks or months.

I am satisfied there are cases closely simulating this disease which are wholly due to hysteria, uterine and ovarian disease. In such cases Cimicifuga, Asafoetida, Liliun, and other utero-ovarian remedies prove useful. I have used in similar cases with brilliant results hypodermic injections of Morphia, Codea, and Atropia, in minute quantities, and their effects were permanent, no recurrence appearing after the production of sound sleep.

FUNCTIONAL DISORDER OF THE HEART.

BY E. M. HALE, M.D.

PALPITATION, IRRITABILITY, INTERMITTENCY, ETC.

Synonyms.—French, Palpitation du Cœur; German, Herzklopfen.

Definition.—By a functional disorder is meant any disturbed action of the heart which arises through the nervous system, independent of any inflammatory or organic conditions. Though these latter may give rise to functional disorder, yet, in such cases the cause can easily be ascertained, and they, not the nervous disturbance, are to be investigated and treated.

It should be remembered also that this nervous influence over the heart can be exerted in various ways; and the nervous system in connection with the heart is so intricate that many diseases, of themselves distinct in character, set up a disturbance in the heart.

Ætiology.—A distinction drawn by many modern authors fairly explains this difference, though it may lack accuracy. These causes are divided into mediate and immediate. A *mediate* or *exciting* cause of functional disturbance or palpitation is one which acts by disarranging the nervous economy at some distance from the centres, hence by reflexion; among such may be classed many and various causes of ill health, *i. e.*, disorders of the stomach, dissipation and its results, distension of the stomach by gases, producing irritation of the pneumogastric nerve, certain articles of diet, causing disturbance of the digestive process. But of all such, this palpitation of the heart is merely a symptom, and the treatment, when requiring to be other than mechanical (a removing of the obstruction or irritation), should be sought chiefly in the treatment of these diseases.

Fothergill (*Medical Record*, July 26th, 1884) draws particular attention to functional disorder, palpitation, in connection with ovarian trouble; he mentions many symptoms in relation to the heart, and says "the cause of all these linked phenomena is an irritable ovary when hunted down." Again, palpitation is often a marked symptom in women at the menopause when all the functions are more or less disturbed; and unless the physician in these cases makes a careful diagnosis, his point of attack in treatment is apt to be wrongly chosen. In *mediate* or *pre-disposing* causes I make a subdivision again. Among these I like to class such general derangements as anæmia; such deteriorations of the blood as occur in gout (where lithic acid is said to play a prominent part), scurvy, chlorosis, or hyperæmia; too great muscular exertion, active exercise, which also *excites* palpitation; bodily exhaustion, venereal excesses, or a bad condition of the general constitution.

Age seems to be important; so is sex; for palpitation oftener occurs

in young people than in the old, in women than in men. Hysterical patients and choreic persons are subject to palpitation.

The direct source of cardiac innervation is an interesting question, both in its pathological and therapeutical relations.

Barthez (*Traité de Therapeut.*, vol. i., p. 43, par Trousseau and Pidoux) says, we must make a distinction between the radical and the acting forces governing the heart. The former may be nearly exhausted, while the latter are in full play; and, *vice versa*, the latter may be but slightly manifested, while the former are powerful. Accordingly, as radical forces there are: A motor apparatus, situated in the substance of the heart itself (which has power of independent motion), rhythmically-discharging motor ganglia; the pneumogastric, which has a regulative movement on the heart; and branches from the spinal cord. As an acting force, there is always the sympathetic, stimulation of which accelerates the pulsations of the heart, assisted by branches from the spinal cord. Now, a functional disturbance must act through these nerves, either by reflex action or directly. The result is perhaps the same,—“an over-stimulation of the excitability of the muscular structure, induced by functional errors of these nerves; *i.e.*, the cardiac ganglia, the vagus, or of those nerves which, proceeding from the cardiac ganglia of the great sympathetic, supply the heart.” Of the causes of those reflex disturbances I have already disposed, as *mediate* and *indirect*. I come now to speak of true neuroses, disordered action due to direct or immediate causes, traceable to the nerves themselves. These causes may be separated into two classes: (1) Nervous excitement of the most varied kind, as joy, hope, surprise, fear, terror, and profound mental emotion or shock; even home-sickness may excite palpitation. And (2) nervous affection due to the use of stimulants, like tea, coffee, tobacco, alcohol, or to the existence of gout, if we accept the lithic acid theory.

The various ways in which these functional disturbances may manifest themselves can best be understood by a close study of the pathogenesis and symptomatology of the drugs employed in treatment, but the following irregularities in the heart's action may serve as keynotes. First, and most common, is palpitation; the heart is much accelerated in beating, with halts at intervals as if it were going to stop; again, there may be a continuous tumultuous beating, with occasional paroxysms of true palpitation. The heart may become irritable from too great demand made upon it, or from a lack of rest, from over-straining of sympathies, or from excessive work. Then there is intermittency and irregularity. At times we find a heart abnormally slow in action, due sometimes to depressing disturbances; sometimes, too, a congenital weakness. Or, if not abnormally slow, the heart may go to the other extreme, suddenly beating very rapidly, leading to the supposition that the cardiac muscles are in a state resembling tetanus. And, as is fre-

quently the case, the heart may act as if exhausted, like any other over-worked machine.

Diagnosis.—In declaring a diagnosis of functional disorder the physician should be careful to assure himself that no organic lesion is present, and that there is no temporary or chronic inflammation, for both these causes may originate functional disturbances which, under such circumstances, do not belong to the neuroses.

Physical exploration is accordingly valuable, in showing the *absence* of the signs of organic or inflammatory affections, and this information is as valuable as if it included positive signs of true neurosis. If the heart is not enlarged, the disorder is quite sure to be functional; yet, if it is enlarged, we cannot affirm that the disorder is *not* functional. Percussion settles the question of possible enlargement.

Palpation enables us to ascertain the *force* of the heart's action, whether due to alterations in function or in structure. We find *increased* and *disturbed* action in the former, augmented power in the *latter*. In functional disturbances, the apex-beat is in its normal position.

Auscultation is important in two ways: First, by showing the *absence* of abnormal sounds indicating valvular lesions; second, showing that the natural sounds preserve their essential characters and normal relation to each other. Functional disturbance is not often accompanied by distinct "murmurs." It must be borne in mind that all normal heart-sounds are intensified by the increased action present in functional disorder, and if they are not changed, but merely intensified, we may know that functional disorder only exists. When this physical diagnosis is made, and organic lesion doubted or denied, various secondary considerations pointing one way or the other must receive our attention. Age for example, functional disorder appearing before middle age of life. Sex; women are more subject than men to functional disorder. The reverse is true with organic disease; hence these factors go far towards deciding the point. In functional disorder the patient is anxious and fearful, in organic disease he is usually apathetic, and the same disturbance in organic disease causes much less than the same irregularity when functional. Exercise may not aggravate the functional symptoms, sometimes it relieves them, while the reverse obtains in organic disease. Organic disease commonly originates in acute rheumatism; if the patient has escaped that affection, the probability points towards functional disturbances.

Prognosis.—The prognosis in cases of uncomplicated functional disorder is always favorable. The opinion that it may lead to organic lesions has been disproved. We may safely assure our patients that if a recovery does not occur, no organic disease need be apprehended.

Treatment.—The treatment of functional disorders of the heart, or *cardiasthenia*, which I consider a better term, may be divided into *palliative* and *radical*. The palliative is to be adopted when the

paroxysms are present; the radical, like the deep undercurrent of a river, during the course of the disease, until the cause is removed.

Palpitation.—The *palpitation* which occurs from excessive exercise, as climbing hills and mountains, running, swimming, etc., does not always subside during rest. It is often persistent, and many chronic cases of nervous heart-trouble can be traced back to excessive physical exertion. A few doses of *Aconite* or *Coca* will generally suffice to prevent continued disturbance, if taken early enough.

Palpitation due to *fright*, yields to *Aconite*; from excessive joy, to *Coffea*; from grief, to *Ignatia*; from general mental excitement, to *Scutellaria*, *Valerian*, and *Bromide of Camphor*. For paroxysms of *irregular and tumultuous beating*, with *violent impulse*, simulating true hypertrophy, the remedies are *Veratrum viride* and *Veratrum album*. When the paroxysms occur in plethoric subjects, the former is preferred; when in exhausted subjects, the latter. Other remedies are *Cactus*, *Convallaria*, and *Belladonna*. When the disorder is characterized by *irregularity* and *intermittency*, with *feeble* action, the chief remedies are *Digitalis*, *Convallaria*, *Adonis*, *Arsenicum*, and diffusible stimulants, such as pure wine, beef-tea, aromatic ammonia, and warmth to the extremities.

There is a kind of nervous disorder of the heart, termed by patients "tremor" and "trembling." This may, or may not, be detected by auscultation or by the pulse. It may be a tremor too fine to be detected by the ear, or to show its effect on the pulse. This symptom is often caused by the excessive use of tobacco and tea. Many remedies have this symptom, notably: *Kalmia*, *Lilium*, *Natrum mur.*, *Spigelia*, *Camphor*, *Sumbul*, *Digitalis*. If these fail, try *Bromide of sodium* in doses of 5 grains, every two hours.

Hysterical cardiac troubles are generally best relieved by *Ambergris*, *Asafetida*, *Camphor*, *Crocus*, *Ignatia*, *Sumbul*, *Valerian*, and *Scutellaria*.

The *radical* treatment of *cardiasthenia* must be prolonged and continuous. The remedies should be carefully studied out, not only on the plan recommended by *Hahnemann*, but according to their organic and tissue affinities.

Plethora should be removed by appropriate diet and exercise. Small meals, composed nearly altogether of fatty food or lean meat, no tea or coffee, no sugar or pastry, much exercise, Turkish baths, etc., are the principal means.

Adiposis is best treated by the same hygienic means, together with the use of 10 grains *Bromide of Ammonia*, three times a day, or *Fucus vesiculosus*, in doses of one drachm of the fluid extract, thrice daily.

Anæmia, by a rich, nitrogenous diet, life in the pure, open air, free from malaria, and by the use of *Ferrum*, *Cuprum*, *China*, *Helonias*, *Ignatia*, *Nux*, *Calcarea*, and the *Hypophosphites*. I have obtained

the best success in idiopathic anæmia, associated with functional disturbance of the heart, by the alternation of Ferrum and Digitalis, Ferrum and Strychnia, or Ferrum and Arsenicum.

Ferro-cyanuret of iron has made some remarkable cures of anæmia and chlorosis with great cardiac weakness. Iodide of iron, also, in strumous subjects, has been found singularly successful.

Collinsonia, which I recommended in my *Lectures on Diseases of the Heart*, has not been found as curative as the reports of Eclectic physicians led us to expect, but I have found it useful in some cases arising from suppressed hæmorrhoids and intestinal irritation.

Cardiac neuroses caused by *uterine* or *ovarian* irritation are best met by the *Bromides*, in appreciable doses, especially if attended by profuse menses and erotomania, sleeplessness, and general nervous erethism. Massive doses will surely bring on all these conditions by their secondary effects; but doses of 1 to 5 grains, three times daily, will remove them. The Monobromide of Camphor must be used in smaller doses, 1st to 3rd trituration. If the neurosis or cardiac irritation is from a gouty or rheumatic diathesis, the Bromide of Lithia in similar doses is specific. *Lilium tig.*, in my practice, has oftener proved of service than any other.

Convallaria maj. (lily of the valley) stands next in order. It belongs to the same botanical family, and its pathogenesis shows many uterine and ovarian symptoms similar to the tiger-lily. No other cardiac remedy has such a broad and potent sphere of action as this, and it will prove one of our most powerful curative agents in a large proportion of cardiac neuroses, whether reflex or idiopathic.

Lacheis, *Naja*, *Apis*, *Conium*, Platina, Cimicifuga, Viburnum op., Nux moschata, Sepia, and Pulsatilla will all be found indicated in certain cases.

If dyspepsia or gastro-intestinal irritation is the cause, Nux vomica, Bismuth, Lycopodium, Hydrastis, *Euonymus*, Iris, Pulsatilla, Podophyllin, and Nitro-muriatic acid will be found indicated. In such cases not medicines alone will cure, but we must see that the patient's diet is corrected, and must assist his digestion by the approved use of Pepsin and Pancreatin.

In a large number of instances of obstinate cardiac disturbances I have found the colon loaded and distended by enormous quantities of fecal accumulations. Enemas of salt water, Ox-gall or Castor-oil emulsions, will generally remove them, aided by abdominal *massage*. But some cases resist these measures, as well as homœopathic remedies like Opium, Plumbum, Nux, or Aluminum. It is our duty in such to empty the colon by laxatives; the most efficient I have found to be McKesson & Robbin's or Warner's pills of "Aloin, Belladonna, and Strychnia," or "Aloin and Ergotin." These will sweep out effectually the poisonous accumulation, and the obstinate cardiac irritation

will leave as if by magic. Then, we can restore the paretic colon to its normal function by appropriate remedies—Nux, Hydrastis, Ergot, or Physostigma, and appropriate food.

Flatulence is a potent cause of cardiac disturbance. It will excite the heart to violent palpitation, cause irregular and intermittent action, and even syncope and dyspnoea from cardiac failure. The most potent remedy I have used for this is Creosote, 1^ʳ, a drop every twenty minutes till the patient is relieved. Oleum cajuputi, Turpentine, and Naphthaline are also efficient remedies. Lycopodium is of great value. Pepsin is invaluable in indigestion from deficiency of gastric juice. Nitro-muriatic acid (dilute), 5 drops before meals, and $\frac{1}{100}$ th grain of Strychnia, after meals, is the best prescription for a radical cure of flatulence.

Dr. Murchison (*Lectures on Functional Disorders of the Liver*) says that hepatic troubles are a prolific cause of cardiac disturbance. The intermittency which they cause is peculiar. It is worse on sitting or lying down; better by motion. The same may be said of the palpitation and the slow pulse due to such disorders. These facts I have often verified. I have found that Euonymin, 1^ʳ to 3^ʳ, is nearly specific in such cases; Podophyllin, 2^ʳ to 6^ʳ, very useful; Chelidonium and Carduus are often indicated; Nux vomica rarely.

CARDIASTHENIA.

I believe there is a true, idiopathic disease due to paresis of the inter-cardiac ganglia. It is caused by strain or overwork of the heart. The primal causes may be reflex, or spinal, or cerebral, but the condition set up by these causes will often persist, from force of habit, long after the reflex, and other, causes have ceased to be present. This condition can only be treated on the same principles on which we treat neurasthenia or cerebrasthenia, namely: absolute rest of the heart as much as is possible (by mental and physical quiet), and the administration of cardiac restoratives, with massage and such food as will lead to increased innervation of the heart. Digitalis, Convallaria, Adonis, Strychnia, Ignatia, Nux, Ferrum, and Phosphorus are the medicines. Oleaginous, nitrogenous, and all blood-making foods are the agents for increased nutrition.

This is the proper place to call attention to causes of *cardiasthenia* of a purely emotional origin. I have fully treated of this subject in the *Appendix* to the last edition of my work on the heart.* But I will here recapitulate certain facts relating to the nervous supply of the heart.

(1.) *The inter-cardiac supply.* The heart is supplied with a number of little, self-acting nerve-ganglia *without* relations to the brain, from

* "Lectures on Diseases of the Heart." 2d ed. Boericke & Tafel.

which spring, under the influence of the blood, a certain number of motor impulsions. These ganglia govern the usual normal action of the cardiac apparatus.

(2.) The brain sends out to the heart two sets of nerves, the retardators (pneumogastric) and the accelerators. Excitation of the former diminishes the frequency and augments the force of the heart's movements. Excitation of the latter produces the opposite results, increasing the number and lessening the force of the heart's contractions.

Now, when the emotional nature of man is normal and not excessive in quality or quantity, no abnormal cardiac manifestations are present. In races low in condition, ignorant, and uncivilized, the emotional functions rarely excite the heart unduly, for only in the highly civilized and refined do we find the general nervous system abnormally sensitive to emotional influences.

In such races and nations as the latter, it is not strange that the intense and varied emotions to which they are subjected should render the heart hypersensitive, and finally reduce it to that condition aptly called *cardiasthenia*. In such cases not only is the brain hyperæsthetic, but certain portions, or the whole, of the spinal cord usually partake of the same condition.

The upper portion of the cord sends nerves to the pneumogastric, and thereby influences the action and functions of the heart. Thus it is that spinal hyperæsthesia complicates the trouble.

Death may ensue from *cardiasthenia*, for there will come a time when the heart will die from the exhaustion of its sources of innervation.

The treatment of cerebral *cardiasthenia* is more moral and emotional than medicinal. By change of scene, of occupation, of mental influences, we must modify and render more natural, and less sensitive, the emotional centres. We have medicines, thanks to Hahnemann and later observers, which may aid us in calming and strengthening the cerebral functions. There will still remain the hypersensitive intercardiac nerve-ganglia. Fortunately, we have now a large number of remedies which have a similar influence over these. The task of enumerating these remedies is too great to be attempted. Each case must be studied as to its origin and its peculiar symptoms, and the remedy selected according to the law of *similia*.

F. DISEASES OF THE GREAT BLOODVESSELS.

BY A. R. THOMAS, M.D.

DISEASES OF THE AORTA.

INFLAMMATION. AORTITIS.

Few organs of the body are more free from *acute* inflammation than the aorta. Indeed, except as the walls of the vessels may occasionally become involved in the inflammations of surrounding structures, the condition scarcely ever exists. *Chronic* inflammation, however, is by no means unusual, this condition being the initial process for most of the structural changes to which the aorta, with other bloodvessels, is liable.

Owing to the absence of capillary vessels in the inner coat of arteries, the inflammatory process commences in the vascular layer beneath the latter, extending, perhaps, to the middle and external coats, affecting the inner coat only by modifying its nutritive, and thus favoring degenerative, changes.

The causes of these inflammations may be various, but are not generally very apparent. Age, constitutional cachexia, etc., and occasionally the breaking down of coagula formed within the vessel, may be found more or less directly associated with this condition.

There are no reliable symptoms by which inflammation of the aorta may be recognized during life.

ATHEROMA.

This degenerative process is one of the most frequent as well as important of the pathological conditions of the aorta. Resulting from a preceding inflammatory condition of the walls of the vessels, it may, by weakening the same, give rise to dilatation, aneurism, or rupture. It affects most frequently the arch of the aorta, yet may involve the whole vessel.

Atheroma usually commences in the deeper layers of the inner coat of the aorta, involving the surface of the latter more by an extension of the inflammatory products (proliferated cell elements) into its substance. As these products increase in quantity, they cause a characteristic thickening and swelling of the inner coat, these occurring in patches rather than involving the whole surface. Fatty degeneration of the involved structure may accompany or follow the process, or an infiltration with calcareous matter may result, giving roughness with brittleness to the inner coat.

While in the earlier stages of atheroma there may be a slight narrowing of the calibre of the aorta from a thickening of its walls, later, from a softening and a weakening of the same, dilatation is most certain to occur, possibly rupture or aneurism. If a section be made of

an atheromatous portion of the aorta, it may be found increased to three or four times the normal thickness. It may be slightly softer than the normal tissue of the artery, or it may be of a pulpy, or even of a semi-fluid, consistency. When less softened, it may present a distinct laminated character. In rare cases the disease may attack, and be confined to, the middle coats of the aorta. The condition of the atheroma of the aorta may be readily recognized in post-mortem examinations by patches of a whitish-yellow color, more generally confined to the arch of the vessel, seated within or beneath the inner coat, varying in size and shape, slightly elevated, yet presenting a smooth surface, being covered by a thin layer of the endothelium. When calcification has taken place, although commencing in the deeper layers, this covering may have disappeared, leaving rough surfaces of calcareous plates exposed directly to the current of blood.

Ætiology.—Age and certain constitutional conditions are believed to be most important factors in the production of atheroma of the aorta. Employment has its influence, as those engaged in laborious occupations appear more subject to the disease than others; hence, it is more common with men than with women. Old age and syphilitic taint are believed to be most frequent predisposing causes, while rheumatism, alcoholism, gout and kidney-disease may all play a part.

Symptoms.—These may be so obscure that extensive atheroma of the aorta may exist while neither subjective nor objective symptoms may be present. As dilatation comes on, however, and more especially aneurism or embolism—secondary results of atheroma—symptoms may arise leading to a recognition of the disease. Functional disturbances of the heart, angina, and various symptoms that would usually be defined as “dyspeptic” may be present in the earlier stages, but they can rarely be traced to this condition of the aorta as a cause. Later in the progress of the disease, by careful auscultation of the heart, particularly while the action is a little accelerated by exercise, there may be noticed, first, a slight indistinctness of the first sound; second, moderate increase of the second sound; and third, a slight *post-systolic* murmur along the course of the arch of the aorta.

At a still later period, indications of dilatation may be present, as pulsation and increased dulness over the arch of the aorta. When marked calcareous degeneration has taken place, slight fremitus may, in some cases, be detected in the same position. The subjective symptoms are likely, at the same time, to be increased in severity and frequency. Embolism may exhibit itself by sudden hemiplegia, hæmorrhage, or gangrene of some part, or symptoms of aneurism appear, and death suddenly result either from rupture of the vessel, embolism of the brain, or from some trouble of the heart which is liable to attend atheroma of the aorta.

Treatment.—Aside from palliative measures, little can be done in

the way of treatment of atheroma of the aorta. All the habits of the patient should be most carefully regulated; excesses of all kinds, whether physical, emotional, or dietetic, should be strictly avoided. Stimulants are undoubtedly injurious when habitually employed, yet may be useful in severe attacks of pain or of dyspnoea.

Among the homœopathic remedies most likely to be indicated in these cases may be mentioned Aconite, Arsenicum, Arnica, Cactus, Digitalis, Gelsemium, Kalmia latifolia, Lachesis, Laurocerasus, Nux moschata, Tarantula, Veratrum viride. The peculiar symptoms in each case must be the guide for the selection of the remedy.

ANEURISM OF THE AORTA.

This constitutes one of the most formidable as well as most dreaded diseases to which man is liable. Insidious in its approach, distressingly painful in its character, liable at any moment to a fatal termination, the sufferer feels his life suspended, as it were, by the most feeble thread, and with momentary liability to its sudden severance.

Definition.—Aneurism of the aorta consists in a dilatation of the walls of the vessel in some part of its course with, possibly, rupture of the same, and the formation of a tumor filled with blood. The following varieties are recognized: 1st. *Fusiform* or *Cylindric*, in which the dilatation is more or less general in its character, involving the whole circumference of the vessel. This is sometimes termed simple dilatation. 2d. *Sacculated*, when the dilatation is more local, and results in the formation of a sac or pouch communicating with the cavity of the vessel. 3d. *Diffused* or *False Aneurism*, when from a rupture of the coats of the vessel the blood becomes diffused into the surrounding tissues. 4th. *Dissecting Aneurism*, in which the inner and middle coats only give way, and the blood is forced between the middle and outer coats, or perhaps splits the middle coat into layers. In this form the blood may work its way for a long distance from the point of rupture for the whole length even of the aorta, and in some cases will again reënter the vessel by another opening from the inner coat. 5th. *Varicose* or *Anastomosing Aneurism*. In this variety there is established a direct communication between the aneurismal tumor and one of the large venous trunks, as the vena cava, or one of the innominate or subclavian veins, or with the pulmonary artery.

In some rare instances a communication has been established with one of the cavities of the heart. In all these cases the communication is the result of contact and pressure of the growing tumor, with final absorption of the intervening walls. Great disturbance of the circulation and sudden death result from the establishment of such communications.

All portions of the aorta are not equally subject to this disease. Of seven hundred and three cases collected by Sibson, four hundred and

forty-nine were of the thoracic, and two hundred and fifty-four of the abdominal, aorta. Of those connected with the thoracic portion of the vessel, eighty-seven were of the first portion of the arch and intra-pericardial; one hundred and ninety-three were of the ascending portion and extra-pericardial; twenty-six were of the transverse portion; seventy-two of the descending portion of the arch; and seventy-one of the remaining portion of the thoracic aorta, making three hundred and seventy-eight for the arch and seventy-one for the thoracic aorta.

Ætiology.—The softening and weakening of the walls of the aorta resulting from inflammatory action and atheromatous changes must be looked upon as one of the most frequent primary causes of aneurism of the aorta. The secondary or exciting causes will include everything that may tend to increase the blood-pressure upon the already weakened vessels. Prominent among these may be mentioned :

1st. *Hypertrophy of the left ventricle*, the increased power of the heart driving the blood into the weakened vessels with greater force than they are able to resist. On the other hand, weakened aortic walls may become the cause of a hypertrophied left ventricle, the two conditions thus acting and reacting upon each other.

2d. *Strain*, as induced by falls, blows or violent muscular efforts.

3d. Obstruction to a free circulation through the great vessels beyond the aorta, as from constriction of the abdominal walls by tight belts, or of the carotids and axillary by tightly fitting dress. It has been shown that soldiers in the British army are vastly more subject to aneurism than civilians, owing, undoubtedly, to the fact that their tightly fitting dress and heavy equipments, in all heavy marches or violent exercise, tend to increase the blood-pressure within the aorta. Sailors, on the other hand, though required to make frequent and violent exercise, are more exempt from aneurism, the result, no doubt, of their more loosely fitting dress.

4th. *Mental Emotion*, through its influence in exciting and disturbing the action of the heart, rheumatism, gout, syphilis and intemperance, may each also become a factor in the production of aneurism from their power to induce disease of the heart and arteries.

Aneurism is a disease of middle life. It is rare before thirty, the greater number of cases occurring between forty and sixty. Men are much more liable to this disease than women, the difference depending, no doubt, mainly upon their more active lives.

Symptoms.—The subjective symptoms of aneurism will be found to vary greatly, according to the manner of origin, seat, stage of development, etc. If the result of some sudden, violent strain, as from a fall or blow, or from lifting a heavy weight, the patient, previously perhaps in good health, may experience a sudden pain in the chest, of a more or less severe character, and followed in time by the usual

symptoms of aneurism. In another case there may have been evidence of impaired general health and, possibly, evidence of disease of the aorta may have been detected, yet the symptoms of aneurism come on very gradually and almost imperceptibly. During the progress of the disease there may appear, more or less prominently, *pain, dyspnœa, cough, hoarseness, headache*, with *disordered vision* and *hæmorrhage*.

The pain of aortic aneurism is usually of a burning or aching, wearing character, and generally referred to the seat of the disease, although it may radiate to distant points. The dyspnœa is frequently marked, and is varied in its character according to the seat and nature of its cause. It may result from the presence of a tumor within the chest, producing pressure on the bronchial tubes, or from obstructed circulation through the lungs. Both pain and dyspnœa occur frequently in paroxysms, varying according to excitement of the circulation. The cough is frequently harassing, dry and paroxysmal. Laryngeal oppression and stridulous breathing may be induced by disturbance of the recurrent branch of the pneumogastric, as this may be compressed, stretched, or dragged from its position by the tumor when of the arch of the aorta.

Aneurism of the abdominal aorta will usually be accompanied by pain of an intermittent and paroxysmal character. It may radiate from the seat of the trouble to different portions of the abdomen, back or pelvis. As a result of pressure, there may be functional disturbance of several organs, as jaundice from pressure on the common bile-duct; vomiting from pressure on the pylorus; kidney derangement may also result from pressure on the renal vessels, while displacement of the heart or liver may result from the same cause. The upper portion of the abdominal aorta is more frequently affected by aneurism. It is rarely found as low as the origin of the renals.

The Objective Symptoms, as revealed by physical examination, are equally characteristic. Inspection will show in many cases of thoracic aneurism a swelling of the face and neck with turgescence of the vessels, extending, perhaps, to the arms, and the result of pressure upon the vena cava or other large venous trunks. As the tumor increases to considerable size, a bulging of the chest walls may be noticed, corresponding to the portion of the aorta involved; when to the right of the sternum, and near the second intercostal space, aneurism of the ascending portion of the arch will be indicated; when at the upper arch of the sternum, the transverse portion. If to the left of the sternum, and in the second or third intercostal space, the descending arch will be the involved portion, while a bulging to the left of the spinal column behind, would indicate aneurism of the descending thoracic aorta. As the tumor reaches considerable size, it will usually be of a conical shape, with a shining, smooth surface, and may be seen to pulsate synchronously with the action of the heart. Occasionally in

aneurism of the aorta, there may be noticed an inequality of the pupils, consisting of a contraction of the pupil on the side corresponding to the seat of the aneurism, and, undoubtedly, attributable to pressure on the sympathetic nerve.

Palpation will enable us to judge of the size of the tumor, of its elasticity, and thus of the character of its contents, whether fluid blood or fibrinous clots, of the character and force of the pulsation, of the thickness of the walls, and so on.

Auscultation of aneurism of the aorta will usually reveal characteristic sounds or murmurs. These will vary according to the location and size of the tumor, nature of its contents, and so on. The sounds will not only be found synchronous with those of the heart, but frequently presenting a corresponding systolic and diastolic rhythm also. The character of the murmur will present great variations. It may be simply blowing, or rough, rasping, sawing or filing in its character. It is generally low-pitched and short in duration; in some cases it may be totally absent.

The physical signs of abdominal aneurism, as revealed by palpation, are a smooth, elastic, pulsating tumor to the left of the middle line, the pulsations being increased by pressure upon the aorta below. The examination should be made with the patient on the back, with the thighs flexed, to relax as much as possible the abdominal walls. Percussion will be of less value in abdominal than in thoracic aneurism, owing to the large mass of intestines, perhaps filled with gases, covering the tumor. Auscultation will usually reveal a murmur, generally post-systolic, single and prolonged. The sound may be blowing, buzzing, or even of a musical character, according to the nature and condition of the contents of the sac; it is rarely heard in the vessels below. In an erect position this murmur is usually absent, but rarely so in the recumbent.

Diagnosis.—The difficulties in arriving at a diagnosis in aneurism of the aorta will depend much upon its seat and stage of development. In all cases we shall have to discriminate between aneurism and tumors, thoracic or abdominal. These may occasionally so rest on the aorta as to receive a pulsation from that vessel. This will not, however, present the elastic or expansive character of the aneurism, but be more of a lifting quality. Sounds or murmurs are generally absent in the tumors, though we may have transmitted sounds from the aorta. The result of pressure on veins may be similar in tumors as in aneurism. In tumors, however, the swelling and œdema of the face and arms is more persistent than in aneurism. From pressure on the heart and lungs the subjective symptoms may be very similar. The bulging of the chest walls will, however, establish the diagnosis in thoracic aneurism, and the position of the tumor and the pulsation with murmur in the abdominal. Aneurism of the innominata artery

may be distinguished from that of the aorta by its position, high in the chest, and more to the right of the sternum. Again, pressure on the carotid or subclavian will diminish the pulsation in aneurism of the innominate, but will not affect that of the aortic arch. Pulsations in the epigastrium are not infrequently met, simulating aneurism, which, however, may be transmitted from a dilated or hypertrophied left ventricle.

An examination of the pulse in the two wrists may reveal differences characteristic of aneurism. They may vary in size, or there may be an apparent delay in the pulse on one side. The sphygmograph may also, in some cases, be of value in diagnosing aortic aneurism, the systolic wave, as indicated by the tracings, being considerably prolonged.

Prognosis, Course, and Termination.—The prognosis of aneurism of the aorta is always extremely unfavorable. Cases of cures have been known, but they are extremely rare. The duration of the disease varies from a few weeks to many years. Filling of the sac with laminated fibrinous clots by producing pressure upon its walls, may serve to retard its development, and thus delay a fatal termination, or even result in a cure. The usual progress of the disease, however, is for the tumor to become larger and larger, its walls in the same proportion attenuated and softened, the system becoming more reduced from pain, with loss of rest, death finally resulting either from rupture of the sac with its attending hæmorrhage, or from gradual exhaustion. Rupture may take place into the pericardial cavity, into one of the chambers of the heart, into the pulmonary artery, either vena cava, the innominate vein, and rarely into the vena porta. Or, again, the rupture may take place into the trachea or bronchial tubes, or into the œsophagus or stomach. In either of these cases, death will be likely to be sudden. Hæmatemesis or hæmoptysis will follow where the rupture is into the stomach or air-passages.

A gentleman of about sixty years, after a hearty dinner, was taken with vomiting, first of blood and food, then of blood alone. The vomiting of blood continued, and in less than an hour the man was dead. A post-mortem examination revealed, first, a tumor in the second intercostal space, to the right of the sternum, of the size of half an orange, firm and immovable. This tumor proved to be an aneurism of the ascending portion of the arch of the aorta, in which a spontaneous cure had taken place. It was known by the family to have been present externally for fifteen years. The adjoining costal cartilages, with the border of the sternum, had been absorbed. Second, an aneurism of the descending arch, which had ruptured into the œsophagus. From this came the hæmatemesis and death.

Rupture occurring in a serous cavity into the mediastinum or upon the surface of the body need not necessarily be immediately fatal.

The adhesion of serous surfaces on the mass of dense clots may so obstruct the flow as for a time to delay the fatal result.

Spontaneous cure of aneurism, when occurring, is always the result of the formation of fibrinous clots lining the sac and arranged in concentric layers. Becoming partially organized, they acquire sufficient vitality to preserve their integrity, and by filling the sac and preventing the entrance of blood into the same, effect virtually a cure of the aneurism. It is the aim of the surgeon, in the treatment of aneurism of arteries within his reach, to induce the same result by the employment of pressure or ligatures.

The case last reported gave an instance of spontaneous cure by this method. Another has come under the notice of the writer. A lady of seventy-five years died from exhaustion and old age. She had suffered from obscure symptoms in the left chest. A post-mortem examination was held. On passing the hand behind the left lung, a tumor was found of the size of the fist, and adherent to the lung and surrounding tissues. On removal, the tumor proved to be an aneurism of the middle portion of the thoracic aorta, firmly filled with dense fibrinous matter, completely excluding the blood, and arresting further development. It was judged that this condition had continued for a long time.

Treatment.—The rational treatment of aneurism of the aorta includes not only the use of such remedies as may be found homœopathic to the symptoms present, but the use of such measures as may tend to promote the coagulation of the blood in the sac, including such palliative means as humanity and experience may dictate as effective in relieving suffering in an almost hopelessly incurable disease. The treatment of aneurism of the aorta may be divided into: 1st, *the homœopathic treatment*; 2d, *the physiological*; 3d, *the surgical*; 4th, *the palliative*.

Homœopathic Treatment.—A great variety of remedies will be found presenting the objective symptoms of aneurism of the aorta. Great care will be required in making the selection. Prominent in the list of remedies would stand: Aconite, Veratrum viride, Digitalis, Gelsemium, and Laurocerasus, while a place may be found for Sulphur, Calcareo carbonica, Calcareo phosphorica, and several other remedies.

The physiological treatment includes the employment of such measures, other than surgical, as tend to favor the coagulation of blood within the sac, as a cure can be hoped for only as that end is attained. It is well known that a retarded circulation favors the coagulation of the blood, hence complete rest in a recumbent position will not only diminish the strain on the weakened vessel, but facilitate fibrinous deposits within the sac. The diet at the same time should be somewhat restricted in quantity, yet nutritious in quality. This course

persevered in for six to eight weeks has been found quite successful in securing a filling of the sac with coagula.

The influence of certain drugs in lessening the force of the circulation, when given in doses to secure their physiological effects, should lead to a consideration of their use in these cases, with the view of securing their aid in favoring the coagulation of the blood. Among the most important of these may be mentioned Aconite, Digitalis, and Veratrum viride. To secure any advantage from their use, they must be employed in full doses. The Iodide of potassium has also been highly recommended, since it induces coagulation of the blood, although some authors consider this effect due to the sedative action of the drug upon the heart. It should be used in doses of from fifteen to thirty grains, repeated every four to twenty-four hours. Dr. Balfour, of Edinburgh, and others, have reported flattering results from this treatment. Dr. Helmuth, of New York, however, has but little to say in its favor, and my own experience with the drug has not been encouraging.

The surgical treatment will include (a) application of ligatures. This is available, however, in a few cases only. In some cases of aneurism of the arch, involving the innominata, or other large branches, by ligating the latter the circulation may be so changed in the arch as to favor a filling of a portion of the vessels with clot, so as at least to delay the progress of the disease, if not to effect a cure. In aneurism of the abdominal aorta, the lower portion of that vessel has been tied, but with such unfavorable results as to make the operation scarcely advisable. (b) *Compression* in the treatment of aneurism of the abdominal aorta offers the greatest encouragement for success. Inasmuch as aneurism of the abdominal aorta is seldom found below its middle portion, the vast majority occurring in its upper third, all the lower portion of the vessel will be available for the application of pressure. Resting, as it does, against the spinal column, to the left of its centre, the abdominal walls—particularly in thin persons—will offer but little impediment to bringing effective pressure upon this vessel. The aorta terminating opposite the umbilicus, the pressure will be required at a point about midway between that and the ensiform cartilage. Tourniquets, especially intended for this purpose, have been devised by Lister, and others. They should be used under an anæsthetic, after the bowels have been emptied, and with such force as to completely arrest the flow of blood through the vessel. The pressure should be kept up for at least four hours. If the pulsations still continue after four or six days, the instrument may again be applied, and the pressure continued for six to eight hours. In many cases the pulsations have ceased after the first application, and in a few days the patient has been considered well.

Where an aneurism of the aorta threatens to burst upon the surface,

the tumor may be covered by a carefully adapted concave shield. The support thus given affords positive relief from pain, and a sense of security against sudden rupture. In the case of aneurism of the thoracic aorta, where compression is not available, it has been proposed that coagulation be induced in the sac, when the same may be reached from the surface, by thrusting into the sac, in different directions, small wires, or, by means of a fine trocar and canula, several horsehairs; but as clots thus induced will be loose and irregular, instead of being arranged in compact, concentric layers, as is the case in spontaneous cures, the method offers no great encouragement.

Galvano-puncture has also been employed successfully in a few cases, yet as the clot is of the same unsatisfactory character as under the previous method, the operation does not offer great encouragement. When employed, each pole is armed with fine steel needles, and both carried deeply into the sac, yet separated by an inch or more. After the current from a ten or twelve cell battery has passed through for an hour, or more, the formation of a coagulum may be hoped for, and the needles carefully removed.

Palliative Treatment.—All methods of treatment of aneurism of the aorta may ultimately fail, and the patient be destined to endure much suffering, and ultimately death will suddenly overtake him. In such cases it becomes the duty of the physician to do everything in his power to relieve suffering. Stimulants under all circumstances must be carefully avoided. Cold, in the shape of ice-bags, may give much relief; but at times it becomes absolutely necessary to resort to anodynes, chloral, opium, or the bromides. When the suffering is severe, the hypodermic use of morphine will give prompt relief. Under the most careful management, however, the patient will be called upon to endure much suffering before death comes to his relief.

STENOSIS OF THE AORTA.

Stenosis of the aorta is of rare occurrence, yet it may exist as a congenital condition, or it may be acquired. Congenital stenosis is usually found at the junction of the ductus arteriosus with the aorta. The arch above that point is usually more or less dilated, as are the large vessels springing from it. Below the stricture, the artery is likely to be more or less contracted, though in some cases it has been found dilated. The stricture has been found of all degrees, from a slight narrowing to complete closing. In the latter cases a collateral circulation is kept up through the superior inter-aortic, internal mammary, and other large branches of the arch, anastomosing with the epigastric, intercostal, and other branches of the descending aorta. The constriction usually involves about a half inch of the vessel only. It may be irregular, somewhat resembling a ring, or a regular constriction, as if tied with a broad string. This condition of the aorta is usually asso-

ciated with some impairment of the valves of the heart, or with hypertrophy of the left ventricle.

The causes for this constriction of the aorta have been sought for in some unusual condition of the ductus arteriosus. If not present at birth, it is believed to develop within a few days after. Males are much more liable to this trouble than females. While it is not necessarily attended with any marked symptoms, the subject is always liable to sudden death.

The diagnosis is rarely made out during life, and were it easily made, no treatment can be of avail, further than to caution or protect the patient against violent physical exercise and mental excitement.

EMBOLISM OF THE AORTA.

Embolism of the aorta is of rare occurrence. Clots may, under certain circumstances, form in the left ventricle, vegetations may become detached from the valves, fragments from the coagulated contents of an aneurism, or threads of tissue from atheromatous patches, may be washed away and carried along the current of blood, but they will scarcely be large enough to lodge in the aorta. They will rather be carried on, to be finally arrested in some one of the arteries of the brain or extremities, producing paralysis or gangrene, as the case may be.

DISEASES OF THE PULMONARY ARTERY.

The main trunk of the pulmonary artery is subject to much the same diseases as the aorta, but with great rarity. Atheroma most certainly may develop in this vessel, and both fatty and calcareous degenerations are occasionally met with. The condition can scarcely be detected by any attending symptoms. The weakened condition of the walls of the vessel will, however, favor a development of an extreme dilatation of the whole vessel, or of an aneurism with very unusual pressure in the pulmonary circulation. This condition we have in many cases of mitral stenosis, in hypertrophy of the right ventricles, or in emphysema of the lungs. The few cases of aneurism of the main trunk of the pulmonary artery on record have been associated with one or the other, or each, of these troubles.

The symptoms of aneurism of the pulmonary artery can with difficulty be distinguished from those of aneurism of the arch of the aorta, especially so in the earlier stages. The pain and general sufferings of the patient are much of the same character. From the greater disturbance of the pulmonary circulation, however, the dyspnoea is likely to be more marked, while cyanosis will often be present, with cough, high-colored urine, and perhaps anasarca.

The physical signs are not characteristic. The prognosis is necessarily grave. Treatment, except as directed towards palliation, is of

little avail. Death will be sudden, and probably result from rupture into the pericardium.

Those smaller branches of the pulmonary artery which ramify through the substance of the lung are vastly more liable to atheroma and aneurism than the main trunk of the vessel. Liable to loss of support from destructive changes in the substance of the lung around, these same changes probably interfering with the nutrition of the vessels and rendering them more susceptible to degeneration and atheromatous processes, we thus find given all the conditions for the development of aneurism. These must be small in size, but a rupture of the sac may be followed by alarming hæmorrhage from the lungs, which need not, however, be necessarily fatal. The violent hæmorrhages of phthisis are frequently from this source. During the formation of vomicæ in the lungs the bloodvessels of the heart are exposed to the inflammatory and ulcerative processes, yet are so enabled to resist these that the destruction of a large vessel at least by ulceration is unusual. Weakened, however, by atheromatous changes, we can readily understand how they may dilate into irregular aneurismal sacs, liable to rupture on any unusual increase of pressure.

The only symptoms of aneurism of the intrapulmonic branches of the pulmonary artery will be the occurrence of repeated hæmorrhages in cases in which cavities are known to exist. The violence of the hæmorrhage will be in proportion to the size of the vessel involved. Frequently the first hæmorrhage will prove fatal.

The *diagnosis* will rest mainly on the character of the hæmorrhage, as above stated. Hæmorrhage occurring before cavities have formed will rarely be from rupture of aneurismal dilatations of the arteries.

The *treatment* is considered in the chapter on Diseases of the Lungs.

Stenosis.—The pulmonary artery, like the aorta, is liable to extreme narrowing, generally of the first part of its course. It is usually associated with some malformation of the heart; or it may be a result of an endocarditis, occurring in foetal life, this being most certain to produce contraction of the commencement of the vessel. Dyspnoea and cyanosis, and general venous congestion, usually are the most marked symptoms of this condition. The most prominent physical signs will be systolic murmurs at the base of the heart, which may be traced to the left, but which fail to be heard along the aorta or great branches of the arch.

There is no treatment for stenosis of the pulmonary artery. Death is more likely to be from gradual exhaustion than to occur suddenly and unexpectedly.

Thrombosis and Embolism.—These conditions of the pulmonary artery are by no means uncommon. Thrombi forming in different portions of the venous system may be easily swept along by the current of blood from smaller to larger branches, until they finally

enter the heart, when, driven into the pulmonary artery, and finally lodging in some of the larger or smaller branches, embolism is the result. These emboli may come from various sources. Clots of blood may form in the systemic veins from various causes, or within the left ventricle itself; fragments of cancerous, or other, growths may enter the vessels, all finally being swept into the pulmonary artery.

The symptoms in embolism of the pulmonary artery will vary according to the size of the vessel occluded. If it be a large branch, sudden and alarming dyspnoea may set in, with pain in the chest, pallor, faintness, palpitation, weak pulse, cold sweat, and perhaps sudden death. When a small vessel is involved, the symptoms may be slight or quite overlooked. As the embolus increases in size, as it is likely to do, the symptoms increase in severity. A slight hæmorrhage may set in. Cough, oppression, and evidences of disturbed circulation through the lungs appear. All these symptoms may abate, and perhaps return again with increased force.

The *diagnosis* of embolism of the pulmonary artery is difficult and uncertain. The symptoms appearing suddenly in parturient or extremely anæmic women, or in patients known to be suffering from some morbid growth undergoing changes, would go far in establishing the diagnosis of embolism.

The treatment includes little more than an observance of complete quiet and the free use of stimulants. Indications may be present for a variety of remedies, but with what confidence of relief can they be prescribed when the cause of the trouble is mechanical and when the only hope lies in the direction of preventing further extension of the clot and of securing its final dissipation—ends only secured through the force of the circulation!

DISEASES OF THE CORONARY ARTERIES.

The coronary arteries, which supply the walls of the heart with blood, are subject to the same diseases as the aorta or the arteries of the body. They may suffer from atheroma, fatty or calcareous degenerations, dilatation, obstruction or aneurism. In addition to these general causes, tending to induce changes in the arterial walls, the peculiarity of the circulation through these vessels may exert an important influence on their nutrition, and thus upon the pathological changes to which they are liable. Arising, as these arteries do, from the sinuses of Valsalva, immediately behind the semilunar valves, the flow of blood through the aortic orifices upon the systole of the heart, these valves are pressed against the orifices of the vessels, preventing the blood from entering these vessels.

As the recoil of the arterial walls takes place, the valves closing, the blood is driven into these vessels by this force only; consequently, any

impediment to the ready entrance of the blood into these arteries, as imperfect semilunars with aortic regurgitation, aneurism of the ascending arch, atheroma with impaired elasticity of the aorta, would necessarily tend to disturb the circulation through the entire heart-walls, disturbing the vitality and functional power of the whole organ, as well as of the coronary arteries. Thus, fatty degeneration of the heart, with functional disturbances, angina, and so forth, may fairly be attributed to disturbed nutrition resulting from disease of these arteries.

In atheroma of these arteries, they will be found dilated and soft, with the usual patchy appearance on the inner surface. Where calcification has taken place, the vessel frequently may be distinctly traced along the groove between the auricle and ventricle, as a hard cylindrical table grating under the knife.

There are no reliable symptoms by which these diseases may be detected during life; for while angina and other disturbances are frequently associated with these conditions, they may exist independent of them.

Thrombosis or *Embolism* of the coronary arteries may exist, the clots forming within the vessels, or, possibly, having been driven into the same from the aorta. Great pain and functional disturbances have attended these cases during life.

Aneurism of the coronary arteries has been seen in a few instances, death having resulted from rupture. Dilatation and rupture may also occur without the formation of an aneurism. In the case of the late Dr. Moore, who died suddenly while at the bedside of a patient, at the post-mortem examination the pericardium was found filled with blood. After carefully sponging this out, the surface of the heart, more particularly at the base and along the line of the coronary arteries, presented an ecchymosed appearance, there being plainly blood diffused beneath the serous covering. An extended careful examination revealed atheroma of the coronary arteries, with rupture of the right vessel, extravasation of blood within the muscular substance and beneath the serous membrane, rupture of the latter between the pulmonary artery and aorta, thus filling the cavity of the pericardium. The heart-walls were pale, soft and flabby, showing fatty degenerations.

DISEASES OF THE GREAT VEINS.

The great venous trunks are subject to many of the diseases of the venous system generally, including inflammation, degeneration, hypertrophy, thrombosis, etc. Varicosity, a condition common in the smaller veins of certain parts, is unusual, if ever present, in the great veins.

PHLEBITIS.

Inflammation of the veins is an occurrence of much greater frequency, at least in the acute form, than acute inflammation of the arteries. The

vena cava and larger veins, however, are not subject to this condition to the same degree as the smaller veins, not being exposed to the same exciting causes.

Ætiology.—The causes of phlebitis are extremely various. One of the most frequent is the formation of clots within the vessel; this will be considered under the head of thrombosis. Phlebitis is frequently the result of the extension of an inflammation from the substance of the organ to which the veins belong, in which case their outer coats only will show changes, the inner remaining normal in appearance. Poisoned wounds, or other injuries, may also result in phlebitis. In these cases there will be generally a tendency for the inflammation to extend along the vessel for some distance. Thickening, softening, or destruction by suppuration may follow, or clots may form, as in phlebitis from other causes. These may soften and become absorbed, or degenerate into a suppurative mass. Erysipelas, carbuncle, inflammation and suppuration of bones, or simple diffuse cellular inflammation may each give rise to inflammation of veins, with, perhaps, accompanying thrombosis. It springs up not infrequently in the uterine veins of puerperal women, and plays an important part in cases of phlegmasia alba dolens. In some cases of phthisis pulmonalis also, for some not easily explained reason, phlebitis of the iliac, and some other large veins, has occasionally been found.

Symptoms.—The symptoms of phlebitis vary according to the size, number and extent of veins involved; pain and tenderness along the course of the vessel will always be present. If a superficial vein is involved, a hardness of the vessel may be detected, and generally a red line of discoloration may be traced along its course. If the deep veins are involved, the hardness and redness may be absent. In the latter case the superficial veins may appear enlarged, and even distended, without being painful. Œdema of the limb will be more or less marked, the swelling being usually colorless and hard.

The constitutional symptoms may be very slight in simple limited phlebitis, but if pus forms, or embolism or thrombosis occurs, high fever of a typhoid character may appear, and even death supervene with every indication of pyæmia. When the outer coat or sheath of the vessel is primarily involved, the inflammation may follow the vein for some distance, finally, at some favorable point, an abscess rapidly forming, with pain and throbbing and marked constitutional symptoms. This form rarely occurs except from injury in persons of broken health and with bad hygienic surroundings.

Inflammation of the vena cava or innominate vein, the largest in the body, rarely occurs, and is not recognized by any characteristic symptoms. Such is not the case, however, with the *portal vein*. This vessel appears specially prone to inflammation and its results, and the

diseased processes are accompanied by more or less characteristic symptoms. *Purulent inflammation of the portal vein*, or *pylephlebitis*, is not an uncommon occurrence. It may be traumatic in its origin. This, however, is very rare.

A few cases have been reported where pins, needles and other foreign bodies, swallowed by insane and other persons, have penetrated the walls of the stomach, and so injured some of the gastric or other veins, as to induce an inflammation which, by direct extension, or by promoting the formation of an embolus which has been swept into some branch of the portal vein, has thus induced a suppurative inflammation of that vessel.*

A more frequent starting-point of this disease, however, will be found in an inflammatory and, perhaps, suppurative process involving some of the organs returning their venous blood to the portal vessels. Thus the cæcum in typhlitis or perityphlitis, disease of the vermiform process, ulcerative processes of the stomach, gall-bladder and hepatic ducts, have each given rise to a suppurative inflammation of the portal vein.

Morbid Anatomy.—The morbid changes in the walls of veins resulting from inflammation will vary according as the process commences in the inner or outer coats. When commencing in the inner coat, it will usually be the result of the pressure of a clot plugging the vessel. The lining membrane is then found thickened, opaque, rough, and adherent to the clot. When the inflammation commences from without, the sheath as well as the outer coat will have become much thickened. When suppuration takes place, the pus will infiltrate the loose tissues of the sheath, forming an abscess even without involving the coats of the vein. The pathological changes in pylephlebitis are strongly marked. The walls of the vessel are much thickened, appearing in some cases as hard cords. The capsule of Glisson is thickened, red, or infiltrated with pus. The lining membrane is opaque, gray in color, and much softened. From its thickened condition the vessel remains open when divided, failing to collapse, as do veins when in a normal condition. The diseased portion will usually be found filled with thin pus. Separating the diseased from the healthy portion of the vein, there will usually be found a firm clot closely adhering to the vessel walls. The destructive process may, in some places, completely destroy the outer walls of the vessel, and form small cavities filled with pus. In such cases the hepatic tissue may become involved in the suppurative process, resulting in abscesses of various sizes.

Symptoms.—The symptoms of pylephlebitis are often directly associated with those of the inducing cause, as perityphlitis, ulceration of vermiform process, gallstones, chronic peritonitis, etc. The com-

* Ziemssen's Cyclopaedia, vol. ix., pp. 807, 808.

mencement of the attack is usually attended by a chill, sometimes severe, with pain in some portion of the abdomen, usually referred to the starting-point of the disease. The abdomen soon becomes distended, hard and sensitive. Nausea and vomiting set in early, and continue through the course of the disease. The introductory chill is followed by hot fever and sweat, the fever, however, not disappearing as in an intermittent; the chill may be repeated daily, varying in intensity according to the gravity of the case. Great prostration and rapid exhaustion show themselves, the eyes become sunken, the skin jaundiced, the pulse small and rapid, the breathing hurried and short, the tongue dry and coated; both liver and spleen appear swollen and tender; the urine becomes scanty, and, as the disease progresses, it nearly ceases. Diarrhoea is usually present, and rapid emaciation accompanies the great prostration. Increased jaundice, clammy sweat, stupor or delirium, usually precede the fatal termination. The disease may run its course within ten days or two weeks, or it may last for several weeks; the more marked the pyæmic symptoms, the earlier death is likely to occur. Recovery is a rare exception.

Diagnosis.—The diagnosis of inflammation of superficial veins is easily made, having to be distinguished only from inflammation of the lymphatics and, perhaps, erysipelas. In the former case the lines of redness are finer, more numerous, and have a distribution corresponding to the course of the lymphatics rather than to that of the veins. In erysipelas the redness is evenly diffused over the surface, with well-defined margins. Both these conditions, however, may be associated with phlebitis, and the combination tends particularly towards pyæmia.

Diagnosis of inflammation of the largest veins, with the exception, perhaps, of the portal, is not so easily made. The deep position of the largest veins, and the fact that disease of these vessels is usually associated with disease of the adjoining tissues or organs, render the diagnosis difficult to be made. With the large trunks of the extremities, including the iliacs and subclavians, the difficulty is less. The tenderness, swelling and hardness along the course of the vessel will be the principal diagnostic signs.

In suppurative phlebitis of the portal vein, the disease may be taken for intermittent fever from the repeated chills followed by fever and sweat. They have, however, nothing else in common. The pain and tenderness of the abdomen, with the incomplete apyrexia, should lead to a correct diagnosis. Obstructions of the gall-ducts, either from gall-stones or catarrhal inflammation, may be mistaken for pylephlebitis. Here the absence of chill, and the great prostration and emaciation, with the accompanying jaundice, should protect from error in diagnosis. Abscess of the liver of an idiopathic origin might also be mistaken for this disease. The chill and fever, with enlargement and tenderness

of the organ, will be similar; they differ, however, in origin; and in simple abscess there will not be the prostration, diarrhœa, or emaciation which mark the pyæmic condition of suppurative phlebitis of the portal vein.

Treatment.—The great and all-important consideration in the treatment of inflammation of the veins of the extremities is rest and external support. The patient must be kept perfectly quiet in bed, and the limb elevated and carefully bandaged. Hot fomentations will not only be grateful and comfortable to the patient, but will aid materially in subduing the inflammation. Should abscesses form, they should be opened early, and poulticed both before and after opening. Any continued œdema will be best overcome by the use of an elastic bandage, which should be worn after getting on the feet until all tendency to swelling has disappeared. Inflammation of the vena cava, whenever present, will be so associated with some other disease, as abscesses, tumors, etc., within the chest or abdomen, that a diagnosis is nearly or quite impossible, and treatment can only be given to the primary disease.

In suppurative inflammation of the portal vein, Von Schueppel says, "We are entirely impotent as we can obtain no influence over the diseased process, nor can we prevent septic infection of the entire organism." We may hope, however, before the pyæmic condition has arisen, by the employment of a well-selected remedy, to subdue the inflammation, and thus arrest the progress of the disease.

Among those more likely to be indicated may be mentioned the following:

Aconite.—In the early stage, or later when there is much fever and restlessness.

Arnica.—When the trouble has been of a traumatic origin.

Arsenicum.—œdema of parts, tendency to renal dropsy or to gangrene, great prostration, symptoms of blood-poisoning. (Apis, China, Scaleg.)

Baptisia.—Typhoid symptoms, with dark, offensive stools, dry, sore tongue, dark and scanty urine. (Lach., Rhus, Bry.)

Hamamelis.—Veins enlarged and varicose, both externally and internally. (Puls., Merc.)

Hepar.—Tendency to formation of abscesses.

Symptoms may also call for Lyc., Nux. v., Sulph., Calc. carb., Phos.

DEGENERATION.

Atheroma.—A degenerative process, occurring frequently in arteries, probably never occurs in veins. Calcareous deposits are, however, not infrequently found in the walls of veins, more especially of those involved in varicose enlargement. The deposits occur in plates beneath the lining membrane, thinner than those found in arteries, but of the same composition. Dr. James Kitchen* reports a remarkable

* Am. Journal of Hom. Mat. Med.

case of calcification of the veins of the omentum, where the process was so complete that the whole omentum was stiff and rigid. The great venous trunks are peculiarly exempt from this change.

PHLEBOLITES.

Remarkable concretions are sometimes found within veins, about the neck of the bladder, or in other veins with varicose enlargements, as well as occasionally in the veins of the lungs and spleen. These bodies are whitish in color, rounded in form, chalky in composition, and composed of concentric layers similar to urinary calculi. The origin of these bodies is not well understood. It is generally considered, however, that they originate from a small blood-clot, which, shrinking into a firm mass, forms a nucleus around which calcareous matter becomes deposited. They may vary in size from a pea, and smaller, to a large bean. They seldom give serious trouble.

VARICOSIS.

One of the most common pathological conditions of veins, is that known as *varicosis*, consisting in an increase of diameter, length, and thickness of the walls, and more frequently involving the superficial vessels of the lower extremities, giving them, from the irregularity of the dilatation, a knotted appearance. It is more particularly the portion of the walls above the valves that becomes dilated and generally much thinned, although their outer coat may be much thickened.

As already intimated, varicose veins are more common in the lower extremities; they not infrequently appear in the spermatic cord, inducing varicocele, or in the veins of the rectum, giving rise to hæmorrhoids. They have also been found in the veins of the neck and upper extremities, and even in those of the œsophagus and stomach. The veins at the base of the bladder are, at times, involved, as may be those of the vulva of the female in pregnancy.

Causes.—The causes of varicose veins may be found :

1st. In some impediment to the ready flow of the blood through the heart or lungs, retarding the return of the blood from the veins, and thus increasing pressure upon their walls.

2d. From pressure upon large trunks of the veins themselves, as from a truss at the groin, a tight garter around the leg, a gravid uterus, pressure of a tumor, an over-distended rectum, or employment requiring prolonged standing. All these conditions, tending to increase the blood-pressure within the veins, are calculated to promote the formation of varicose veins.

The morbid changes taking place in varicose veins are gradual and progressive. At first, a simple dilatation and thinning of the walls. Soon, however, the walls, and particularly the middle coat, will become thickened as well as the connective tissues around the vessel;

the veins thus become larger, harder, and more tortuous than normal. The valves become thickened, and the veins more dilated immediately above, thus acquiring a knotted appearance. After long continuance, the vessel may become more superficial by absorption of covering tissues; the vitality of the skin becomes impaired, and an ulcer appears, or, perhaps, rupture of the vein takes place, followed by serious, or even fatal, hæmorrhage. Clots may form as a result of the sluggish flow of blood, these being either swept on to the heart, and then to the lungs, or, remaining permanently at the point of formation, induce inflammation of the lining of the vessel, or shrink into a firm semi-organized mass, or, perhaps, form the nucleus of a phlebolite.

Treatment.—The treatment of varicosis includes:

1st. The removal of the cause, when that is possible.

2d. The maintenance of a horizontal position.

3d. External support by bandage or elastic stocking, when the veins of the legs are involved, and a suspensory bandage in varicocele.

4th. Obliteration of the vessel by surgical operation. The several methods for accomplishing this end include the application of caustics over the vessel, galvanic puncture, injection of perchloride of iron, subcutaneous division, and acupressure. All of these operations, however, are attended with more or less danger of being followed by phlebitis, and perhaps thrombosis, while none of them are certain of being followed by a radical cure.

5th. Medical treatment. The remedies which have been found most useful in varicosis are as follows:

Hamamelis.—Dr. Hughes says “In the various forms of varicosis this is the prince of remedies.” It seldom fails to benefit, even if a cure is not effected. While the remedy is used internally, the tincture, diluted with water, may be applied externally. The special symptoms calling for its use are: veins dilated, sore, and with a distended forcing feeling in the varices.

Arsenicum.—Where the veins are of a livid red color, and attended with severe burning pain.

Belladonna.—Erysipelatous inflammation along the course of the veins. (Rhus tox., Puls.)

Arnica.—When the patient has to be much on his feet, or when the trouble is of a traumatic origin.

The following remedies may be found useful in some cases: Aconite, *Æsculus hip.*, Ambra, Calcarea carb., China, Graphites, Hepar, Kreasotum, Lachesis, Nux vom., Sepia, Sulphur, Zincum.

THROMBOSIS AND EMBOLISM.

An important pathological condition, associated with both arteries and veins, is that of thrombosis and embolism. By the former term is understood the formation of a clot in some portion of the vascular system, while embolism signifies the transference of this clot, or some portion of it, by the current of blood to some smaller vessel, blocking

up the same. Thrombosis, or the formation of clots, may take place in the heart, arteries, veins, or capillaries. Embolism, or the lodgment of a clot swept from its point of formation, may occur in any portion of the arterial system, more frequently in the arteries of the brain or extremities. While in the venous system, emboli are more liable to lodge in some of the branches of the portal vein, or of the pulmonary artery into which, in the latter case, they have been carried from the right or venous side of the heart.

Thrombosis of the heart will be found fully considered in the chapter on diseases of that organ. Capillary thrombosis plays an important part in the pathology of the lungs, kidneys, liver, and other organs, and usually tends towards the formation of hæmorrhagic infarctions, or of small abscesses.

Causes of Thrombosis.—The most potent causes of thrombosis are undoubtedly found, 1st, in disturbance in the circulation of the blood itself; and 2d, in altered conditions of the lining membrane of the vessels.

Any cause tending to retard the circulation in either the arteries or veins is favorable to the formation of a thrombus. Venous circulation being always more sluggish than arterial, the tendency is greater for their formations in veins than in arteries. The impeded circulation in varicose veins often induces thrombosis. Wounds of veins, arterial pressure, general feebleness of circulation, and syncope, may all tend to promote the formation of a thrombus. Inflammation or degeneration, particularly the calcareous form, either in arteries or veins, by producing a roughened condition of the lining membrane, favors thrombosis. Again, an embolus carried to and lodged in a vessel, may become a starting-point for the formation of a new and large thrombus. Inflammation of veins is sometimes, no doubt, a cause of thrombosis, yet more frequently thrombosis will bear the relation of cause rather than that of effect to phlebitis, inflammation resulting from pressure and irritation of the clot.

Thrombi are found more frequently in the veins of the legs and pelvis, where the venous circulation is opposed by the force of gravity, and where varicosis or dilated veins add to the impeded circulation. The portal vein is another frequent seat of thrombosis, the peculiarity of the circulation through the liver, with the numerous diseases of organs from which the portal veins spring, favoring this condition.

Emboli in the arterial system will be found to have arisen from the left side of the heart in the vast majority of cases. Endocardial inflammation inducing lymph deposits upon the ventricular walls, these may become detached and swept into the aorta with the current of blood, ultimately lodging in some of its branches, frequently reaching the brain, or perhaps some of the more distant organs or part of the body. Not only fibrinous clots may thus form an embolus, but small

fragments of calcareous matter may become detached from the surface of degenerated arteries, or fragments of broken-down tissue from a sloughing wound or abscess may enter the general circulation, and thus form the substance of an embolus.

Symptoms and Results.—The symptoms of embolism or thrombosis are very similar, if not identical. In both cases the symptoms result from *obstructed circulation*. When the obstruction is in an artery, function and nutrition will be suddenly impaired, and even death of the part from gangrene may supervene. Embolism or thrombosis of veins, when in the limbs, will be accompanied with œdema and tendency to the formation of abscesses. Pain at the seat of the obstruction is usually present in all cases accompanied by tenderness upon pressure. Obstruction of arteries is usually more sudden in its appearance than in veins, and the symptoms are more severe. In most cases, when an obstruction has been diagnosticated, it is difficult to determine whether the obstruction is an embolus or a thrombus. If an embolus, there should be detected in some other organ or point evidence of a thrombus or diseased vessel from which the obstruction might have been carried.

Embolism or thrombosis of the vessels of different organs will induce very different symptoms and results. Mention should therefore be made of the results of obstruction of different vessels.

OBSTRUCTION OF VESSELS OF THE BRAIN.

The arteries of the brain are more liable to become obstructed than the veins, and the obstructing plug will, in the majority of cases, be an embolus swept from the heart. Thus, both acute and chronic valvular or endocardial disease are liable to induce embolism of the brain. A vegetation from a valve, a mass of fibrin or lymph, a scale of calcareous matter, may at any time become detached and carried into the aorta, and thus through the carotids into the brain. Thrombosis of any artery of the brain may occasionally occur, yet the middle cerebral, from its more direct line with the internal carotid, will more frequently be the vessel involved.

The symptoms of obstruction of the vessels of the brain are sudden and alarming in their character. They may simulate apoplexy, epilepsy, or syncope. The symptoms may be slight or severe, according to the size of the vessel obstructed. Immediate death is not so liable to occur as in apoplexy. A degree of paralysis may follow the seizure, and congestion of some portions of the brain, anæmia of others, followed by softening, are liable to supervene.

OBSTRUCTION OF THE PULMONARY ARTERIES.

The symptoms of obstruction of these vessels will be a "sudden embarrassment of respiration, great dyspnœa with coldness, pallor and

clamminess of the skin, pallor and lividity of face; feebleness, rapidity and irregularity of the pulse, followed by death, sometimes after an interval of several days, sometimes quite suddenly."*

These obstructions are usually embolic in their origin, and may have arisen from almost any point of the venous system, or from the right ventricle itself. From necessity, clots forming in any of the systemic veins must find their way finally to the heart, and from there into the pulmonary arteries. If death do not immediately result, pulmonary apoplexy may follow, or inflammation of a considerable portion of the lung supervene.

OBSTRUCTION OF VESSELS OF THE EXTREMITIES.

When in the arteries, these obstructions are nearly always embolic, the clot having arisen at the heart or at some other point. Occasionally they may arise from a disease of the artery at the point of the obstruction. Sudden acute pain at the point of obstruction, loss of pulsation below, with falling of temperature and pallor of the surface of the limb, will immediately follow the blocking up of the vessel, while later, numbness, loss of vitality, and even gangrene, may follow.

Embolism of the veins of the leg occurs less frequently than of the arteries. Clots may form, and they may occasionally become lodged at another point, but the venous blood flowing from smaller to larger branches, any floating masses are more liable to be carried to the heart and from there to the lungs, producing embolism of the pulmonary artery.

The results of embolism of the veins or arteries will vary according to the nature or source of the embolus. Arterial emboli will usually have arisen from the heart, and be composed of firm fibrinous matter slowly undergoing change. Venous emboli, on the other hand, are more frequently from some suppurating surface, and serve to convey septic matter to the organ in which they become lodged, giving rise to abscesses in the same, and to general pyæmic symptoms. The liver and lungs are notably exposed to the danger of abscesses from this source.

Treatment.—The treatment of thrombosis or embolism will vary according to the seat of the trouble and severity of the symptoms. No specific rules or remedies can be given for all cases. When of the brain, the treatment will be much the same as in apoplexy. Quiet, freedom from all excitement, noise and from stimulation will be of great importance. When in the liver or lungs, and accompanied with pyæmic symptoms, alcoholic stimulation may be of great importance. When in the extremities, elevation of the limb and the application of artificial heat will tend to promote the collateral circulation and pre-

* John Syer Bristowe, M.D., *Reynold's System of Medicine*, vol. ii., page 896.

serve the vitality of the part. Where gangrene supervenes, amputation may become a necessity. Gangrenous surfaces should be dressed with antiseptic poultices of charcoal, or flaxseed meal mixed with a solution of carbolic acid or "Platt's chlorides." When abscesses form, they should be opened. Abscesses forming in the liver, and clearly recognized, may be advantageously aspirated.

The system should be sustained by milk, animal broths, beef-tea, and, in some cases, by brandy.

The symptoms, both subjective and objective, may call for a large number of remedies. At the commencement of an attack, indications will be likely to be found for: Aconite, Arnica, Arsenicum, Belladonna, Bryonia, Camphor, Gelsemium, or Veratrum viride.

Later in the course of the disease, we may consult: Arsenicum iodat., Apis, Carbo veg., Digitalis, Hepar, Lachesis, Mercurius, Nux vom., Rhus tox., Phosphorus, Secale, Sepia, Sulphur.

For obstruction of vessels of the brain: Aconite, Arnica, Belladonna, Hyoscyamus, Lachesis, Opium, Pulsatilla, Stramonium.

For obstruction in the portal vein: Aconite, Arsenicum, Belladonna, Digitalis, Hepar, Mercurius, Nux vomica, Phosphorus.

For obstruction of vessels of the lungs: Aconite, Arsenicum, Calcarea carb., Belladonna, Bryonia, Digitalis, Hepar, Lachesis, Laurocerasus, Phosphorus, Rhus tox., Spigelia, Veratrum alb.

For vessels of extremities: Aconite, Arnica, Apis, Belladonna, Carbo veg., Hamamelis, Hepar, Lachesis, Mercurius, Rhus tox., Secale.

Indications for many other remedies may be found in diseases of the veins, embolism, and thrombosis. In all cases careful study of symptoms and comparison of remedies should be made, while the hygienic, mechanical, and surgical treatment should each receive due attention.

DISEASES OF THE ORGANS OF DIGESTION.

A. DISEASES OF THE MOUTH.

DISEASES OF THE GUMS.

BY CLARENCE M. CONANT, M.D.

GUM-BOILS.

Synonyms.—Parulis, Alveolar abscess.

Definition.—A circumscribed phlegmonous inflammation of the external side of the fibrous gum-tissue, and also of the dental and alveolar periosteum.

Ætiology.—The gum-boil arises in almost every case from a decayed tooth, and is really a sequel of dental caries. It may also be seen on a large scale as a secondary affection of scurvy, and not unfrequently follows the abuse of certain drugs, as mercury, phosphorus, etc.

Pathology.—When a tooth becomes carious, the dental pulp usually becomes inflamed, and *always* so when the cavity in the tooth extends into, and communicates with, the pulp. This inflammation is sometimes averted by a formation of secondary dentine within the pulp-cavity opposite the external caries, so that when the destructive process reaches the pulp-cavity, it is yet shut off from that sensitive substance by the adventitious formation of dentine. The pulp once inflamed, the trouble rapidly extends to the periosteum covering the root of the tooth, and to the alveolar process of the jaw. In rare cases the periosteal lining of the body of the jaw is attacked, producing a chronic periostitis. The fibrous and mucous tissues of the jaw form a circumscribed swelling, which suppurates, bursts, and discharges through an opening in its mucous covering, or rarely through an orifice in the adjacent integument, forming a fistula dentalis.

Symptomatology.—The symptoms of a gum-boil are heat, redness, swelling, and a throbbing-drawing pain felt in any other abscess. The inflammation develops suppuration in a few days, and after discharging freely, shrinks up and heals over speedily. Gastric disorders and constipation not unfrequently, especially in young children, appear as concomitants.

Diagnosis.—Gum-boil might be mistaken for epulis, but its severe pain, tenderness, and redness serve as distinguishing features. An incipient wisdom-tooth has been taken for a gum-boil; but the position of the swelling serves to differentiate, the tooth pushing through

the upper surface of the gum, while the boil affects its lateral surface, and is usually located near its base.

Treatment.—Whatever tends to preserve the textural integrity of the teeth tends to prevent the formation of alveolar abscess. Hence, the teeth should be kept clean, and the accumulation of tartar removed from time to time; the correction of an acid stomach by the indicated remedy is also advisable. When a tooth is carious, it should be either filled or removed.

The diet should consist of milk, meat-broths (especially beef-tea), and gruels. Oatmeal gruel, acting as a gentle laxative, and being nutritious, may be added to the list. The mouth, especially before eating, should be thoroughly rinsed with hot water, which may contain a small percentage of Condly's fluid, or a solution of chlorides, while the abscess is discharging.

Therapeutics.—**Mercurius.**—Aching and throbbing pain in, and swelling of, the gum, which is painful to the touch. Fœtid odor from the mouth. Salivation. Constitutional tendency to gum-boils.

Hepar sulph.—Soft swelling of the gum, with great tenderness to touch; throbbing pain; the swelling softens, but does not open.

Silicea.—Swelling of the alveolar (?) periostem. Gums very sore and inflamed. Discharge of offensive matter from openings near the roots of the teeth or from the gums. The abscess heals slowly.

Compare also: Aconite, Belladonna, Calcarea carb., Hydrastis, Phosphorus, Staphisagria, Sulphur.

An old-fashioned fig-poultice, or even a fig roasted, and put on the swelling as hot as it can be borne, will often relieve the pain and hasten the issue. Should suppuration delay, it may be hastened by any poultice prepared, that of linseed-meal being chiefly recommended. Should the swelling fluctuate and not open, it should be lanced deep and low, without delay. Otherwise the pus may burrow, forming sinuses and fistulous openings in the cheek, or even necrosis of the jaw.

EPULIS.

Synonyms.—French, *Épulide*; German and Latin, *Epulis*.

Definition.—A smooth, hard, or semi-elastic, rounded or lobulated tumor, usually painless, arising from the gum. The causes which give rise to this growth are not known.

Pathology.—Many authorities regard epulis as a benign fibroid or fibro-plastic growth, which rarely becomes malignant. Careful observation, however, while establishing the harmless nature of this growth in its early stage, proves also the danger of neglecting it; if allowed to develop, it may ultimately burst through the covering mucous membrane, and exhibit many of the characteristics of a malignant ulceration.

The histological elements differ widely in different cases. Round and spindle cells, and giant cells in great numbers, are found in vary-

ing specimens. Osseous trabeculæ are also seen extending down into the subjacent bone, binding the tumor to it.

Symptomatology.—Epulis arises from the alveolar periosteum of the *lower* jaw, usually, and appears on the side of the gum or between two teeth, as a small, hard, painless swelling. It grows slowly in most cases, and gradually loosens and pushes up and out the adjacent teeth, the growth assuming the form of a round or, more often, lobulated, semi-elastic tumor. This tumor is painless, does not bleed easily, and, if pedunculated, may be readily raised with the forceps, and freely inspected. The protuberances now become bared of their mucous covering, are of a red color, and gradually assume a malignant ulceration, when the term myeloid epulis is applied to the growth.

Authors mention the following varieties, which, practically, are different stages of one pathological process: (a) the simple fibro-plastic tumor; (b) round-celled sarcoma; (c) the myeloid tumor.

Diagnosis.—An incipient wisdom-tooth might simulate an epulis but that the hardness and pain stand in reverse order; an epulis is hardest when painless, and rarely appears on the posterior aspect of the gum.

Treatment.—The treatment is chiefly surgical. The tumor must be removed, and with it, the bone traversed by the osseous trabeculæ; at least, the bone should be thoroughly scraped to avoid prompt recurrence of the growth.

The remedies to be consulted are: Natrum muriat., Calcareæ carbon., Silicea, Thuja.

FUNGOID TUMORS OF THE GUMS.

Fungoid tumors of the gums (encephaloid cancer) are very rare. They are readily recognized by their characteristic fungoid appearance, profuse and readily excited bleeding, and rapid growth. As the cancerous cachexia is well marked in this form of cancer, the diagnosis is still more readily made.

For *treatment*, compare hints given under cancerous affections in other sections.

SALIVARY FISTULA.

Definition.—An abnormal orifice in Steno's duct, leading to a discharge of the secretion of the parotid gland upon the face instead of into the mouth.

Ætiology.—A salivary fistula is caused by the division of Steno's duct during an operation, or by the formation of an abscess in or about the duct, breaking outwardly.

Symptoms.—An orifice is seen in the cheek from which saliva runs down over the face.

Treatment.—The treatment is purely surgical. Through that part

of the duct remaining with the gland, a probe, wire, or catgut is passed into the gland from the mouth. Or, should the duct be merely severed and the natural orifice not be obliterated, that orifice should be sought and the probe passed through it so as to unite the two parts of the duct. The edges of the fistulous opening on the cheek are now freshened and brought together, and retained in place by sutures until the healing process is well established. The treatment of salivary fistula always requires considerable time and patience, and a depressed scar is left at the seat of the fistula.

DENTAL FISTULA.

A tube or pipe leading from the root of a tooth, opening into the mouth or on the face, discharging through its hard callous edges a pus-like, ichorous fluid. It results from a gum-boil, and from a dental and alveolar periostitis and caries. It does not heal spontaneously, and is differentiated from a salivary fistula by the nature of the discharge proceeding from it, consisting of pus, ichor, or blood, but never containing saliva. The treatment is largely surgical, but the following remedies may be exhibited with excellent results.

Causticum.—Tedious suppuration of the gums.

Silicea.—Discharge of offensive matter from openings near the roots of the teeth.

Calcareo carb.—The lower jaw is affected.

Consult: *Askalabotes, Ratanhia, Sulphur.*

THE MORE COMMON AFFECTIONS OF THE TEETH.

BY CLARENCE M. CONANT, M.D.

ODONTALGIA—TOOTHACHE.

First and chiefly, toothache is a sign of decayed or of decaying teeth. The pulp and the periosteum covering the roots of the teeth are liable to become inflamed, giving rise to excruciating toothache. Dental periostitis is common in syphilitic subjects and in persons who have taken too much mercury or iodide of potassium. In some instances the formation of secondary dentine, or dental exostoses, takes place, and occasions severe pain. Some authorities mention a rheumatic inflammation of the fibrous gum-tissue as a cause of odontalgia, but the existence of such an inflammation has never been positively demonstrated, and is doubted by many.

The *pathology* of toothache is mostly identical with that of dental caries, which process is practically a chemical process. Bone caries is always preceded by inflammation, and the toothache arising from dental caries is a sign that the destruction of the tooth-substance is already far advanced. Dental caries is a progressive and gradual dis-

integration of the teeth in which the lime salts are first absorbed, the organic matter soon likewise disappearing. An acid condition of the stomach, mouth, or system in general, seems to favor this process.

Inflammation of the periosteum often follows caries, and extends to the pulp of the tooth unless headed off by the formation of secondary dentine, which in itself may give rise to severe toothache. We now have redness and painful swelling of the gum, pain in the tooth, and frequently destruction of the entire tooth.

Two kinds of exostoses are found on and near the teeth: The first, a true exostosis or osteoma, which is a bony tissue produced by inflammatory action, and found in small nodes on the roots of the teeth, sometimes in such profusion as to give the root the appearance of general enlargement, causing much pain by pressure upon contiguous tissues, and offering a very serious obstacle to the extraction of the tooth. These osteoma are often seen. Not so with a very rare dental exostosis, called by Virchow the *odontoma*. These are small tumors of dentine and enamel, arising from undeveloped teeth left in the alveoli.

Symptomatology.—Pain in a single tooth, or in a whole row of teeth, sometimes extending through the jaws into the ears and about the eyes, and even into the head and neck. The pain is sometimes continuous, but more often paroxysmal. It is of a dull or hard aching, or of a sharp, lancinating, darting (“jumping toothache”) character.

Diagnosis.—When pain occurs as located above, and the teeth are found tender and carious, the diagnosis is certain. But should the teeth be sound, and the pain periodic and not limited to a well-defined area, facial neuralgia may be suspected. Pains in the teeth occur not infrequently with affections of the ear, but the soundness of the teeth and the symptoms obtained by a careful examination of the ear are sure to establish the diagnosis.

Treatment.—The teeth should be brushed always, after eating, with cold water and a *soft* dentrifice, to secure absolute cleanliness; no tooth-powder should contain charcoal or other hard particles, as these scratch the enamel and lead to caries. After swallowing acid foods, drink, or medicine, the mouth should be well rinsed with cold water. So soon as any caries of the teeth is detected, it should be carefully cut away, and the cavity filled with gold, or the tooth should be extracted. To attain this result, persons with presumably sound teeth should have them examined three or four times a year by a competent dentist.

Therapeutics.—*Antimonium crudum.*—Boring, digging, tearing, jerking pains in hollow teeth, sometimes penetrating into the head and nose, in the evening, in bed, after eating, and from taking cold water into the mouth; touching the tooth with the tongue causes pain as if the nerve were torn. Better when walking in open air

Arnica.—Bleeding after the extraction of teeth. Pain and swelling from wearing false teeth, or after filing out, filling, etc. Throbbing toothache.

Arsenicum.—Very debilitating toothache. Jerking, tearing, burning pains, referred to the gums. Worse when touched, when lying on the painful side, when at rest, and from cold; better from warm applications, or when exposed to the heat of the stove, or when sitting up in bed. The teeth feel too long, and are loose.

Belladonna.—Toothache in women and children. Toothache after eating, not during eating. Right upper teeth ache all night. Pain extends into the ear. Great restlessness, nervousness, excitability, with running about and crying.

Carbo vegetabilis.—Teeth decay rapidly. Drawing-tearing toothache, worse when touched by the tongue, and after eating. Molars and incisors are affected. Teeth loose and ulcerated.

Chamomilla.—Stitching, digging, gnawing toothache in children and in women before menstruation, as if from taking cold. Pain worse during and after eating warm food, especially from drinking coffee; worse at night. Left-sided and in the lower jaw; but often no particular tooth can be pointed out as aching.

Cinchona.—Toothache in nursing women while the infant is at the breast. Throbbing, tearing, jerking, or drawing toothache, with great pressure. Periodical toothache, during the sweat.

Coffea.—Most severe and agonizing stinging, jerking, intermittent toothache, worse while chewing, from warm drink, and at night. Relieved for a time by ice or ice-cold water held in the mouth.

Glonoin.—After taking cold from overheating; pulsating throbbing pains like a pulse in the teeth, or a drawing pain. Sudden waves of spontaneous aggravation in the right, and then left, side of the whole head, jaw, and ear.

Hamamelis.—Passive, dark fluid hæmorrhage from the gums after the extraction of teeth. Toothache in sound (?) teeth, worse in a warm room.

Kreasotum.—Bad odor from, and much drawing aching pain in, carious teeth, extending to face, temples, and ears. Milk-teeth decay and ache so soon as they appear. (Staph.)

Magnesia carb.—Ailments from cutting, and slow eruption of (all teeth), wisdom teeth especially. Toothache worse at night; it drives one out of bed (also Magn. phos.). Toothache of pregnant women.

Mercurius.—Pulsating toothache at night, in the evening in damp weather, in children; from caries, or when the dentine is inflamed. Tearing, lacerating, drawing, stinging pains, which affect the whole jaw and side of the face, and extend into the ears. Worse from the heat of the bed, and from both warm and cold things, but better from rubbing the cheek. Teeth loose, gums swollen, ulcerated, and retracted from the teeth.

Nux moschata.—Toothache in children and women during pregnancy. Front teeth especially. Stinging-tearing pains, worse in cold damp weather, and from washing, touching, or sucking the teeth. Better from application of warmth. First right side, and then left.

Nux vom.—Men who use tobacco, coffee, and ardent spirits freely. Stinging in decayed teeth; burning, stinging in a whole row of teeth; worse from cold things, also coffee, wine; better from warm drinks, and from exercise, physical or mental.

Pulsatilla.—Fretful women and children. Drawing, throbbing, jerking toothache, with headache and earache, usually one side (left?); worse at night, from picking teeth, in a warm room or bed; when eating, but not from chewing; from cold water, or warm food or drink, during pregnancy, and in women suffering from amenorrhœa. Better when walking in the open air.

Sanguinaria.—Toothache from picking the teeth (also Puls.), and in hollow teeth when touched by food.

Staphisagria.—Easy and early decay of all the teeth; they are black, crumbling, and carious. Gnawing, drawing, tearing in the roots of decayed teeth, affecting a whole row, and shooting into ear and temples. Worse from cold drinks, in the open air, while eating, and from touch, but not from biting on them, and during the night or towards morning.

Compare also :

Aconitum.—When caused by exposure to cold, dry wind. The pain is agonizing, and is accompanied by feverish action, with rush of blood to the head. Useful in children, and when *Coffea* has failed. When it fails, give *Belladonna* or *Chamomilla*.

Bryonia.—The teeth are apparently sound. The pains extend to the head, cheeks, and neck, especially while eating.

Calcarea carb.—During pregnancy and menstruation. Worse from cold draught of air.

Causticum.—Stinging throbbing toothache from inhaling cold air. In the left side of the face, especially when lying upon it.

Cepa.—Characteristic catarrhal affections. First left, then right side.

Coca.—Said to prevent and to arrest caries.

Ignatia.—Resembles *Nux vom.*, and often relieves when *Nux* fails.

Lachesis.—Pain referred to the gums, although the teeth are decayed and break away. During damp weather. After the abuse of *Mercury*.

Mexereum.—Teeth sensitive to cold air and touch with the tongue. Sudden paroxysms of pain, affecting the whole (left side) of the head, especially the temples and facial bones.

Plantago.—Caries of teeth, with left-sided shooting pain. Red face. Worse from walking in the cold air and from contact.

Phosphorus.—The teeth are black, and decay easily. Brought on by having the hands in warm water. (*Sepia*.)

Sepia.—Toothache brought on by having the hands in warm or cold water. Characteristic disturbances in women.

Sulphur.—Tearing toothache on the left side. Worse in the open air or from the slightest draught; at night, from heat in bed, from washing with cold water.

Consult *Ammon. carb.*, *Apis*, *Clematis*, *Dulcamara*, *Hyoscyamus*, *Kali carb.*, *Magnesia phosph.*, *Natrum sulph.*, *Petroleum*, *Plumbum*, *Rhus tox.*, *Sabadilla*, *Silicea*, *Spigelia*, *Thuja*, *Zincum*.

Dentists frequently have resort to the application of a mixture of the tincture of iodine and carbolic acid by means of a pledget of cotton saturated with the mixture, introduced into the cavity of the tooth; the cavity is then filled with cotton, and the whole covered with a resinous mixture which protects the diseased structures from coming into contact with saliva or air. This treatment usually gives prompt relief. In unmanageable cases, when dentists are convinced of the wisdom and of their ability to save the tooth, *Aconite* or *Morphine* are used in the same manner.

SWELLED FACE.

A non-specific swelling of one or both cheeks frequently accompanies or follows toothache. It is usually hard and pale, but sometimes it becomes red and erysipelatous. It is pretty sure to disappear of its own accord within a few days, but in exceptional cases may terminate in an abscess.

The following remedies prove useful:

Arnica.—Swelling is hard, stiff, sensitive, and pale; rarely red and hot.

Belladonna.—Swelling hot, red, erysipelatous.

Chamomilla.—Great fretfulness; swelling hard, hot, and red; almost as marked as in *belladonna*.

Hepar.—When the swelling begins to soften, but does not actually suppurate, or the suppuration is very profuse. After Lachesis.

Lachesis.—Deep mahogany-red erysipelatous swelling of the (left) cheek. Intercurrently with Hepar.

Mercurius.—Hot, red swelling, like erysipelas. After Lachesis.

Pulsatilla.—When Chamomilla or Mercurius were taken for the toothache.

Sulphur.—When Arsenic, Belladonna, or Bryonia were given for the toothache. Mostly pale swelling, sometimes erysipelatous.

DENTITION.

Synonyms.—Teething; (German) Zahnen; (French) Troubles de la dentition.

Definition.—Physiologically speaking, dentition is the process of development of the temporary teeth from the already ossified dental sacs, and their eruption through the gums. As this development and eruption is often attended by various morbid phenomena, the term has attained a significance almost pathological, and the abnormalities observed coincident with this process are in most text-books considered under the title "dentition."

Ætiology.—Of the more remote but absolute causes which give rise to diseases during dentition we have little positive knowledge, although many surmises and ingenious theories are offered. A pure-blooded, vigorous child will cut the whole twenty milk-teeth without the occurrence of an abnormal symptom, save, perhaps, a slight elevation of temperature and some nightly restlessness.

The important changes which take place at this age in almost every part of the organism, necessitating a state of marvellous activity, hence excitability, deserve careful consideration. The brain is developing more rapidly than at any other period of life. Its convolutions are increasing in number and in size; the sulci are growing correspondingly deeper; the brain substance itself is assuming more density and firmness, and the distinction between its gray and white matter becomes more marked, while the yellow substance which served as a boundary line between them is rapidly disappearing. In the intestinal canal the follicular apparatus is undergoing a similarly marked and rapid development. Leaving out of consideration the wonderful functional activity of the brain, the constant exercise of every faculty of the infant, we cannot be surprised that both the brain and the bowels are easily irritated, thrown out of balance, and a morbid process set up by a seemingly slight provocation.

Among the direct exciting causes of codentitional diseases, inappropriate clothing and improper food stand prominent. Already made sensitive to atmospheric changes by the particularly rapid changes going on in almost every direction, the young infant is constantly exposed to danger from taking cold by the folly of parents who think more of elegance of the baby's wardrobe than of its proper and legitimate object. Dressed in light fabrics during the hot days of the

warm season, it is exposed to the cool air of evening without being provided with additional clothing, and intelligent care is rarely taken to dress the child in accordance with the needs of the hour rather than with the customary dress of the season. The result is easily apprehended, and a series of slight catarrhal affections, often so insignificant as to attract little, if any, attention, leads the way to a feverish condition which, during the process of teething, is sure to become an important factor in the development of grave ailments.

There exists also constant danger of committing errors in feeding the infant which, in view of the sensitiveness of the digestive apparatus at this time, must necessarily lead to those disorders of digestion which so often form serious and unmanageable complications of "dentition," and which are fully described at another place.

Pathology.—The pathology of the various affections which may occur during dentition is not essentially different from that peculiar to them at other times, and as treated elsewhere in this work. The gums, however, present interesting and characteristic changes. They swell, become tense and shiny, red, purple, even almost black in color; if this exceedingly dark appearance continues for some length of time, and the eruption of the teeth does not take place, the inflamed gum undergoes a retrograde metamorphosis and becomes dense, hard, whitish, or yellow-white, almost like cartilage. Sometimes the gums become very hot, swollen, and extremely sensitive, the tooth presents a single point or corner through the gum, the edges of which ulcerate and slough; this condition has been styled *odontitis infantum*.

Symptomatology.—A little swelling of the gums, some fever, fretfulness and restlessness at night, mark the progress of a normal dentition, each tooth in its development occasioning a manifestation of such phenomena lasting about three days and nights. The symptoms of the various abnormalities of dentition will not vary for the most part from those signs observed at other times, save that the fever of dentition is extraordinarily irregular, now higher, now lower, without any periodicity or apparent cause. If there be any characteristic, it is a high early morning temperature, say 104° or 105° by eight o'clock A.M.

Normally, dentition should begin not before the fourth month nor later than the seventh, and should be completed during the first month of the third year. But it has been remarked that tuberculous and syphilitic children cut their teeth early, while in rickety infants the teeth are slow to appear.

The following abnormalities are those chiefly observed coincident with teething: Nervous irritation, involving insomnia; febrile states; intestinal catarrh; constipation; bronchial catarrh; skin affections, especially eczema; eclampsia; retarded or difficult dentition; tubercular meningitis.

Diagnosis.—The diagnosis of the various complications arising during dentition depends upon the prompt recognition of their diagnostic symptoms, which are fully described under the various chapters to which they properly belong. Grave cerebral disturbances are likely to arise at this time, and the occurrence of any brain-symptom during dentition must ever excite our anxious apprehension; and it behooves the physician, especially in the case of scrofulous infants, with large heads and open fontanelles, to be on his guard and to watch closely for the first symptom indicating danger from this source.

Prognosis.—The prognosis in diseases which are connected with dentition, aside from their termination when appearing at any other time, depends largely upon the vitality of the child, the intelligence of the parents or nurses, the cleanliness and healthfulness of surroundings, upon the ease with which teething progresses, and, above all, upon the diathesis of the patient. If the child is markedly scrofulous or syphilitic, or gives evidence of a tubercular diathesis, conditions which in the healthy infant would not indicate especial danger would so complicate the case that the prognosis must of necessity be guarded, and, perhaps, decidedly unfavorable.

Treatment.—Careful attention to regimen is of the greatest importance. The baby, before being fed heartily, should have a morning bath in tepid water, followed by gentle yet brisk friction. The mouth and gums, after nursing or feeding, should be carefully wiped with a soft cloth dipped in cold water. In warm weather the child should live out of doors, playing, eating, and sleeping out of doors, avoiding only exposure to inclement weather and to the extreme heat of the sun. An abundance of sleep should be had, and due pains taken to secure it. Close attention to dress will amply repay for the trouble taken by lessening the dangers arising from colds. The feet and bowels should be particularly well covered when a tendency to diarrhoea shows itself; during the cold season of the year the children of the poor are habitually neglected, and thin and short stockings, bare and cold legs, damp napkins, and an unprotected abdomen only too often occasion long and stubborn sickness, and during the period of teething cause serious illness when, with proper attention to these details of dress, the entire process would have been completed without difficulty. During the heated term, when severe diarrhoea so constantly occurs in teething children, the importance of passive motion from riding in a baby-carriage, or on a steamboat, anywhere in the open air, cannot be overestimated. No matter how ill the little patient, if properly dressed and comfortably placed in the carriage, nothing but good will come from taking the child into the open air as soon as bathed and dressed, and keeping it in passive motion throughout the day; children, apparently ill beyond the hope of recovery, revive perceptibly when thus treated; the intense restlessness is

greatly lessened, the condition of the bowels usually improves, and a general and permanent change for the better is almost always observed.

Nervous and sleepless children should be given absolute quiet of surroundings, and their nurses should carefully abstain from worrying and fretting. No loud noises should be tolerated; the prevalent belief that babies do not mind noise is a great mistake. When feverish, the little one should have, off and on, small quantities of cold drink, preferably water, unless great gastric or intestinal irritation exists, which is aggravated from taking cold drink. When diarrhœa exists, the greatest pains must be taken to furnish the best of food—that is, the food best borne. If breast-milk cannot be had, Imperial Granum, Mellin's Food, some good brand of condensed milk, or any of the various preparations likely to be thought of at such a time, may be employed, always provided that it agrees; if it does, no change should be made. Solid food is not to be used. Constipation can usually be relieved by a small enema of soapsuds and sweet oil, lukewarm milk or water. In skin affections the indicated remedy may be used locally as well as internally. Cosmoline forms the best base for ointments, and starch for powders.

A convulsed child should be put into a hot bath, near a fire when the weather is cool; when the patient begins to relax, he is to be taken out of the bath, carefully but briskly rubbed, and, without being dressed, wrapped in a warm flannel blanket. When fully restored to consciousness, the child may be dressed. If the child remains in a stupor and cannot swallow, a single drop of medicine may be safely trusted on the tongue or between the teeth, and will serve its purpose even when thus administered.

Many of the later authorities deprecate the old habit of lancing the gums of teething children, save when the gums are very tense and of a semi-cartilaginous consistency.

Therapeutics.—When *sleeplessness* and *nervous irritability* are the most prominent symptoms, consult

1. Aconite, Belladonna, Chamomilla, Cina, Coffea.
2. Borax, Cypripedium, Kreasotum.

When *fever* is particularly marked, consult

1. Aconite, Gelsemium, Belladonna, Veratrum viride, Arsenic.
2. Chamomilla, Borax, Podophyllum, Nux vomica.

For *intestinal catarrh*, consult

1. Arsenicum, Calcarea phosph., Chamomilla, Colocynthis, Ipecacuanha, Magnesia carbon., Mercurius, Podophyllum, Sulphur, Psoricum, Ferrum, Apium virus.
2. Calcarea carbon., Rheum, Jalapa, Cina, China, Kreasotum, Sulphuric acid, Benzoic acid.

For *constipation*, consult

1. Alumina, Bryonia, Calcarea carbon., Podophyllum.
2. Graphites, Kreasotum, Causticum, Nux vom., Silicea.

For *bronchial catarrh*, consult

1. Aconite, Ipecacuanha, Kali carbon., Tartar emet., Calcarea carb., Dulcamara, Ferrum phosphor., Chamomilla.
2. Cina, Kreasotum, Cactus, Belladonna, Lycopodium, Rumex.

For *skin affections*, the following are to be studied :

- a. *Intertrigo*. Borax, Graphites, Lycopodium, Mercurius, Sulphur, Rhus tox., Causticum, Petroleum, Hydrastis.
- b. *Eczema*. Graphites, Sepia, Sulphur, Calcarea carb., Arsenicum, Dulcamara, Hepar, Tellurium, Staphisagria.
- c. *Herpes*. Sepia, Tellurium.

Convulsions call for

1. Belladonna, Gelsemium, Veratrum viride, Zincum met., Helleborus nig., Hyoscyamus, Cicuta, Cina, Cuprum met., Stramonium.
2. Aconite, Apium virus, Calcarea carbon.

For *tardy dentition*, consult

Calcarea carb., Calcarea phosph., Ferrum met., Phosphorus, Sulphur, Magnesia carbon., Magnesia muriat.

For full indications the reader is referred to the several chapters treating upon the various disorders likely to occur during dentition; the following brief and very general hints may also prove of service:

Aconite.—Characteristic restlessness. The child gnaws at its fist. Is most nearly content while drinking or holding a cup of water.

Alumina.—Difficult voiding of even soft stool. Bottle-fed babies who are badly constipated.

Apium virus.—Characteristic diarrhoea. The gums over the incipient teeth are festered, showing little watery sacs. Brain-irritation, and starting during sleep with a sharp cry. Red spots, like hives, here and there on the skin.

Arsenicum.—Characteristic gastric and diarrhoeic symptoms. Scaly, silver-white eczema. Dry, shrivelled skin. Characteristic thirst and restlessness. The blisters on the gum secrete a dark fluid (*Apis, white*).

Belladonna.—Symptoms of active congestion. Of frequent use during the occurrence of convulsions, when it is to be carefully compared with *Veratrum viride* and *Hyoscyamus*.

Benzolic acid.—Diarrhoea of copious, grayish-white, watery stools, like dirty soap-suds, excessively offensive, scenting the whole house. The urine is dark and exceedingly offensive; it is sometimes retained, or passed involuntarily at night.

Borax.—Characteristic fear excited by a downward motion. Aphthae of the gums. In nervous children it is often difficult to differentiate between *Belladonna* and *Borax*; the former corresponds to the violently congestive or inflammatory type, the latter to the purely functional group of disturbances.

Bryonia.—Dryness of lips and, usually, stools. The gums are pale, or light-red, but hot and dry. Characteristic great thirst for cold water and aggravation from motion.

Calcarea carb.—An excellent remedy for fair, fat, large children, with open anterior fontanelles, and perspiration of the head during sleep. Large, chalky stools, expelled with difficulty and pain (*Hepar; Podophyllum*). Loose, rattling cough.

Calcarea phosphorica.—Flabby, shrunken, emaciated children, with

open posterior fontanelles. The child does not learn, or forgets, to walk. Diarrhoea with much flatus; green, thin, sometimes slimy stools, or fetid, containing pus. Rickets.

Cauticum.—Dark-haired children with delicate skin. Intertrigo. Constipation. Tough stools, covered with mucus, looking as if greased. Tedious suppuration of the gums.

Chamomilla.—Of great use in nervous, excitable children who suffer from the characteristic diarrhoea; the patient is not quiet unless constantly carried in the arms; one cheek red, the other pale. Gums hot and tender. Fond of cold water. Characteristic rotten-egg odor of the stools.

Cicuta virosa.—An excellent remedy for convulsions of teething children. The jaws are firmly closed, as in lock-jaw; the limbs are relaxed and hanging down, or stiffened and extended.

Cina.—Worm symptoms, and exceedingly sensitive, "touchy" mood of the patient. Urine like milk. Convulsions, the child suddenly growing stiff, making a noise as if water were poured from a bottle.

Cuprum met.—Convulsions. Vomiting of mucus (often green) before each spasm. Convulsions begin in the muscles of the leg, and spread all over the body; the child lies on its abdomen, and spasmodically thrusts the breech up.

Cypripedium.—Sleeplessness. The child is very lively, laughs and plays, and will not go to sleep. A tendency to laugh constantly, at all times, is characteristic.

Ferrum phosph.—Useful in catarrh of the respiratory organs, the symptoms resembling Aconite.

Helleborus.—White, jelly-like stools. Convulsions, with extreme coldness and many brain-symptoms.

Hyoscyamus.—The symptoms resemble those of Belladonna. There is much twitching of the muscles about the eye, and the remedy is of particular value if brain irritation results from a fright.

Ignatia.—Well-known characteristics. The child is easily frightened, awakens from sleep with piercing cries and violent trembling. Convulsions after fright or punishment, even when sleep intervenes, preceded by hasty drinking, frothing at the mouth, and violent kicking, recurring daily, at the same hour.

Kreasotum.—Slow, difficult dentition. The child moans constantly while asleep, or dozes with the eyes half-open, taking only short naps; better during the day, but again worse at night. The gums are swollen, dark-red or purple, and seem infiltrated with a dark ichor. The teeth turn black and decay as soon as cut. Dark-brown, offensive diarrhoea.

Podophyllum.—Fever and sleeplessness from nervous irritability; the child is drowsing, with eyes half closed, moaning and whining; rolling of the head from side to side (Apis, boring of the head into pillows; Stramonium, sudden, quick raising of the head from the pillows, dropping it again as suddenly). Characteristic diarrhoea. The child gags; there is no stomach-effort; the mouth alone seems engaged in it. Morning aggravations. Prolapsus recti.

Silicea.—Children who have large heads with open sutures, and who are very large and full in the abdomen. Tardy dentition, the gums being sensitive and blistered. Fætor of the feet, which is not removed by washing.

Stannum.—This remedy is often very useful when Cina seems indicated but fails to relieve. During sleep the child moans and seems to supplicate in a timid manner. Pains in stomach and bowels are relieved by lying with the abdomen pressed against some hard substance.

Staphisagria.—The patient is very sensitive to physical and mental impressions. Pot-bellied children who have much colic and rectal tenesmus, not relieved by free evacuations. The gums look whitish and are tender; the teeth are dark in streaks.

Sulphuric acid.—Aphthous condition of the mouth and gums. Stools of bright, yellow mucus, stringy or as if chopped.

Tellurium.—Bing-worms all over, more distinct on the legs. After Sepia.

Veratrum viride.—The child trembles as if frightened and on the verge of a spasm. Convulsions with opisthotonos in anæmic children, after diarrhoea. Irritative fever, with quick, hard, bounding pulse; when congestion threatens the brain, chest, spine, or stomach.

Zincum.—Convulsions in anæmic, pale children, who are cross during the day and restless at night, with jerking and twitching of the feet and muscles generally, especially on the right side. Nightly fever.

DISEASES OF THE TONGUE.

BY CLARENCE M. CONANT, M.D.

PARALYSIS OF THE TONGUE.

Synonym.—Glossoplegia.

Definition.—Partial or complete loss of power to move the tongue, with or without atrophy of its substance.

Ætiology.—Since the hypoglossal nerve is the motor of the tongue and its subjacent muscles, we find glossoplegia arising from the pressure upon it of tumors and syphilitic growths, or of the exudation of meningitis and of caries of the cervical vertebræ. A lesion of the nerve itself, independent of any discoverable cause, may occasion paralysis of the tongue.

Pathology.—In glossoplegia the locality of the lesion in the hypoglossal nerve is interesting and diagnostic. Thus, unilateral paralysis indicates pressure upon, or disease of, the motor tract above the nucleus (the nucleus being rarely affected), or of the filaments of the nerve either within or without the medulla oblongata. Bilateral paralysis mostly arises from disease of the nucleus or its immediate neighborhood. The pathological process consists in inflammation, hyperæmia, and thickening of the walls of the vessels and round cells, with consequent atrophy of the gray nuclei. In glosso-labio-laryngeal or bulbar paralysis these lesions extend from the nuclei of the hypoglossal to the gray matter whence originate the fibres of the pneumogastric, the glosso-pharyngeal, the abducens, the trigeminus, the seventh pair, and the spinal accessory.

Symptoms.—In unilateral paralysis the tongue is observed to lie naturally in the mouth, save that the root on the affected side is elevated above the rest of the tongue, nor can the tongue be moved to the paralyzed side, while to the unaffected side it is freely movable. When protruded, it is curved about toward the affected side; articulation remains normal, except that the pronunciation of the labials is difficult; deglutition is not impaired, or at worst is performed rather awkwardly.

In bilateral paralysis the tongue lies helpless, flat, and flabby in the mouth; it cannot be protruded, or, at best, it is slightly raised and pressed against the under teeth; articulation is lost, but not always phonation, the production of sounds being possible, unless the larynx is also paralyzed; mastication and deglutition are performed with difficulty; the sense of taste is impaired in some cases, but never quite

lost, unless extreme atrophy be present, a condition of somewhat rare occurrence.

Diagnosis.—Paralysis of the tongue may accompany various paralytic and brain affections; it is then merely a symptom. In an independent unilateral paralysis of the tongue there is sometimes found paralytic weakness of the same side of the whole body, or perhaps only of the corresponding half of the palate and vocal cords. Bilateral glossoplegia is usually associated with atrophy of the tongue and paralysis of the lips and throat.—The prognosis is always unfavorable.

Treatment.—**Baryta carb.**—Paralysis of the tongue, with loss of speech. Fleishy old people, or dwarfish, scrofulous children.

Causticum.—Paralysis of the tongue, larynx, and even lips. Speech is stuttering, difficult, indistinct, or lost entirely; distortion of the mouth and tongue when talking, or attempting to do so.

Hyoscyamus.—Speech embarrassed; tongue protruded and drawn in with difficulty; useful in old men and drunkards.

Nux moschata.—The child, though old enough, cannot talk; it acts as if it were difficult to move the tongue (Natr. mur.); anæmia and infantile marasmus. Old people, especially women.

Opium.—Paralysis of the tongue, with difficult articulation. In children, old people and drunkards.

Plumbum.—Tongue heavy or paralyzed.

Compare also Aconite, Arsenicum, Belladonna, Graphites, Lachesis, Natrum muriat., and Stramonium.

Tongue heavy.—Anacardium, Belladonna, Carbo veg., Colchicum, Lycopodium, Muriatic acid, Natrum mur., Plumbum.

Tongue moved with difficulty.—Anacardium, Belladonna, Calcarea carb., Lycopodium, Natrum mur., Nux mos.

Tongue stiff.—Borax, Colchicum, Euphrasia, Lachesis, Natrum muriaticum.

INFLAMMATION OF THE TONGUE.

Synonym.—Glossitis.

Definition.—An inflammatory infiltration of a circumscribed part of the tongue, or of the entire organ, characterized by swelling, tenderness, and pain.

History.—When calomel was universally and profusely administered, mercurial glossitis was a frequent accompaniment of salivation; but it is now of comparatively rare occurrence.

Ætiology.—Glossitis is sometimes epidemic; sporadic cases follow a chill, just like pneumonia or influenza; but we do not know why the tongue is attacked in preference to other organs. Mercury and other corrosive chemicals may cause glossitis by their direct action upon the tongue, or inflammation may arise as the result of injuries from the bites and stings of insects, and from septic poisoning, as in anthrax. Glossitis is occasionally a symptom arising during the course of other diseases.

Pathology.—Glossitis is an inflammatory infiltration of the interstitial connective tissue of the tongue. Usually, this process ends in resolution, but sometimes abscesses are formed and, more rarely, the connective tissue becomes largely increased and indurated, and remains so permanently, resulting in an acquired hypertrophy of the tongue. In the height of the inflammation the muscular fibres are swollen, friable, and exsanguinated.

Symptomatology.—The most prominent and important symptom is rapid and excessive swelling of the tongue. Sometimes two days may suffice to so increase it that the mouth must be kept open to allow it a partial protrusion. Swallowing and breathing are performed with difficulty. The patient suffers paroxysms of asphyxia, becomes cyanotic, and suffocates, unless the pressure occasioned by the swollen tongue is promptly relieved.

The submaxillary and cervical glands are often swollen, especially when septicæmia prevails. The patient complains of severe pains extending to the ears and throat. The disease runs a rapid course, and ends by complete resolution or partial subsidence of the swelling, leaving a chronic hypertrophy. In less favorable cases death ensues from suffocation, or abscesses form and burst, or, in case of mercurial poisoning, gangrene appears and portions of the tongue slough off.

A partial glossitis commences as a small, painful swelling, like a kernel, on the back part of the tongue, which forms slowly, suppurates, discharges and heals without exciting any marked constitutional symptoms.

Diagnosis.—Universal glossitis is recognized promptly and easily. Partial glossitis might be mistaken for a cancerous or syphilitic tumor, but will be readily distinguished by its bland nature and the comparative rapidity of its development.

Prognosis.—In traumatic, sporadic and epidemic cases the prognosis is generally favorable. In mercurial poisoning it is grave. In septic cases it is very unfavorable.

Treatment.—**Apis.**—Stinging, burning pain in the tongue; blisters or vesicles along its edge or on its dorsum.

Arsenicum.—Violent burning pain in the tongue; swelling about the root of the tongue externally and internally. Gangrene of the tongue. Spots on it which burn like fire.

Belladonna.—Tongue much swollen and inflamed; papillæ deep red, edges and tip pale red.

Cantharides.—Tongue swollen and thickly coated; the base is partly covered with blisters and partly excoriated.

Conium.—Tongue swollen, stiff and painful; chronic indurations after acute inflammation.

Cuprum.—Chronic glossitis; tongue dry and rough, papillæ enlarged.

Lachesis.—Tongue swollen, coated white; papillæ enlarged; dry, red and cracked on the tip; mapped, dry, black and stiff; blisters about the tip of the tongue; it trembles, or catches on the teeth, when protruded.

Lycopodium.—Tongue distended, giving the patient a silly expression; painful and swollen in places; tubercles; vesicles on the tip of the tongue.

Mercurius.—Tongue swollen, flabby, imprinted by the teeth; inflamed, indurated or suppurating, with pricking pains. Tongue swollen, stiff, with pyalism, papillæ elevated, strawberry-like (*Mercurius cor.*).

Plumbum.—Tongue inflamed, swollen, hurts as if bitten.

Glossitis from the sting of an insect: *Camphora* or *Natrum mur.*
Glossitis from abuse of Mercury: *Hepar.* or Nitric acid. Glossitis leaving chronic indurations: *Calcareæ carb.*, *Carbo an.*, *Conium*, *Hepar*, *Lycopodium*, *Mezereum*, *Silicea*, *Sulphur*.

Whenever immediate relief must be had, free scarification of the tongue, or the application of leeches, may become a necessity. If pus has formed in any part of the tongue, its evacuation will afford great relief.

CANCER OF THE TONGUE.

Definition.—A swelling or ulceration on the tongue exhibiting the characteristics of cancer.

Ætiology.—Cancer of the tongue is rarely seen in persons under forty years of age, and is twice as common in men as in women (*W. Fairlie Clark*). As the epithelioma more often arises from the edge of the tongue, it has been thought that the sharp point of a carious or broken tooth is the provoking cause.

Pathology.—An epithelioma begins in a limited infiltration of the edge of the tongue, forming a hard tumor which soon bursts into an excavated or flat ulcer with infiltrated edges. This ulcer is very destructive of the surrounding tissues, and by the sympathy of the lymphatics, so characteristic to cancer, secondary epitheliomatous formations shortly appear in the submaxillary and even cervical glands. Scirrhus formations of the tongue are rare, but when they occur the infiltration is more general and less circumscribed than that of the epitheliomata, so that the exact limits and dimensions of the tumor are recognized with greater difficulty. There is a proliferation, hardening and contraction of the connective tissue which occasions a shrunken appearance of the tongue. Recent parts of a scirrhus show epithelial cells and stroma in abundance, while in older portions the cells have disappeared for the most part and we find only a dense connective tissue. This appearance is occasioned by fatty degeneration.

Encephaloid or soft cancer of the tongue is of such rare occurrence that its discussion may be omitted.

Symptomatology.—The varieties of cancerous degeneration in the tongue present no difference in their earlier symptoms. A scratch or crack or abrasion is noticed in the side of the tongue, about midway from the tip to the root; or a small, hard, tender lump is observed in the side of the tongue, either protruding from its substance or buried in it. This scratch or lump may result from some local injury or previous lesion, or it may arise without any known cause. Lancinating, darting, boring, burning pains soon appear, radiating from the diseased

spot into the head, ears and throat. These pains are aggravated at night, and are often so agonizing as to drive the patient to contemplate suicide. Salivation causes incessant spitting; the whole base of the tongue becomes thickened, infiltrated and immovable, and the sore or node develops into a foul, ragged, excoriated ulcer. This ulcer declares its true character by its continuous eating-away both along the surface and into the substance of the tongue, by its raised edges, from which a milky, viscid fluid (cancer-juice) is readily expressed, by its hard, uneven, lardaceous bottom, and by the characteristic pains. The adjacent glands, both salivary and lymphatic, become swollen and tender. As the ulceration proceeds, portions of the tongue slough away, cerebral circulation is unbalanced, and headaches and vertigo follow. Owing to the helpless condition of the tongue, eating is agony, and emaciation and prostration are inevitable. Stagnation of the circulation in long-lasting cases may occasion œdema glottidis, bronchitis, or even pneumonia (W. Fairlie Clark). The disease lasts from one to three years, the average duration being fifty-seven weeks.

Cancer of the tongue is almost invariably epithelioma, either superficial or deep. The former, which is probably not really cancerous, is known by a little itching and burning, raised papillæ, or even a slight superficial ulceration; while the deep variety presents those graver symptoms above enumerated. Scirrhus or encephaloid are rarely seen upon the tongue.

Diagnosis.—In early stages the diagnosis between cancerous and syphilitic affections of the tongue is extremely difficult. Gummata, however, develop rapidly into ulcerations, whereas the cancerous degeneration is slow, and, when advanced to ulceration, is marked by its unmistakable characteristics.

Prognosis.—The outlook is always unfavorable, excepting in cases of the so-called superficial epitheliomata. When these heal permanently and kindly, we have pretty strong proof that they were not really cancerous.

Treatment.—**Arsenicum album.**—Violent burning on the tongue; swelling about the root of the tongue, internally and externally. Burning, lancinating pains; emaciation, restlessness, anguish, characteristic thirst.

Arsenicum iodat. resembles *Arsenicum album* closely. Is preferred to the former when a painful diarrhœa exists.

Gallium aparine.—Nodulated tumors or cancerous ulcers on the tongue. Dropsical symptoms.

Hydrastis canadensis.—Tongue swollen, saliva increased, thick and tenacious; erosions.

Lachesis.—Bad odor from the mouth; saliva increased and tenacious; tongue dry, black and stiff.

Nitric acid.—Deep, irregular ulcers on the edge of the tongue, with secretion of tough, ropy mucus, cadaverous odor from the mouth, and fetid, acrid, bloody saliva. Tumor in the mouth.

Silicea.—Cancerous ulcer on the right edge of the tongue, eating into the tongue, and discharging much pus. One-sided swelling of the tongue.

Compare also Carbo an., Carbo veg., Causticum, Conium, and Phytolacca.

SIMPLE ULCERATION OF THE TONGUE.

Definition.—A suppurative degeneration of circumscribed parts of the tongue, of non-specific origin, and marked by the characteristics of a bland ulceration.

Etiology.—Simple ulceration of the tongue is caused by a vitiated digestion, although its exciting cause may seem to be a cold or a wound made with the teeth, or some sharp instrument, or even by an accumulation of tartar on the teeth.

Pathology.—Joseph Coats aptly styles ulceration “molecular necrosis.” By it we understand a gradual loss of vitality of the affected part, a breaking down of its structure, and the conversion of the elements of that structure into the inflammatory exudation.

Symptomatology.—In badly fed children, or in high livers, or in chronic dyspeptics, a small, shallow ulcer is often seen on the sides, upper surface, or tip of the tongue, and especially on the frænum linguæ. The ulcers are surrounded by a halo of inflammation, are flat, and are covered by a yellow slough. They are exquisitely tender when touched or when the tongue is moved; sometimes the breath of the patient and the discharge from the ulcer are very offensive, and the sublingual and submaxillary glands not infrequently sympathize.

Diagnosis.—The simple or dyspeptic ulcer is known by the negative evidence of the blandness of its nature and of the absence of all constitutional symptoms, with prominent gastric disturbances, distinguishing it from all other ulcerations of the mouth.

Treatment.—**Arsenicum.**—Violent burning in small pit-like ulcers on the tongue. Aphthous ulcers.

Baptisia.—Tongue cracked, sore and ulcerated; fetid odor from the mouth.

Hydrastis.—Tongue dark-red, ulcerated, and feels as if raw, burnt, or scalded. Aphthous ulcers.

Mercurius.—One of the best remedies for this condition. Tongue inflamed, indurated, or suppurating; pricking pains. Burning, aphthous ulcers (especially the red Iodide).

Also, **Aloes.**—Yellow ulcers on the tongue.

Apis.—Tongue cracked, sore, ulcerated, or covered with vesicles.

Aurum met.—Aphthæ and ulcers on the tongue.

Benzoic acid.—Extensive ulceration of the tongue, with deeply chapped fungoid surface.

Borax.—Red blisters (?) on the tongue, as if the surface were eroded, with pain from every motion of the tongue, or from being touched.

Capicum.—Flat, sensitive, spreading ulcer, with a lardaceous centre, on the tongue.

Fluoric acid.—Tongue deeply and widely fissured in all directions, with a large deep, phagedenic ulcer in the centre.

Graphites.—Whitish, painful ulcer on the under side of the tongue.

Hamamelis.—Tongue feels as if scalded; blisters on its sides, and cankers near the tip.

Kali bichrom.—Deep ulcer on the edge of the tongue.

Lycopodium.—Ulcers on and under the tongue.

Muriatic acid.—Tongue sore, bluish; contains deep ulcers, with black bases, and vesicles.

Nitric acid.—Deep, irregular-shaped ulcers on the edge of the tongue; ulceration of tongue, with tough, ropy mucus.

Phytolacca.—Small ulcers on the tongue, like those produced by mercury.

DISEASES OF THE SALIVARY GLANDS AND THEIR DUCTS.

BY CLARENCE M. CONANT, M.D.

RANULA.

Synonyms.—(French) Grenouillette; (German) Ranula or Fröschleingeschwulst.

Definition.—A cystic tumor lying beneath the tongue.

History.—The exact nature of ranula has been the objective point of much investigation, speculation, and discussion. It was long thought that the obstruction of Wharton's duct occasioned the development of the sublingual gland into a cystic tumor. But the observations of Recklinghausen show that the initial cause is purely mechanical, and not at all pathological. An inflammatory action closing the orifice of the duct, it becomes distended by the constantly accumulating secretion poured into it from the still intact and active gland, so that the cyst-walls are not the gland-walls, but the walls of the duct. It will thus be seen that persistence and not the destruction of the gland is an essential condition in the formation of ranula. Undoubtedly, the *bona fide* ranula is, therefore, of glandular origin; and it cannot be denied that the pathologists and nosologists have confused nomenclature in including under that term also cysts arising (from unknown causes) in the sublingual areolar spaces, and in the bursa between the genio-hyo-glossi muscles.

Ætiology.—A ranula, then, may be produced by any cause which occludes the orifices of the ducts leading from the sublingual and submaxillary glands; such a cause is, commonly, an inflammatory process in the mouth; or the formation of calcareous concretions upon the margins of the duct delta or impacted in the duct, or a salivary calculus. Cystic tumors, entirely unconnected with the glandular apparatus, and situated under the tongue, or even protuberant between the tongue and the jaw in the upper part of the neck, are also styled ranulas.

Pathology.—Ranula is a retention-cyst; that is to say, it is the dilated duct of either the submaxillary, sublingual, or mucous glands, distended with the accumulated and retained secretion from the gland. The stagnant secretion becomes inspissated and almost jelly-like; it resembles albumen, has no salivary reaction, and under the micro-

scope shows tessellated and globular epithelial cells and cholesterine crystals. Where the cyst is of idiopathic origin, so to speak, a sebaceous cyst, the contents are a dirty-white, often offensive, putty-like substance of greater consistency than the semi-fluid contents of the retention cysts, but, like them, made up of epithelium, cholesterine, and oil. These sebaceous cysts are certainly in a sense retention cysts likewise, but their contents and mode of growth present greater abnormalities than the class first mentioned.

Symptomatology.—Ranula is chiefly a disease of childhood. A round or ovoid, painless, semi-pellucid swelling is found in front of, and under, the tongue. Inspection shows the tumor to be a cyst which contains a fluid, jelly-like or pasty substance; the former indicates a very recent formation, the second an older tumor, and the last a sebaceous cyst of non-glandular origin. Should the tumor remain on the floor of the mouth, as is the habit of a tumor of glandular origin, and attain any considerable size, the various uses of the tongue are seriously impeded, and the front lower teeth may be displaced. If the swelling protrudes beneath the jaw in the neck, deglutition, and even respiration, may become embarrassed; in such cases it is safe to infer that the tumor is of sebaceous origin, and not a retention cyst. The retention cyst is usually rapidly developed as the capacity of the duct is limited, while the sebaceous cyst is likely to be more tedious in its growth. W. Fairlie Clarke thinks that "the majority of cases of ranula are unconnected with the salivary glands."

Treatment.—The treatment of ranula by internal medication is unsatisfactory. The following remedies have been recommended: Thuja, Calcarea carb., Mercurius sol., Belladonna, Mezereum, Nitric acid, Fluoric acid.

Surgical treatment is somewhat more satisfactory. The cyst is opened from the mouth, emptied of its contents, and filled with lint. The use of Iodine, preferably a solution of the crystals in water, injected into the cyst, offers advantages which deserve consideration.

DISEASES OF THE TONSILS.

BY CLARENCE M. CONANT, M.D.

TONSILLITIS.

Synonyms.—Quinsy, Cynanche tonsillaris, Amygdalitis, Angina tonsillaritis.

Definition.—Inflammation of either superficial or deep structures of the tonsils, tending to abscess and ulceration.

Ætiology.—Tonsillitis chiefly affects young persons. It occurs most frequently in the damp weather of spring and autumn, or after

a sudden fall in the temperature; exposure to severe cold winds or getting wet is a frequent cause. One attack predisposes to another.

Pathology.—The swollen tonsil in a parenchymatous amygdalitis consists of an inflammatory infiltration of the lymphatic follicles. Mr. Joseph Coats thinks that suppuration rarely results when the tonsils alone are inflamed and the adjacent structures unaffected. A follicular catarrh of the tonsils is sometimes coexistent with a similar affection of the pharynx. A thin, or more often thick, yellowish-white, cheesy substance is exuded upon the surface of the tonsil, either in patches or covering the whole gland. This exudation is sometimes mistaken for that of diphtheritis, but is readily distinguished by its want of all organization as a true membrane, and by its easy removal. When the gland is seen honeycombed, and when its mucous covering is otherwise intact, sometimes an abscess is formed at some point in the connective tissue surrounding the tonsil; this is appropriately styled a peri-tonsillar abscess, or, to coin a word, peri-tonsillitis.

Symptomatology.—In a case of simple catarrh of the mucous membrane covering the tonsils, or of their follicular apparatus, the symptoms are few and not severe. A complaint of sore throat will lead to an inspection of the fauces, when the tonsils and palatine arches are seen swollen and inflamed, and a vitiated secretion, as described, is observed upon these glands. A few days will suffice to effect a spontaneous evacuation of the supercharged follicles, or more rarely the inflammation assumes a sub-acute character, and the exudation degenerates into a hard and cheesy, or even calcareous substance, which is gradually worked out of the tonsil, when the latter slowly resumes a normal state.

Parenchymatous tonsillitis, or peri-tonsillar abscess (the *angina gravior* of William Aitken), is a much more serious disorder, whose onslaught is marked with rigors and fever. The throat becomes sore, deglutition difficult, and even talking, moving the tongue or head, is quite painful. In small children convulsions sometimes are the first morbid manifestation. Severe pains in the throat, which extend along the Eustachian tube into the ear, down into the neck, or up to the head, augment the distress.

If the tonsils are much swollen, paroxysms of suffocation alarm the patient, especially when lying down, and he sits in a chair, day and night. The fever is now intense, temperature reaching 105° F., and the pulse running from 100 to 110, with morning remissions and evening aggravations. The patient refuses all food, but craves drink, which he cannot swallow, and frequently he is exhausted and delirious. In eight to ten days (often during sleep) the abscess suddenly breaks, and a complete remission of all the symptoms follows.

If the throat be inspected during the height of the disease, the tonsils will be seen scarlet-red and swollen so as to fill the whole fauces,

of which any part visible will be observed to be highly inflamed. This inspection cannot be had in every case, as the patient cannot always open the mouth sufficiently to permit it. A peculiar, thick, guttural, or possibly nasal quality of the voice in cases of angina shows that the tonsils are swollen. The following varieties are distinguished: simple catarrhal tonsillitis, follicular tonsillitis, parenchymatous tonsillitis, peri-tonsillar abscess.

Diagnosis.—An inspection of the throat determines the diagnosis. When inspection is impossible, we must be guided by the other symptoms. The prognosis, with rare exceptions, is favorable.

Treatment.—The diet should be liquid or semi-solid, and light. Hot milk, beef tea and mutton broth are excellent; oatmeal porridge, blanc mange, or any easily swallowed and nourishing food may be allowed.

Apis.—Tonsils swollen, bright red; stinging pains in them when swallowing; deep ulcers on the tonsils, surrounded by an erysipelatous œdematous halo. Throat swollen inside and outside; breathing, talking, and swallowing difficult. The voice is hoarse and guttural. Absence of thirst.

Baryta carb.—Tonsillitis after a light cold or suppressed foot-sweat. Tonsils tend to suppurate, especially the right tonsil.

Belladonna.—The swelling is bright red; the neck is swollen, stiff, and tender externally. Rapidly forming aphthous ulcers on the tonsils. Intense congestion, headache, and even delirium; preference for the right side.

Bromium.—Constant pain in the throat; swallowing difficult, of fluids more so than of solids; after measles.

Cantharides.—Aphthous ulcers, covered with a white, adherent crust on the right tonsil. Whole throat swollen, and liquids swallowed with extreme difficulty.

Cuprum met.—Tonsils and whole throat inflamed; dull pain in the left tonsil. As Cuprum acts especially upon cellular inflammations, it should be carefully considered in the treatment of peri-tonsillar abscess.

Hepar sulph. calc.—Swelling of the tonsils and glands of the neck. Sensation, when swallowing, as if a fish-bone or splinter were sticking in the throat. After the use of mercury, when suppuration is inevitable, but delayed.

Ignatia.—Inflamed, hard swollen tonsils, with small ulcers. "In follicular tonsillitis almost specific." (Rau.)

Lachesis.—Pain, soreness and swelling of the left tonsil, with a tendency to extend to the right side; inability to swallow, with pain shooting into the ear (left) when the attempt is made; aggravation from hot drinks; fluids are swallowed with more difficulty than solids, and are returned through the nose. Excessive tenderness of the throat to external pressure. Peri-tonsillar abscess.

Lycopodium.—Swelling and suppuration of the tonsils, extending from right to left.

Mercurius sol.—Tonsils dark red, studded with ulcers; stinging pains in the throat.

Mercur. iodat.—Easily detached patches (pseudo-membrane) on the right tonsil; thick, bright yellow coating on the base of the tongue; salivary glands swollen.

Mercurius biniod.—Left tonsil swollen; fauces dark red; diphtheritic patches; submaxillary glands painfully enlarged; follows well after Belladonna.

Phytolacca.—Tonsils large, bluish, ulcerated; throat feels dry, rough, burning, smarting, as if puckered up with an astringent; pus watery, fetid, ichorous, deficient.

Plumbum met.—Tonsils inflamed and covered with small painful abscesses; left side.

Silicea.—Tonsils swollen, inflamed; and abscesses form, which refuse to heal; especially on the left side; fistulous ulcerations. Peri-tonsillar abscess.

Sulphur.—Tonsillitis, first on the right side, then on the left. Scrofulous diathesis.

Compare Ammon. mur., Benzoic ac., Calcareo carb., Psorinum, Ranunculus sceler.

Poultices around the throat, so soon as resolution becomes impossible, hasten the climax. Earlier, inhalation of steam from water medicated with the appropriate remedy is always grateful, and often efficient. A gargle of warm milk and water is very useful, and often indispensable after the abscess has burst and is discharging. Should the discharge be offensive, a weak solution of Permanganate of potash, or Platt's Chlorides, will be of service.

HYPERTROPHY OF THE TONSILS.

Synonyms.—Enlarged tonsils, Chronic tonsillitis.

Definition.—A low grade of painless inflammation occasioning and accompanying abnormally large tonsils.

Ætiology.—Chronic hypertrophy of the tonsils is frequently an hereditary symptom of scrofulosis. In the adult, its occurrence depends upon frequent and severe attacks of acute tonsillitis during childhood.

Pathology.—The chronically enlarged tonsil consists of a true hypertrophy of its lymphatic follicles, and in many cases of a proliferation of the inter-follicular connective tissue. The increase of the former tissue preserves to the enlarged gland an approximately normal density, so that it is not usually found very hard. When the gland is indurated as well as enlarged, the connective tissue has become hardened and thickened by a low grade of inflammation, which, in turn, arises from repeated attacks of acute angina which have closed and distended the follicles. This condition has been styled "scirrhus of the tonsil" (Claude Muirhead). That the scrofulous habit, rather than the repeated attacks of acute inflammation, is the chief cause of tonsillar hypertrophy appears from the fact that the greatest degrees of enlargement are usually seen in children who have never suffered an acute tonsillitis. Thus it follows that in the enlarged but soft tonsil we can observe evidence of the scrofulous diathesis; the indurated tonsil usually affords a history of previous quinsies.

Symptomatology.—Among the first signs of enlarged tonsils are commonly noticed a peculiar silly expression of countenance, occasioned by the mouth being continually kept partly open. This open mouth may be observed both day and night, and is an effort to facilitate the respiration which is impeded in the nasal passages by the partial closure of the posterior nares. For the same reason, the patient snores loudly and continuously when asleep. The peculiar quality of

voice to which allusion was made under Acute Tonsillitis is equally pronounced in the chronic form, the enunciation being thick, guttural, and almost nasal. When the glands are very large, the patient complains of a sense of a lump, or a fulness, in the throat, and is sometimes quite deaf. All these symptoms are greatly intensified whenever the patient has an acute attack of catarrh or angina; and persons suffering from them are peculiarly susceptible to all throat affections, and when seized with any disease of which angina is a prominent symptom (as diphtheria or scarlatina), suffer its extreme penalties.

Prognosis.—Hypertrophy of the tonsils is removed slowly under the most favorable conditions, and the enlarged gland rarely returns to an absolutely normal size.

Treatment.—**Baryta carb.** or **Baryta iodat.**—Chronic induration of the tonsils; sensation as of a plug in the throat; difficulty of swallowing solids.

Baryta mur.—Chronic hoarseness from enlarged indurated tonsils. Difficulty of swallowing; mercurial breath.

Calcarea carb.—Characteristic constitutional symptoms.

Calcarea iod.—Chronic tonsillitis, with disposition to laryngeal catarrhs.

Calcarea phos. and **Sulphur.**—Recommended as indicated by characteristic constitutional symptoms.

Hepar s. c.—Chronic tonsillitis with hardness of hearing; sensation of a splinter or fish-bone in the throat.

Ignatia.—Tonsil indurated, not inflamed.

Lycopodium.—Tonsils enlarged, indurated, and covered with many small ulcers.

Mercurius biniod.—Affects the left side chiefly; recommended by Edmunds as the specific for chronic tonsillitis.

Consult also Kali bichrom., Kali iodat., Phosphorus, Phytolacca, Psorinum, and Sulphur.

DISEASES OF THE PHARYNX.

BY W. T. LAIRD, M.D.

ACUTE CATARRHAL SORE THROAT.

Synonyms.—Common sore throat, Superficial sore throat, Inflammatory sore throat, Erythematous sore throat, Rheumatic sore throat, Pharyngitis simplex, Pharyngitis catarrhalis, Angina erythematosa, Angina catarrhalis, etc.

This affection consists of an acute erythematous inflammation of the mucous membrane of the pharynx, tonsils, and soft palate. The inflammatory process may be either circumscribed or diffuse; in the majority of cases, one side of the throat is more prominently affected than the other.

Ætiology.—The disease occurs most frequently in children and adolescents, but no period of life can claim entire immunity from its

attacks. It is most prevalent during cold and inclement weather. It is usually sporadic, but under certain peculiar atmospheric conditions, the exact nature of which has not yet been ascertained, has been known to occur as an epidemic. In the victims of malarial poisoning it sometimes manifests a periodical tendency, and in rheumatic patients it often precedes an outbreak of acute articular rheumatism. The susceptibility to sore throat varies greatly in different individuals; some rarely have an attack, while others contract the disease whenever the weather changes. Persons debilitated by scrofulosis, syphilis, or the abuse of mercury, are peculiarly liable to this affection. Sedentary habits, defective ventilation, impure water, and bad food may also act as remote causes. In fact, anything which tends to depress the vital powers and renders the body unduly sensitive to atmospheric vicissitudes, may aid indirectly in the production of this malady. The immediate exciting cause is usually exposure to cold and dampness.

Acute catarrhal sore throat may also be induced secondarily by the extension of inflammatory affections of the nose, larynx, or buccal cavity, by gastric catarrh or by measles, scarlatina, small-pox, typhoid fever, pneumonia, gout, tuberculosis, and various other acute and chronic diseases.

Anatomical Characters.—On inspection of the fauces, the mucous membrane covering the pharynx, tonsils, and soft palate is seen to be congested, swollen, and often œdematous. Its color varies from a bright red to a dark or even livid hue. The follicles are generally enlarged, and there is a more or less profuse, muco-purulent, tenacious secretion, which sometimes forms a thin layer over the tonsils and the posterior wall of the pharynx. In infants, a confervoid growth (*leptothrix buccalis*) is occasionally seen upon the inflamed surface, and may be mistaken, by a careless or inexperienced observer, for diphtheritic exudation.* Late in the disease, a few superficial erosions may appear in the epithelial layer, but this lesion is not constant.

In some cases, characterized by extensive serous infiltration into the submucous connective tissue, the mucous membrane appears pale and smooth, and is soft and sticky to the touch.

The uvula is often œdematous and so elongated that it lies upon the base of the tongue or rests upon the posterior wall of the pharynx or the laryngeal surface of the epiglottis. In some instances it is attached by viscid mucus to one of the arches of the palate; in others, the posterior palatine arches are also œdematous, and “appear like the wings of a central portion, the body of the uvula, which no longer presents as a free and pendent structure.”†

The cervical and submaxillary glands are generally swollen and painful. When the inflammation is intense, it may involve the sub-

* Diseases of Children, by J. Lewis Smith, M.D., p. 660.

† Cohen's Diseases of the Throat and Nasal Passages, p. 85.

stance of the tonsils and the adjacent connective tissue. In a fatal case reported by Rilliet and Barthez* these glands were enlarged, softened, and infiltrated with pus, and the pharyngeal surface was intensely congested, thickened, and covered with a layer of bloody mucus.

Symptomatology.—The local symptoms are frequently preceded by slight fever, loss of appetite, and a feeling of lassitude and depression. At the commencement of the disease there is an abnormal dryness of the mucous membrane, and a sensation of heat, soreness, and stiffness in the pharynx; but the surface soon becomes moist, and at a later stage the patient is constantly coughing and hawking in order to clear his throat of the viscid secretion poured out by the inflamed follicles. Deglutition is painful in all except the mildest cases. In health, the contraction of the muscles of the anterior palatine arches closes the isthmus of the fauces, and prevents the return of food into the mouth, while the muscles of the posterior arches at the same time close the opening into the nasal cavities. In severe forms of this disease these muscles become so extensively infiltrated with serum that their contractile power is lost, and consequently food and drink are ejected through the mouth and nose as soon as the patient attempts to swallow. If the constrictors of the pharynx be also paralyzed by serous infiltration, the bolus, after it passes the anterior palatine arches, becomes impacted, and is expelled only by violent and long-continued efforts, during which a portion of the ingesta frequently enters the larynx and causes spasmodic cough. The patient soon becomes alarmed at these attacks and refuses all nourishment.† The voice acquires a nasal tone, articulation is impaired, and speech is difficult and often painful.

In ordinary catarrhal inflammation involving the upper part of the pharynx, there is often transient deafness with noises in the ears. In severe cases the morbid process may extend through the Eustachian tube to the tympanum, and give rise to suppurative inflammation of the middle ear, attended with excessive pain, which persists until the pus escapes down the tube or bursts through the membrana tympani, when the suffering at once subsides.

When the lower portion of the pharynx is attacked, the throat is swollen externally, and the pain is increased by movements of the larynx and by pressure at the sides of the neck.

Elongation of the uvula causes a constant desire to swallow, and induces a hacking cough, which is aggravated whenever the patient assumes a recumbent posture. In infants and young children the cough is often hoarse or harsh and croupal. In the majority of cases there is a mild grade of catarrhal stomatitis; the breath is slightly offensive, the tongue is coated, and the salivary secretion is increased. When

* *Maladies des Enfants*, p. 233 *et seq.*

† *Niemeyer's Text-book of Practical Medicine*, vol. i., p. 447 *et seq.*

the disease pursues a mild course, the systemic disturbance is trifling; there is usually a moderate febrile action and a slight acceleration of respiration and circulation. In severe cases the pulse often rises to 120 or even 140 beats in the minute, the temperature is correspondingly elevated, and there may be severe headache, backache, and pains in the extremities.

In young children, pain and difficulty in swallowing may be slight or absent, but the constitutional symptoms are more pronounced than in adults. In grave cases the invasion of the disease is sometimes accompanied by high fever, vomiting, excessive restlessness or drowsiness and stupor, muscular twitchings, delirium, and occasionally clonic convulsions. Even in the mildest forms there is more or less nervous irritability and insomnia. Thirst is usually intense, but the appetite is diminished or lost.*

The duration of an attack is generally from three to ten days.

Diagnosis.—When the inflammation is confined to one tonsil and its immediate vicinity, acute catarrhal sore throat may be confounded with quinsy, but is easily distinguished by the greater tumefaction of the gland in the latter affection.

In children who are too young to describe their feelings, the diagnosis is often difficult. According to Meigs and Pepper,† “there are no local symptoms in two-thirds of the cases at the invasion, nor in some instances at any period of the attack.” The violent constitutional disturbances may, therefore, be ascribed to any cause except the right one; and if inspection of the throat be neglected, the disease may be mistaken for scarlatina, indigestion, or cerebral irritation due to dentition. In some instances it may also be confounded with diphtheria, on account of the confervoid growths upon the mucous membrane of the pharynx, but the soft pultaceous character of this deposit, its easy removal, and its microscopical appearance are so characteristic that an error in diagnosis is hardly possible.‡

Prognosis.—In idiopathic cases the tendency is almost invariably to spontaneous recovery. A few instances have been recorded in which extension of the inflammation to the larynx produced fatal œdema of the glottis, but such a termination is exceedingly rare. In debilitated and cachectic subjects there is often induced a permanent weakness of the mucous membrane, which predisposes to subsequent attacks. According to Gubler§ and Broadbent,|| this form of sore throat is occasionally followed by paralysis of the soft palate.

When this affection is associated with a grave constitutional malady, although not dangerous *per se*, it may produce a fatal result by aggravating the primary disease.

* Meigs and Pepper, *Diseases of Children*, p. 348.

† *Loc. cit.*

‡ *Archives Gén. de Méd.*, 1859–60.

§ Smith, *loc. cit.*

|| *Lancet*, 1871.

Treatment.—The predisposition to sore throat can often be counteracted to a great extent by inuring the skin to exposure by daily cold baths, followed by brisk friction with a coarse towel or a flesh-brush. Persons subject to this disease should wear flannel, silk, or woollen underclothing, and avoid getting the feet wet or sitting in damp garments. The remedies most frequently indicated are: *Acon.*, *Apis*, *Arum tri.*, *Bapt.*, *Bell.*, *Canth.*, *Capsic.*, *Gelsem.*, *Hepar*, *Ignat.*, *Kali bich.*, *Lach.*, *Lycopod.*, *Merc.*, *Nux vom.*, *Phytol.*, *Pulsat.*, and *Rhus tox.*

When food and drink are ejected through the nose, compare *Bell.*, *Lach.*, *Lycopod.*, *Merc.*, *Nitric acid*, and *Phosphorus*.

For elongation and œdema of the uvula, *Raue** recommends *Acon.*, *Bell.*, *Coff.*, *Crot. tig.*, *Lach.*, *Merc.*, *Natr. mur.*, and *Phos.†*

Special Indications.—**Aconite.**—High fever with burning, unquenchable thirst, restlessness and great nervous excitability; fauces and pharynx dark red; burning or pricking pains, with a feeling of dryness and contraction in the throat; deglutition difficult or painful; uvula elongated; the attacks occur during dry, cold weather; sanguine or nervous temperament. This remedy is useful only in the early stages.

Apis.—Bright-red œdematous swelling of tonsils, palate and uvula; throat swollen both internally and externally; difficult deglutition and respiration; burning, stinging pains; accumulation of tenacious mucus in the throat; fever without thirst; aggravation from heat, amelioration from cold.

Arum triph.—Lips and corners of the mouth cracked and bleeding; the throat and tongue are so sore that the patient refuses both food and drink.

Baptisia.—Fauces dark red; tonsils swollen; can swallow nothing but liquids; the throat feels contracted; abundant secretion of mucus which can neither be swallowed nor expectorated; offensive breath; the tongue has a yellowish-brown streak down the centre and red shining edges; absence of pain; great prostration.

Belladonna.—Fauces and pharynx deep red; tonsils and palate swollen; worse on the right side; violent and painful constriction of the throat, worse when attempting to swallow fluids; sensation as if the parts were *too narrow*; constant inclination to swallow; dryness, scraping, burning, and stinging in the throat; uvula elongated; throat swollen externally and painfully sensitive to touch; accumulation ofropy mucus in the throat. Violent fever with intense thirst; hot, red, swollen face; throbbing headache; dilated pupils, and pulsation of temporal and carotid arteries.

Cantharides.—*Throat feels on fire*; constriction and intense pain at the back of the throat; difficult deglutition.

Capsicum.—Dark redness of the throat, with a burning, pungent sensation in the pharynx; fetid breath; burning and constriction worse between the acts of deglutition; dry, teasing cough from elongation of the uvula.

Gelsemium.—Dryness and soreness of the throat; swallowing causes shooting pains in the ears; chilliness in the back; languor and drowsiness; characteristic headache.

Hepar.—Sensation as if a splinter or fish-bone were sticking in the throat; stitches in the throat extending to the ears when swallowing; pressure in the throat as from a plug; scrofulous patients.

Ignatia.—The pain and soreness are worse when not swallowing and when swallowing liquids, and are relieved by swallowing solid food; stitches in the throat only between the acts of deglutition; nervous patients.

Kali bichr.—Accumulation of *stringy* tenacious mucus in the pharynx; sharp

* Pathology and Therapeutics, p. 109.

† Compare also *Apis*, *Capsic.*, and *Rhus tox.*, and consult the treatment of chronic catarrhal sore throat.

shooting pains in the throat, extending into the ears; the inflammation affects principally the arches of the palate and the tonsils; morning aggravation.

Lachesis.—The throat is exceedingly sensitive to pressure; the soreness is worse on the left side, or goes from left to right; the mucous membrane is swollen and purplish; empty deglutition is more painful than swallowing food; liquids escape through the nose on attempting to swallow; the distress is greater than the local symptoms would seem to warrant; great dryness of the throat, worse after sleep.

Lycopodium.—The inflammation begins or is worse on the right side; choking sensation, which induces constant swallowing; deglutition difficult; food and drink are ejected through the nose; nose stuffed; cervical glands swollen; child very irritable on first waking; worse from 4 to 8 P.M. and from warm drinks.

Merc. sol.—Throat swollen and very red; raw smarting sensation in the throat; feeling of a lump in the pharynx, with constant desire to swallow; inability to swallow liquids—they return through the nose; profuse salivation; fetid breath; tongue swollen and flabby, taking the imprints of the teeth; gums swollen and tender; bad taste in the mouth; uvula elongated; glands swollen; much perspiration which affords no relief; all symptoms worse at night.

(When the inflammation is intense and there is great œdema of the throat, *Merc. corr.* is preferable to *Merc. sol.* If the disease affect principally the right side, and the tongue has a thick yellow coating at the base, *Merc. iod. sat.* should be given.)

Nux vom.—Throat feels rough, raw, and sore, as if scraped; constant hawking; sensation of a plug or lump in the pharynx when swallowing; dry cough with headache and pains in the hypochondria when coughing; soreness in the stomach and abdominal walls; cross and irritable; morning aggravation.

Phytolacca.—Sensation as if a red-hot ball had been lodged in throat; swelling of the tonsils and soft palate; sensation as if the trachea were compressed; the throat feels enlarged; constant hawking; great prostration; fetid breath; violent pains in the back and limbs.

Pulsatilla.—Bluish redness of the pharynx, tonsils, and uvula, with swelling of the affected parts; sensation of a lump in the throat; dryness and soreness of the throat; chilliness toward evening with increase of the soreness; burning fever without thirst; always worse in a warm room and better in the open air.

Rhus tox.—Fauces and pharynx œdematous; the curtain of the palate puffed and pink; uvula elongated, puffed translucent, the end nearly spherical, looking like a great drop of fluid or jelly just ready to fall off; vesicles in the pharynx and on the palate and uvula; intolerable roughness of the pharynx and larynx; great debility.*

Compare also *Amygdala persica*, *Baryta c.*, *Cham.*, *Dulc.*, *Sulph.*, etc.

Elongation and œdema of the uvula, when intractable to internal medication, may be quickly relieved by a few punctures which allow the effused serum to escape, or by excision of the tip with scissors or the uvalatome.

In all except the mildest cases the patient should be confined to the bed or lounge, and restricted to a light and easily digestible diet. The local distress may be palliated by the external application of warm, moist compresses, by the free use of demulcent drinks, and by allowing small pieces of ice to slowly melt in the mouth or, when cold aggravates, by gargles of very hot water. Intense burning heat of the skin may be relieved by frequently sponging the surface with tepid water, to which a small quantity of alcohol has been added. The patient should remain in the house until the throat has regained its normal condition, for a careless exposure during the first few days of convalescence is often followed by a relapse, which sometimes exceeds in severity the original attack.

* Dunham's Lectures on Mat. Med., vol. i., p. 154.

CHRONIC CATARRHAL SORE THROAT.

Synonyms.—Chronic catarrh of the fauces, Chronic pharyngeal catarrh, Chronic catarrhal angina, Relaxed sore throat, etc.

Chronic catarrhal 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.

Ætiology.—This disease is usually the result of repeated attacks of acute catarrhal sore throat, but may also be due to disorders of the alimentary tract and, in women, to uterine irritation. It is frequently observed in persons who are addicted to the excessive use of alcoholic stimulants and tobacco or indulge too freely in the pleasures of the table. It is most prevalent in damp, variable climates and, according to Cohen,* may exist with any diathesis. Acute exacerbations may be provoked by exposure to the night air, by prolonged stay in overheated rooms, and in some instances merely by fatigue.†

Anatomical Characters.—The faucial mucous membrane is swollen, congested, and relaxed, presents a doughy or pasty appearance, and is often thrown into prominent ridges or folds by infiltration of the submucous connective tissue. In some instances the surface is coated with a transparent film of mucus. The superficial veins of the palatine arches, and occasionally those of the pharynx, are engorged, tortuous, and varicose. A few enlarged follicles are observed in some instances, and the papillæ at the base of the tongue are frequently congested and hypertrophied. The soft palate is relaxed and dependent. The uvula is increased in length and, occasionally, in breadth. Its muscular structure is seldom implicated, but the enveloping mucous membrane is often so elongated that it lies upon the base of the tongue, and is sometimes drawn into the larynx during inspiration, or into the œsophagus during the act of deglutition. This membrane usually tapers to a fine point, but sometimes forms, at the extremity of the uvula, a spherical swelling resembling an opaline vesicle, from which watery mucus constantly drips. In advanced cases the morbid process may extend to the vault of the pharynx and the posterior nares.

Symptomatology.—On waking in the morning the throat feels dry and stiff; there is a sensation as if a foreign body had lodged in the pharynx, and considerable hawking is required to cleanse the parts of the mucus which has accumulated overnight; during the day the secretions are generally swallowed with the saliva, and consequently there is little or no expectoration. In some cases the local discomfort is most marked in the evening, and not unfrequently it rouses the patient from sleep; it is temporarily relieved by either hot or cold drinks and by insalivation. When the uvula is much elon-

* Op. cit., p. 178.

† Mackenzie: Pharynx, Larynx, and Trachea, p. 39.

gated it causes a tickling, spasmodic cough, and may induce nausea and vomiting; during sleep it is occasionally drawn into the larynx, as already mentioned, and the patient suddenly awakes with a suffocative attack. In some cases, however, considerable elongation of the uvula may exist without producing any symptoms.

There is often a bad taste in the mouth; the bowels are inclined to be constipated, and there is more or less languor and depression; but the general health is never seriously affected.

Diagnosis.—This rests upon the anatomical appearances and the symptoms above described.

Prognosis.—The prognosis is always favorable. The disease rarely terminates in spontaneous recovery, but may exist for years without causing structural changes or producing any serious inconvenience.

Treatment.—The use of tobacco and spirituous liquors must be strictly forbidden, and the patient must avoid late hours, overheated rooms, and exposure to the night air. The remedies which, in the writer's experience, have proved most efficient in this disease are: *Alumina*, *Hyos.*, *Kali bich.*, *Lach.*, and *Nux vom.* China, Capsic., Coffee, Hepar, Ignat., Iod., Kali c., Lycop., Merc., Nitric acid, Phos., Puls., Silic., and Sulph. may also be required in some cases. Where elongation of the uvula refuses to yield to medicine, the mucous membrane at the extremity of that organ must be excised. This simple operation at once relieves the tickling cough, but frequently increases the local discomfort, and may give rise to severe odynphagia. The exacerbation is only temporary, however, and is followed in a few days by a marked remission of all the symptoms.

Therapeutic Indications.—**Alumina.**—Great dryness of the throat, especially on awaking, with hawking and sensation of a lump in the throat; mucous membrane and bloodvessels relaxed; uvula elongated and dark red.

Capsicum.—Dry, hacking cough, caused by elongation of the uvula; fetid breath; burning sensation in the throat.

Coffea.—Uvula elongated, and swollen; sensation of a plug in the throat, with constant desire to swallow; soreness of the throat aggravated by cool air.

Hyoscyamus.—Dry, hacking, or spasmodic cough, worse when lying, relieved by sitting up; uvula elongated and palate relaxed.

Iodine.—Uvula swollen and elongated; scraping and burning sensation in the throat, extending into the œsophagus.

Kali bich.—Uvula relaxed, with sensation of a plug in the throat, not relieved by swallowing; viscid, stringy expectoration; morning aggravation.

Lachesis.—Uvula elongated; throat so dry that the patient awakes choking; external throat sensitive to pressure; aggravation after sleeping.

Merc. sol.—Uvula swollen and elongated; salivation, fetid breath, and flabby tongue.

Nux vom.—Dryness and smarting in the throat; uvula elongated; constant hawking and hemming to clear the throat in the morning; cough hurts the abdominal walls; characteristic mental and gastric symptoms.

Phosphorus.—Uvula elongated, with burning and dryness in the throat; the mucus is detached with difficulty.

Pulsatilla.—Uvula elongated and flabby; varicose veins in the throat; dryness of the mouth without thirst; chilliness; cannot bear a warm room; characteristic mental symptoms.

Sulphur.—Great dryness and burning in the throat, first right side and then left, with elongation of the uvula.

Compare, also, the treatment of Acute Catarrhal Sore Throat and Chronic Follicular Sore Throat.

CHRONIC FOLLICULAR SORE THROAT.

Synonyms.—Chronic pharyngitis, Follicular pharyngitis, Chronic glandulous pharyngitis, Chronic laryngo-pharyngitis, Granular pharynx, Granular sore throat, Clergyman's sore throat; Angina impetigenosa, Angina glandulosa, Dysphonia clericorum, etc.

This disease is essentially a chronic catarrhal lymphadenitis of the pharynx, resulting in hypertrophy of the follicles and thickening of the mucous and submucous tissues. In advanced cases, the follicular glands of the nasal fossæ, palate, base of the tongue, epiglottis, and larynx are also involved.

Ætiology.—Chronic follicular sore throat attacks men more frequently than women, and prevails more extensively in cities than in rural districts. It generally occurs during the vigorous period of adolescence, from twenty-five to forty years of age—but is also occasionally seen in children. According to Professor Horace Green,* it is often hereditary. Persons who are anæmic, or debilitated by mental overwork, sedentary habits and lack of exercise, are especially liable to contract follicular disease of the pharynx. The strumous, rheumatic, and tuberculous diatheses may also be regarded as predisposing causes. In some instances this form of sore throat may occur as the sequel of repeated attacks of acute or subacute catarrhal pharyngitis, while in others it may be dependent upon gastric or intestinal irritation.† The most frequent exciting causes are: (1) Overexertion of the voice, (2) exposure to cold, and (3) irritation of the weakened mucous membrane by “mechanical and chemical emanations from various manufacturing processes.”‡

There is a wide-spread belief among the laity that this affection is confined almost exclusively to the clergy, but a careful analysis of Professor Green's§ four hundred cases shows that less than twenty per cent. of the patients were members of that profession, or could in any way be classed as public speakers. It is also probable, as Cohen|| suggests, that the prevalence of this disease among clergymen is largely due to the inequalities of temperature to which they are often exposed while preaching.

Anatomical Characters.—The appearance of the throat is very characteristic. In the early stages the mucous membrane is more or less deeply congested, while the enlarged and hypertrophied follicles

* Treatise on Diseases of the Air-passages, etc., p. 159.

† Cohen, op. cit., p. 181.

‡ Op. cit.

‡ Cohen, loc. cit.

|| Loc. cit.

may be seen projecting from its surface and forming hemispherical, elliptical, or irregularly shaped elevations that are usually about the size of millet-seeds, but, in exceptional cases, may attain the bulk of a small pea. These prominences occur singly or in groups, are usually of a deeper red than the surrounding tissues, and may be either transparent or opaque. Each elevation is surrounded at its base by a narrow zone of inflammation that appears like a fine red line. The inflamed mucous membrane is often dry and glistening, the orifices of the follicles are bright red, and a turbid viscid mucus adheres to the affected parts in clumps or strands. In some instances the normal transparent exudation collects upon the healthy portion of the membrane in minute drops, which might easily be mistaken for herpetic vesicles. The surrounding parts look sunken by contrast, and the throat, in these cases, often presents a deceptive appearance of rawness; but if the supposed vesicles be carefully wiped off, the underlying mucous membrane will be found to have suffered no loss of epithelium.* The follicular glands of the soft palate, the uvula, and the base of the tongue may be involved in the morbid process; but the tonsils are not usually affected nor the uvula elongated at this stage of the disease. The mucous membrane of the larynx is hyperæmic after protracted use of the voice, but regains its normal condition after a few days' rest.

As the malady progresses, the follicles undergo further hypertrophy, and ultimately coalesce and form "broad flattened elevations or long ridges," † which often have a velvety surface, and are elastic to the touch. These extend in various directions over the mucous membrane, and are usually surrounded by a network of injected superficial veins. The diseased follicles now pour out a viscid secretion, which either hangs like a thread from the point of exit, or adheres to the part in small white patches. In some instances this exudation has a cheesy character; in others it resembles the contents of an acne pustule; and occasionally it is "chalky in appearance and calcareous in composition." ‡ When the glandular tissue at the vault of the pharynx is involved, greenish-yellow masses of hardened mucus may be seen adhering to the posterior wall of the pharynx behind the soft palate; and when the disease has extended to the posterior nares or the posterior surface of the palate, strings of tenacious mucus will hang from the velum into the pharynx. The mucous membrane of the posterior pharyngeal wall is often excoriated by the acrid discharges that flow over it, and is frequently atrophied, whitish, and semi-transparent. The tonsils are enlarged, the soft palate is relaxed, the uvula is elongated, and there is a chronic inflammation of the mucous membrane of the larynx. Real vesicles may sometimes be seen upon the palate and uvula. § The inflamed follicles may now suppurate or undergo

* Cohen, loc. cit.

† Ibid.

‡ Mackenzie, op. cit., p. 48.

§ Cohen, loc. cit.

superficial ulceration; and small ulcers, covered with a grayish or whitish exudation, may also form in the epithelial layer of the mucous membrane of the pharynx, tonsils, soft palate, and uvula. In severe cases, the discharge from the ulcers becomes purulent or sanguinolent; and a few instances have been reported in which alarming, and even fatal, hæmorrhage was caused by erosion and perforation of the palatine and carotid arteries.* As a rule, however, extensive ulceration occurs only in scrofulous subjects, or when the follicular disease is associated with syphilis or phthisis.†

Symptomatology.—The symptoms vary greatly in different individuals and at different stages. In some cases they steadily increase in severity; in others they are aggravated whenever the patient takes cold or strains the vocal organs, and after a few days or a few weeks partially subside, and then remain stationary until another imprudent act provokes a fresh exacerbation. The affection begins so insidiously and causes so little annoyance at the outset, that a physician is seldom consulted until it has existed for months or years. In fact, a considerable hypertrophy of the follicles may occur, and the patient not be aware that his throat is at all affected. At first there is merely a sensation of dryness and stiffness in the pharynx, associated, in some instances, with a tickling cough that is either dry or attended with a scanty expectoration of viscid mucus. When the cough occurs in severe paroxysms, it causes a feeling of soreness and tenderness in the larynx and about the arch of the palate. As the malady progresses, the throat becomes excessively dry and sore; there is a sensation of heat and pricking in the pharynx; and a feeling of obstruction in the larynx causes frequent hawking. In persons whose occupations require a constant use of the voice, one of the most important symptoms is the marked impairment of the vocal powers. This may occur early in the disease from “a mere extension of the nervous influence of the pneumogastric nerve,”‡ or ensue at a later stage from implication of the larynx. The voice is muffled, hoarse, or feeble, and articulation is difficult and often painful. Sometimes the hoarseness is temporarily relieved by drinking water. At other times, if the patient persist in the effort to talk, he becomes aphonic for the remainder of the day. A “change of key” frequently occurs in the middle of a sentence. In some cases the voice is deep and gruff in the morning, but gradually rises in pitch, and becomes high and shrill in the evening; in others, the patient wakes with dysphonia or complete aphonia, but the voice steadily improves with exercise, and by noon is nearly natural, with the exception of a slight hoarseness. In persons who limit the use of the vocal organs to the requirements of ordinary conversation, these symptoms do not occur until late in the disease, and then only as the result of a distinct laryngeal complication.

* Cohen, loc. cit.

† Mackenzie, loc. cit.

‡ Cohen, loc. cit.

When the orifices of the Eustachian tubes are involved, the hearing becomes affected, and in some cases the deafness is permanent. When the morbid process extends to the nasal fossæ and the mucous membrane of the palate, the senses of smell and taste are impaired or lost. In some cases there is nervous dyspnœa; in others, the respiration is obstructed by tumefaction and thickening of the nasal mucous membrane, or by the accumulation of mucus in the nasal cavities.

Deglutition is often difficult and painful. In some instances the patient is obliged to subsist entirely upon a liquid diet, but occasionally solids are swallowed more readily than fluids. In the worst cases there may be complete aphagia, but this is rare. The dysphagia may be purely nervous, or it may be due to ulceration or to loss of contractile power in the deglutory muscles from infiltration or atrophy of the muscular tissues.

When the disease is fully developed, the cough is sometimes severe, and in rare instances may be accompanied by hectic fever, rapid pulse and progressive emaciation. It may be induced by the presence of irritating secretions in the pharynx, by elongation of the uvula, and by extension of the inflammatory process to the larynx. More frequently, however, cough is absent; but the patient, in his efforts to clear the throat, is almost constantly giving utterance to "a kind of high-pitched grunt or a hem."* The expectoration may be mucous or muco-purulent, thin or viscid, and is occasionally blood-streaked; not unfrequently it contains small pellets of mucous or bloody semi-solid masses, which have been drawn down from the retro-nasal portion of the pharynx, the posterior nares, or the vault of the pharynx.

The constitutional disturbance is usually very slight. The patients are often excessively nervous, and can hardly be convinced that they are not the victims of phthisis; † there may be languor and debility, headache, coolness of the extremities, palpitation of the heart, evidences of dyspepsia, and, in some instances, as already mentioned, hectic fever and emaciation: but in the great majority of cases the general health is not materially impaired.

Diagnosis.—An ordinary case of chronic follicular sore throat is not likely to be mistaken for any other malady. In those exceptional instances in which the symptoms simulate those of phthisis, the diagnosis is readily established by inspection of the pharynx and examination of the lungs by auscultation and percussion. It must not be forgotten, however, that the two affections sometimes coexist. ‡

Prognosis.—Under appropriate treatment a complete cure of the pharyngeal trouble may be confidently expected in the great majority of cases; but in regard to the perfect restoration of the vocal powers the prognosis is less favorable, especially if the disease has existed

* Cohen, loc. cit.

† Niemeyer, op. cit., vol. i., p. 449.

‡ Mackenzie, op. cit., p. 51.

several years. In the case of clergymen, teachers, singers, etc., the voice is sometimes permanently weakened to such an extent that the patients are obliged to relinquish their professional work and seek occupations requiring less vocal effort.

Treatment.—As Cohen* pertinently remarks, both the disease and the treatment are “eminently chronic.” The general hygienic management is the same as in acute catarrhal sore throat. In all cases the protracted use of the voice must be interdicted until the curative process is well advanced; and where there is a distinct and severe laryngeal complication, absolute rest of the vocal organs, for a few days or a few weeks, is imperatively demanded.

The remedies most frequently indicated are: *Alumina*, *Argent. met.*, *Argent. nitr.*, *Arnica*, *Arum tri.*, *Kali bich.*, *Lachesis*, *Lycopod.*, *Merc. iod. flav.*, *Merc. iod. rub.*, *Natrum mur.*, *Nux vom.*, *Phosphorus*, *Phytolacca*, *Plumbum*, and *Rhus tox.* *Æsculus*, *Chimaph.*, *Hydrastis*, *Natrum arsen.*, and *Petrol.* may also occasionally prove serviceable.

Special Indications.—**Alumina.**—Voice husky, hoarse, or weak, especially in the morning on waking; rawness and soreness in the throat, with a sensation as if a splinter were sticking in the pharynx; the mucous membrane is dark red, has a glazed look, and is very dry, or there may be an accumulation of thick, tough mucus; uvula elongated and dark red; amelioration from warm food and drink.

Argent. met.—Hoarseness, with copious accumulation of mucus, when beginning to sing or talk; easy expectoration of mucus, which looks like boiled starch.

Argent. nitr.—Loss of voice; difficult detachment of thick, tenacious mucus; constant hawking and occasional gagging; feeling of a pointed body in the throat when swallowing, breathing, or moving the neck.

Arnica.—Great hoarseness, with pain in the fauces and larynx after protracted use of the voice; stinging in the back of the throat between the acts of deglutition.

Arum tri.—Voice hoarse, uncertain, constantly changing; hoarseness is aggravated by talking; accumulation of mucus, which causes constant hawking.

Kali bich.—Posterior wall of pharynx dark red and often glossy, cracked and bleeding; accumulation of tenacious *stringy* mucus in the throat and posterior nares; yellowish or greenish masses of hardened mucus are hawked up in the morning (*Lyc.*).

Lachesis.—Painful deglutition, with constant desire to swallow; spasmodic contraction of the fauces; hawking of mucus, with rawness and dryness of the throat; hoarseness; rawness and scraping in the larynx; external throat very sensitive to touch; solids swallowed more readily than fluids; worse on left side and worse after sleeping.

Lycopodium.—Brownish-red appearance of the fauces; worse on the right side; hoarseness; hardened masses of greenish-yellow mucus are hawked up in the morning (*Kali bich.*).

Merc. iod. flav.—Base of tongue covered with a thick dirty-yellow coating; much tenacious mucus in the throat; hawking causes gagging; hoarseness and aphonia; fetid breath; salivation; worse on the right side.

Merc. iod. rub.—Voice hoarse and husky, or complete aphonia; uvula elongated; hawking of tough white mucus, or hard greenish lumps; ptyalism; fetid breath; the throat is worse on the left side.

Natrum mur.—There is a feeling of great dryness in the throat, and yet the patient is constantly hawking up thin transparent mucus; hoarseness, with accumulation of mucus in the larynx; especially indicated after the topical application of *Argentum nitr.*

Nux vom.—Dryness, smarting, and burning in the pharynx; voice hoarse; has

* Loc. cit.

to clear the throat constantly, especially in the morning; dull frontal headache and the characteristic gastric symptoms.

Phosphorus.—The throat is so dry that it fairly glistens; roughness, scraping, and burning in the pharynx; hoarseness and roughness of the voice; aphonia from prolonged loud talking.

Phytolacca.—Dryness of the throat, with sensation of scraping and rawness; constant hacking to rid the throat and posterior nares of mucus; feeling when swallowing as if a ball of red-hot iron had lodged in the pharynx; choking sensation; cannot drink hot fluids.

Plumbum.—The disease goes from right to left; tough mucus in the throat and posterior nares; tonsils inflamed and covered with small abscesses; sensation of a plug in the throat; spasmodic contraction of the fauces.

Rhus tox.—Hoarseness from overstraining the voice; the hoarseness is improved by talking; the throat feels sore and stiff; roughness and soreness in the larynx.

Compare also the treatment of acute and chronic catarrhal sore throat, and the chapters on Chronic Nasal Catarrh and Chronic Catarrhal Laryngitis.

When the local suffering is severe, it may be palliated by demulcent drinks; but astringent gargles are not required. The prevalent method of treating this disease by the topical application of caustics, etc., cannot be too strongly condemned.

ULCERATED SORE THROAT.

Ulceration of the mucous membrane of the throat is usually the result of catarrhal inflammation, syphilis, or tuberculosis. Occasionally it occurs in debilitated persons from exposure to septic influences. In cases of malignant scarlatina and diphtheria, the attendants, when exhausted by protracted watching and loss of rest, frequently contract this form of sore throat, and it is also common in medical students who spend much time in the dissecting-room or in the wards of a hospital.*

Ulceration of the mucous follicles is regarded by some authors as a manifestation of scrofulosis; but it is probable that in the severe grades of this so-called scrofulous ulceration the morbid process is due to a syphilitic taint, either hereditary or acquired, and that, in the milder cases, the strumous diathesis simply aggravates an existing catarrhal inflammation.

Anatomical Characters.—The appearance of catarrhal ulcers has already been described.† In some instances they are confined to the extreme upper or lower portion of the pharynx, and in these cases, if rhinoscopic or laryngoscopic examination be neglected, the true nature of the disease generally escapes detection.

Two varieties of syphilitic ulceration may be recognized—the superficial and the deep. The superficial ulcers attack by preference the soft palate, but may also be found on the tonsils and the pillars of the fauces. They have irregular, ragged, undermined edges; their bases

* Mackenzie, op. cit., p. 42.

† Vide preceding chapters.

are covered with an ichorous pus or with whitish or yellowish tenacious lymph; and the surrounding parts are inflamed, but never indurated. The deep or perforating ulcers, which are almost invariably produced by the softening of gummata, have steep, crested edges, lardaceous bases, and hard, inflamed, copper-colored borders; they may occur in any part of the throat. The ulceration often extends to the nasal passages and to the larynx. It may destroy the uvula and portions of the soft palate, and penetrate deeply into surrounding structures. In some instances it causes perforation of the cervical bloodvessels and fatal hæmorrhage; in others it produces caries of the base of the skull or of the cervical vertebræ, and not unfrequently it provokes fatal lesions of the brain and spinal cord.*

Tubercular ulcers are lentil-shaped, and have "a caseous, broken-down floor, with undermined, hyperæmic edges, in which new tuberculous deposits are imbedded in various stages of development. These rapidly disintegrate, and cause necrosis of the mucous membrane lying between them."† In the immediate vicinity of these ulcers may be seen small grayish or yellowish nodules which ultimately become the seat of fresh ulceration. The morbid process begins upon the lateral walls of the pharynx, and gradually extends to the posterior wall, the soft palate, and the roof of the mouth. In the majority of instances it also spreads to the epiglottis and the larynx.‡

Ulcers, due to slight septicæmia, are always superficial, present a whitish appearance, are round or oval, and never coalesce. They are usually found on the tonsils and fauces.§

Symptomatology.—In all cases of ulcerated sore throat there is more or less inflammatory swelling of the affected parts with fetid breath and ptyalism. The pain and difficulty in swallowing vary according to the site of the ulceration, being most severe where the tonsils and epiglottis are implicated.

In the syphilitic form of this disease the voice often loses its natural resonance, and acquires a peculiar clang from tumefaction of the uvula and perforation of the soft palate; the breath is horribly offensive; and the local lesion is associated with external evidences of syphilis.

In the tubercular variety the soreness of the throat is marked and persistent; deglutition is excessively painful, and is often attended with violent stabbing pains in the ears; and aphagia is not uncommon. The lungs, if not primarily implicated, soon become involved; the well-known phenomena of acute pulmonary tuberculosis supervene; and death ultimately ensues from exhaustion.

In both the syphilitic and tubercular forms of this affection, hoarse-

* For a detailed description of syphilitic ulceration of the throat, the reader is referred to Professor W. B. Trites's article on syphilis.

† O. Weber, quoted to Mackenzie, *op. cit.*, p. 109.

‡ *Vide* chapter on Tuberculosis.

§ Mackenzie, *loc. cit.*

ness and cough may be induced by the extension of the morbid process to the larynx.

When the ulceration is due to slight septicæmia, there is moderate febrile disturbance, with splitting headache, shooting pains in the limbs, drowsiness with inability to sleep, and a feeling of lassitude and general malaise.*

Diagnosis.—The diagnosis is based upon the history of the case, the symptoms above enumerated, and especially upon the evidences afforded by inspection of the throat.

Prognosis.—The prognosis is favorable when the disease is due to catarrhal inflammation or slight septicæmia. In the syphilitic variety, as long as the ulceration is superficial, there is but little danger to life, unless the patient is seriously debilitated; but, if the ulcerative process penetrate deeply, death may occur, as already mentioned, from erosion and perforation of the cervical bloodvessels, or from lesions of the brain and spinal cord. Even if these perils be avoided, the extensive sloughing is often followed by vicious cicatricial contractions and by adhesions of the soft palate to the posterior wall of the pharynx, producing permanent deformities which seriously interfere with nasal respiration, speech, and deglutition.

Tubercular ulceration usually proves fatal within six months.

Treatment.—Topical applications are unnecessary. In some instances they afford temporary relief, but as curative agents they are far inferior to the properly selected remedy. The diet should consist principally of nutritious liquids given by the mouth, or, in cases of aphagia, by the rectum.

Therapeutic Indications.—**Alumina.**—Spongy ulcers secreting a yellowish-brown, offensive pus; boring pain from the fauces to the right temple and head; the throat is very dry or filled with thick, tough mucus.

Apis.—Deep ulcers, with œdematous or erysipelatous borders; burning, stinging pains.

Argent. nit.—Ulceration, with a sensation as if a splinter were sticking in the throat (Alum., Hep., Nitric ac.); uvula and fauces dark red; accumulation of tough, tenacious mucus.

Arsenic.—The ulceration spreads superficially and threatens to become gangrenous; intense burning pain; great prostration; characteristic thirst and mental symptoms.

Arum tri.—Putrid ulcers in the mouth and throat; fetid breath; salivation; lips and corners of the mouth raw, cracked, and bleeding; the patient refuses food and drink on account of the soreness of the mouth and throat.

Aurum.—Putrid smell from the mouth like old cheese; deep ulcers affecting the bones; mercurio-syphilitic cases.

Baptisia.—Painless, putrid dark ulcers; can swallow only liquids; fetid breath; great prostration; the tongue has a yellowish-brown streak down the centre, and red tip and edges.

Caplicum.—Small, flat, burning ulcers in the mouth and fauces; pungent burning in the throat, relieved by swallowing.

Hydrastis.—Ulcers in the fauces and nasal passages; hawking of much tenacious mucus; bloody or purulent discharge from the nose; tongue flabby, taking the

* Mackenzie, loc. cit.

imprints of the teeth (Merc.); mercurial salivation; aggravation from the least exposure to cold.

Ignatia.—Small, flat ulcers on the tonsils; the throat is most painful between the acts of deglutition, and the soreness is temporarily relieved by swallowing.

Iodine.—Ulceration of the throat, with swelling of the cervical glands; scraping and burning in the throat, extending to the œsophagus; elongation and swelling of the uvula.

Kali bich.—The ulcers look as if they had been made with a punch, have ash-colored bases and copper-colored borders; fauces and pharynx bright red or livid; ulceration of the septum of the nose, with fetid discharge; viscid, stringy expectoration.

Kali hyd.—Ulceration and sloughing, with lancinating pains in the throat, which is swollen internally and externally; thin, watery, excoriating discharge from the nose, with or without destruction of the nasal tissues; weak, debilitated, scrofulous subjects; mercurio-syphilitic cases.

Lachesis.—The throat is swollen, purplish, and ulcerated; the ulceration begins or is worse upon the left side; spasmodic contraction of the fauces during deglutition; can swallow solids more easily than liquids; intolerance of pressure about the neck and throat; aggravation after sleeping.

Lycopodium.—Tonsils studded with small ulcers; fauces brownish-red; the ulceration is worse upon the right side or goes from right to left. Aggravation from 4 to 8 P.M.

Merc. sol.—Suppurating, slowly spreading ulcers in the throat; ptyalism, fetid breath and flabby tongue; pains worse at night; much perspiration, which affords no relief; syphilitic cases.

Nitric acid.—The ulcers are irregular in outline, covered with pale, flabby granulations, and bleed easily and profusely; pricking pains in the throat when swallowing; great debility, sweating, and exhaustion; mercurio-syphilitic cases.

Sanguinaria.—Ulceration of the throat, with sensation of dryness, not relieved by drinking; rush of blood to the head; circumscribed redness of the cheeks; characteristic headache.

Compare also Belladonna, Carbo veg., Cinnabar, Hepar, Mercurius corr., Mercurius cyan., Muriatic acid, Nux v., Phosphoric acid, Phytolacca, and Psorinum.

MEMBRANOUS SORE THROAT.

Synonyms.—Non-malignant membranous sore throat, Herpetic sore throat, Aphthous sore throat, "Cankered sore throat," (so-called) Diphtheritic sore throat, False diphtheria; Angina herpeticiformis, Herpes pharyngis, Herpes gutturalis, etc.

Membranous sore throat is analogous to herpes of the skin, and is characterized by the formation of vesicles, which, in the majority of cases, are ultimately replaced by a fibrinous deposit similar in anatomical structure and general appearance to the exudation of diphtheria.

Ætiology.—According to Mackenzie,* this affection is extremely rare in England. In this country, however, it is probably the most frequent variety of sore throat. It occurs at all seasons of the year, but prevails most extensively during the inclement, changeable weather of autumn and early spring. It is not confined to any locality nor to any particular class of society. Children are usually

* Op. cit., p. 57.

more susceptible than adults, but the disease may occur at any period of life. Debilitated subjects sometimes contract it during the prevalence of diphtheria, and in these cases it is sometimes followed by that malady. In many instances one attack seems to engender a predisposition to another, and I have known patients in whom this affection recurred regularly every spring, for several years in succession. Imperfect drainage and impure air are potential predisposing causes, while the immediate exciting cause is usually exposure to cold when overheated. Membranous sore throat may also accompany advanced cases of syphilis and phthisis.

Anatomical Characters.—The disease usually begins on one side of the throat and ultimately extends to the other. Occasionally the morbid process is confined to the side first attacked, and more rarely both sides are simultaneously affected. The parts usually involved are the tonsils, the pillars of the fauces, and the soft palate; the posterior wall of the pharynx and the hard palate are seldom implicated. The cervical and submaxillary glands of the affected side are slightly swollen and tender. In the early stages of this malady the mucous membrane is tumefied, reddened, and covered to a greater or less extent with a fine vesicular eruption. The vesicles are whitish or opaline, and are about the size of millet-seeds, or, in some instances, slightly larger. They may occur singly or in groups, and in the worst cases are so thickly clustered that the eruption is practically confluent. Each vesicle is surrounded by an inflammatory zone, and frequently has a dark spot at its apex. The duration of this stage is from twenty-four to forty-eight hours. Occasionally the vesicles are reabsorbed and the mucous membrane rapidly regains its normal condition; but in the great majority of cases the vesicles burst, and leave small, superficial, circular ulcers. According to Mackenzie,* resolution may now take place, but my own experience leads me to believe that such a termination is extremely rare. Almost invariably each ulcer becomes covered, in a few hours, with a white or yellowish-white fibrinous deposit that gradually extends over the surrounding mucous membrane, coalesces with adjacent deposits, and forms patches which often attain considerable size. In the course of a few days the ulceration heals, the exudation becomes loosened, and is either expectorated or swallowed, and in a very short time the last vestige of the disease is effaced. Simultaneously with the deposit in the throat a similar exudation may appear upon other abraded mucous surfaces, and even upon cutaneous ulcers. An herpetic eruption upon the inside of the lips and cheeks, at the corners of the mouth, or upon the face, occasionally accompanies the pharyngeal lesion. This symptom has a peculiar diagnostic value, since medical aid is rarely summoned until the exudative

* Loc. cit.

stage is reached, and the eruption thus furnishes the only evidence by which the vesicular nature of the disease can be positively demonstrated. Unfortunately, however, it is absent in the majority of cases.

Symptomatology.—An attack of membranous sore throat is often preceded for a few hours, or in some cases for two or three days, by loss of appetite and a feeling of lassitude and general malaise. The invasion of the disease is announced by a chill, or merely a sensation of general coldness, followed by marked febrile reaction, the bodily temperature often rising to 103°, or even higher, while the pulse varies in frequency from 100 to 140 beats in the minute. The fever is accompanied by a violent supra-orbital or frontal headache and pains in the back and lower extremities. Deglutition is always more or less painful, and is often attended with stitches in the ears. There is a constant feeling of soreness, heat, and dryness in the throat, and this sensation may extend to the posterior nares, and occasionally to the larynx. The tongue is coated, the breath is offensive, and the complexion is often sallow. In some cases there is profuse salivation; in others there is an accumulation of ropy, tenacious, turbid mucus. The uvula is frequently elongated and cedematous. When the orifices of the Eustachian tubes are involved, there is transient deafness; and extension of the morbid process to the larynx may give rise to hoarseness, cough, and dyspnoea, and, in rare instances, to mechanical asphyxia.* In nearly all cases there is, throughout the whole course of the disease, a degree of prostration entirely disproportionate to the gravity of the local lesion. Under proper treatment the severe symptoms usually subside within forty-eight hours; and the duration of an attack is rarely longer than a week or ten days, even in the worst cases. In scrofulous and tuberculous subjects, however, the disease sometimes shows a peculiar persistency, either recurring at frequent intervals, or continuing, with occasional exacerbations and remissions, for weeks and months.†

Diagnosis.—Membranous sore throat is frequently confounded with diphtheria, and remedies which have been employed more or less successfully in the former malady may thus acquire an unmerited reputation for efficacy in the treatment of the graver disease. The differentiation of these two affections is often difficult. During the vesicular stage, and when the local lesion is accompanied by an herpetic eruption upon the mouth or face, the diagnosis is easy. When the exudation is confined to the tonsils, the pillars of the fauces, and the soft palate, and the constitutional symptoms rapidly subside under treatment, there is a strong presumption that the malady is not diphtheria. But occasionally, in membranous sore throat, the deposit not only appears upon the posterior wall of the pharynx, but may also extend to the air-passages, the systemic disturbance may be

* Cohen, op. cit., p. 105.

† Ibid.

severe and protracted, and the attack may be followed by paralysis of the soft palate.* In these cases the resemblance to diphtheria is so strong that an accurate differential diagnosis is impossible.

Prognosis.—Membranous sore throat is seldom a dangerous affection *per se*; but during an epidemic of diphtheria it may serve as a starting-point for the latter disease, and in debilitated subjects it is occasionally followed by gangrenous sore throat.

Treatment.—The majority of cases will terminate in recovery without any treatment, but the duration of an attack can be shortened, and the suffering greatly relieved, by the administration of properly-selected remedies. Those which in my own experience have proved most efficient are Kali bich., Lachesis, and the Iodides of mercury. Belladonna, although apparently well indicated at the outset of the disease, seems to act as a palliative rather than a curative agent. Apis, Lycopodium, and Rhus tox. are occasionally useful. We append the indications for the principal remedies :

Kali bich.—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 to the air-passages; *violent supra-orbital headache.*

Lachesis.—The deposit is confined to the left side of the throat, or commences on the left side, and extends to the right; solids are swallowed more easily than liquids; the patient cannot bear the slightest pressure about the throat or neck; *great dryness of the throat, which is always worse after sleeping.*

Merc. iod. flav.—The exudation is principally on the right side; *thick yellow coating at the base of the tongue*; breath offensive; *profuse salivation*; coppery taste in the mouth; uvula elongated and oedematous; cervical and submaxillary glands swollen; complexion sallow; aggravation from warm drinks.

Merc. iod. rub. is similar in many respects to *Merc. iod. flav.*, but lacks the thick yellow coating at the base of the tongue so characteristic of the latter remedy, and the patches are confined principally to the *left tonsil.*

The throat should be protected by a silk handkerchief or a single thickness of flannel, but external applications and astringent gargles are unnecessary. In ordinary cases, the diet should consist of bread and milk, or milk porridge. When the patient is much debilitated, beef-tea and nutritive soups should be given. Alcoholic stimulants are never required in this disease.

GANGRENOUS SORE THROAT.

Synonyms.—Putrid sore throat, Ulcerous sore throat, Phagedenic sore throat, Malignant sore throat; Angina ulcerosa, Angina putris, Angina gangrenosa, Cynanche maligna, Tonsillitis maligna, etc.

Mackenzie † restricts this term to "primitive gangrene of the pharyngeal mucous membrane originating independently of any other malady," but the majority of writers use it to denote a form of pharyngeal inflammation which may occur idiopathically, or may accom-

* Cohen, op. cit., p. 106.

† Op. cit., p. 53.

pany or follow other diseases, but is always either gangrenous from the outset, or speedily leads to gangrene.

Before Bretonneau investigated the subject, there was a prevalent belief that the disease was a common one; but the exhaustive researches of that observer have conclusively proved that it is in reality a rare affection, and that the malady described under this name by ancient writers was diphtheria. The later observations of Trousseau and Gubler also serve to confirm this view.

Ætiology.—Its predisposing causes are often obscure. It may supervene upon diphtheria, typhoid fever, erysipelas, dysentery, glanders, malignant pustule, or the acute exanthemata. It may also occur in tubercular phthisis, even when the larynx and trachea are not involved, and it may follow any variety of sore throat.* In some instances, exposure to cold, or sudden suppression of perspiration, seems to act as an exciting cause.

Anatomical Characters.—In the majority of cases the appearance of the throat is not characteristic in the early stages, and the distinctive phenomena of the disease do not appear until the second or third day. At first, the tonsils are swollen and livid, and the uvula, soft palate, and pharynx are congested and œdematous. When the morbid process is fully developed, ash-colored, dark or black, slightly elevated patches can be seen upon the tonsils, the pillars of the fauces, and the posterior wall of the pharynx, or, exceptionally, they may be confined to the posterior surface of the palate, where they can be detected only by rhinoscopic examination. These patches form eschars, which ultimately become detached from the underlying tissues and leave irregular ulcers, covered with an ichorous, offensive sanies. The cervical lymphatics are often slightly tumefied and tender, but this lesion is not invariably present. In favorable cases, the ravages of the disease are confined to the parts first attacked. More frequently, however, the gangrene rapidly spreads in all directions, extending upward to the mouth and posterior nares, and downward to the œsophagus, larynx, and trachea. In some instances, fatal hæmorrhage is induced by ulceration and perforation of the cervical bloodvessels; and in the worst cases, sphacelated patches are found in the lungs, stomach, and intestines.

Symptomatology.—Occasionally the disease begins like an ordinary sore throat, with considerable fever, local inflammation, and painful deglutition; but as a rule, the symptoms assume an asthenic type from the outset, and pain and dysphagia are but slightly marked, and may be absent. In all except the mildest cases, the breath has a peculiar, fetid, gangrenous odor; this horrible fetor is present even in the early stages, and persists throughout the whole course of the disease. The tongue and the mucous membrane of the mouth are often

* Cohen, *op. cit.*, p. 101.

covered with a dark, pultaceous secretion. When the gangrene is fully developed, there is a remarkable prostration of the vital forces, and the patient falls into a state of collapse closely resembling the algid stage of cholera. The features become pallid, pinched, and haggard, the eyes have a glassy look, the voice is weak and muffled, there is general coldness of the surface, the skin often presenting a bluish, mottled appearance, and the pulse is slow and feeble. If the morbid process extend to the lungs, there is copious hæmoptysis, and when the alimentary tract is implicated, there is a profuse offensive diarrhœa. Occasionally, in the worst cases, there is a simultaneous passive hæmorrhage from the nose, mouth, lungs, and bowels, and blood may also be extravasated under the skin, forming petechial spots which soon become gangrenous. Phlebitis of all the superficial veins has also been observed. Death occurs from exhaustion, syncope, hæmorrhage, or œdema of the glottis. In some instances the fatal termination is preceded by coma, but more frequently consciousness is retained to the last.

Diagnosis.—In the early stages, and in those cases in which the ulceration is confined to the posterior surface of the soft palate, and is, therefore, out of the line of direct vision, this disease may be mistaken by a careless observer for acute catarrhal sore throat, but can easily be distinguished by the absence of severe pain, the marked prostration, and the peculiar odor of the breath.

In later stages it may be confounded with diphtheria; but as Mackenzie* remarks, the resemblance between these two affections "is not sufficiently great to lead an observant practitioner into error." In diphtheria, the patches in the throat are, at first, whitish, and gradually assume a darker hue, and the fetor of the breath is not marked until the disease is fully developed; while in gangrenous sore throat the patches are ash-colored, dark, or black, when they first appear, and the peculiar fetid breath is one of the earliest symptoms. In diphtheria, the cervical and submaxillary glands are always swollen; in gangrenous sore throat, the glandular swelling is slight or entirely absent.

Prognosis.—The prognosis is always grave, yet in apparently hopeless cases the patients sometimes survive. Recovery is rarely perfect, however, for in the majority of instances the ravages of the disease cause more or less permanent deformity. The uvula is generally destroyed, and the soft palate either shares the same fate or contracts adhesions to the pharyngeal walls, and in this way complete occlusion of the retronasal portion of the pharynx may be produced. As the result of this changed position of the parts, nasal respiration is abolished, smell and taste are impaired, the voice loses its natural resonance, articulation is difficult, and deglutition is often seriously embarrassed.

* Loc. cit.

Treatment.—Prof. Farrington * recommends *Arsen.*, *Bell.*, *Carbo veg.*, *Conium*, *Kreos.*, *Lach.*, and *Silic.* Prof. Lilienthal† suggests *Ammon. c.*, *Arsen.*, *Conium*, *Euphorb.*, *Kreos.*, *Lach.*, *Merc.*, and *Sulph.* Arsenic and Lachesis have the best clinical record.

Special Indications.—Arsenicum.—Great anguish, restlessness, and prostration; livid or bluish appearance of the throat; constant thirst for cold water, but takes only a swallow at a time; the symptoms are all worse at night, especially after midnight, and are temporarily relieved by hot drinks.

Belladonna is sometimes useful in the early stages of the disease, when there is intense congestion of the throat with flushed face, dilated pupils, throbbing of the carotid and temporal arteries, and drowsiness with inability to sleep.

Carbo veg.—Rapid sinking of strength; cold breath; general coldness of the surface, which may be covered with a clammy, sticky perspiration, yet the patient desires to be fanned.

Kreosotum.—According to Prof. Lilienthal,‡ this remedy “acts well in scrofulous and lymphatic persons, with black softening and decomposition of the mucous membrane, with atony and extension of the softening, especially toward the œsophagus.”

Lachesis.—Dark red or purplish appearance of the throat; the disease begins or is worse upon the left side; intolerance of the throat to the least touch or pressure; great debility, with coldness of the extremities and feeble pulse; aggravation after sleep.

Destruction of the diseased tissue by bromine, caustic potassa, the mineral acids, or the incandescent cautery, although highly recommended by many writers, is of doubtful utility, and is applicable only when the gangrene is superficial. If the ulceration extends deeply, or occurs in close proximity to the cervical bloodvessels, this treatment is dangerous and impracticable.

When there is reason to apprehend perforation of the carotid, the patient must be constantly watched, and if hæmorrhage occur, it must be controlled by digital compression until the arteries can be properly secured.

Beef-tea, eggs, milk, cream, and nutritious soup should be given in large quantities and at frequent intervals, and in many cases alcoholic stimulants are required. In the majority of instances the patient can swallow readily, and nourishment may, therefore, be administered by the mouth; when there is marked difficulty in deglutition, nutritive enemata must be employed.

RETROPHARYNGEAL ABSCESS.

Synonyms.—Peri-pharyngeal abscess, Post-pharyngeal abscess, Retro-œsophageal abscess, Peri-œsophageal abscess, Abscess of the pharynx.

A collection of pus between the posterior wall of the pharynx and the bodies of the cervical vertebræ is technically known as retropharyngeal abscess.

Ætiology.—This affection may occur at all periods of life, but is most frequent during infancy and childhood, and attacks by prefer-

* Studies in *Materia Medica*, Hahn. Monthly, vol. xv., p. 582.

† *Homœopathic Therapeutics*, p. 562.

‡ *Loc. cit.*

ence those already debilitated by scrofulosis or syphilis. It may arise primarily from an idiopathic inflammation of the retro-pharyngeal lymphatics or of the submucous connective tissue, the immediate exciting cause being, usually, protracted exposure to a chilling atmosphere or a sudden change from extreme cold to undue warmth. It may also supervene upon pharyngitis, acute tonsillitis, parotitis, suppurative inflammation of the external cervical lymphatics, caries of the cervical vertebræ, scarlatina, measles, erysipelas, and pyæmia. More rarely it is induced by wounds of the mucous membrane of the pharynx produced by sharp foreign bodies—pieces of bone, splinters of wood, pins, etc. All writers upon the subject, with the exception of Bokai* and Mackenzie,† agree that, in the great majority of cases, the disease is a secondary affection, and that its most frequent cause, especially in adults, is cervical spondylitis terminating in caries.

Anatomical Characters.—The site of the abscess varies in different cases. Usually the swelling can be seen on one side of the pharynx opposite the glottis, but occasionally it is concealed behind the posterior nares or behind the œsophagus. It may be no larger than a pigeon's egg, or it may fill the whole pharyngeal cavity, and even project in front of the soft palate. Its walls may be thin and fragile, or hard and almost cartilaginous. The overlying mucous membrane is reddened and shining from tension, but seldom presents any evidence of severe inflammatory action; late in the disease a few yellow spots appear upon its surface, indicating the formation of pus. In the majority of cases the abscess discharges its contents into the pharynx, but occasionally the purulent fluid burrows in various directions, in some instances making its exit in the parotid region, in others gravitating toward the thoracic cavity, and perforating the œsophagus, trachea, or pleural sac.

Symptomatology.—The onset of the malady is generally insidious. In secondary abscesses the precursory symptoms are those of the primary disease; but in idiopathic cases, with the exception of pain and soreness in the throat and slight difficulty in swallowing, there is nothing to excite suspicion in the early stages. Later, the symptoms become more pronounced. The pain and soreness increase and are aggravated by motion of the neck or by pressure upon the larynx. The throat is swollen externally upon the side corresponding to the site of the abscess. This tumefaction usually occupies the natural depression between the angle of the jaw and the sterno-cleido-mastoid muscle, but sometimes involves the whole side of the neck, and may even extend to the posterior cervical region. The neck is stiff, and there is a marked immobility of the head, which is either retracted or, when the abscess occupies a lateral position, inclined toward the healthy side. In some instances there is a rigid contrac-

* Jahrbuch für Kinderheilkunde, 1876.

† Op. cit., p. 34.

tion of the sterno-cleido-mastoid, simulating torticollis. Usually, there is a pronounced febrile action, with alternation of heat and rigors or merely general chilliness. There is great restlessness, the mouth is hot and dry or filled with mucus, and the tongue is heavily coated. Convulsions are frequent in nursing infants, and facial paralysis has been observed by Bokai* in three cases.

A marked feature of this disease is the serious interference with the degluto-respiratory functions. The dysphagia varies from simple inability to swallow solids to complete aphagia. Respiration is labored and stertorous during both inspiration and expiration; the voice is muffled, feeble, or indistinct, and there is snoring during sleep. Cough is slight or absent. The dyspnoea increases with the growth of the abscess; the patient is obliged to maintain an erect or semi-reclining posture; and suffocative attacks are induced by coughing, swallowing, and by any attempt to bend the head forward or to assume a horizontal position. Cyanotic symptoms supervene, and, unless the abscess is opened or ruptures spontaneously, death ensues from asphyxia. The case may also be complicated by œdema of the larynx and suppuration of the submaxillary glands.

When the abscess is situated entirely behind the œsophagus, the symptoms vary slightly from those above described. There is less relief in the sitting posture; the lateral swelling of the neck is lower down, further forward, and is most prominent on the left side; food is not ejected through the nostrils, but part of it is swallowed and part passes into the larynx, causing paroxysms of cough; pressure upon the larynx induces attacks of asphyxia, but causes less pain than pressure upon the œsophagus, and the voice is "shrill and piping, and comparable to that of a duck."†

Finally, there are exceptional cases in which many or all of the characteristic symptoms of the disease are absent. When the abscess occupies an exactly central position, there is usually no external swelling of the neck; when it is located behind the posterior nares, there may be dysphagia, but there is no marked dyspnoea; and when it is small and has an extreme lateral site, or forms between the sheaths of the muscles and the membranous walls of the pharynx, the suppurative process may run its course without fever or any serious obstruction in swallowing or breathing. In some cases, dependent upon caries of the cervical vertebræ, the first noticeable symptom may be a sudden expectoration of purulent matter, mingled with small pieces of carious bone.‡

The *duration* of the disease varies according to the location and size of the abscess, the rapidity of its growth, the direction in which it extends, and the severity of the accompanying inflammation. In the

* Jahrbuch für Kinderheilkunde, 1876.

† Cohen, op. cit., p. 247.

‡ Meigs and Pepper, op. cit., p. 351.

worst cases death may occur as early as the second or third day; when the malady pursues its ordinary course, it may last from one to three weeks; and when the abscess is small, grows slowly, has a lateral or downward extension, and exerts but slight pressure upon the air-passages, the case may be prolonged for months.

Diagnosis.—Retropharyngeal abscess may always be suspected when a child has paroxysms similar to those of croup, but less distinctly remitted, associated with well-marked dysphagia. These symptoms, however, are not conclusive. Positive proof of the existence of the disease can be obtained only by ocular inspection and digital exploration. When the abscess is located behind the posterior nares or behind the œsophagus, it is out of the line of direct vision, and can be detected only by the aid of the rhinoscope or the laryngoscope; but when it occupies its usual site, if the mouth be widely opened and the tongue strongly depressed, the swelling, or at least some portion of it, can be seen pushing forward the posterior pharyngeal wall and encroaching upon the cavity of the pharynx. The forefinger, carried down over the base of the tongue, encounters a hard, elastic, or fluctuating tumor, which, in many cases, can also be felt externally. By this method a positive diagnosis may often be made when ocular inspection affords only negative or uncertain evidence.

In a large proportion of the reported cases, the disease was not recognized during life, but was mistaken and treated for some other affection. The maladies which most resemble it are membranous croup and œdema of the larynx. From the former it may be distinguished by the dysphagia, the aggravation of the dyspnoea in the horizontal position, the sensitiveness of the larynx to pressure, and the tone of the voice, which may be muffled or indistinct, but never has the hoarse or whispering sound characteristic of croup.

In œdema of the larynx, the obstruction to breathing occurs suddenly, and is most marked during inspiration, while in abscess there is usually a period of several days before the respiration is seriously affected, the dyspnoea develops gradually, and both inspiration and expiration are equally difficult. It must not be forgotten, however, that the two affections may coexist.

In infants the reflex cerebral phenomena may so completely mask the primary lesion that the disease may be mistaken for meningitis. The diagnosis is often difficult, but if an accurate history of the attack can be obtained, the priority of the pharyngeal affection will indicate the true nature of the malady. In all cases of doubtful diagnosis the crucial test is the evidence afforded by inspection and palpation.

Prognosis.—In neglected or mismanaged cases, most of the patients die of apnoea or œdema of the larynx; but when the disease is recognized early and properly treated, the majority recover. Abscesses which form behind the œsophagus usually terminate fatally. The prognosis is also unfavorable when the pus perforates the œsophagus,

trachea, or pleural sac. In rare instances death may ensue from erosion of the internal carotid artery. When a large abscess is punctured or ruptures spontaneously, the purulent matter sometimes floods the air-passages and causes instant asphyxia.

When the disease is dependent upon caries of the cervical spine, recovery is occasionally effected after the exfoliation and discharge of portions of the vertebræ; but in the great majority of these cases, even when the malady is properly treated, the patients ultimately perish. When the abscess produces extensive caries of the intervertebral cartilages, rupture or incision of the sac may be followed, according to Dr. Allen,* by dislocation of the vertebræ and fatal compression of the spinal cord.

Treatment.—When the disease develops idiopathically, it can generally be aborted in the incipient stage, according to Duncan,† by the timely administration of Belladonna or Kali bich. Raue‡ considers Hepar and Silic. the main remedies, and recommends Aurum, Bell., Lach., Lycop., Merc., Nitric ac., and Phos., if fluids regurgitate through the nose when the patient attempts to swallow.

In the majority of cases, medical aid is not summoned until the malady has reached a point where all efforts to prevent suppuration are likely to prove futile. The indications for treatment under these circumstances are to hasten the suppurative process by such remedies as Hepar, Merc., or Silic., and to promptly evacuate the pus as soon as fluctuation can be detected.

The abscess may be opened with a lancet, scalpel, bistoury, or the needle of the aspirator; when its walls are thin, they may be punctured with the finger-nail or ruptured by the pressure of the finger; and when the swelling points externally, it may be opened from the outside. Care must be taken not to injure the vertebræ or to wound the cervical bloodvessels, and caution is especially necessary when the abscess lies in close proximity to the internal carotid artery. If the sac refill, it must be emptied by gentle pressure from below upward. Usually, the abscess rapidly heals after the evacuation of the pus, but occasionally there remains an ulcer which slowly heals by granulation.

Tracheotomy is sometimes necessary when the abscess forms behind the œsophagus, or when there is œdema of the glottis which refuses to yield to Apis or Merc. corr.

Stimulants are rarely needed, but the patient's strength must be sustained by nutritive liquid food, given by the mouth, or, where there is inability to swallow, by the rectum.

DIFFUSE INFLAMMATION OF THE CONNECTIVE TISSUE OF THE NECK.

Synonyms.—Angina Ludovici, Morbus Ludovici, Cynanche cellularis maligna, Cynanche sublingualis rheumatico-typhoides, Pseudo-

* N. Y. Jour. Med., Nov., 1851.

† Diseases of Children, p. 292.

‡ Pathology and Therapeutics, p. 112.

erysipelas subtendinosum colli; Diffuse cervical abscess, Diffuse cervical phlegmon.

This formidable disease is, fortunately, rare, and is confined almost exclusively to adults. It sometimes presents itself as an idiopathic affection. In other cases it is secondary to inflammatory affections of the hyoid bone, inferior maxilla, or larynx. It has also been known to occur as a complication of typhoid and puerperal fevers and the acute exanthemata, and in some instances has followed wounds of the neck.

Anatomical Characters.—The whole cervical region may be involved from the parotids to the clavicles. The inflammatory process begins in the connective tissue, but soon extends to adjacent structures. It may terminate in resolution, but more frequently passes into suppuration, which, in the majority of cases, ultimately becomes gangrenous. In the worst forms of this disease the different planes of cellular tissue, one after another, are destroyed; the cervical lymphatics and the submaxillary, parotid and thyroid glands, may slough; and, finally, the cervical muscles, and even the larynx, may undergo degenerative changes. The affected parts are infiltrated with a sanious, offensive pus, which usually makes its exit upon the cutaneous surface or into the mouth, but in some instances gravitates into the mediastinum or perforates the œsophagus or the trachea.

Symptomatology.—The initial symptoms are headache, loss of appetite, dysphagia, and slight fever. A hard, painful swelling next appears on one or both sides of the neck in the supra-hyoid region, and, in some cases, can be felt in the floor of the mouth; the skin retains its normal color and is freely movable. The tumefaction rapidly increases in size, and in the course of a few days may project beyond the chin. The overlying integument is now tense, brawny, and firmly adherent, and the mucous membrane of the whole oral cavity is swollen and reddened. The face is œdematous, the head is retracted, the floor of the mouth is pressed upwards, the mobility of the tongue is lost, the jaws are nearly or completely closed, the breath is offensive, and there is a profuse flow of fetid, viscid saliva. Speech is indistinct, and deglutition difficult or impossible. The pressure of the tumor upon the larynx and trachea causes serious embarrassment of respiration, which may increase to urgent dyspnoea and even asphyxia; and the compression of the internal jugular vein induces hyperæmia of the brain, headache, vertigo, and delirium. Œdema of the larynx may also occur. The fever at this stage may be slight or severe. If resolution takes place, the symptoms gradually subside, but the process of resorption is slow, and a hard swelling remains for weeks.

Where the disease passes into the suppurative stage, the tumor softens, the overlying skin becomes congested and, as the pus approaches the surface, shows an erysipelatous blush, or presents a

glazed appearance; fluctuation can be detected, in the majority of cases, by careful palpation, and if gangrene supervene, there is well-marked crepitus on pressure. The constitutional symptoms now assume an adynamic or typhoid form. The patient, unable to obtain any refreshing sleep, and exhausted by constant suffering, rapidly loses flesh and strength, while the toxæmic influence of the fetid secretions helps to still further depress the vital power.

According to Cohen,* the duration of an idiopathic case, terminating in recovery, is from ten to twenty days, while secondary cases pursue a more chronic course. When the disease proves fatal, death may occur in a few days, or the suffering may be prolonged for two or three weeks.

Diagnosis.—This malady is not likely to be confounded with any other affection. The symptoms are so striking and peculiar that an error in diagnosis is hardly possible.

Prognosis.—This is always grave. Recovery may be expected when the inflammation shows a tendency to terminate in resolution, or the suppuration is of limited extent; but, unfortunately, these are the exceptional cases. When suppuration and gangrene are extensive, a few patients may survive, but the great majority die of exhaustion or pyæmia. If the abscess burst into the mediastinum, œsophagus, or trachea, the result is almost invariably fatal. Death may also occur from œdema of the larynx, from mechanical asphyxia induced by the pressure of the tumor upon the air-passages, or, in some cases, as the late Dr. Sidell† has recently demonstrated, from hæmorrhage due to ulceration and erosion of the tunics of the cervical bloodvessels by “a peculiar species of inflammatory *ramollissement*.” The disease may be followed by fistulous ulcerations, by cicatricial contractions which interfere with the mobility of the neck, and, in some cases, by caries and necrosis of the hyoid bone and the inferior maxilla.

Treatment.—Homœopathic literature is silent upon the therapeutics of this affection; but the remedies which, according to their pathogeneses, ought to prove reliable are: Anthracinum, *Arsen.*, *Arsen. iod.*, Bell., Crotal., *Hepar*, Kreos., *Lach.*, *Merc.*, Phytol., *Rhus tox.*, *Silic.*, and *Tarantula cubensis*.

Of these, Antrac., *Arsen. iod.*, Bell., and *Rhus tox.* correspond to the inflammatory stage; *Hepar*, *Merc.*, and *Silic.* to the suppurative period; and *Arsen.*, Crotal., Kreos., *Lach.*, Phytol., and Tarant. cub. to the gangrenous form of the disease.

Apis or *Merc. corr.* will be indicated when there is œdema of the larynx, and Carbo an. will be required for induration remaining after resolution.

The patient's strength must be sustained by a nourishing diet, and if aphagia exist, by nutritive enemata. Stimulants should be freely

* Op. cit., p. 690.

† Amer. Jour. Medical Sciences, Oct., 1883.

used when necessary. In the early stages the external application of ice is sometimes beneficial; when suppuration is inevitable, hot fomentations are indicated to hasten the process. As soon as fluctuation can be detected, the pus should be evacuated by a free incision, or, when this is hazardous, by a careful dissection of the tissue of the neck. Strict antiseptics and thorough drainage are absolutely essential. All soiled dressings must be destroyed or disinfected.

When asphyxia is imminent from œdema of the larynx, or from compression of the larynx and trachea, and free incisions fail to afford relief, tracheotomy is imperatively demanded. The operation is exceedingly difficult in these cases, and the tracheotomy-tube must be of extra length, or, as Cohen* suggests, a section of rubber tubing may be used as a substitute.

When hæmorrhage occurs, Dr. Sidell advocates the following treatment: The abscess cavity must be freely opened, the clots turned out, and the bleeding vessel ligated on each side of the opening in its walls. If the ligature cut through the softened tunics, the actual cautery must be applied. When neither of these methods is applicable, digital compression of the common carotid should be tried, and if this fail, ligation of that artery affords the only hope of saving life.

DISEASES OF THE MUCOUS MEMBRANE OF THE MOUTH.

BY CLARENCE M. CONANT, M.D.

THRUSH.

Synonyms.—French, Aphthe; German, Mundschwamm.

Definition.—A circumscribed inflammation of single or numerous spots on the mucous membrane of the mouth, characterized by a white exudation which, whether forcibly removed or spontaneously exfoliated, leaves an ulcer in the subjacent mucosa.

History.—In popular parlance all those ulcerations of the mucous membrane of the lips, tongue, and cheeks, which are characterized by the white flaky membrane and the excavated underlying ulcer, have been styled thrush. Nor was it until 1842 that the histological nature of these white patches was understood. In that year Gruby first discovered a minute fungus in them, which he styled Aphthaphyte, from which is derived our word aphthæ. For that reason, remarks W. Fairlie Clarke, it would seem desirable to restrict the term aphthæ to those exudations in which this fungus is found; for there may exist in the mouth a simple stomatitis or a dyspeptic ulceration in whose exudation this fungus does not exist. This fungus was recognized by Robin as belonging to the genus *oidium*, and was named by him *oidium albicans*.

* Op. cit., p. 691.

Ætiology.—Thrush is usually seen in the last stages of wasting diseases, or in the new-born or the extremely aged. The fact that gastric, and sometimes intestinal, disturbances usually accompany it, would seem to point to disorders of the digestive apparatus as a cause.

Pathology.—Genuine aphthæ originate in small patches of a white, curdy, or flake-like membrane, forming upon the mucous membrane of the mouth, and firmly adherent to it. These patches tend to extend and coalesce, so as to form a continuous white coating. Under the microscope the exudation is seen to depend upon a minute fungus, the *oidium albicans*. This is found growing upon the mucous membrane, in intimate association with its epithelium, arising in delicate horizontal threads, composed of homogeneous cells, much elongated, and placed end to end. The upmost cells expand into oval bodies, which, falling off, become transplanted and, taking root elsewhere in the mucous membrane, form a new patch or extend the old one. This white patch or pseudo-membrane is then seen to consist of these filaments, tangled together and mixed with debris of scattered cells, epithelium, and spores of that other fungus found in the angle between the teeth and the gums, the *leptothrix buccalis*. When this white patch is removed, or even spontaneously shed, the mucous membrane comes with it, and a characteristic ulcer is observed in the subjacent papillæ. This ulcer is small, flat, and of regular geometrical shape, round or oval; its base is soft and smooth, with a yellowish or ashy slough; its edges are well defined, but not thickened or elevated, and the whole is surrounded by a red areola. As the patches seem to develop in successive crops, so likewise do the ulcers. A dyspeptic thrush, sometimes proceeding to ulceration, is frequently seen, but this is not aphthæ proper, as it does not arise from, nor contain, the fungus *oidium albicans*. This form will be discussed under "stomatitis."

Symptomatology.—Raue lays much stress upon an acid condition of the system in general, and an intensified acidity of the buccal fluids in particular, as a forerunner and cause of thrush; when, therefore, in bottle-fed infants, or in poorly nourished persons, unusual dryness, heat, and redness of the mouth are observed, and increased viscosity and acidity of saliva, an attack of thrush may be expected. In a few hours initial spots of white flakes, of the size of a pin's head, may be detected under, or upon the edges of, the tongue (a favorite location) or upon the cheeks; these rapidly multiply and coalesce, so that ten or twelve hours may suffice to bring the disease almost to its height. The membrane remains firmly adherent until the third or fourth day, when the ulceration is seen occupying the same spots at first covered by the white pseudo-membrane. Or more frequently the mouth exhibits successive stages or crops of the spots; some show evidence of inflammation, and are dotted with minute

white flecks, others are well covered with the white adherent fur; still others, denuded of the exudation, show the papillæ raw and red; and again we see them in the last stage, exhibiting the characteristic ulcer. The ovoid tops of the filaments composing the *oidium albicans* take root readily and grow if placed upon any mucoid surface; thus the flakes may be grafted upon the nipple of the nursing mother; or, when swallowed by the child, may develop in the stomach and bowels, appearing at the anus as an intertrigo. This intestinal development gives rise to an actual follicular enteritis. Fever, nausea, vomiting, and often diarrhœa, increase the discomfort caused by the heat and dryness of the mouth, which alone are quite enough to occasion much thirst and uneasiness. The disease may continue for an almost indefinite length of time, the strength and powers of endurance of the patient being its only limit, unless checked by treatment. The termination is favorable, save when the thrush is a symptom occurring in the last stages of wasting diseases.

Treatment.—As an acid state of the system in general, and of the saliva in particular, favors the development of thrush, scrupulous cleanliness should be insisted upon in the care of bottle-fed babies. Absolutely sweet wholesome food, and plenty of it, is essential, and should be secured by careful and frequent washing of all the bottles, tubes, spoons, and other utensils employed in feeding. If the infant is suckled by its mother, her milk should be examined, and any variations in it, or in her health, should be corrected. If these deviations from normal standards are very wide, or not easily and speedily set right, a wet-nurse should be had, or the child weaned and fed artificially.

When thrush occurs in old people, or in the course of wasting diseases, the aphthous fungus seems to flourish with unusual vigor, and a disinfectant is often necessary, not alone to destroy the growth and to prevent its reproduction, but also to overcome the fœtor so often observed. For this purpose Sir William Jenner advises a weak solution of the sulphite of soda in water, a drachm to an ounce. A weak solution of carbolic or sulphurous acid, or of Condy's fluid, or of the various chlorides, is also recommended.

Remedial.—**Aethusa.**—Painful aphthæ in the mouth of infants who cry much, as from colic; vomiting of milk in lumps; diarrhœa of undigested stools.

Arsenicum album.—Aphthæ in the mouth of adults or infants, becoming bluish or livid. Intense burning; great exhaustion: characteristic diarrhœa.

Arum triph.—Buccal cavity raw, sore, and bleeding. The mouth burns; infants refuse drink, and cry when it is urged or even offered. Acute stomatitis, with great swelling of the lips and superficial ulceration.

Baptisia.—Aphthæ in the last stages of phthisis and of nursing infants. Putrid ulceration of the mouth, with salivation and well-developed ulcers. The thrush extends through the alimentary canal, giving rise to an offensive, watery, excoriating diarrhœa, which may even become slimy and bloody.

Borax.—Infantile aphthæ which bleed easily; great heat and dryness of the mouth.

Helleborus.—Mouth full of flat yellow ulcers with elevated gray edges or red swollen bases. Carrion-like odor; salivation; glands under the jaw and on the neck swollen.

Hydrastis.—Follicular inflammation and dyspeptic ulcerations, with exceedingly tenacious mucus in the mouth. Nursing women, weakly children, and debilitated persons. Marasmus. Chronic gastric catarrh. Constipation.

Mercurius.—Apthous ulceration of the mouth; copious, fetid, ropy salivation; scorbutic gums; large blisters in the mouth; ulceration of the glands, ducts, and their orifices; burning pains at night, burning diarrhoeic stools.

Muriatic acid (or Nitro-muriatic acid).—Stomatitis of nursing babies; large irregular deep ulcerations; fetor of breath.

Natrum mur.—Vesicles and ulcers in the mouth and on the tongue, smarting and burning when touched by the food.

Nitric acid.—Mucous membrane of the mouth swollen and ulcerated; pricking pains, especially after the abuse of Mercury. Fetid and acrid saliva, which causes sores on the lips, chin, and cheeks.

Nux vomica.—Dyspeptic and apthous ulcerations in small spots; putrid odor from the mouth; bloody saliva; gums foul, swollen, and ulcerated. Constipation.

Staphisagria.—Stomatitis. Apthous blisters, changing into canker sores, with a bluish-red or yellowish bottom.

Sulphur.—Blisters in the mouth. "When the thrush has gone through the child."

Sulphurous acid.—Apthous mouth, and gums yellowish and painful. After Borax. Stomatitis of nursing women.

Also Calcarea carb., Carbo veg., Chamomilla, Cornus cir., Eupatorium, Hepar, Lachesis, Phytolacca, Veronica.

A weak solution of the appropriate remedy may be locally applied, frequently to the greatest advantage.

STOMATITIS.

Synonyms.—French, Stomatite; German, Mundschleimhautentzündung.

Definition.—An inflammation and, sometimes, ulceration of the mucous membrane of the mouth, resembling thrush or aphthæ, but distinct from it pathologically.

Ætiology.—Like genuine aphthæ, stomatitis arises in debilitated infants or adults, dyspeptics and children convalescing from eruptive fevers affording many cases.

Pathology.—The first stage of stomatitis consists in an inflammation of the mucous follicles of the mouth and a mucoid exudation in white patches. This exudation is histologically distinct from that constituting true aphthæ in that it does not contain any fungus or organized growth, although it is almost identical with it in appearance. This is called follicular stomatitis, there being as yet no breach of surface. Should the inflammation remain unchecked, the mucous exudation is exfoliated, the follicles rupture, and form small ulcers covered with a yellow or gray slough; often these coalesce and form large ulcerated spots. This is ulcerative stomatitis or dyspeptic thrush, whose ulcer, although resembling the true apthous ulcer, differs from it in essential features, notably in degree of intensity.

Symptomatology.—In follicular inflammation the mouth becomes hot, dry and tender; the follicles are seen to be red and swollen; salivation occurs, and sometimes diarrhœa. So far, there is no solution of continuity, but if the morbid process now becomes suppurative, the white or ash-colored patches are thrown off, and little ulcers are formed in the burst follicles. These sometimes remain few and distinct, but more often they spread, and rapidly coalesce.

Varieties.—Stomatitis may be follicular, ulcerative or gangrenous. The first two have been discussed; the last will be considered under "Gangrene of the Cheeks."

Diagnosis.—The only differential question which is likely to arise lies between true aphthous thrush and simple stomatitis. Nor can we certainly distinguish them save by the aid of the microscope, which in true aphthæ will show the *oidium albicans*. Fortunately, the diagnosis is of more theoretical than practical value, since the homœopathic treatment is very similar.

Prognosis.—Follicular stomatitis is never a serious complaint, but its advanced form (ulcerative) may occasion great annoyance by its persistence, and may even occasion death by exhaustion. True aphthous thrush is always to be dreaded; it frequently hastens death in consumption, typhus, and other diseases marked by great waste; occasionally it destroys a nursing woman, and not a few infants succumb to its torments.

Treatment.—Stomatitis, follicular and ulcerative, so closely resemble thrush that we have included the treatment of all under the common head, Thrush.

GANGRENE OF THE CHEEKS.

Synonyms.—Gangrenous stomatitis, Cancrum oris, Noma.

Definition.—A malignant ulceration of the cheeks, arising in their mucous surface, and ending in destruction of the affected parts by gangrene.

Ætiology.—Severe attacks of profound diseases which impoverish the blood, such as scarlet fever, measles, small-pox and typhus in children, and typhus and puerperal fever in adults, predispose to noma. It is not often seen outside of public institutions.

Pathology.—William Aitkin and C. G. Raue describe cancrum oris as originating from one small vesicle, or more, situated inside the cheek and containing a pale red, grayish or brown ichor. Raue remarks of the vesicle: "It bursts so soon that its formation is mostly overlooked." And so good authorities as W. Fairlie Clark, Dr. West and Joseph Coats describe as the initial process the ulcer arising from the rupture of this blister. Nevertheless, we think it is in this vesicle and its fluid contents that pathologists must seek for the exact histological cause

and nature of that unknown and yet confessedly specific poison from which is developed this destructive and fatal morbid process.

Coexistent with, and subsequent to, the formation of this blister is an intense diffuse inflammation of the whole cheek, while on its site arises a phagedenic ulceration, speedily becoming gangrenous and sloughing away. Should the patient survive long enough, the whole cheek, and even the ear and eyelids, become sphacelated, while in extreme cases necrosis of the jaws, gangrenous pneumonia, and general septicæmia rapidly succeed each other.

Symptomatology.—As described above, gangrene of the cheeks begins as a small blister or vesicle on the inner side of the cheek, near the angle of the mouth. This vesicle contains a pale-red or brownish fluid, and very quickly bursts, leaving on its site a dirty, foul, deep ulceration. The whole cheek is now seen to be swollen, its outer surface red, tense, and shining as if oiled. The redness soon becomes marbled and darker, while a central spot in the cheek externally, opposite to the ulcer in the mouth, becomes very hard and dark colored, and soon is covered with a black crust or scab, the centre of a gangrenous slough which speedily falls out, leaving a hole in the cheek whose edges are gangrenous ulcerations. The glands of the neck (and sometimes the whole lymphatic system) become poisoned, enlarged and tender; prostration is complete, colliquative diarrhoea sets in, and the patient speedily dies of exhaustion. Should exuberant vitality or careful nursing and treatment buoy up the system, an extension of the gangrenous process to the jaws, eyelids and ears may be expected; the teeth fall out, and even the tongue, palate and tonsils are invaded, the whole process occupying only a very few days.

Prognosis.—Always doubtful, and usually unfavorable.

Treatment.—The diet is of great importance. Milk, beef tea and other nourishing fluids should be fed often and in small quantities.

The mouth should be frequently rinsed with a warm antiseptic solution. Permanganate of potash, carbolic acid, and corrosive sublimate are recommended. A poultice on the cheek, continued until the slough falls out, will prove of advantage.

Arsenicum.—Sore lips and ulcers in the mouth. Dryness of the mouth with violent thirst. Painful blisters on the inside of the cheek. Gangrenous sores.

Carbo veg.—Humid gangrene, and collapse. Bleeding ulcerations.

Cinchona.—Salivation. Gangrene of the throat. Black, humid gangrene. Hæmorrhages from the mouth.

Helleborus.—Corners of the mouth sore. Flat, yellow ulcers on the cheeks with elevated gray edges, red, swollen base, and carrion-like odor; salivation.

Lachesis.—Bad odor from the mouth; bluish or black ulcerations; gangrene.

Mercurius dulcis.—Rapidly spreading gangrenous destruction of the lips, cheeks, gums and jaws.

Muriatic acid.—Deep, painful, putrid ulcers in the cheeks. Foul breath. Great nervous prostration; typhoid condition.

Nitric acid.—Ulcers in the corners of the mouth and in the cheek. Putrid odor from the mouth.

Phosphoric acid.—Cancrum oris following measles in syphilitic children. Painless glandular swelling; painless diarrhoea. Gnawing pains.

Silicea.—Mouth gangrenous; perforating ulceration of the palate.

Sulphur.—Blisters in the mouth. Foul ulcerations surrounded with pimples.

B. DISEASES OF THE ŒSOPHAGUS.

BY W. T. LAIRD, M.D.

INFLAMMATION OF THE ŒSOPHAGUS.

Synonyms.—Œsophagitis, Dysphagia inflammatoria.

Inflammation of the œsophagus is a comparatively rare affection. It may affect the whole extent of the tube or only a limited portion. The inflammatory process may be acute or chronic and, in some instances, may terminate in ulceration or abscess.

Ætiology.—Catarrhal inflammation of the œsophagus is usually caused by exposure to cold and damp; by improper regimen, especially the habitual use of very hot or very cold food; and by the administration of irritant medicine. It may arise from the extension of gastric and pharyngeal catarrh, thrush and stomatitis, or it may accompany measles, scarlatina and typhoid fever. It may also be induced by passive venous congestion dependent upon chronic cardiac and pulmonary disease, or upon the pressure of tumors, aneurisms, etc., upon the tube. Corrosive œsophagitis is due to the deglutition of caustic alkalies, strong mineral acids or boiling water.

Membranous, exudative or croupo-diphtheritic œsophagitis occurs in connection with croup, diphtheria, croupous pneumonia, typhus fever, tuberculosis, carcinoma, pyæmia, and the acute exanthemata. Pustular œsophagitis is caused by small-pox or by the abuse of tartar emetic. Ulceration and abscess may result from the impaction of foreign bodies, or from corrosive or catarrhal inflammation.

Anatomical Characters.—In acute catarrhal œsophagitis the mucous membrane is congested, friable, and covered with thick mucus; in chronic cases it is hypertrophied, and presents a brownish or grayish appearance. In corrosive inflammation the affected parts are black and gangrenous, while the surrounding portions are intensely congested and extensively infiltrated with serum. In the membranous variety the œsophageal walls are greatly thickened by infiltration of the mucous and submucous tissues, and the interior of the tube is lined for some distance with strips or patches of exudation. Pustular œsophagitis is characterized by the formation of small pustules which burst and leave superficial erosions; when the disease is due to large doses of tartar emetic these pustules are confined to the lower portion of the tube. Ulceration is usually limited to the mucous membrane, but, in some instances, it may penetrate to the underlying structures.

Symptomatology.—The œsophagus possesses so little sensibility that mild cases of this disease often escape recognition. Severe inflammation is characterized by a sensation of constriction and dull, aching, stinging, burning or lancinating pains behind the sternum or between the scapulæ, and when the upper portion of the tube is involved, this pain is increased by external pressure. The affected parts are so exquisitely sensitive that even the passage of saliva increases the suffering, and the patient, although tormented by constant thirst, often refuses to swallow. In some instances every attempt to take nourishment produces spasm, retching and vomiting; in others the food is partially swallowed and then regurgitated, covered with mucus, pus, blood, or shreds of false membrane. The dysphagia, which is due in part to the swelling of the mucous membrane, but more especially to the inflammation and infiltration of the œsophageal muscles, is always aggravated in the recumbent position, and may increase to complete aphagia. The tongue is heavily coated, the breath is fetid, and there is profuse salivation. Diarrhœa and other symptoms of deranged digestion are often present; and in corrosive inflammation there is usually coincident stomatitis, pharyngitis, or gastritis. In the worst cases there is fever with great mental anxiety, headache, pale, distorted face, and small, feeble pulse; and in children, reflex irritation of the pneumogastric nerve may give rise to convulsions. In chronic œsophagitis the symptoms are similar to those above described, but milder and more protracted.

Diagnosis.—In many instances the diagnosis is difficult. Mild cases present no characteristic features by which they can be recognized during life; pustular œsophagitis has no distinct significant symptoms, and in the membranous variety the pain and dysphagia are obscured by the graver phenomena of the accompanying affections, and the disease, therefore, usually escapes detection unless masses of the exudation are expelled by hawking or vomiting. In severe or moderately severe catarrhal or corrosive inflammation the diagnosis is comparatively easy. A sudden discharge of pus and pieces of necrosed membrane is indicative of abscess. In some cases of chronic ulceration the permanent interference with deglutition might lead to the suspicion of stricture, but the diagnosis is easily established by the passage of the sound, which encounters no obstruction and, when withdrawn, is often covered with mucus, blood, or pus.

Prognosis.—The prognosis depends upon the cause of the disease, and to some extent upon the severity of the inflammation. It is favorable in ordinary acute catarrhal œsophagitis and pustular œsophagitis from tartar emetic. It is unfavorable in membranous œsophagitis, the pustular œsophagitis of variola, and in the extensive inflammation and sloughing caused by corrosive substances. Intense acute catarrhal œsophagitis, chronic œsophagitis, moderately severe cor-

rosive inflammation, abscesses and ulceration are usually followed by stricture; chronic œsophagitis may also cause dilatation of the tube, and abscesses which burst externally produce fistulæ. Death occurs in some instances from perforation or rupture of the œsophagus.

Treatment.—In cases of corrosion of the œsophagus, if the patient be seen immediately after the accident, the proper chemical antidotes should be promptly administered—vinegar and water if caustic alkalis have been swallowed, dilute alkaline drinks after the deglutition of acids. Impacted foreign bodies must be removed or, if removal be impracticable, forced into the stomach. The diet should consist principally of bland, mucilaginous liquids, and when the patient is unable to swallow, nourishment must be given by enema. Thirst may be assuaged in these cases of aphagia, by sucking juicy acid fruits or small pieces of ice, or by simply rinsing the mouth with water. After the acute symptoms have subsided, a bougie should be passed at frequent intervals to prevent the formation of stricture. The principal remedial agents are *Acon.*, *Arnica*, *Arsenic.*, *Bellad.*, *Canth.*, *Hydropho.*, *Kali bichr.*, *Mer. sol.*, *Mezer.*, *Rhus rad.*, *Rhus tox.*, and *Verat. vir.* Spasms of the œsophagus require *Bapt.*, *Bell.*, *Coccul.*, *Lach.*, *Phos.*, etc.* When the spasm is caused by the impaction of a foreign body, *Bell.*, *Cicuta*, or *Ignat.* will afford relief.

Special Indications.—**Aconite.**—Violent pain in the middle of the chest, extending through to the back with a feeling as if the food lodged near the heart—this pain is aggravated by motion; inability to lie on the back; high fever with thirst, nervous distress, restlessness, and anxiety. Useful only in the early stages.

Arnica.—Burning in the back of the throat; stinging and darting pains during deglutition; pains produce delirium. Indicated when the œsophagus has been bruised by the passage of a foreign body.

Arsenic.—Burning pains, soreness, dryness and constriction in the throat; food is ejected as soon as it reaches the larynx; pains are felt during sleep and cause shuddering and chilliness; cramping pains with feeling of pressure in the œsophagus. *Characteristic anguish, restlessness, and thirst.*

Belladonna.—Deglutition difficult or painful; violent spasmodic contraction of œsophagus and pharynx, causing expulsion of the food; these spasms are renewed whenever the patient attempts to eat or drink; a feeling as if the parts were too narrow; sensation as if a foreign body had lodged in the œsophagus; lancinating or stitching pains when swallowing; *flushed face with dilated pupils and throbbing of the carotids.*

Cantharides.—Especially serviceable when the inflammation is due to burns or scalds of the œsophagus. Dysphagia with violent burning and constriction of the œsophagus and nocturnal regurgitation; thirst with aversion to all fluids.

Hydrophob.—Burning, stinging pains in the throat; periodical spasms of the œsophagus; aversion to fluids, especially water; constant desire to swallow; speech difficult or incorrect; cough and gagging.

Kali bichrom.—Burning from pharynx to stomach; after swallowing solids there is a sensation as if something remained in the œsophagus; *viscid, stringy saliva.*

Merc. sol.—Burning and aching pains in the œsophagus, associated with painful pressure and a feeling of dryness, causing a constant desire to swallow. Deglutition difficult, with danger of suffocation; liquids are ejected through the nose; feeling when eating as if the food passed over raw spots; *fetid breath; pyalism.*

* *Vide Treatment of Spasmodic Stricture.*

Mezereum.—Dysphagia with violent burning and soreness in the upper portion of the œsophagus; aching in the throat when swallowing.

Rhus radicans.—Excessive hot and raw feeling in the throat, with sharp pain and sensation of hardness, soreness, and contraction when swallowing; dryness of throat and burning in the œsophagus; painful deglutition.

Rhus tox.—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 pains during deglutition.

Veratrum viride.—Dryness, heat, and burning in the fauces and œsophagus; spasms of the œsophagus; rising of frothy, bloody mucus; nausea, vomiting, and hiccough.

Compare also *Asa foet.*, *Carbo veg.*, *Cicuta*, *Coccul.*, *Euphorb.*, *Hydrocyan. acid.*, *Hyos.*, *Kali c.*, *Lach.*, *Lauroc.*, *Natrum mur.*, *Nitric ac.*, *Phos.*, *Plumb.*, *Sabad.*, *Secale*, and *Silicea*.

STRICTURE OF THE ŒSOPHAGUS.

Synonyms.—Stenosis of the œsophagus, Contraction of the œsophagus.

This term is used to designate a contraction or occlusion of the œsophagus from any cause, although, according to strict pathology, it should be limited to those cases in which the diminished calibre of the tube is the result of structural changes of its walls. Excluding cases due to spasm,* we may divide strictures according to their origin into three varieties—congenital, organic, and mechanical.

Ætiology.—Congenital stricture is caused by lack of development during ante-natal life, and is exceedingly rare. Organic stricture usually depends upon cancerous infiltration of the œsophageal walls, or upon cicatricial contraction following corrosive inflammation, ulceration, or abscess. It may also be induced by acute or chronic catarrhal œsophagitis terminating in hypertrophy of the mucous and submucous tissues with or without fibrinous deposit.

Mechanical stricture is due either to compression of the œsophagus by aneurisms, retro-œsophageal abscesses, enlarged lymphatics and tumors of the neck and mediastinum, cancer of the lungs and pleura, bronchocele, exostosis or caries of the vertebræ, dislocation of the hyoid bone, etc., or to the protrusion of morbid growths into the canal and the blocking-up of the passage by masses of the thrush-fungus or by the impaction of a foreign body. In rare instances the obstruction may be due to "an abnormal laxity of the mucous membrane permitting a fold to be formed in such a manner as to impede the passage of the bolus, though there would be little or no impediment to regurgitation and vomiting."†

Anatomical Characters.—The favorite sites of stricture are (1) opposite or slightly below the cricoid cartilage, (2) near the junction

* Spasmodic strictures will be considered under the head of "Neuroses."

† Cohen, *op. cit.*, p. 291.

of the œsophagus and the pharynx, and (3) at the cardiac extremity; but the constriction may occur in any portion of the tube. It is usually annular, and ranges in depth from a few lines to three or four inches. It is generally single, but two, three, and even four, strictures have been found in the same patient. The diminution in the calibre of the canal varies from a barely perceptible contraction to complete occlusion. The morbid process rarely attacks the muscular structures, but in most instances is confined to the mucous and submucous tissues, which are unnaturally hard and of a grayish, whitish or slightly bluish color. When the contraction is slight, the parts in its immediate vicinity remain normal; but when the occlusion is complete, or nearly so, the œsophagus above the stricture is dilated into a pouch, whose walls are at first hypertrophied, and later undergo fatty degeneration. The irritation caused by the retention of food in this pouch may induce ulceration or abscess, and ultimately lead to perforation. Below the constriction the tube is collapsed and, often, atrophied.

Symptomatology.—In the majority of cases the disease develops insidiously. For weeks and months the only symptom may be an occasional difficulty in swallowing large morsels, and this slight impediment is readily overcome by drinking water or by forcible deglutition. The dysphagia slowly increases until the ability to swallow solids is lost. The smallest quantity of food, even when finely masticated and reduced to a semi-fluid consistence, is arrested just above the stricture. In some instances, after repeated and violent deglutory efforts, aided by external manipulation of the œsophagus, the bolus passes through the constriction and enters the stomach; more frequently, however, it is regurgitated, covered with mucus, blood or pus. The act of deglutition often provokes a spasm of the œsophagus, attended with great nervous distress, a feeling of suffocation, spasmodic contraction of the chest, palpitation of the heart, and pain behind the sternum, in the stomach, or, more rarely, in the cervical region.

Finally, the stricture becomes impervious, not only to solids and semi-solids, but in the worst cases even to liquids. If the upper portion of the tube be affected, all aliment is ejected as soon as the patient attempts to swallow; when the constriction is near the cardiac extremity, the bolus is first swallowed and then regurgitated after an interval of fifteen to thirty minutes; and when there is extensive dilatation above the stricture, the food may be retained for hours and undergo partial decomposition before ejection. This rejected matter always has an alkaline reaction.

The acoustic phenomena detected by auscultation vary according to the roughness or smoothness of the walls and the degree of contraction. The passage of the bolus through a narrow stricture is at-

tended with creaking. In some cases choking and gurgling noises are heard. In others the normal œsophageal sounds suddenly cease at the point of constriction, and are followed by those due to the ascent of bubbles of air or the regurgitation of the ingesta.

In some cases of organic stricture dysphonia and dyspnœa are induced by paralysis of the recurrent laryngeal nerve.*

As long as sufficient nourishment can be taken to maintain nutrition, the general health is not much impaired; but as soon as there is serious interference with deglutition, the digestive functions become seriously disordered, and the patient is troubled with acidity, flatulence, and constipation. As the disease slowly approaches a fatal termination, the constitutional symptoms become more pronounced. Emaciation ensues, the abdomen is sunken, the features are sallow, pinched, and have an anxious, haggard expression; the impoverished blood is no longer able to maintain the normal heat of the body, and the sufferer finally dies of slow starvation. In some cases, the reduced condition of the vital powers gives rise to tuberculosis and gangrene which precipitate the fatal issue; in others, death occurs from perforation or rupture of the œsophagus.

Diagnosis.—The diagnosis is comparatively easy. The conjunction of dysphagia, spasm and regurgitation affords strong presumptive evidence of stricture, and careful auscultation will enable us to determine with approximate accuracy the site of the constriction. The history of the case and laryngoscopic examination furnish data by which we can decide in the majority of cases whether the stricture is organic, mechanical, or spasmodic. But no symptom, or group of symptoms, furnish conclusive proof; this can be obtained only by the passage of the sound which detects with unfailing accuracy not only the existence of strictures, but also their character, number, exact location, diameter, and consistence. It must be used, however, with a cautious hand, for the exercise of undue force may result in perforation of the œsophagus.

Prognosis.—The prognosis is controlled to some extent by the cause of the disease, but is generally unfavorable. Congenital strictures are usually, but not invariably, fatal. In mechanical strictures the prospect of a recovery depends entirely upon the character of the primary affections. The prognosis is comparatively favorable when the disease is caused by cicatricial contraction or fibrinous deposit in the upper portion of the tube, but even these cases sometimes prove intractable. Strictures due to carcinoma are always inimical to life.

Treatment.—When the disease is due to compression or obstruction of the œsophagus, our first efforts must be directed to the removal of the cause by appropriate medical or surgical treatment, whenever such removal is practicable.

* Cohen, *op. cit.*, p. 292.

The treatment of carcinomatous strictures will be considered under "Morbid Growths."

For non-malignant organic strictures, Professor Helmuth* recommends *Bell.*, *Con.*, *Hyos.*, *Ignat.*, *Lycop.*, *Merc.*, *Natr. mur.*, *Nux v.*, *Puls.*, *Sul. ac.*, and *Verat.* In vol. ii. of the *American Homœopathic Review*, Dr. B. F. Joslin, Jr., gives the following remedial indications:

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 swallowed over a lump. Strangling 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 mur.—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 if from swallowing too large a morsel.

But the most carefully selected remedies are comparatively powerless. They will relieve pain and control spasm; they may even retard for a time the progress of the disease, but in no well-authenticated instance have they effected a cure.

When the constriction is located in the upper portion of the tube, favorable results are often obtained by gradual dilatation with bougies or probangs, preceded in some cases by division of the constriction; the treatment is necessarily protracted, and failures are not uncommon. In strictures near the cardiac extremity the preference should be given to electrolysis. The other operations which have been proposed—divulsion, destruction of the cicatricial tissue by caustics, œsophagotomy and gastrostomy—are rarely successful.

When the patient is unable to swallow, a small tube should be passed through the constriction, and liquid food injected into the stomach; or, if the stricture be impervious, life may be prolonged by nutrient enemata.

DILATATION OF THE ŒSOPHAGUS—ŒSOPHAGOCELE.

Dilatation of the œsophagus may be general or partial. In the former variety, the whole, or nearly the whole, of the tube is affected; in the latter, only a limited section is involved. Partial dilatations may be subdivided into annular or saccular dilatations and diverticula.

* *System of Surgery*, p. 699.

General Dilatation is usually caused by stenosis of the cardiac orifice of the stomach, or by muscular paralysis of the tube, induced by chronic catarrhal inflammation. The enlargement may be very slight, or it may attain an enormous size. In the remarkable case reported by Professor Luschka,* the œsophagus measured 30 centimetres in circumference at the largest part, and 46 centimetres in length. The walls are usually hypertrophied; the mucous membrane may be normal, but is more frequently ulcerated, eroded, and studded with poly-poid growths.

Annular or Saccular Dilatation is occasionally congenital, but is generally the result of stricture or of the impaction of a foreign body. It affects only a limited portion of the œsophagus, is largest just above the obstruction, and gradually diminishes in size from below upward. In the majority of cases the whole circumference of the affected portion of the tube is equally dilated, but unequal dilatations are not infrequent. There is usually hypertrophy of the muscular structures.

Diverticula are generally caused by the impaction of foreign bodies and the retention of food above them; as the result of pressure thus exerted upon a circumscribed portion of the posterior wall, the muscular fibres separate, and the mucous membrane protrudes between them; with every deglutitory effort this protrusion is increased; and finally a funnel-shaped pouch is formed which lies between the œsophagus and the vertebræ. They may also be produced, as Rokitansky has shown, by inflammation of the bronchial gland near the bifurcation of the trachea. During the inflammatory stage these glands contract adhesions to the external wall of the œsophagus, and, as they subside to their normal volume or undergo cicatricial contraction, draw out the portion of the tube to which they are attached. Occasionally they are due to ruptures of the muscular coat by blows or falls, and in some instances the cause is unknown.

Diverticula, caused by the impaction of foreign bodies, are usually single. They are always located just below the inferior constrictor muscle of the pharynx, and are frequently associated with pharyngocele. Those due to the shrinkage of diseased bronchial glands are often multiple. When the diverticulum is small, and communicates with the œsophagus by a narrow, fissure-like opening, it offers no serious impediment to deglutition. On the other hand, when it is large and has a patulous, elliptical, or circular orifice, it often drags the œsophagus out of position, usurps its place, and forms a blind pouch, which not only intercepts the passage of food to the stomach, but by its pressure upon the lower portion of the tube, produces mechanical stricture. The irritation, induced by this retention of food in the diverticulum, leads to inflammation, ulceration, and perforation into the mediastinum, bronchi, lungs, or pleura.

* Virchow's Archiv für Anat., March, 1868.

Symptomatology.—General dilatation, when slight, presents no characteristic symptoms. When the enlargement is moderate, and the muscles retain their contractility, there is little or no difficulty in swallowing; but as soon as the walls become paralyzed by overdistension, dysphagia occurs, and may increase to complete aphagia. In some instances there is rumination, and Cohen* reports a case in which the patient “confessed to a sensual pleasure in the process.” The sound passed down the œsophagus encounters no obstruction, but can be freely moved in all directions. Auscultation shows diminished vigor of peristaltic action; the bolus is no longer gradually transmitted downward, but seems to drop at once into the stomach.

In annular dilatation, the symptoms are similar to those of stricture, but food is retained longer and in larger quantities. When the upper part of the œsophagus is the seat of the dilatation, a unilateral or bilateral swelling appears behind the trachea immediately after eating, and completely disappears after regurgitation or vomiting. In some instances, pressure upon this sac expels its contents with a splashing or gurgling sound. When the dilatation is large, it may seriously interfere with respiration, circulation, and innervation by its pressure upon the trachea, bloodvessels and nerves. When the food is finally expelled by regurgitation or emesis, it is undigested, mixed with mucus, partially decomposed, has an alkaline reaction and a sweetish, insipid, or foul taste. The breath is usually horribly offensive. The exact site of the dilatation can be ascertained by a cautious use of the sound, and auscultation reveals “a general sprinkling of the fluid bolus not unlike that of rain deflected by the wind.”†

Diverticula of moderate size often cause no symptoms at all. When they are large enough to interfere with the passage of food, they give rise to phenomena similar to those above described; but regurgitation does not occur until several hours after a meal, and there is greater decomposition of the ingesta. As the size of the pouch increases the dysphagia gradually diminishes. In some instances, as already noted, the diverticulum displaces the œsophagus and forms a cul-de-sac which receives the food. If an attempt be made to pass the sound soon after eating, the point of the instrument enters this sac and is arrested; a few hours later, when the pouch has been emptied by regurgitation or vomiting, the sound readily passes the obstruction and enters the stomach. This variation in results at different times is conclusive evidence of the existence of a diverticulum.

In any form of dilatation, whenever the amount of food which reaches the stomach is insufficient to maintain the vital processes, we have symptoms of inanition. The features become haggard and pinched, gradual loss of flesh and strength ensues. The extremities are habitually cold, there is undue susceptibility to atmospheric

* Op. cit., p. 301.

† Cohen, op. cit., p. 301.

changes, and finally the patient either perishes of starvation, or death occurs from perforation of the œsophagus, followed by gangrenous inflammation of the intra-thoracic viscera.

Diagnosis.—The diagnosis is based upon the symptoms above enumerated, and especially upon the results obtained by exploration with the sound. When the dilatation affects the upper part of the œsophagus, the swelling behind the trachea may be mistaken for an abscess or tumor, but can readily be distinguished by its increase in size after eating, and its subsidence after regurgitation or vomiting.

Prognosis.—The prognosis is always grave. The majority of patients ultimately perish, though the suffering may be prolonged for years.

Treatment.—Foreign bodies should be removed and strictures dilated, if possible, when the disease depends upon these causes. In general dilatation due to paralysis, *Caust.*, *Coccul.*, *Cupr.*, *Gelsem.*, *Lach.*, etc.,* may prove useful. To prevent the retention of food in diverticula, liquid nourishment must be given through a stomach-tube.

PERFORATION AND RUPTURE OF THE ŒSOPHAGUS.

Perforation of the œsophagus may occur from within outward, or in the reverse direction. Perforation from within is due to the impaction of foreign bodies, abscess, ulceration and carcinoma; perforation from without is due to pressure upon the tube caused by aneurisms of the aorta, tubercular degeneration of the bronchial glands near the bifurcation of the trachea, caries of the vertebræ, retro-œsophageal abscess, tubercular cavities in the lungs, etc. The perforation usually occurs in the thoracic portions, and may be single or multiple.

Rupture of the healthy œsophagus is exceedingly rare. In the majority of cases, solution of continuity occurs only when the walls have been previously weakened by cancerous degeneration, ulceration, or atrophy, and is then induced by severe retching or vomiting. The rupture is usually longitudinal, more rarely transverse; its most frequent site is just above the diaphragm.

Unless the opening is very small, perforation and rupture of the œsophagus are followed by the escape of its contents into the surrounding areolar tissue, or into the trachea, pericardium, lung or pleural sac. Mucus, pus, blood, and the products of tubercular degeneration may also pass into the œsophagus and be expelled by vomiting.

Symptomatology.—The symptoms are sudden, intense, deep-seated pain in the breast, with a sensation as if something had given way in the œsophagus, followed by nausea, vomiting, cough, emphysema of the neck, paroxysms of suffocation, orthopnoea, slight cyanosis, chills, coldness of the extremities, cold sweat, pallor, fainting, and

* *Vide* Treatment of Paralysis of the Œsophagus.

collapse. If the patient survive the immediate effects of the injury, these symptoms are succeeded by those of purulent or gangrenous inflammation of the mediastinum, lungs, pleura, or pericardium.

Diagnosis.—When these phenomena occur in a person who is known to have chronic disease of the œsophagus or of the intra-thoracic viscera, there need be no doubt about the diagnosis.

Prognosis.—The prognosis, although dependent to some extent upon the cause and the site and extent of the injury, is generally unfavorable. If the opening be so small that there is no escape of the contents of the tube, or if there be a single slight discharge, followed by a circumscribed peri-œsophageal abscess, which “bursts externally, leaving a fistula, or internally into the œsophagus,” recovery may be expected. But unfortunately, these cases are extremely rare; and when they do occur, the absence of the characteristic symptoms of perforation and rupture renders the diagnosis uncertain. In the majority of instances, death either occurs instantaneously from shock or hæmorrhage, or within a few days from the secondary lesion of the neighboring structures; but occasionally the sufferings are prolonged for weeks and months.

Treatment.—The most essential part of the treatment is absolute avoidance of swallowing and perfect rest in the recumbent position. All nutrition must be given by enema, for the use of the stomach-tube is hazardous. Thirst may be allayed by rinsing the mouth with simple or acidulated water, by allowing small pieces of ice to slowly melt upon the tongue, or by occasionally sponging the body. For the symptoms accompanying, or immediately following, the injury, Camph., Verat., Arsen. or China may be administered, either hypodermically or by the rectum. When the primary lesion is succeeded by gangrenous inflammation of the adjacent structures, Arsen., Crotal., Kreos., Lach., Secal., etc., may be tried; but in these cases the result is inevitably fatal. In those rare instances in which the only secondary lesion is a small peri-œsophageal abscess, Hep., Merc. or Silic. will be indicated; after its contents have been discharged, and sufficient time has elapsed for firm cicatrization, we may cautiously return to nutrition by the mouth.

MORBID GROWTHS OF THE ŒSOPHAGUS.

The œsophagus may be the seat of both benign and malignant morbid growths. The former are comparatively rare; fibroid polypi constitute the most frequent and, clinically, the most important variety; lipoma, papilloma, myoma, and myxoma may also occur. Carcinoma, on the other hand, is the most common and the most fatal disease of the œsophagus. It may be scirrhous, medullary or epithelial. The

majority of surgical writers, including Gross* and Helmuth,† agree that scirrhus is the most frequent variety; Cohen,‡ however, claims that in order of frequency, medullary is entitled to the first place, epithelial to the second, and scirrhous to the third; while Ziemssen§ asserts with equal positiveness that primary cancer of the tube is always epithelial.

Ætiology.—The ætiology of morbid growths is unknown. Carcinoma rarely occurs before middle life, and attacks men more frequently than women. In some cases local injury by mechanical, chemical, or thermal irritants has seemed to act as an exciting cause.

Anatomical Characters.—Benign growths may occur in any portion of the œsophagus. They usually originate in the submucous tissue, and may be either pedunculated or sessile. Occasionally they are attached by long, slender pedicles to the posterior nares, the pharyngeal surface of the epiglottis and larynx, or the posterior wall of the pharynx, and merely hang into the tube. They grow slowly, and sometimes attain the dimensions of an ordinary sausage.

Carcinoma is usually primary; more rarely it is secondary to cancer of the tongue, larynx, epiglottis, or stomach. It occurs most frequently either at the upper or lower extremity; occasionally it attacks only the central portion; and exceptionally it may involve the entire length of the œsophagus. The morbid process affects the whole circumference of the tube, and produces stricture; above the constriction the walls are hypertrophied and dilated; below it they are usually collapsed and atrophied. The disease begins in the submucous tissue, either in the nodular or diffuse form, and soon extends to the mucous membrane. The cancerous growth protrudes into the canal, disintegrates and sloughs, leaving large, irregular ulcers covered with vascular, fungoid granulations, or shreds of gangrenous tissue. From the œsophagus it spreads to the adjacent intra-thoracic viscera; metastatic deposits occur in the liver, lungs, kidneys or brain; and finally there is perforation into the larynx, trachea, mediastinum, lungs, pleura, pericardium, aorta, pulmonary, carotid, or subclavian artery.

Symptomatology.—Benign tumors, when small, cause no inconvenience, and are rarely detected during life; large tumors produce symptoms similar to those of stricture. As a rule, these growths are painless.

Carcinoma develops insidiously. At first, there may be merely a gradual loss of flesh and strength, associated with a vague feeling of uneasiness in the œsophagus. As the disease progresses, dysphagia appears, and gradually increases to complete aphagia; the food is reurgitated, mixed with mucus, blood, or fragments of disintegrated cancerous tissue, and the patient is tormented with severe pricking,

* System of Surgery, vol. ii., p. 500.

† System of Surgery, p. 699.

‡ Op. cit., p. 303.

§ Ziemssen's Cyclopædia, vol. viii., p. 173.

burning, or lancinating pains, which often extend downward to the stomach, producing gastralgia and cardiac spasm, or backward to the spine between the scapulæ, or they dart upward to the neck and head, and radiate to the shoulders and arms. Dysphonia and aphonia may be produced by compression of the recurrent laryngeal nerve, and pressure upon the larynx and trachea may give rise to dyspnœa. Associated with these local phenomena, there is a well-marked cancerous cachexia, characterized by a peculiar sallow, dirty-yellow, cadaverous complexion, and rapid emaciation. Death ultimately ensues from marasmus, from perforation of the œsophagus, or, in some cases, from hæmorrhage. More rarely, the fatal result is due to secondary inflammation of the brain or lungs, caused by metastatic cancerous deposits or to paraplegia, induced by extension of the disease to the spinal cord.* The duration of carcinoma is from one to two years.

Diagnosis.—Benign growths arising outside the œsophagus, or situated in the upper portion of the tube, can readily be detected by direct inspection or by laryngoscopic examination, while exploration with the sound will detect those located near the cardiac extremity. Carcinoma may always be suspected when symptoms of organic stricture are associated with burning, lancinating pains and well-marked cachexia in a patient of advanced years; and this suspicion may be converted into a certainty by microscopical examination of the cancerous fragments regurgitated with the food.

Prognosis.—Benign growths, even when they have attained considerable bulk, are seldom dangerous. A large pedunculated tumor, suddenly ejected into the mouth or pharynx during emesis, may obstruct the entrance to the larynx and cause suffocation, and a few instances have been recorded in which large fibroid polypi produced complete obstruction of the tube and subsequent death by inanition; but these cases are extremely rare.

In carcinoma the prognosis is hopeless.

Treatment.—Benign growths, when readily accessible, may be removed by the ligature, *écraseur*, or galvano-cautery; when they are located at some distance within the tube, these operations must be preceded by œsophagotomy.

As Lilienthal † tersely expresses it, "there are no remedies yet for cancer. The individuality of the patient and the concomitant symptoms may aid us in selecting the remedy, which, for the time being, will alleviate the suffering"—and this is all that we can hope to accomplish. The medicines most frequently serviceable are *Apis*, *Arsen.*, *Carbo*, *Galium aperine*, *Kreos.*, *Lach.*, and *Phytol*.

In the early stages, if the patient is unable to swallow, nourishment must be given through the stomach-tube, or if the stricture be impervious, by enema. After ulceration has ensued, the weakened

* Ziemssen, loc. cit.

† *Homœopathic Therapeutics*.

walls are easily perforated, and, although the calibre of the tube is partially restored, the use of the tube is dangerous, and we must rely exclusively upon rectal alimentation.

NEUROSES OF THE ŒSOPHAGUS.

Very little is known in regard to the derangements of the sensory nerves of the œsophagus. Anæsthesia, hyperæsthesia, and neuralgia occasionally occur, but their ætiology is obscure, and their diagnosis difficult.

The motor disturbances—spasmodic stricture and paralysis—have been more thoroughly investigated.

SPASMODIC STRICTURE OF THE ŒSOPHAGUS.

Synonyms.—Spasm of the œsophagus, Œsophagismus, Dysphagia spasmodica, Œsophagospasmus, Cramp of the œsophagus.

This very singular disease, as Gross* justly styles it, attacks both sexes and may occur at any period of life from infancy to old age, but is most common in nervous, excitable women, soon after puberty or at the menopause. Its most frequent cause is, undoubtedly, local irritation due to inflammation or ulceration of the lining membrane of the tube, the presence of morbid growths and foreign bodies, either in the pharynx or the œsophagus, or to external pressure upon the œsophageal walls, occasioned by cervical spondylitis, retro-pharyngeal abscess, bronchocele, enlarged lymphatic glands, tumors of the posterior mediastinum, and aneurisms of the aorta, carotid, or innominate artery.

It may also occur as the result of irritation or actual disease of the brain, spinal cord, and pneumogastric nerve, or depending upon gout, rheumatism, tetanus, hydrophobia, and hysteria.

In some instances, the spasm is induced by irritation of the peripheral branches of the pneumogastric external to the œsophagus. Under this head may be included diseases of the larynx, functional or organic affections of the stomach, especially carcinoma, intestinal irritation due to worms, and uterine irritability dependent upon pregnancy, metritis, flexions, or morbid growths. In vol. ii. of the *American Homœopathic Review*, Dr. B. F. Joslin, Jr., gives the details of a singular case which terminated fatally. At the autopsy, an osseous growth "about an inch long and half an inch in breadth and thickness, with numerous spiculæ of bone projecting from it," was found loosely attached to the trachea, just above its bifurcation, and "closely adherent to the vena cava superior." Intimately attached to its anterior surface was a nerve-filament which was believed to be the cardiac branch of the

* *System of Surgery*, vol. ii., p. 498.

vagus. This tumor, Dr. Joslin states, exerted no pressure upon the œsophagus, and could, therefore, only be implicated in the production of the symptoms by its relation with the pneumogastric nerve.

Again, in a certain proportion of cases, the spasms may be induced by irritation or disease of remote parts which have no direct nervous connection with the œsophagus. A striking illustration of this fact will be found in the instance cited by Gross,* in which the whole train of morbid phenomena promptly disappeared after the removal of hæmorrhoidal tumors.

Finally, in many cases, the origin of the disease is undoubtedly psychological. Anger, fright, or the fear of hydrophobia, are sufficient to bring on an attack; while in persons subject to these paroxysms, the dread of their recurrence, or merely the thought of swallowing, may induce the spasm.

According to their ætiology, spasmodic strictures of the œsophagus are divided into symptomatic and idiopathic, the latter including all those for which no definite anatomical cause can be assigned.

Symptomatology.—The characteristic symptoms are sudden attacks of dysphagia, sometimes painless, but more frequently associated with a sensation of burning and constriction in the chest, severe pain in the pharynx and œsophagus, or in the œsophagus alone, globus hystericus, hiccough, embarrassed respiration, great mental distress, with fear of impending suffocation, and, in severe cases, violent muscular spasms of the pharynx, larynx, and chest, and even syncope. The relaxation of the constriction is often followed by a copious discharge of flatus and limpid urine. The spasm may affect any portion of the œsophagus, and in some persons its apparent site varies with each attack. If the upper portion of the tube be affected, food and drink are ejected as soon as the patient attempts to swallow. When the constriction is at, or near, the cardiac extremity, the bolus is first swallowed and then regurgitated, mixed with mucus and gas; and in chronic cases, when the lower portion of the œsophagus is habitually the seat of spasm, the tube becomes dilated above the constriction, as in organic stricture, and the food is retained for several hours, or even a whole day, before regurgitation. In the majority of instances, however, deglutition, although difficult, is not impossible, and after repeated violent efforts and copious eructations the food finally passes into the stomach. Liquids are usually swallowed more easily than solids, but in rare cases the reverse is true. Some patients swallow warm fluids best, others cold fluids. By careful auscultation in the dorsal region, sounds due to bubbles of air rising in the œsophagus, or in other cases those caused by regurgitation of the ingesta, can be distinctly heard. A sound passed gently down the tube is arrested at the stricture, but if the point be firmly pressed against the constricted

* Loc. cit.

portion for a short time, the obstruction disappears either suddenly or gradually, and the instrument enters the stomach. It is not always possible, however, to thus positively demonstrate the existence of spasmodic stricture, for many cases are recorded in which the introduction of the sound merely into the pharynx promptly dispelled the spasm.

The duration of a single paroxysm is usually brief, rarely lasting more than a few minutes, but in exceptional cases it may continue for hours and even days. The spasms generally recur at irregular intervals; in some instances, however, they are characterized by a marked periodicity.

The disease, with occasional exacerbations and remissions, or even with long periods of complete quiescence, may extend over many years, and Aird* has reported a case in which it persisted "during the whole course of a long life." Usually, however, and especially under proper treatment, recovery takes place in a few weeks or a few months, provided the spasm does not depend upon some incurable organic lesion. As a rule there is no emaciation.

Under the name of "*Stenosis spastica fixa continua*," Hamburger has described a rare form of this affection in which a painless, spasmodic contraction persists for weeks and months, with "fluctuations of intensity without, at any time, complete disappearance of the spasm." In consequence of this long-continued interference with deglutition, nutrition is impaired, and the health of the patient seriously affected.

Post-mortem examinations have thus far yielded only negative results.

Diagnosis.—An accurate diagnosis, especially in the early stages, is often exceedingly difficult; and no positive opinion should be expressed until long-continued observation has enabled the physician to exclude all possible sources of error. No reliance can be placed upon the suddenness of the attack, since the published cases of Drs. Thornton and Moorehead † show that this sudden dysphagia may be the first appreciable symptom of cancer of the œsophagus. The most reliable diagnostic tests are the intermittent paroxysms and the prompt disappearance of the spasm after the introduction of the sound or galvanization of the pneumogastric. These will usually be sufficient to distinguish spasmodic stricture from stenosis, dilatation, paralytic dysphagia, morbid growths, or the impaction of foreign bodies. Even in the "*Stenosis spastica fixa continua*" of Hamberger, there are occasional brief intervals in which the power of deglutition is almost wholly regained.

Prognosis.—Spasmodic stricture of the œsophagus is rarely a dangerous disease *per se*. Of the idiopathic form, only two fatal cases have thus far been reported—one published by Dr. Powers in the

* Ziemssen's Encyclopædia, vol. viii., p. 206.

† Vide Lancet, 1881.

Lancet, for 1866, and that of Dr. Joslin already quoted; and in the former, the recorded symptoms would seem to justify the conclusion of Ziemssen* that the patient died of bulbar paralysis rather than idiopathic spasm of the œsophagus. As a rule, these cases are curable, but all predictions in regard to their probable duration must be very guarded.

In the symptomatic variety the prognosis depends entirely upon the nature and curability of the primary lesion.

Treatment.—The principal remedies for spasmodic stricture are Alumina, Argent. nit., Arsenic, Asa foet., *Bapt.*, *Bell.*, Bryon., Canth., *Carbo veg.*, Cicuta, Coccul., Elaps, Hydroc. ac., Hydroph., Hyos., Ignat., Kali bich., Kali c., *Lach.*, *Lycop.*, *Naja*, Natr. m., Nitric ac., Phos., Plumb., *Rhus tox.*, *Stram.*, and *Verat. vir.*†

Of these, *Alumina*, *BELL.*, *Canth.*, *Carbo veg.*, *Cicuta*, *Hyos.*, *Ignat.*, *LACH.*, *LYCOP.*, and *Stram.* correspond to spasms of the upper portion, while *ARGENT. NIT.*, *Arsenic*, *Lach.*, and *PHOS.* are applicable when the cardiac extremity is affected. Spasmodic stricture due to œsophagitis calls for *ARSENIC*, *Rhus tox.*, and *Verat. vir.* *Asa foet.*, *Coccul.*, *Ignat.* and *Lach.* are useful “in nervous, hysterical persons where there is also reversed peristalsis.”‡ Dr. Joslin recommends *Bell.*, *Ignat.*, *Merc. sol.*, *Natr. m.*, and *Puls.*§

Baptisia, *Belladonna* and *Phosphorus* have the best clinical record.

Special Indications.—**Alumina.**—Sensation of constriction in the œsophagus when swallowing food; violent, pressive pains as if a portion of the œsophagus were contracted or compressed in the middle of the chest, especially during deglutition, but also when not swallowing, with oppression of the chest alternating with palpitation of the heart, especially after a meal. *Great dryness of all the mucous membranes.*

Argent. nit.—Paroxysms of cramp in the œsophagus; the œsophagus feels spasmodically closed, producing a sensation in the stomach as if it would burst.

Arsenic.—Violent burning pains, soreness and sensation of constriction in the œsophagus; deglutition difficult, painful or impossible; food either lodges in the œsophagus, producing a feeling of pressure, or is ejected as soon as it reaches the pharynx; dryness and burning in the throat; *characteristic thirst and mental symptoms.*

Asa foetida.—Food, when partially swallowed, returns into the mouth; spasms of the œsophagus with reversed peristalsis; aching and burning in the œsophagus; *mental and physical hypersensitiveness; nervous, hysterical persons.*

Baptisia.—œsophagus feels constricted from the pharynx to the stomach; can swallow liquids only; aversion to the open air. (This inability to swallow solids is also found under *Natr. m.*, *Nitric ac.* and *Plumb.*, but is considered by Professor H. N. Guernsey to be especially characteristic of *Bapt.*.)

Belladonna.—Violent spasmodic contractions of the œsophagus causing the food to be expelled; extremely difficult and painful deglutition, with sensation as if the parts were too narrow; constant desire to swallow, but every attempt at deglutition renews the spasms of the pharynx and œsophagus; *face flushed, pupils dilated* (*Bell.*, *Cicuta*, and *Ignatia* are especially useful when the spasmodic contractions are due to the presence of a foreign body).

Bryonia.—Pressive, sticking pains and painful sensation of contraction in the œsophagus, especially in the lower portion, with inability to swallow.

* Loc. cit.

† Vide *Studies in Mat. Med.*, by Professor E. A. Farrington, *Hahn. Monthly*, vol. 15.

‡ *Hahn. Monthly*, loc. cit.

§ *Amer. Hom. Review*, vol. ii.

Cantharides.—Burning and constriction of the œsophagus; deglutition difficult, painful or impossible; nocturnal regurgitation; thirst, with aversion to all fluids.

Carbo veg.—Painless spasmodic contractions of the pharynx and œsophagus; dysphagia; *feeling of coldness in the throat.*

Cicuta.—Spasmodic closure of the œsophagus, with danger of suffocation after swallowing a sharp piece of bone; deglutition impossible; the throat seems grown together internally, and is painful externally; frequent eructations.

Cocculus.—Choking constriction of the œsophagus causing dyspœcia and cough; dryness of the pharynx and œsophagus; burning pain in the œsophagus, pharynx and fauces, with taste of sulphur in the mouth; desire for acids or thirst, with aversion to drink; hysterical person.

Elaps.—Constriction of pharynx and œsophagus; food and liquids are suddenly arrested, and then fall heavily into the stomach. (Spasm followed by paresis.)

Hydrocyanic acid.—Spasms in pharynx and œsophagus, with heat, inflammation and inability to swallow.

Hydrophobinum.—Spasms of the œsophagus returning periodically; constant ineffectual urging to swallow; aversion to all fluids, especially water; burning, stinging pains in the throat; speech difficult or incorrect.

Hyoscyanus.—Spasmodic contractions interfering with speech and respiration; *aggravation from cold fluids; solids and warm drinks are swallowed most easily;* hiccough, nausea, spasmodic cough and stiffness of the cervical muscles.

Ignatia.—Sensation of a lump in the throat; difficulty in swallowing solids or liquids; hysterical patients.

Kali bichr.—Burning sensation from pharynx to stomach; pain and sensation as if something remained in the œsophagus after swallowing solids.

Kali carb.—Food lodges in the œsophagus and produces gagging and vomiting; dysphagia with great sensitiveness of the œsophagus, which is aggravated by warm food or drink; *can take only lukewarm nourishment.*

Lachesis.—Sensation as if a button or crumb had lodged in the throat; gagging and smothering when attempting to swallow, as if the food had gone the wrong way; *can swallow solids more easily than liquids; the spasms rouse him from sleep or develop as he awakes; intolerance of all pressure about the neck and throat.*

Laurocerasus.—Spasmodic contraction of the throat and œsophagus, with impeded deglutition; dull pain in the throat extending to the *right scapula*; burning pain in throat, with accumulation of tenacious mucus.

Merc. sol.—Difficult deglutition with danger of suffocation; liquids are ejected through the nose; pressure, burning and aching pains in the œsophagus.

Naja.—Deglutition greatly impeded, hardly anything can pass into the stomach.

Natrum mur.—Spasms of the pharynx; can swallow only liquids; solids, when they reach a certain point, are violently ejected with gagging and attacks of suffocation.

Nitric acid.—Violent pains during deglutition; can swallow only liquids; while eating, small pieces of food are forced into the choanæ.

Phosphorus.—Dryness and burning in the pharynx and œsophagus with difficult deglutition; *food scarcely swallowed comes up again.*

Plumbum.—Violent spasmodic constriction of the œsophagus; liquids can be swallowed easily, but food comes back into the mouth; burning in the œsophagus and stomach.

Pulsatilla.—Choking pain in the pharynx as if from swallowing too large a morsel; sensation as if the pharynx was swollen; difficult deglutition.

Rhus tox.—Solids can only be swallowed with difficulty, owing to a feeling of contraction in the œsophagus; burning and soreness in the œsophagus.

Stramonium.—Violent constriction of the throat; deglutition difficult, almost impossible; terrible spasms of the throat when attempting to swallow.

Veratrum viride.—Spasms of the œsophagus with or without rising of frothy, bloody mucus; constant inclination to swallow; dryness and heat in the throat; burning in the fauces and œsophagus; constant, distressing hiccough; nausea and vomiting.

The prompt relief obtained by the passage of a sound or by its introduction merely into the pharynx, has already been mentioned.

Usually this treatment is only palliative, but in some instances it effects a permanent cure. Great caution must be observed in the performance of this apparently trivial operation, for if the walls of the œsophagus are weakened by inflammation or ulceration, the instrument in unskillful hands may produce perforation or rupture; and when the calibre of the canal is narrowed by the pressure of an overlying aneurism, the end of the sound may penetrate the aneurismal sac and cause instant death from hæmorrhage.

Electricity has been successfully employed in obstinate cases. It may be applied indirectly through galvanization of the pneumogastric, or directly by means of an insulated œsophageal electrode passed down to the constricted part and connected with the positive pole of a galvanic or faradic battery, preferably the latter.

The diet should consist principally of nutritious liquids; and in case of long-continued spasm, associated with marked impairment of nutrition, the patient must be fed through an œsophageal tube.

PARALYSIS OF THE ŒSOPHAGUS.

Synonyms.—Paralysis œsophagi, Dysphagia paralytica.

Paralysis of the œsophagus rarely occurs as an isolated affection, but is generally associated with paralysis of the tongue, palate, epiglottis, pharynx or larynx, or with general paralysis. It may be partial or complete.

It is often dependent upon disease of the brain and spinal cord, and may also be induced by diphtheria, syphilis, alcoholism and chronic lead-poisoning. In some cases it is due to muscular atrophy of the œsophageal walls caused by dilatation. It may also result from "external adhesions of the œsophagus to intra-thoracic tumors,"* or from pressure upon the tube by exostoses, abscesses, morbid growths, etc. More rarely it depends upon mental shock or sudden suppression of perspiration.

Symptomatology.—The onset of the disease may be sudden or gradual. When the paralysis is partial it causes no inconvenience. In the majority of cases, however, there is well-marked dysphagia. The bolus lodges in the œsophagus, and can only be forced into the stomach by repeated deglutitory efforts, by drinking large quantities of water, or by taking additional solids. In advanced cases the food may remain in the canal for hours and, by its pressure upon the intra-thoracic viscera, give rise to palpitation of the heart and moderate dyspnœa. Large morsels are swallowed more easily than small ones, and solids more readily than fluids; the passage of the latter is attended with a loud rumbling sound. Deglutition is less difficult in the erect

* Cohen, op. cit., p. 326.

than in the recumbent position. Regurgitation is present in some cases, absent in others. As a rule, there is little or no pain. On account of the difficulty in swallowing, there is constant dribbling of saliva. In some cases there is rapid emaciation.

A sound passed down the œsophagus encounters no obstruction, and can be freely moved from side to side. The auscultatory phenomena are similar to those of dilatation.

Diagnosis.—This disease can readily be distinguished from spasmodic stricture by the evidence afforded by the passage of the sound, and from paralysis of the pharynx by the ability to swallow the bolus. A careful distinction between paralysis and dilatation of the œsophagus is far more difficult; and when the disease develops slowly, and there is no coincident paralysis of the pharynx or larynx, an accurate differential diagnosis between these two affections is often impossible.

Prognosis.—This depends entirely upon the cause of the disease. It is favorable when the paralysis is limited to the œsophagus and is due to a curable affection. It is decidedly unfavorable when the local trouble is associated with other paralyzes dependent upon lesions of the brain and spinal cord.

Treatment.—According to Professor Lilienthal,* the principal remedies are *Caust.*, *Coccul.*, *Cupr.*, *Gelsem.*, *Lach.*, and *Silic.* Compare also *Arsen.*, *Baryta c.*, *Mur. ac.*, *Nux mos.*, *Nux v.*, *Op.*, *Phos.*, *Plumb.*, and *Verat.* Electricity has proved beneficial in some cases, in others it has seemed to aggravate the paralysis. When the food lodges in the canal, it must be forced downward by the œsophageal sound. In advanced cases nourishment must be given through the stomach-tube or by enema.

C. DISEASES OF THE STOMACH.

BY H. R. ARNDT, M.D.

INTRODUCTORY REMARKS TO THE CHAPTER ON DISEASES OF THE STOMACH.

In entering upon a study of the diseases of the stomach, it seems necessary to call attention, in a very general way, to certain facts which are rather intimately connected with the subject, and refer exclusively to functional disorders of the organ. These facts are presented in a decidedly fragmentary manner in order to economize space, and the remarks made are chiefly intended to serve the purpose for which so often extensive foot-notes are appended to the body of a work. Several topics which might properly be discussed here are of sufficient importance to warrant more extensive treatment than could

* Homœopathic Therapeutics.

have been afforded them in this place, and consequently have here received mere mention, but are considered in full under separate headings.

The process of digestion constitutes one of the most interesting and important functions performed within the animal economy, and a very large share of this work, *i. e.*, the changes of the nitrogenous elements of food which are necessary to fit them for absorption, is performed within and by the stomach. Whenever the process of digestion is disturbed or arrested by functional derangement, which may be of local or of reflex origin, or by some structural lesion, indigestion results. Our remarks and studies are necessarily confined to what might properly be called "gastric indigestion."

Indigestion, depending upon a great variety of causes, and giving rise to a great multitude of symptoms, must not be looked upon as a pathological entity, but as a symptom of frequent occurrence and of much practical importance.

Among the *causes* of indigestion three distinct factors deserve consideration: 1st, the food eaten, its quality and quantity; 2d, disturbances of the mechanism of digestion; 3d, partial or complete failure in the chemical changes which constitute an important part of digestion.

Food.—To insure normal and complete digestion, the food taken must be of proper quality and must be had in proper quantity. The human organism, for the maintenance of vigorous health, demands a certain variety of nutritious elements, representing both the animal and the vegetable kingdom; or, perhaps more correctly, nitrogenous principles, non-nitrogenous principles, and inorganic matter, as water and salts, which are best and easiest supplied by a mixed animal and vegetable diet. The relative proportion of these different elements, to answer the demands of each individual case, must of necessity differ with the calling in life, with the nature of the employment and labors which the calling of the respective individual entails, with age, sex, temperament, and idiosyncrasy; within certain limits, each person is a law unto himself, and the natural preference for certain articles of diet in different persons, in a state of health, is a safe guide in the selection of the food which readiest supplies the food-elements conducive to the support of life and health. A consideration of the quality of food best calculated to insure health would lead to an exhaustive and, probably, impracticable discussion on the subject of diet; in a general way, it may be stated that Moleschott estimates that a daily supply of about twenty-three ounces of dry solid matter, one-fifth of this amount being nitrogenous elements, is well calculated to maintain "health in a person of average stature under exposure to a temperate climate and a moderate amount of muscular work;" to this must be added a daily supply of water varying from fifty to eighty ounces.

Experience and common sense suggest general rules of diet which should always be observed. A person engaged in active and hard exercise in the open air requires a somewhat stimulating diet, and may with safety partake far more freely of animal food than a person of sedentary habits of life. Age and climate also bear directly upon the subject of diet; a free supply of food the quality of which is well calculated to insure the physical welfare of a young child would be utterly insufficient to provide an adult with the strength and endurance necessary to undergo the exertions and the toil which mature years bring with them; the light diet which, in the tropics, is indispensable to the maintenance of health could by no means take the place of the liberal amounts of fatty substances which inhabitants of the frigid zone find so necessary to their very existence; and *vice versa*.

To maintain and preserve health, it is not only important to insure a fair representation of the various alimentary principles, but care must be had that no substances are eaten which are unfit for digestion on account of inherent unfitness, such as noxious and indigestible substances, or which have been disqualified for food-purposes on account of partial decay or of improper preparation or cooking. It is even necessary that a certain proportion of food be taken in the fresh state, the scorbutic affections illustrating the harm likely to result from a disregard of this natural law.

In *quantity*, food may be taken in excess or in deficient amount; if the former, symptoms of gastric disturbance soon show themselves, with lassitude, loss of mental and physical energy, sleepiness, dulness, irregularity of the heart's action, dull, heavy headache, which is usually frontal; constipation, and, frequently, deposits of urates in the urine. A deficiency of food, at times merely the result of a disinclination to eat, produces loss of weight, physical and mental exhaustion, and results, sooner or later, in a state of general malnutrition, which becomes an important factor in the development of any inherited predisposition to disease.

The digestive process consists of an elaborate series of mechanical and chemical action, so intimately related to each other that imperfect or abnormal action on part of any of them necessarily gives rise to disturbances throughout the entire series. Hence, anything which prevents the proper performance of mastication gives rise to indigestion; imperfectly formed or decayed teeth, a swollen tongue or tonsils, abscesses and tumors in the œsophagus or larynx, may produce marked gastric disturbances. Obstructions or dilatations anywhere in the alimentary canal have a like effect, such as tumors and constrictions at the orifices of the stomach or in the intestines, dilatation of the stomach, or adhesions of the intestines. Spasms, constituting an excess of action, and paralysis, being a deficiency of action,

obstructions by foreign growths, cicatrices anywhere in the alimentary canal, and all other conditions which interfere with a proper performance of mastication, deglutition, and defecation, have the same effect.

Since each of the secretions of the various glands which take a part in the process of digestion performs a certain portion of the work which no other secretion can perform, it is evident that an abnormal constituency of these secretions, leading to imperfectly performed chemical changes, must give rise to disturbance by passing onward in the alimentary canal food not in proper condition to be acted upon efficiently by the secretions with which it later comes in contact. We know, for instance, that the insoluble starches are converted into soluble and diffusible sugars by the action of the saliva and of the pancreatic juice. If this step in the digestive process is not properly performed, either on account of the insufficient supply of saliva or because of a vitiated condition of this secretion, the food, when taken into the stomach, is not in a proper condition for gastric digestion, and, frequently repeated, this must necessarily give rise to indigestion. It is understood that these abnormal states of the secretions, producing the imperfect chemical changes which we are now discussing, depend upon perverted nervous influence, abnormal blood supply, or altered conditions of the blood itself, but we do not yet know under what conditions they occur.

The *symptoms* of indigestion are varied and characteristic. We have fermentation of food, with a long train of symptoms directly due to fermentation, and fully described hereafter. Characteristic gastric disturbances occur, such as pain, weight, fulness, and distension in the gastric region. The appetite becomes deranged, and thirst is usually experienced. There are disturbances in the intestinal tract, as pain, flatulence, diarrhœa, or constipation, and we find secondary trouble in the nervous system, as neuralgia in different parts of the body, headache, irritability, fretfulness, mental depression, and moodiness. There are alterations in the urinary secretion; the organs of circulation, the respiratory apparatus, and the generative organs are variously affected, and a state of malnutrition soon prevails. Not unfrequently the symptoms which occur in remote parts of the system are more marked than the gastric disturbances proper, and, on the other hand, many of the symptoms here enumerated may occur when gastric digestion is perfectly normal, but when the disturbance arises in the intestinal canal. Vertigo, for instance, a frequent accompaniment of gastric derangements, is very commonly caused by intestinal flatulence.

A functional disturbance, which is of frequent occurrence in affections of the stomach, and one worthy of careful consideration, is *pain*, varying from a slight uneasiness at the stomach to most intense suffer-

ing; it is usually located at the epigastric region, though it is also often referred to the hypochondriac or umbilical region. The pain is rarely confined to a circumscribed spot, but frequently radiates upward or downward, or into the back, shoulders, or hypochondria. The neuralgias, for instance, present a tendency to attack, in the most erratic manner, various localities; cancer and ulcer have severe dorsal pain; dyspepsia has pain and tenderness in the muscles of the chest and back, particularly under the shoulder-blades. The causes of pain are manifold. The neuralgic pains are often due to derangements in some remote organ, and are of frequent occurrence in diseases of the uterus or ovaries, in pericarditis, and occur quite commonly as concomitants in menstrual disorders; they are also associated with existence and passage of gall-stones, abdominal aneurism, etc. Not unfrequently, general constitutional disturbances, accompanied with impaired nutrition, produce neuroses of the stomach, in which case the neuralgia improves as we succeed in relieving the cause. Purely nervous gastric pain is rare; it is found in hysteria, hypochondriasis, and similar conditions. The presence in the stomach of irritating foreign bodies gives rise to spasms of the muscular coat and, hence, to pain. Sharp foreign bodies and corrosive poisons produce pain by the more or less extensive injury done to the structures of the stomach. The presence of indigestible food, of acrid substances, the result of fermentation, of marked distension from gas, and of bile in the stomach, produce the same effect. Purely inflammatory conditions, while giving rise to considerable distress, do not by any means cause the intense suffering and the severe and continuous pain resulting from cancer or chronic ulcer, which in their growth either destroy branches of nerves, or, by the formation of cicatrices, produce pressure upon nerves; when the latter give rise to obstruction of the pylorus, they cause spasmodic action of the muscular coats, and thus act as a most important factor in the production of pain in the stomach. Not unfrequently, severe pain in the stomach is caused by the irritating properties of acid secretions from the gastric mucous surface, a condition which, at times, stubbornly resists the best directed and most persevering treatment.

The pain of indigestion is not unfrequently mistaken for pain in the abdominal muscles, perhaps of a rheumatic character, for the epigastric pain which depends upon diseases of the spine, or for the intestinal pain, in the transverse colon, which depends upon distension from flatulence. The pain in the abdominal muscles should be recognized without very much difficulty; a superficial tenderness and an aggravation from motion usually determine the diagnosis. With epigastric pain which depends upon functional diseases of the spine, there is an absence of gastric disturbances, superficial tenderness on pressure, and disappearance of the pain from deep pressure; the hys-

terical diathesis is commonly marked, and by following the course of the nerve affected, other painful points are readily found. In organic diseases of the spine we must be guided by the existing perversion of sensation and motion in the lower extremities, the sensitiveness of the spine to pressure, heat and cold, and by the general relief experienced from rest. Pain in the transverse colon, arising from flatulent distension, is usually most severe in the hypochondriac region, and is liable to extend through the sigmoid flexure. They are not only migratory abdominal pains, due to flatulent distension in the bowels, but the contractions in the intestines may be felt by the hand, and borborygmi are constantly heard. The diagnosis of neuralgic pain from the pain which depends upon organic lesions of the stomach, depends on one hand upon the more frequent occurrence of neuralgia in women, especially in early life, and on the other upon the uniformity with which the pain of organic diseases of the stomach occurs soon after eating, and the promptness with which it is relieved by emptying the stomach; in the latter case, the pain is also likely to be confined to a well-defined locality, and is promptly increased by pressure.

The secretions of the stomach may be excessive or deficient in amount, or perverted in quality. The secretion may be of an acid or of an alkaline character; it is presumed that the former is furnished by the glands of the fundus and of the body, and the latter by glands situated at the pyloric region, lined with columnar epithelium. Excess of secretion is chiefly due to nervous disturbance. It is not clearly understood under what conditions an excess of acid or alkaline secretions may be had; the presence of an excess of acid in the stomach is, however, more frequently the result of fermentation than of hypersecretion. Whenever digestion is delayed by an imperfect supply of gastric juice, or food in a state of fermentation is introduced into the stomach, or when obstruction of the pyloric orifices exists, causing retention of food in the stomach, or when the digestion of starchy substances during mastication has been imperfectly performed, fermentation takes place, giving rise to the formation of lactic, butyric, and acetic acid, and of gas, consisting of carbonic acid and of volatile carbo-hydrogens, or of sulphuretted hydrogen. Perversion of secretion occurs chiefly in uræmia and in diabetes; in the former, urea or carbonate of ammonia, and, in the latter, sugar have been found in the secretions of the stomach. Diminution or arrest of secretion is of very frequent occurrence, and follows profound nervous disturbances, sudden depression, great exhaustion, physical or mental, occurs as a sequela of long-continued disease, of the privation of food and water, and is not unfrequently found associated with the existence of intestinal worms, of constipation, and of other conditions which will be enumerated in their proper place.

The functional disturbances of movement consist chiefly of paralysis

of the muscular coat of the stomach, either from enervation or from over-distension, causing dilatation; and, secondly, of vomiting. Both subjects possess special importance, and are treated in full hereafter.

VOMITING.

Vomiting is produced by the action of the muscles of the diaphragm, of the abdominal walls, and of the longitudinal fibres of the stomach. The contraction of the first two sets of muscles produces pressure upon the stomach; the longitudinal fibres of the stomach, contracting simultaneously, dilate the cardiac orifice, and draw the stomach toward the diaphragm. If, during these contractions, the cardiac orifice remains closed, *retching* is the result. The contents of the stomach may be ejected, without the participation of the muscles of the abdomen and thorax, in which case *eructation* results. Eructations occur chiefly in infants; in grown persons they consist in the ejection of gas or of fluids, depending upon irritation or distension of the stomach, and, in many cases, they become almost habitual.

The act of vomiting is produced by an excitation of the vomiting centre, located, according to Budge, in the right corpus striatum. The co-ordination of the movements rests within a nerve-centre on a floor of the fourth ventricle in the medulla oblongata, from which the impulses are sent by the intercostal, phrenic, and the pneumogastric nerves.

Vomiting may be caused by excitation of the great nerve-centres or by reflex action, or by peripheral irritation from the various viscera of the body. Among the cerebral causes we may enumerate nearly all the diseases which affect the brain or its membranes, such as cancer, tubercle, inflammations, hæmorrhage, apoplexy, and so forth; also Menière's disease; injuries to the brain or head, such as blows or violent concussions, are very likely to excite vomiting. The same effect is produced by the action of narcotic poisons upon the brain, and by the disordered conditions of the blood which are found in typhus, yellow fever, cholera, and even in the cold stage of intermittent fever, not to forget certain functional disorders of the nervous system which result from fright or shock, and the pain caused from hurts or operations.

Unpleasant odors, the sight of nauseating objects, and even the thought of them, act upon the brain through the nerves of special sense, and produce nausea and vomiting. General nervous derangement of a functional character, as found in hysteria, long-continued swaying movements of the body, also the sight of objects in motion, very frequently result in vomiting. Car-sickness and sea-sickness are a common experience in travel, and are probably due to disturbances of the vomiting centre through irritation of the optic nerve.

The causes which constitute peripheral irritation from different

viscera embrace an almost interminable list of different diseases which produce irritation of the nerve branches that control the various organs. Irritation of branches of the glosso-pharyngeal nerve, supplying the soft palate, root of the tongue and pharynx, whether by tickling with finger or feather, or by inflammatory action in those parts, produces vomiting; the same effect is caused by irritation of the gastric branches of the vagus and of the sympathetic, and of the nerves which supply the liver, gall-duct, intestines, kidneys, bladder, uterus, and ovaries. Vomiting by irritation of the gastric nerves may be produced by irritation or inflammation of its wall, or from the presence of irritating substances either introduced or found in the stomach; it may be the result of a congested or catarrhal condition; of softening of the mucous membrane; of the presence of poisons or of scirrhus affections; of distension from gas, liquids, or any other source; of pressure from within or without, as from hernia or tumor. Any persistent pressure upon the stomach, such as is made by tight lacing, or by pressure of the stomach against hard benches or tables, in the pursuit of mechanical occupations, may produce this symptom. Severe paroxysms of cough have the same result, due, probably, in part to muscular contraction and pressure, and to the interruption of the circulation, giving rise to congestion of the vessels. Among the more remote conditions which may produce vomiting as a reflex symptom, we may mention: hepatitis, the passage of biliary calculi, obstruction of the intestine, strangulation, intussusception, peritonitis, nephritis, renal calculus, either in the pelvis of the kidney or escaping by the way of the ureters, vesicular inflammation, uterine affections, pregnancy, ovarian inflammation.

Diagnosis.—In a diagnostic point of view the characteristics of the matter vomited are of especial interest. The food ejected is fresh and unchanged, save as affected by mastication, when the vomiting depends upon nervous irritation; evidence of fermentation in the ejected food furnishes conclusive evidence that it has been retained in the stomach for a considerable period of time. At times the vomited matter is thick, glairy, tenacious, or frothy; again, it contains alcohol, with various acids, such as butyric, acetic, and lactic acids. Since food is longest delayed in case of pyloric obstruction of the stomach, it is during the existence of this condition, so commonly associated with dilatation of the stomach, and particularly favorable to the indefinite retention of food, that we find the most positive evidence of decay and fermentation; *torula cerevisiæ* and *sarcina ventriculi* are found in the scum which rises on the surface of the vomited matter. The presence of bile is of no diagnostic value; the presence of mucus indicates a catarrhal condition, and pus may be found, and is found only, when there exists ulceration of the submucous coat, unless it has been emptied into the stomach from other sources, or has been

swallowed through the œsophagus. Fæcal matter may be vomited; if so, it is an evidence that a portion of the intestine—usually the colon—communicates with the stomach, or that fæcal matter is forced upward on account of obstruction in the intestines. It has been affirmed that the presence of cancer-cells in vomited matter may be demonstrated, but recent writers discredit the assertion.

The question often arises during the occurrence of vomiting, especially when it takes place suddenly, whether the symptom arises from cerebral or from reflex causes; the question is one of great practical importance and not always easy of determination. Usually, the concomitant symptoms, and their relation to each other, throw light upon the subject. The following points should also be borne in mind: If vomiting depends upon gastric irritation, it is almost sure to be preceded by nausea, and to be accompanied with pain and discomfort in the epigastric region, and with derangements of digestion, such as loaded tongue, thirst, discomfort in the bowels, flatulence, headache, and commonly constipation or diarrhœa; the nausea, pain, and headache which precede and accompany indigestion, are usually relieved with great promptness by the emptying of the stomach. In cerebral vomiting, on the other hand, nausea and epigastric pain are very rarely experienced; the tongue is usually clean; there are likely to be present vertigo and headache, disturbances of vision, mental confusion, loss of memory, disorders of sensation and of motion, and, possibly, convulsions and coma. These symptoms develop gradually, and are liable to occur when the vomiting depends upon disturbances of the gastric functions; neither are they relieved by vomiting.

Treatment.—Since vomiting *per se* is merely a symptom, it is evident that the first step to arrest it is to determine its cause, and then to remove the same.

In vomiting which depends upon irritation of the brain, cold applications to the head may be found useful, and the old school in such cases frequently practice successfully the application of leeches. It is also recommended, and the advice is excellent, to administer by the mouth small bits of ice. Our chief reliance, however, on account of the promptness and permanency of their action, is in the administration of the carefully selected homœopathic remedy. Among those likely to be called for we may mention Belladonna, Hyoscyamus, Helleborus niger, Aconite, Opium, Apium virus, Coccus, Arnica, Laurocerasus, and others.

The vomiting arising from gastric irritation is usually relieved with reasonable promptness. Common sense suggests the prompt evacuation of the stomach if the difficulty is due to the presence of poisons or of irritating substances.

There are practitioners who, in the latter case, advise entire reliance upon the indicated remedy; it seems, however, more in accord-

ance with good judgment to insure the prompt removal of the offending substance than to allow it to remain in the stomach for an indefinite period, and by its continued presence to give rise to much inconvenience and suffering, if not to absolute danger. The offending substance once removed, a few doses of the proper remedy will at once allay the entire difficulty. Lukewarm water with mustard, freely administered, usually causes prompt emesis. Copious draughts of hot water alone are often not only quite sufficient to produce vomiting, but have an admirable effect by diluting the irritating substance and by affording much relief to the irritated mucous surface. If the vomiting depends upon an inflamed condition of the stomach, our sole dependence lies in appropriate medication. If decomposition of food, or fermentation, has set in, the wisdom is urged of administering light doses of sulphurous or of carbolic acid. The action is purely antiseptic, and the propriety of this treatment is based upon the fact that even violent vomiting will not eject from the stomach the small remnants of fermented matter which, remaining, continue to excite fermentation in food which is later taken into the stomach. Persons who are subject to frequently occurring attacks of vomiting may receive a certain measure of relief by avoiding lying on the right side, since in that position the weight of the stomach produces unpleasant sensations, the gas cannot readily escape, and the sickness is likely to be kept up for an indefinite period. The list of remedies from which to select in this class of cases is almost unlimited; those most frequently useful are ARSENICUM, *Ipecacuanha*, BRYONIA, NUX VOMICA, *Phosphorus*, *Ignatia*, Opium, *Argentum nitricum*. For special indications the reader is referred to the various chapters on special diseases of the stomach.

The vomiting of sea-sickness is often exceedingly unmanageable; the use of wines, coffee, and other stimulants has been advised; some authorities insist upon almost total abstinence from food, while others urge the opposite course. From personal experience, based upon the advice of an old navy surgeon, the writer thinks the best results are to be obtained by constantly repeated and copious draughts of luke-warm water, with perfect quiet until the stomach regains its tone; the use of warm water renders the repeated vomiting easy and painless by keeping the stomach well filled. An occasional dose of *Cocculus* is of much service; the patient should assume a reclining position, and keep the head lower than the body.

The vomiting of pregnancy belongs to the field of obstetrics, and its discussion can find no place here. Careful attention to diet, and the patient exhibition of the right remedy, greatly lessen the suffering from this source, and largely reduce the rate of mortality. The following remedies are of importance in the treatment of the vomiting of pregnancy: Alumina, ARSENICUM, BRYONIA, *Calcarea carb.*, Cham-

milla, Carbo veg., COCCULUS, *Conium*, IPECACUANHA, Kali bichr., LAUROCERASUS, *Nux vomica*, PHOSPHORUS, PULSATILLA, VERATRUM.

ATONIC DYSPEPSIA—ATONY OF THE STOMACH.

Definition.—A disorder of digestion which is characterized by a general depression of the vital force, and by a feeling of heaviness, vague distress or uneasiness at the stomach, following the ingestion of food. The disease develops gradually, and naturally assumes a chronic course; it is not attended with fever or with violent disturbances of the digestive functions; it depends upon a loss of tone of the stomach, due to inherited tendency or to some cause which exerts a depressing effect upon the vital force, and leads to imperfect secretion of gastric juice or to enfeebled muscular movements of the stomach.

Ætiology.—*Inherited Predisposition.*—Scrofulous children, or children born of parents who are sufferers from nervous irritation, indigestion, and a lack of vitality, due either to inherited tendencies or to habits of living, are particularly liable to suffer from this affection. Such persons in childhood need not necessarily give evidence of a marked weakness of digestion or of disease of the stomach; having passed the period of adolescence, they are, however, liable to betray this inherited tendency by symptoms of indigestion which, at first of slight severity, become more and more marked, and soon give rise to much inconvenience, depending in extent largely upon the temperament of the individual, the judgment used in the care of health, and upon occupation; carelessness of living, excesses of various kinds, and sedentary occupation naturally favor the rapid development of the complaint; it is not unfrequently the case that such persons have become confirmed sufferers long before they have reached the prime of life.

Age has considerable influence in the same direction. As people grow old, the different glands of the body lose, to a large extent, their power of secretion, the muscular fibre possesses less tonicity than in the prime of life, and disorders of digestion readily show themselves. *Sex* is not an important factor; men, however, are particularly subject to inflammatory diseases, while the predisposition of women to nervous affections, or to diseases in which the nervous system plays an important part, makes it probable that they more commonly suffer from derangements of digestion which are of nervous origin.

It is safe to state that any condition of the system which is associated with, or depends upon, a state of general depression of the vital forces, predisposes to atonic dyspepsia. Extreme heat, for instance, particularly in moist countries, develops a marked tendency to this complaint.

Certain pathological conditions act as predisposing, and in another

sense, as exciting causes. A gastritis, acute or chronic, as well as almost any chronic lesion of the gastric mucous membrane, is pretty sure, under favorable circumstances, to be followed by atonic dyspepsia; the same result may obtain from the existence of various structural changes, ulcers, growths, or from dilatation or atrophy of the gland itself.

Errors in diet are the most fruitful exciting cause, especially when the stomach is already weak, or when an inherited tendency to dyspepsia exists. Irregularity in the time of taking meals, prolonged fasting, eating too often and in too much haste, and eating between meals, deserve mention here. It is a remarkable fact that people of more than average intelligence frequently suffer severely from indigestion simply because they seem not to realize the folly of partaking of food long before the contents of the stomach, from a previous meal, have had time to pass into the duodenum. The habit of drinking to excess at the table is also very pernicious, and the effects of moderately warm drinks, thus excessively taken, are particularly disastrous. A general relaxation of the mucous membrane results from their use, and is quite as mischievous as the diluting and weakening of the gastric juice which result from the copious admixture of drink. The too liberal use of condiments, spices, narcotics, and of stimulants generally is sure to destroy, sooner or later, the integrity of the stomach; a long-continued diet of tea, soups, and other liquids, resembles in its general effect that of warm drinks. The imperfect mastication of food, whether the result of carelessness, or due to defects of the teeth or of the mouth, greatly impairs the vigor of digestion, and, if long continued, is almost sure to result in harm. Fenwick (Quain's "Dictionary of Medicine") says, "The writer has found that only nineteen per cent. of those who were not dyspeptics confessed to the habit of eating very quickly, whilst among the sufferers from gastric disorders, fifty-one per cent. were in the habit of improperly masticating their food."

It is undoubtedly true that the poor often suffer severely from dyspepsia, owing to insufficient supply of food, to long fasts imposed upon them by stern necessity, and, above all, to the use of food utterly unsatisfactory in quality. The wealthy, with all the luxuries at their command, are, however, not exempt from indigestion. The temptation to indulge too freely in the pleasures of the table, to eat oftener than required, or to indulge in food which they have not sufficient vigor of body to digest, in many persons of this class leads to a complete exhaustion of the digestive powers, while in others it results in the establishment of gout and other fashionable diseases.

The integrity of the gastric juice depending upon a sufficient supply of the proper material from the blood, it is evident that any condition which impoverishes the blood, thus making it impossible for this fluid to furnish the material necessary to preserve the integrity of the gas-

tric juice, must lead the way to eventual and serious harm to digestion ; hence it is that anæmia, chlorosis, copious discharge from the mucous or serous membranes, hæmorrhages and excessive suppuration rarely continue for any length of time without seriously affecting digestion, and leading to atonic dyspepsia. Long-continued sexual excesses are also a fruitful cause of this affection by the great waste of matter, and by the wear and tear which this vicious habit entails upon the nervous system.

It is well known that the condition of the nervous system greatly affects the digestion ; any marked nervous disturbance promptly modifies and, not unfrequently, arrests this important process. Mental strain exhausts vitality, lessens the secretion of gastric juice, and interferes with proper muscular action. The shock of a sudden, violent emotion, a fit of passion, a paroxysm of violent anger, a fright, an unexpected and great joy, all these are known to have arrested instantaneously the process of digestion, leading, in some instances, to very serious results. In a similar manner, the demands made upon the active business man, the worry of the ambitious, the anxieties of professional life,—in fact, everything partaking of the nature of an excess, are productive of stubborn and long-continued derangements of the stomach. These causes are most operative during the years which constitute the prime of life, and the perplexities caused by them, with the attending loss of sleep, and the constant excitement of the entire system, furnish the reason why men more often suffer from atonic dyspepsia between the age of forty and fifty-five,—the time of life when ambition is most active, and the efforts to achieve success are most persistent and daring.

On the other hand, it is not unusual to find dyspepsia resulting from utter indolence on the part of those who, by virtue of wealth and position or from hopeless idleness, feel not called upon to make any exertion. The utter apathy of such a life seems to produce a condition of depression little less serious than the strain of continued overwork, and quite likely to produce similar results.

Pathology.—Atonic dyspepsia is practically a functional disturbance, and we have not a clear idea of those pathological changes which, it is presumed, are always associated with even mere functional disturbances. We are justified in looking for the evidences of faulty nutrition, but cannot satisfactorily describe them. An atrophy of the gastric mucous membrane, with thinness and transparency of the walls of the stomach, fatty degeneration, and structure-waste, have been observed in many cases. According to Handfield Jones, Habershon, and Wilson Fox, such conditions, in many instances, were found to be replaced by a greater or less amount of fibro-nucleated tissue, associated, frequently, with distinct loss of power in the digestive function during life. Dr. Fenwick asserts that in such cases the digestive powers of

the mucous membrane after death are also markedly diminished. Bearing in mind the fact that the tendency to degeneration which, on one hand, is characteristic of old age, and, on the other, frequently the result of previously existing inflammatory conditions, is important in properly estimating the meaning of the structural changes which have been observed after death, we are forced to admit that the pathology of atonic dyspepsia is wholly speculative, and is likely to remain so for an indefinite period of time. Whenever we find appreciable structural changes, well-defined and unmistakable, they are the result of a deeper-lying disease of which atonic dyspepsia simply formed an incidental part.

Symptoms.—Atonic dyspepsia develops gradually and slowly, with a decided tendency to the chronic state. The first symptom is usually a sense of fulness and distension at the stomach which appears soon after a meal, continues for one, two, or three hours, and either gradually disappears of its own accord, or is relieved by the next meal. There is rarely present much pain, the feeling of fulness at the stomach being accompanied only with a vague epigastric uneasiness. Later, these symptoms become more troublesome. The pain at the stomach rarely grows severe, but flatulence, at first in the stomach, later throughout the alimentary tract, becomes very annoying. There is connected with it a sense of constriction, an oppression of the upper chest, which is most keenly felt at the middle sternum, and is relieved by repeated eructations of gas and small amounts of undigested food. Usually these eructations are not rancid, though at times butyric-acid fermentation occurs. The flatulence frequently produces distressing dyspnoea, which is most painful in persons somewhat predisposed to functional disturbance of the heart. In such subjects the difficulty of breathing is, at times, excessive, the action of the heart irregular, moderate indulgence in the pleasures of the table produces violent palpitation, and the slightest exercise, especially when taken soon after a meal, causes markedly irregular action of the heart. Not unfrequently such persons find it difficult to go to sleep, and if of a nervous and apprehensive turn of mind, fancy that they are the victims of an incurable heart disease and are liable to die at any time. In other instances the sufferer awakens in the middle of the night, the heart performing remarkable antics, and he is obliged to lie awake for an hour, or more, before sleep again comes to him. It is often remarked by this class of sufferers that the heart seems suddenly to turn a somersault.

Flatulence is a common feature of atonic dyspepsia, and constitutes one of its most annoying symptoms. In some cases, the distension at the stomach is distressing. A choking sensation is bitterly complained of. Pressure upon the stomach and violent motion of the body are occasionally followed by eructations, affording much relief. As the gas passes along the alimentary canal, it produces tightness and neu-

ralgic pains in various parts of the body, and borborygmi may readily be heard on external pressure. The pains produced by the accumulations of flatulence are not always severe, but at times they radiate to the shoulders and to the left arm, and are of sufficient severity to produce serious discomfort, resembling, somewhat, a light attack of angina pectoris. The differential diagnosis from this far more serious affection rests upon the fact that the paroxysms of pain resulting from flatulence almost always occur soon after a meal, and lack the aggravation from motion which is characteristic of the latter.

The epigastric distress is rarely accompanied with tenderness in the epigastric or in the abdominal region, as the case may be; it is relieved by pressure, unless there exists that general tenderness of the surface which is, at times, found in drunkards and in hysterical persons; but even in such cases, hard, deep pressure is readily borne, and affords relief.

The appetite is poor, and, at times, complete aversion to food exists. Occasionally, the patient craves indigestible food, starchy substances, and fats, soups, broths, and, in some instances, boiled unsalted meat, which, if eaten, produce violent suffering. Vomiting is not a usual symptom, although consumptives and persons suffering from hysteria are likely to be troubled with it. When vomiting occurs, the matter ejected is watery, and contains particles of undigested food.

Thirst rarely exists, and many patients practice total abstinence from drink. Some cases seem to receive temporary relief from copious draughts of cold water. The tongue, which in inflammatory conditions of the stomach is usually red and pointed, is pale, flabby, broad, showing indentations from the teeth. It is rarely heavily coated; this pallor and a sponginess of the sore parts extend to the lips and gums. The soft portions of the throat are usually relaxed, producing thickness and hoarseness of the voice, and hawking and spitting.

The breath presents no characteristics. It is rarely offensive, and, at times, is of a sweetish odor. The pulse is slow, feeble, and compressible, and easily excited; it partakes of that irregularity and excitability of the action of the heart which has already been described.

The surface of the body is cold, clammy, and moist. The hands and feet are cold and damp; the complexion is sallow and dirty, and there is usually perceptible loss of flesh, which, however, does not compare with the remarkable emaciation found in organic diseases of the stomach. The urine is pale, of low specific gravity, and gives a pale sediment; urea is deposited in cases which are characterized by great tissue-waste.

The intestine partakes, in most cases, of the general condition of atony. Constipation is of almost constant occurrence, although diarrhoea is observed in exceptional cases. The stools are solid, dry, scybalous, at times frothy from fermentation. In some instances, as ob-

served by Fenwick, they contain pieces of fibre-like tissue resembling worms. The constipation, the result chiefly of the existing atony, tends to aggravate the existing difficulties. It aids in still further deranging the appetite, assists in the formation of gas, and, in some cases, by the irritation of the hard stool and of the undigested food upon the mucous membrane, produces inflammatory action which causes additional sufferings, complicates the case, and increases the difficulties of a cure.

The nervous system partakes of the general state of depression and irritability; especially do those patients suffer seriously in whom nervous depression is in itself the probable cause of the entire difficulty. The patient suffers from great languor and weakness, especially from heaviness of the legs. His sleep is hopelessly disturbed; he becomes irritable, peevish, and irresolute, is unable to exert himself, or to concentrate his thoughts for any length of time upon any one subject, and a vigorous and long-continued effort of body or mind soon becomes an utter impossibility.

Diagnosis.—The diagnosis of atonic dyspepsia usually presents no especial difficulties. The absence of thirst and fever, the condition of the tongue, as already described, the absence of pain in the epigastric region, and of tenderness to pressure, aided by a careful study of the causes of the disease, will usually determine the diagnosis of the case. Occasionally, the physician is puzzled in differentiating between a catarrhal state of the gastric mucous membrane and dyspepsia, the more so since frequently attacks of inflammation of the stomach occur in the course of dyspepsia. The following are to be borne in mind: In gastritis the pain is marked, and there exists great tenderness to pressure; in atonic dyspepsia the patient rarely complains of much pain in the epigastric region, save as an uncomfortable feeling of distension exists as the result of flatulence, and there is no tenderness upon pressure. In gastritis there is much vomiting, acidity, and heartburn; in dyspepsia these symptoms are not prominent, and frequently do not occur at all. In gastritis the urine is high-colored, loaded with lithates; in dyspepsia it is pale, and deposits urates when great tissue-waste exists; at times, in dyspepsia, it shows deposits of oxalates and phosphates.

It is scarcely necessary to point out the differentiation between atonic dyspepsia and the more serious organic diseases of the stomach, as ulcer, cancer, and so forth. The entire history of the case, the appearance of the patient, the cachexia unmistakably shown in the advanced stages of the disease, the intensity of the suffering and the violence of all the symptoms in the case, the frequently-occurring vomiting,—all these symptoms point with almost unerring certainty to the graver lesions of the stomach.

Prognosis.—The prognosis of the average case of atonic dyspepsia, not complicated by serious constitutional disorders, under well-directed treatment, is favorable, although the patience of both patient and physician are frequently taxed not a little before permanent improvement takes place. When the functional disturbance of the stomach occurs in persons of advanced age, or when in those younger in life it follows a long-continued state of inflammation of the stomach, it is wise to make a somewhat guarded prognosis. Cases frequently occur in which the disease of the stomach depends upon the existence of a deep-seated difficulty in some other organ of the body; if so, common sense suggests that no cure of the dyspepsia can be looked for until the first cause of the difficulty is wholly removed.

The existence of atonic dyspepsia should always enlist the interest of the attendant physician. Nutrition must necessarily become impaired wherever this atony exists for any length of time, and it is safe to assume that such a state of impaired nutrition may often act as exciting cause in the formation of diseases of the kidneys, lungs, heart, and other organs, when such organs are already by inheritance or disease predisposed to abnormal states. In anæmic patients the occurrence of atony of the stomach may well excite apprehension, and for self-evident reasons the physician must concentrate his energy in the direction of furnishing relief to the sufferer by establishing to the fullest extent of his power the integrity of the digestive organs.

Treatment.—In view of the fact that patients suffering from atonic dyspepsia are likely to remain under the care of their physician for some considerable length of time, and that a favorable termination of the case depends largely upon the patience and willingness of the invalid to implicitly follow directions given, it is of the last importance that the physician should, first of all, use all means to gain the full confidence of the patient; the more friendly and the closer the relation between patient and physician, the better able is the latter to determine the primary cause of the difficulty, and he can do much toward relieving unpleasant surroundings, unhappiness in family relations, anxiety of mind, and even business vexations, which constantly provoke, irritate, and aggravate the patient's condition. This accomplished, so far as lies in his power, the physician concentrates his attention upon the peculiarities of the case before him, supporting the patient morally and physically, prescribes the diet best adapted to the wants and digestive powers of the patient, sees to it that proper regimen is had, and, last of all, administers the specific homœopathic remedy.

The subject of the patient's diet is of the greatest importance. It is necessary to remember that idiosyncrasies of patients very often determine the food upon which to place them. In a general way, however, it is well to observe a few general rules which may be embodied

in the following propositions: Do not let the stomach be overloaded by eating too much or too often; insist that the patient masticates thoroughly, takes abundance of time for his meal, drinks a small amount only, and then of cold water, cold milk, or cold tea; let the food be cooked plainly but carefully, and not too highly seasoned; see that the time of the meal be made the occasion of a pleasant family gathering; let the conversation be bright and stimulating, and the faces cheerful and happy. After the meal is finished, let the patient abstain for some length of time from all exercise, physical or mental, and devote himself to quiet and rest.

Occasionally cases occur where the patient demands, and should have, food oftener than once in five or six hours. These cases are exceptional, but when they occur, and this is particularly the case in persons who are anæmic, it is best to give food in small amounts and at short intervals. Under all circumstances, it is well to bear in mind the fact that very long intervals between meals are fully as dangerous as eating too often; long fasting weakens greatly the powers of digestion, and in many instances is responsible for the existence of gastric atony.

As a general thing, dyspeptic persons must avoid fried dishes and grease; they should eat no soup or broths, no condiments, no fresh bread, no young potatoes, no pastry, and they should avoid heavy stimulants. Vegetables are wholesome, if judiciously selected; they must be fresh, thoroughly ripe, and well cooked. In some cases a vegetable diet creates flatulence; if so, it is best to discontinue it for a time, and to use freely in its place reasonable quantities of lemon-juice.

Dr. Charles Gatchell, speaking of persons troubled with flatulency and eructations of gas from the stomach, states that this difficulty may be corrected by eating only vegetable food at one meal, and animal food at another. Roasts are preferable to boiled meat. Of the meats, mutton, beef and game are to be recommended; pork, veal, salted or canned meats must be avoided. Fresh eggs can easily be used with impunity. Chicken is readily digested by many, while in others it produces serious disturbance.

Of the vegetables and fruits, turnips, parsnips, onions, cucumbers, watermelons and cantaloupes are to be avoided. Peaches, grapes, strawberries, prunes, if ripe, are rarely harmful. Bread must be well baked: it should never be eaten fresh, and is best two or three days after baking; it does nicely when toasted. Pastry, nuts, pickles and cheese are to be avoided. Sugar must be eaten in moderate quantities, and light starchy puddings should be eaten with caution, for frequently they produce acidity of the stomach; under no circumstances should they be sweetened richly. Of drinks, moderate amounts only can be taken; they should be cold, and it is better to drink between meals than at the table. The value of milk as an article of diet in the great

majority of cases is well understood; it is both refreshing and nourishing. Cocoa also deserves mention as a palatable and nutritious drink; chocolate, if well made, is too rich for the stomach of the dyspeptic. Wines are recommended by European writers, especially claret, hock, champagne, and sherry. American practitioners, as a class, discountenance the use of wines, but it cannot be denied that in many instances much good has been done by their judicious use. In nervous and utterly prostrated persons, particularly in nervous women, a small amount of iced champagne frequently exerts a most pleasing effect upon the stomach. A glass of heavy claret often affords wonderful help to the overworked business man or professional man, and, used wisely, produces none but desirable results. Some patients prosper upon a diet largely made up of corn-meal and clabbered milk. The latter is an article of diet not appreciated as it deserves to be. It should be served cool with cream or nutmeg, and is really a delicious dessert dish, much used in Europe by all classes. Crackers, made after the formula of Dr. Charles Gatchell, in the practice of the writer have done excellent service. The following directions are given for their preparation (Gatchell, *Diet in Disease*): "Take of wheat meal one quart; butter, one tablespoonful; water enough to make a very stiff dough. Beat this dough with a potato-masher or rolling-pin for half an hour, laying it on a bread-board for the purpose. Roll it into a ball, and beat it out over and over again. Now roll it out very thin; cut into round shapes; prick with a fork, and bake in a quick-oven. The wheat meal should be especially prepared for these crackers. If no other is to be had, use good brown flour. To secure a good article, buy some good wheat, take it to the mill, and have it ground. Let the bran be sifted out, but leave the middlings and flour together, and you have a good wheat meal."

Raue (*Special Pathology and Therapeutics*) gives an excellent bit of advice when he urges *in an acute case of dyspepsia to follow the cravings of a patient, but to mistrust morbid appetite in chronic cases.*

The regimen of the dyspeptic must be looked after. As already indicated, the state of the patient's mind is of the utmost importance; whatever can be done to make him content and happy, to unload his mind of anxiety and worry, helps just so much toward putting him forward on the road to recovery. Over-work and indolence must be alike avoided. The occupation should be agreeable; if it is not already so, a change should be made, if at all possible. The patient must be taught to cultivate an intimate acquaintance with the open air and sunshine. He must sleep in a cool room with an abundance of fresh air in it. Exercise in the open air is of the last importance. Whenever possible, easy travel, and in desirable companionship, should be recommended. Travel necessitates particular care so far as diet is concerned, but has a most satisfactory effect upon the nervous system

and upon the mind of the patient. Dyspeptics have a tendency to brood upon their troubles, and everything they see is colored by the reflection of their own gloom; slowly moving from place to place, viewing constantly changing scenery and studying new faces, helps people get outside of themselves, and this one point alone is often of the greatest importance. When travel under desirable conditions cannot be had, boating, yachting, occasional hunting, camping-out, etc., are to be recommended. If lack of means or of time stand in the way, the benefits of the gymnasium are almost always available. In all these outdoor exercises the patient must be carefully cautioned against undue exertion, and must be instructed never to indulge to the point of exhaustion. After exercising, he must rest until thoroughly refreshed, when a light meal may be taken. Bathing may be recommended, but must not be carried to excess. If the patient is sufficiently robust to bear a short cold bath, a sponge-bath, or a shower-bath, he may safely indulge in it twice a week, but not oftener. The bath should always be of short duration, and friction should be thoroughly used after the bath. The habit of directing patients to take such baths daily, is decidedly unwise; the effect is exhausting rather than stimulating. In some cases, a daily sponge bath, rapidly administered, and followed by the necessary amount of friction with a bath-towel and flesh-brush, has been found advantageous. Dyspeptics who possess the necessary means may be sent to the seashore or to mineral baths. A brief residence at the seashore gives many of the advantages of travel: the faces seen and the surroundings had are constantly changing, and the air usually is bracing. A residence at mineral baths, especially at some of the gaseous and chalybeate springs, may be recommended, not so much on account of the medicinal virtues of the waters, as because of the intelligent care usually exercised by the physician in charge, so far as attention to regimen and to the diet of the patient is concerned.

Therapeutics.—Since a very large number of remedies of the homœopathic materia medica may, under proper conditions, be exhibited with advantage, and since all remedies to be considered must present a totality of symptoms closely resembling those described under the symptomatology of atonic dyspepsia, the most pertinent symptoms only need be pointed out here.

Nux vomica.—The great usefulness of Nux depends very largely upon its peculiar action upon the nervous system. It is best indicated in persons who suffer from loss of muscular power, and who, from close confinement, over-work, and indulgence of the appetite, have utterly broken down the nervous system. The patient is cross; easily irritated; has a sallow, yellowish complexion; suffers from dull frontal headaches in the morning, and becomes incapable of making a prolonged mental exertion; fullness and distension after a meal; sensitiveness to pressure, and tightness around the waist; lassitude; nausea; vomiting of food and bile. Taste, especially in the morning, is insipid, bitter, or sour. Appetite is wanting. He cannot eat bread, milk, or acids. Symptoms are usually aggravated from eating. Constipation, with

useless urging (?) to stool, and with feeling of constriction about the anus; pyrosis; borborygmi.

Ignatia.—Ignatia, in some respects, partakes of the general sphere of action of Nux. Weariness and great nervous prostration, with general depression, are characteristic of Ignatia. Bloating after meals, with hiccough from eating or drinking. The patient has no appetite, and suffers from musty eructations. Or, if appetite is tolerable, he eats a few mouthfuls, and then feels thoroughly repleted. There is a faint, gone feeling at the stomach, even when there is no bloating; flatulence and colic, however, occur frequently, and especially at night. Breathing is oppressed and sighing, with tendency to palpitation of the heart, most marked at night. Periodical cramps occur at the stomach, occasionally with canine hunger and qualmishness; pressure in the region of the vertex, which shifts toward the forehead; the stools are hard, and are passed with great difficulty.

Phosphorus.—An excellent remedy in persons who have masturbated or indulged in sexual excesses. There is great prostration, with a dry, earthy-colored tongue; dryness of the throat, sour taste and eructations. Regurgitation of food after taking it. Cold drinks are grateful to the patient and relieve the burning at the stomach; as soon as they warm in the stomach they are ejected with a return of the painful symptoms. There is constant, loud, annoying rumbling of gas in the bowels, which seems not lessened by the frequent emissions of gas which take place. Heat and congestion of the head; soft, watery, painless diarrhoea.

Calcarea carbonica.—A very valuable remedy, frequently overlooked; particularly useful in cases which have run a long time. The tongue is coated thick, whitish-yellow. The patient has no appetite, and has a positive dislike to meat and warm food, what he eats he wants cold. There is considerable thirst, and the taste is bitter and putrid—sometimes sour. After a meal there is much bloating and fulness at the stomach, which is somewhat sensitive to touch, accompanied with heat and palpitation of the heart. The stomach symptoms are often relieved for the time being by a profuse accumulation of saliva in the mouth. Hemicrania in the morning, with a weakening tendency to cold sweat, especially of the feet.

Bryonia.—Bryonia, according to Trinks, relieves the pressure on the stomach, caused by irregularity in diet, eating indigestible food, bread not enough baked, coffee, brandy, or bad beer. It comes on when the stomach is empty, as well as when it is full; the patient complains of a pressure at the pit of the stomach as of a heavy stone there. It lasts from two to four hours, sometimes longer, and goes off after copious eructations. In worse cases the so-called water-brash is accomplished, or there is a great deal of acidity generated, which shows itself by sour risings, heartburn, and vomiting of very sour and acrid mucus. In severe cases there is much sensitiveness of the stomach to external pressure. Bryonia is very useful during hot and moist weather. The mouth and throat are dry; the tongue yellow; everything tastes bitter. An icteric condition prevails. Severe and characteristic headache. Fluids disagree. The patient wants wine, coffee, acids. He is restless, irritable, vehement. Constipation without desire for stool.

Carbo veg.—Charcoal restores the vitalizing purity of the blood, rouses the sinking energy of the nervous system, and purifies the secretions of the mucous membrane; in the hands of the careful prescriber it is one of the most valuable remedies in the treatment of indigestion. It is particularly useful in the case of persons who have lived high, and who suffer from excess of flatulence, sour and rancid, with epigastric soreness as result of this flatulence, and with a tendency to diarrhoea. There is a great aversion to food, with occasional violent spasmodic contractions in the epigastrium, worse at night and, sometimes, after breakfast; relieved by eructations. Vomiting rarely occurs, but the patient suffers much from nausea, particularly in the late forenoon. He is temporarily relieved by taking stimulating drinks. There is trembling and a sense of weight at the stomach. The patient can drink no milk, loathes meat, and especially fat meat. Fright, cold, and heat bring on the symptoms. Hiccough; gas moves upwards.

Hydrastis.—Great lassitude and debility; weak digestion, with heavy, hard thumping pain and fulness of the chest, and dyspnoea; large, flabby tongue, looking as if covered with slime; dull, frontal headache; empty, gone, faint feeling at the stomach; palpitation of the heart with strong pulsations in the pit of the stomach; sour and bitter eructations; pyrosis; symptoms worse from eating; constipation; stools hard, knotty, followed by pain and faintness; hæmorrhoids; chronic discharges from mucous surfaces.

Arsenicum.—An excellent remedy in persons who have enfeebled the stomach by the persistent use of ice-cold drinks, tobacco, and excesses of various kinds, and whose nervous system gives evidence of great exhaustion. The remedy is most frequently indicated when the condition of the stomach borders upon inflammation or when gastritis actually exists. The stomach is exceedingly irritable and refuses to retain food. Heartburn; gulping up of acid fluids; excoriating the throat; the epigastric region is full, and there is a tenderness to pressure; nausea and vomiting, relieved by hot drinks; tongue red, hot, rough, irritated, pointing to inflammatory action; the patient can take no animal food; tendency to diarrhoea; pulse feeble, quickened, irregular; cold extremities, and general coldness and dryness of the surface, interrupted with fever-flashes and shiverings; fits of sudden weakness; great thirst; drinks often and little at a time; symptoms worse from drinking cold water.

Argentum nitricum.—Like Arsenicum, useful when there exists much irritation of the mucous membrane. There is excessive flatulence; the stomach seems ready to burst; copious eructations, which are accomplished only after persistent effort and are very violent; fluid seems to run right through the entire alimentary canal without stopping; the patient is in a condition of apathy; the mental symptoms are of great importance, and consist of marked depression, great anxiety and worry, with an impulse towards self-destruction, the result of excesses.

China.—Of great value in the treatment of patients suffering from anæmia or malarial poisoning. Continued feeling of acidity; sinking at the epigastrium, relieved for a time by eating, but returning soon; coldness in the stomach; desire for pungent and refreshing things and stimulants; can eat no farinaceous food; slowness of digestion, with cramps and pressure after eating; vomiting of ingesta; thin, dark, offensive diarrhoea after eating; ill humor; indisposition to make any exertion; heaviness. When the symptoms of malarial poisoning are especially well defined, with enlargement of the spleen, the lower triturations of the Sulphate of Quinine are frequently very useful.

Pulsatilla.—Tongue thickly coated with white, rough fur; taste pasty, as of spoiled milk; absence of thirst; repugnance to warm dishes; pain after eating, worse from drinking cold water. Said to cure dyspepsia brought on by the use of fat and rich foods. Hiccough, colic, rumbling in the bowels, slow stools.

Anacardium.—Useful in cases where the difficulty depends upon complete prostration of the nervous system, and atony of the stomach, as the result of long-continued and excessive mental labor, resulting in exhaustion of the nervous force. The nervous symptoms predominate, hence the constant desire to eat at any time, day and night, without receiving relief.

Asa foetida.—Especially adapted to nervous and hysterical women. Its most important symptom is the enormous meteorism of the stomach. As in *Argentum nitricum*, the patient finds it difficult to relieve himself of the flatulence which refuses to pass downwards and must be ejected from the stomach. General hypersensitiveness, both physical and mental; craving for wine.

Aurum.—Useful in cases suffering from flatulence, palpitation and pain of the heart, and pain in the chest, with great mental depression, burning and pressure in the stomach, with hot rising. Palpitation relieved by eructations of gas.

Berberis.—Valuable in cases with a tendency to bilious dyspepsia, muscular rheumatism, melancholy, listlessness, mental depression, great prostration, causing perspiration from slightest exertion. Offensive, metallic odor from the mouth, which is dry and sticky.

Bismuth.—Sweetish, metallic taste in the mouth; thirst for cold drinks, with immediate vomiting of cold water taken. Burning and pressure of the stomach after eating, confined to a circumscribed small spot, forcing the patient to bend backwards; eructations of offensive odor.

Ipecacuanha.—Indicated by the presence of constant sickness at the stomach, with tendency to vomit and other characteristic symptoms.

Iris vers.—An important remedy when the condition borders upon an inflammatory state. The symptoms are violent, with great burning distress in the stomach; vomiting of water and very sour fluid; belching of wind, and yellow, watery discharges from the bowels, the passage of which causes extreme burning in the anus and rectum.

Kali carbonicum.—"Well adapted to corpulent, aged people, who are constantly chilly, never perspire, have pallor of the face, œdema of the upper eyelids, great desire for sweet things, bloatedness of the abdomen, dryness of the mucous surfaces, dry, hard stool, turbid urine, constant chilliness."

Lachesis.—The patient can endure nothing tight about the throat or elsewhere; feels as if a foreign body were in the throat, which he must swallow but cannot move; offensiveness of the stools; sour, foul, cadaverous taste; perceptible trembling in the epigastric region. This remedy is often indicated from the totality of the symptoms, but in the experience of the writer, and of many others, rarely does satisfactory work.

Leptandra virg.—Useful in cases with complication of the liver; flat, pappy taste; nausea with death-like faintness upon rising; great distress in stomach and liver, worse from drinking water; black, papescent, fetid, and profuse stools, followed by prostration.

Lycopodium.—Dyspepsia with intestinal flatulence; desire for food from sensation of weakness in the stomach; can eat but little on account of the enormous distension from flatulence; brick-dust sediment in the urine; nervous exhaustion.

Mercurius.—Liver complications; foul, sweet, brassy, saltish, bitter taste in the mouth, especially in the morning; wants spicy food, cold drinks, wine, brandy; suspicious, sad, vehement mood; slimy mouth; ptyalism.

Nux mosch.—An excellent remedy in nervous, hysterical women. Great flatulence, which seems brought on not only from eating but by any excitement; vertigo; brain feels loose in the skull; fair appetite, but a few mouthfuls satisfy.

Podophyllum.—In cases with intestinal complications; in morning diarrhoea, followed by weakness; desire for acids; dryness of mouth, throat, and tongue; sour eructations; bilious complications.

Sepia.—To be consulted whenever women suffer from menstrual or uterine difficulties; sour, putrid taste; aversion to meat; desire for sour things; emptiness in the stomach, with anguish; palpitations; weakness and weariness of legs; sour eructations; the sweat of the axillæ and feet exhales a very strong odor.

To be consulted: Arnica, Hepar, Sulphur, Rhus tox., Æsculus, Alu-
mina, Cina, Cocculus, Magnesia muriat., Sanguinaria, Agaricus, Anti-
monium crudum, Colocynth., Fluoric acid, Dioscorea, Silicea, Ra-
tanhia, and the mineral acids.

Auxiliary Treatment.—The remarks made under regimen practically form the chief part of the auxiliary treatment. Cases occur in which much relief is given by the use of pure Pepsin, administered in doses of from 3 to 5 grains, about a half-hour before a meal is taken.

Electricity, in some cases, may be advantageously employed. It is serviceable, according to Beard and Rockwell, first, by improving the nutrition of the tissues of the organs; secondly, by improving the nutrition of the brain, spinal cord, sympathetic, and entire nervous system. The faradic current is usually preferable to the galvanic, because it acts more vigorously on the muscles, "and hence produces more purely mechanical effects with possible exercise of all the deep tissues. It may be safely said that we know of no treatment more sure to relieve the leading and concomitant phenomena of dyspepsia than general faradization and central galvanization. In connection with these we sometimes use galvanization of the sympathetic, pneumogastric, and the spine. General faradization relieves nervous dyspepsia, not so much by the virtue of its influence on the stomach—although it directly affects the stomach—as by its influence on the nervous condition of which dyspepsia is a symptom. The stomach may be indirectly galvanized through the pneumogastric in the neck, or directly faradized by applying large electrodes, with very fine

pressure over the back and abdomen, thus passing the current directly through the organ. If the organs are not diseased, they will bear a fairly strong current, which may be applied on an average of from three to ten minutes, either keeping both electrodes in a fixed position, or moving one slowly over the surface of the organ operated upon.

NEUROSES OF THE STOMACH.

Synonyms.—Cardialgia, Gastralgia, Gastrodynia, Morbid sensibility of the stomach, Cramps of the stomach (?).

Definition.—A disturbance of the stomach characterized by pain, vomiting, derangement of appetite, and perversion of function; the disease is functional, and depends upon constitutional disorders capable of producing this condition as a reflex symptom or of so lowering the standard of vitality as to cause marked general depression, with nervous irritability and excitability.

Ætiology.—The neuroses of the stomach, like many other functional disturbances, find their most prolific causes in those conditions of the general organism which are characterized by an impairment of nutrition, predisposing to, and resulting in, functional disturbances of a local character either as reflex symptoms or as a necessary sequence of the general derangement. As a general proposition, it is safe to assert that pain at the stomach, with the concomitant symptoms described in this chapter, is likely to occur in any person whose nutrition is already impaired by a constitutional disturbance of long standing, and of a temperament which, by virtue of an inherited or acquired nervous irritability, is predisposed to the neuroses.

A vigorous constitution, supported by habits of prudence and by a wise economy of vital resources, is likely to resist the effects of extraneous inimical influences and the wear and tear of grave responsibility and worry, while a constitution feeble by inheritance, and barren of vitality, is sure to break down under the same strain. Hence, in estimating the probable effects of exciting causes it is necessary to pay due consideration to the amount of vitality at the disposal of the patient for resisting the effects of untoward influences; that which merely staggers for a moment one individual will lead to hopeless prostration in the case of another. All depressing influences, as grief, anxiety, long-continued excitement, jealousy, mortification, anger, and fear, if long-continued, are peculiarly liable to produce functional disturbance in the digestive sphere; but they are much more sure to give rise to serious disorders in this direction in persons already weakened or in those naturally very sensitive, than in those of a robust temperament. The same applies to long-continued and hard intellectual employment, and it is on this account that professional

work and the life of the student are by no means fit employments for those physically weak, but require for their successful pursuit the most robust and vigorous constitutions. Severe physical labor, also, if pushed too far, may tend to establish neuroses of the stomach, although it is much less likely to bring about this result than are those labors which involve wear and tear of the nervous system.

Whatever depresses vitality and impairs nutrition deserves study in this connection. The loss of animal fluids from hæmorrhages and other causes, anæmic conditions, and bad feeding belong here. All excesses must be considered; the abuse of stimulants, for instance, and sexual excesses and irregularities, among the latter more especially the practice of onanism, are prolific causes of nervous disturbances which sooner or later affect the stomach.

Diseases of the nervous system generally may act as predisposing or exciting causes of neuroses of the stomach. Hysteria, with the host of abnormal nervous phenomena which this term covers, furnishes as large a quota among women as hypochondriasis does among men. It is, indeed, very rare that we find a well-defined case of hysteria which does not present many of the gastric disturbances which are here considered, and those at all experienced in the treatment of hysterical women will quite readily accept the statement made by Briquet that of 358 cases of hysteria treated by him within a certain length of time all but 30 had suffered more or less severely from gastralgia.

Malarial poisoning, no doubt, frequently results in the production of these neuroses. In such cases it is not unusual to find that the gastralgia is distinctly intermittent, and this fact becomes a diagnostic point of no little value. The gouty diathesis is also held by many writers to predispose to these affections; it seems, however, that the stomach symptoms often found in connection with gout partake more of an inflammatory nature than of a purely functional disturbance. The effect of tobacco, more particularly when chewed, deserves consideration; it acts powerfully upon the nervous system, and tobacco chewers frequently suffer severely from cramps and other painful disturbances of the stomach. Among those causes which produce neuroses of the stomach as a purely reflex symptom, a variety of disorders may be mentioned, even trivial conditions, sometimes far removed, for affections of the external ear and of the teeth at times affect in a marked manner the functional integrity of the stomach. Diseases of the kidneys, constipation, inflammation of the testicles, gall-stones, but more particularly diseases which involve the female reproductive organs, and above all the uterus, are almost sure, sooner or later, to give rise to stubborn and painful neuroses of the stomach. Structural diseases of the stomach also, as cancer and ulcer, are classed in the same category by many writers. It is, however, diffi-

cult to draw the line where those symptoms which properly belong here are the result of purely functional disturbances, and where they are due to inflammatory action with characteristic tissue changes.

Age and sex are not without influence. In women, the appearance and the cessation of the menstrual function mark the time at which disturbances in the sexual and reproductive sphere are most common, and where disturbances of the nervous system, and among them neuroses of the stomach, are very likely to take place. The occurrence of this class of gastric affections in women is alike rare before puberty and after the climacteric period has passed. In some women who are sufferers from abnormal, and especially from painful, menstruation, attacks of gastralgia, at times very severe, mark the recurrence of every menstrual period, the patient, during the intervals, enjoying almost perfect immunity from them. Men are most likely to suffer from neuroses of the stomach at that time of life when they are called upon to bear the heaviest burden and to exert themselves to the utmost. It is at the time when atonic dyspepsia breaks down so large a number of business and professional men that they also suffer most frequently from neuroses; in fact, the same conditions predispose to both affections, and atonic dyspepsia is in itself a potent predisposing cause of gastralgia.

Hereditary predisposition and idiosyncrasy deserve notice. It is readily seen that persons who, by inheritance, are predisposed to atonic dyspepsia, must likewise be excellent subjects for the development of neuroses. The matter of idiosyncrasy hardly admits of explanation; we merely know that certain persons are so organized that in them serious effects are produced by agents which in all others appear perfectly or comparatively harmless. Cases are on record where strawberries, one of the most delicious and harmless of fruits, produced intense suffering at the stomach, and where honey could not be eaten without giving rise to violent functional disturbance of the stomach.

Bearing in mind the intimate relation between neuroses of the stomach and those constitutional disturbances which are characterized by impaired nutrition, general weakness, sensitiveness and nervous excitability, it is evident that everything which tends to produce such a state must be considered a predisposing cause of neuroses of the stomach. Disease of the nervous centres frequently produces gastric disturbances very like those here described; and affections of the spinal cord may give rise to violent epigastric pain. These conditions will receive fuller consideration elsewhere.

Pathology.—In the entire absence of positive and characteristic anatomical changes, the pathological questions involved in the discussion of this subject do not admit of a satisfactory solution. We simply understand that mal-nutrition of the nerve-centres plays a very

important part, and that such a condition invariably results in destroying the harmony of their action—producing an excess of activity in one direction, and a corresponding measure of deficiency of action in another. We also know that lack of coördination and inefficiency of function go hand in hand with nervous excitability, resulting in a large variety of disturbances of sensation and motion, with a long train of morbid phenomena the relation of which to each other, as to cause and effect, is not understood. The theories of Anstie, and of other authorities, do not even approximate a satisfactory solution of the questions which arise in connection with this subject. The same applies to the organic changes which, it is presumed by many close observers, must result from a long-continued and profound functional disorder in the stomach, as well as in other portions of the human organism.

Symptoms.—The neuroses of the stomach are characterized by pain, vomiting, derangement of appetite, and perversion of function.

Pain.—This symptom is usually preceded by evidence of depression, faintness and nausea, possibly vomiting, and, at times, a flow of saliva into the mouth; in other cases it is the first symptom indicating the approach of the attack. The nature of the exciting cause usually determines the character of the preliminary symptoms; it varies from a feeling of annoying fulness and distension to a pain of agonizing intensity, accompanied with violent constitutional disturbances, and embracing in character an infinite variety of manifestations; it is boring, shooting, gnawing, burning, pressing, tearing, or cramp-like, frequently radiating upward into the chest, directly backward into the spine, or into the hypochondriac regions. If severe, it is accompanied by signs of extreme suffering. The patient bends backwards; the face is distorted from the severity of the pain, and at times is almost hippocratic. The pulse becomes irregular, the extremities cold, and the surface bathed in cold, clammy perspiration. Pressure, if light, usually aggravates; deep and hard pressure as often gives marked relief. In rare cases great sensitiveness to pressure exists, and the patient objects even to the weight of his covering. The suffering at times is so intense that the patient faints, and it is stated that even convulsions have occurred. At times the pain is paroxysmal, and between the paroxysms the patient enjoys a few moments of rest. In light cases the paroxysms of pain are of comparatively short duration; in severe cases the suffering is continuous, and may cover a period of many hours of the greatest agony. The abdomen, during these attacks, may be retracted or distended. If the attack depends upon nervous irritability or is the result of great exhaustion, eating sometimes affords considerable relief; and it is characteristic of the neuroses of the stomach that this relief may be had from eating food which, in inflammatory conditions of the stomach, would not only be speedily re-

jected, but would intensely aggravate the suffering, while, on the other hand, more harmless and bland foods are not kindly borne. Exceptions to this rule, however, occur; when the pain is due to uterine disturbances, or when it exists as a reflex symptom, the introduction of food is followed by such keen suffering that the patient utterly refuses to partake.

The paroxysms of pain are not accompanied by an elevation of the temperature, and involve no danger to life.

In less violent cases, pain, varying from a feeling of fulness and weight to a gnawing and tearing pain of considerable severity, is likely to occur a few hours after food has been taken, and in such cases it may be due less to an irritation of the sensory nerves of the mucous membrane of the stomach than to a spasmodic, cramp-like action of the abdominal muscles. The pain here radiates in different directions, and marked distension of the stomach from flatulence is a symptom which frequently occurs. The attacks usually terminate with belching of wind and vomiting of water or mucus, followed by copious urination, profuse perspiration, soreness at the epigastric region, and exhaustion, which is in proportion to the severity of the attack.

Vomiting sometimes occurs independent of pain. In the majority of cases it is preceded by nausea and is not accompanied with many suspicious concomitant symptoms. It is readily differentiated from the vomiting of gastritis or of organic disease of the stomach; in the latter, vomiting is persistent, long-continued, and accompanied with intense pain, while in the neuroses it is neither so long-continued nor very severe. In many cases these attacks are followed by intervals of several days during which the condition of the stomach seems in every respect normal.

The vomiting of hysteria and, more especially, of pregnancy, when it becomes continuous, constitutes a source of great danger to the patient. It may occur immediately after eating or within a few hours after the ingestion of a meal, or it may be most violent early in the morning before food is taken, in which case a small amount of food, for instance a glass of milk, taken before rising, frequently lessens the severity of the symptom. The matter ejected in such cases is often undigested, containing little bile or mucus, while at other times much acidity of the stomach is shown. With few exceptions, the appetite in these cases remains good. The patient vomits, only to return again to the table, and to again eat heartily. The quality of the food taken does not materially affect the frequency or the persistency of this type of vomiting, which becomes dangerous only as it may lead to an inflammatory condition of the stomach, or to anæmia, and even starvation. It is on this account that the stubbornness with which hysterical patients occasionally refuse to take nourishment becomes a source of annoyance to their attendants and of danger to themselves. The

tongue, in these cases, is rarely coated, and usually presents merely that broad, large, pallid and flabby condition which is so generally found in functional gastric disorders.

The **perversions of the appetite** which occur in connection with these cases are of interest. There is likely to be either a craving for the most extraordinary and unwholesome substances, or there exists a ravenous hunger which cannot be satisfied even by repeated indulgence in enormous quantities of food. Among the strange cravings noticed in such persons, a desire for chalk, charcoal, brick, and pins are the most harmless. It is utterly useless to reason with such patients about the folly of yielding to so strange an impulse, for they are bound to satisfy it at all risk. Whenever there exists bulimia, this ravenous craving for large amounts of food, the patient suffers severe pain, nausea, and goneness at the stomach, unless his hunger is satisfied. It must not, however, be understood that indulgence in eating affords relief. On the contrary, faintness and distress occur soon after eating. These hysterical cases present also a tendency to diarrhœa, with flatulence and evacuations of liquid, undigested stool. Frequently the stools occur before eating, and are delayed if food is taken before the patient leaves the bed. A sudden start, a slight fright, in fact, nearly all sudden emotions, are likely in such cases to bring on a sudden stool or an attack of diarrhœa. It is quite probable that Trousseau is correct in attributing this condition to an irritability of the muscular coat of the intestines and of the stomach, by which the food is propelled onward with abnormal rapidity. This tendency to diarrhœa in hysterical patients is the more interesting since other cases of neuroses of the stomach are usually accompanied with a fairly normal condition of the bowels, or with a somewhat constipated habit.

The **constitutional disturbances** which are found in connection with this class of gastric affections are chiefly those of general enervation and nervous depression, or such symptoms as are associated with the disorders upon the existence of which the gastric neurosis depends.

Neuralgic pains in various parts of the body, and of various degrees of intensity, are of quite common occurrence. If the functions of the nervous system are badly deranged, even paralytic symptoms may appear. Sleep may be profound, but is unrefreshing, and the patient often wakes in the morning tired and sore; it requires an effort to rise, and he feels better only after stirring about for some little time. Others suffer more or less from insomnia; while still another class drop into a quiet sleep, only to waken during the night hungry and faint, and unable to again sleep until the hunger has been satisfied or exhaustion forces heavy, unrefreshing, or restless sleep; the latter symptom often occurs in those suffering from hysteria.

Cases of hysteria, melancholia, chlorosis, and others of the same class, present a vast array of concomitant and characteristic symptoms peculiar to those conditions, a recital of which has no place here.

Diagnosis.—In differentiating between the neuroses of the stomach and organic diseases of the same organ, we must depend largely upon the character of the pain and of the vomiting, upon the coating of the tongue, the presence or absence of fever, and the existence of such constitutional disturbances as have already been considered. With the aid of all of these it is at times still exceedingly difficult to determine the presence or absence of gastric ulcer or cancer. Whenever the symptoms described in this chapter occur in a person who is suffering from great exhaustion, nervous depression or excitability, from well-marked symptoms of hysteria, melancholia, or of those constitutional disorders which have been mentioned as ætiological factors; when in such cases the gastric difficulties improve or grow worse as the general condition of the patient improves or grows worse, the existence of organic lesions is counterindicated. The existence of neuralgias in various parts of the body strongly favors the diagnosis of a neurosis, although intercostal neuralgia may exist in ulceration of the stomach, and dorsal neuralgia may be felt alike in neurotic and in organic affections of the stomach. The pain which depends upon a nervous disorder remits, while in an inflammatory condition it is inclined to be more constant. In severity gastralgia exceeds the pain of any other affection of the stomach, save that resulting from the action of a corrosive poison. The pain is usually most violent when the stomach is empty, and is relieved by eating. The reverse is the case in the pain of inflammation: it is not usually intense, it is aggravated from eating, and subsides when the irritating food has been ejected. In pain of a nervous origin articles of diet are borne which would violently increase the distress of a patient suffering from an inflamed stomach; in the former, bland articles of food often disagree; in the latter they alone may be kindly borne. In the former, heavy pressure relieves; in the latter, it intensifies. It is to be remembered that in ulcer or cancer of the stomach perfect remissions of pain are not of unusual occurrence.

The vomiting due to a neurosis is usually easy, and recurs again and again; in organic diseases of the stomach vomiting is more painful, but ceases when the irritating substance has been ejected. The neuroses are accompanied with no fever; in acute gastric catarrh fever exists; in ulcer and cancer fever is rarely noted, unless incidental inflammation occurs. The tongue, in the neurotic condition, is pale, flabby, large; in inflammatory conditions it is dry, red, pointed, cracked; in ulcer or cancer it is changeable.

A differential diagnosis of neurotic from gouty affections is difficult; the existence of burning and heat at the stomach, fever, and

other symptoms pointing to inflammatory action, would indicate the latter. If gouty in its character, metastasis may occur to the joints, producing in them characteristic symptoms; if the metastasis is followed by relief of the stomach symptoms, such an occurrence would at once determine the true nature of the difficulty.

Prognosis.—The prognosis, so far as danger to life is concerned, is favorable; so far as it refers to a prompt and speedy cure it must be very guarded, for the tendency of this condition is to run for an indefinite length of time, and a cure may be a matter of years. Cases occur where we have no repetition of an attack, but they rival in rarity those cases in which a perfect cure follows at once the administration of the "right" remedy. Unfortunately, many cases have been placed on record which must lead the inexperienced practitioner to presume that the right remedy is not only easily found, but that its administration is sure to be followed by a prompt cure. Undoubtedly, a great number of these remarkable cures recorded are cases of a mistaken diagnosis; it is, however, a matter of congratulation to know that remedies selected under the law of the similars enable the physician to produce results in the treatment of this class of affections which, on the whole, are very satisfactory.

The duration of the neuroses of the stomach depends very largely upon the nature of the exciting cause. If the latter be limited in duration, the paroxysms of epigastric pain grow less violent, and disappear as the exciting cause ceases to act; hence, violent attacks of pain at the stomach which appear in hysterical patients recur less frequently and with constantly decreasing violence as the age of the patient advances.

The vomiting of pregnancy, when continuous, frequently becomes the source of the greatest danger to mother and child, and in many instances it becomes necessary to deliberately sacrifice the latter by inducing an abortion in order to save the life of the former. In exceptionally obstinate cases of hysteria, where the anorexia is profound, and the patient cannot be induced to take sufficient nourishment, serious consequences result from the unwillingness or inability to take food, and from subsequent inanition.

Treatment.—Nothing can be done directly to prevent the occurrence of these severe paroxysms of pain and of their attending symptoms, save to make every effort to establish a satisfactory state of health, and to restrict and modify the operation of the constitutional disturbances which are responsible for the existence of the local disorder. All measures which tend to establish a good digestion, a healthful state of mind, and a fair measure of general health, must be carefully observed; especial attention must be given to the diet of the patient, and the directions given in the chapter on "Atonic Dyspepsia" should be carefully observed.

Therapeutics.—Phosphorus.—Oppression of the chest, proceeding from the stomach, and worse after eating. Belching of large quantities of flatus after eating and during the attacks. Burning and gnawing pain in a circumscribed spot at the stomach, which is very sensitive to the least pressure; the pain extends backward to the spine, is increased by motion and eating, and is relieved by cold drinks and rest. Gnawing pain at the stomach, relieved for a short time by eating. Vomiting of the entire contents of the stomach; vomiting of pure blood or brown masses containing blood; rising of swallowed food by the mouthful; great thirst during the paroxysms, with aggravations of the symptoms from drinking, and vomiting as soon as the drink has warmed in the stomach; weakness in the abdomen; palpitation.

Plumbum.—Pain which causes the patient to bend backward, and is relieved by hard pressure on the stomach; it is accompanied with marked hardness of the abdomen, which feels like a board; sensation as if the abdomen were drawn in, so that it and the backbone seem to meet; feeling of constriction at the pharynx; hands and feet cold.

Belladonna.—Gnawing, pressing pain, or a wrenching pain extending to the spine, or a spasmodic tension which makes the patient bend backward, or stop breathing, which appears to give relief. Tired feeling in the spine; the patient attempts to rest the spine by bending backwards; pain is excessive, so that the patient becomes unconscious, and threatens to go into convulsions. The face is bloated and congested; congestion from disturbances or suppression of the menstrual functions; the symptoms are aggravated by vomiting (a Belladonna plaster applied to the stomach not infrequently gives much relief).

Nux vomica.—Clawing and cramping pain, with pressure and tension between the shoulder-blades; the pain radiates into the chest, or downwards into the abdomen, producing uneasiness in the rectum, and the characteristic sense of constriction at the anus; the anus is drawn in; pain worse from eating, from light pressure, better from hard pressure, from bending backward, from vomiting; nausea; accumulation of water in the mouth; heartburn; feeling as if a band were tied around the chest, with pain radiating into the small of the back.

Argentum nitricum.—Gnawing, ulcerative, sore pain, which is confined to a small spot between the xiphoid cartilage and the umbilicus, with sensitiveness to slight pressure; from there the pain radiates into the back, hypochondria and shoulders. Spinal irritation; worse from eating; great flatulence; often nausea with palpitation; the pain increases and decreases gradually; when at its height, the patient finds relief by making violent pressure with the clenched fist into the pit of the stomach.

Stannum.—The pain comes on gradually, but is very obstinate; it extends to the navel; is relieved by hard pressure. Sinking, gone feeling at the pit of the stomach; canine hunger; great uneasiness, the patient walking about until weakness causes him to desist, and finding relief from pain by walking.

Ignatia.—Painful pressure as from a stone in the pyloric region, especially from eating or at night; gnawing, cutting pain; weakness; faintness, and feeling of emptiness at the pit of the stomach, which is sensitive to contact; burning in the stomach; regurgitation of food. The remedy is of peculiar value in the treatment of those hysterical cases where anorexia is almost absolute, and the gastric symptoms are gradually intensified by this habitual starving. Frequent voiding of large quantities of pale urine is also a common symptom. Ignatia is said to be a good remedy in the case of habitual smokers.

Bryonia.—Pressure in the stomach right after a meal, as from a stone; pressure all over the stomach, with soreness and tenderness in the epigastrium; feeling of bloatedness and oppression of breathing, with stitches in the stomach. Contractive, pinching pain, relieved by eructations. All the symptoms are made worse by motion; characteristic headache. In chronic cases the pain comes on even an hour or two after eating, continues for several hours, and then wears off.

Ferrum.—Of especial use in anæmic subjects suffering very much from neuralgic affections, and who are subject to cardiac uneasiness; atony of the stomach; heavy pressure in the pit of the stomach; vomiting immediately following eating; not often preceded by nausea; brought on by coughing and moving about; pain relieved by vomiting; intolerance of milk.

Bismuth.—One of the chief remedies in the hands of the old-school physicians. Pressure as from a load in one spot; heaviness; intense malaise with burning pain in the spine; the patient bends back to find relief from it. Excessive pain in the back and shoulders; water-brash; flatulence; prostration.

Arsenicum.—Particularly useful when the condition borders upon the inflammatory state. Gnawing, corroding pain, with pressure in the stomach as from a lump, which sensation is confirmed by touch; violent burning with characteristic irritability of the stomach, and vomiting. Pain relieved by drinking sweet milk.

China.—Bilious derangements. Distension in the region of the stomach, with painful pressure after eating or drinking even small amounts; pain gets worse during rest; better during motion; stupid, depressed, and indolent mood, particularly after eating. Icteric symptoms. The sulphate of quinine is especially useful when paroxysms return regularly, and symptoms of malarial poisoning exist.

Dioscoria.—Useful in persons with weak digestion, with tendency to colic. The remedy has a marked effect upon the nervous system of the abdomen, especially the coeliac and umbilical plexus. Burning at the stomach, with sharp, pricking pain and faintness. Pains radiate in all directions, and appear constantly in head and feet; belching of large quantities of gas.

Pulsatilla.—Especially useful in persons betraying a tendency to digestive derangements; feeling as if a large piece of food had lodged in the œsophagus; also over the hypochondria, then darting upwards into the chest, impeding respiration. Characteristic gnawing at the stomach when empty; sour and bitter vomiting, and absence of thirst.

Petroleum.—An excellent remedy in those cases where the patient experiences relief by constant eating. The pain is pressing, drawing. Emptiness and weakness at the stomach; water-brash.

Consult also the following: *Asa foetida*, *Calcarea carb.*, *Cal. hypophosph.*, *Carbo veg.*, *Chamomilla*, *Chelidonium*, *Colocynthis*, *Gelsemium*, *Leptandra*, *Lycopodium*, *Acid. phosph.*, *Rumex*, *Veratr. alb.*, *Cocculus*, *Iris*, *Lobelia*, *Sanguinaria*, *Aesculus*, *Acid. nitric.*, *Sepia*, *Silicea*.

The *auxiliary treatment* of the neuroses is practically embodied in judicious attention to the hygiene and regimen, embracing also those manifold special attentions to the constitutional causes of the neuroses which will tend to modify and relieve them. When the patient does not care to eat, simply because there is no desire for food, iced effervescing drinks and a little champagne, or a little iced champagne, will frequently be very grateful and help give tone to the stomach.

The persistent vomiting is often greatly benefited by adding to the administration of the proper remedy, more especially in hysterical patients, the douche, shower-bath and cold affusions; a few doses of pure pepsine sometimes act very nicely. When vomiting has been long continued, it is an excellent plan to give very small amounts of easily digested food at quite short intervals: the stomach thus gains rest, while at the same time a certain amount of nourishment is introduced into the system. It is often expedient to administer in this manner very small amounts of milk, even a teaspoonful at a time, at frequent intervals.

Counter-irritation, by means of sinapisms over the stomach, is occasionally used with varying success. In the vomiting of pregnancy the use of oxalate of cerium, in light doses, has of late become quite fashionable, and the writer has seen several cases in the practice of his colleagues in which happy results were obtained from its administration. The use of opium or of morphine, for the relief of intense pain, is open to serious objections, and it can honestly be asserted that

the skillful homœopathic prescriber is rarely called upon to employ it. Nevertheless, cases occur in which the suffering of the patient is so intense that a refusal to administer an anodyne would be simply inexcusable. In such cases the salts of morphia are to be administered in proper doses by the mouth or hypodermically.

Electricity has been employed with a fair measure of success. Erb recommends its use, and indorses the method of Lube, who applies the positive pole to the most painful part of the epigastrium, the negative pole in the left axillary line, or more toward the spinal column, and allows a strong stable current (a current applied with both electrodes in a fixed position) to pass for five to ten minutes. Viziola reports a cure of a very severe case of hysterical gastralgia by the application of the positive pole, the negative pole being kept in the hand. Erb also commends treatment of the spinal cord, or of the sympathetic and pneumogastric in the neck, as well as direct faradization of the gastric region, or the faradic brush to the epigastrium. Rockwell and Beard state that their "results in gastralgia have thus far been more satisfactory than in any other neuralgia." They cite a very severe case of chronic gastralgia, of a periodic nature, of four years' standing, relieved by galvanization after the failure of faradization. In using the strong galvanic current, the positive pole was placed on the back of the neck just above the seventh cervical vertebra, and the negative pole was applied over the region of the stomach in order to affect the solar plexus of the pneumogastric.

ACUTE GASTRIC CATARRH.

Synonyms.—Gastritis, Inflammatory dyspepsia, Gastric fever.

Definition.—An acute disorder of the stomach, depending upon an inflamed state of the gastric mucous membrane, characterized by malaise, loss of appetite, nausea, vomiting, and intolerance of food and drink.

Ætiology.—It is proposed to consider under acute gastric catarrh that entire range of acute gastric disorders which lie between common acute indigestion and that rare, and nearly always fatal, condition, true acute inflammation of the stomach. The various names used to describe this condition are alike inappropriate and misleading. The term "catarrh" should not be used in connection with the gastric mucous membrane, because its functions differ materially from those of all other mucous membranes, an abundant secretion of mucus being a physiological function of the former, while it is pathological in the latter; the term "gastritis," on the other hand, correctly used, signifies a condition the gravity of which is out of all proportion to the comparatively trivial disturbances which constitute what is more commonly and incorrectly called acute gastritis.

Gastric catarrh, as the term is here employed, is of frequent occurrence. It usually depends upon some disturbance in the digestive function caused either by a weakened state of the stomach, which prevents normal digestion of healthful food, or by the introduction into the stomach of food which is unwholesome, or which, by some idiosyncrasy, cannot be tolerated in the particular case in question. In either case the food is not digested, and soon becomes a foreign body, producing more or less violent disturbance and irritation. A stomach debilitated by pre-existing illness, or sympathetically affected, perhaps by general ill health or by a profound mental or nervous depression, may be utterly inadequate to the task of digesting even light and simple articles of diet, and may thus suffer severely from what, under other circumstances, would have produced no disturbance whatever. The stomach suffers readily from the depressing effects of grief, and any profound shock may suddenly arrest digestion, and thus produce considerable inconvenience and even serious consequences. Age is a predisposing cause of gastric catarrh; in the young infant gastric disturbances constitute a fruitful source of danger to its health and life; the decrepitude of old age forbids the indulgence in articles of food which the stomach of a younger person readily digests.

Under certain circumstances, indulgence in a moderate amount of perfectly healthful food may give rise to acute indigestion. More frequently, however, unwholesomeness of the food taken is responsible for the disturbances which follow its use. Certain articles, as cheese, shellfish, hot bread, and others, tax severely the digestive powers of most persons, especially if poorly cooked or richly seasoned. The habitual use of very hot or very cold drinks, more particularly the latter, is very liable to produce unfavorable results; the deleterious effects of immoderate amounts of ices, iced-water, and especially of iced-milk, during the heated term, are clearly established. Idiosyncrasy asserts itself; ripe strawberries, tomatoes, and other favorite and wholesome articles of food, in certain cases not unfrequently produce violent gastric irritation.

Again, acute indigestion is brought on by the use of food which, by partial decay or bad cooking, has ceased to be wholesome. Tainted meats, badly brewed beer, unripe or decaying vegetables and fruit, are sure to create trouble when eaten. Young children are made seriously ill by being fed upon milk which is sour, or which comes from cows fed upon medicinal herbs, or upon brewery slops, or from animals which are forced to habitually drink impure water. All the factors stated are necessarily modified by hereditary tendency, climate, and exposure to sudden atmospheric changes.

Violent irritation of the gastric mucous membrane is also produced by the action of certain irritating substances, as alcohol in any form, or irritating drugs, the latter quite often administered under

medical advice; the habitual use of alcoholic stimulants, especially, destroys the integrity of the stomach, and becomes a most important predisposing and exciting cause of gastric catarrh. The presence in the stomach of irritant poisons is one of the most common causes of true acute gastritis, and will be more fully discussed hereafter.

Acute gastric catarrh may occur in connection with certain diseases, as scarlet fever, measles, variola, erysipelas, cholera, and pyæmia. In fact, Fenwick (see Quain's *Dictionary of Medicine*) establishes a connection between gastritis and eruptive conditions, and divides gastritis into *catarrhal* and *erythematous*.*

Occasionally, acute gastric catarrh is the result of metastasis occurring in gout or acute rheumatism; such a condition always involves great danger, and is only relieved by the re-establishment of the morbid action in the organs primarily affected.

Morbid Anatomy.—A clear idea of the nature of the anatomical changes which constitute the lighter forms of gastric catarrh is not readily obtained; death does not result from them, although gastric catarrh may have been one of the incidental symptoms of a fatal case; under such circumstances much circumspection would have to be used in properly estimating the bearing of the graver malady upon the structural lesions discovered in the stomach.

The artificial excitation of gastritis in animals, and the observations of Dr. Beaumont upon Alexis St. Martin, lead to the following conclusions: The condition is primarily one of hyperæmia, varying under different conditions in intensity of action and in extent of territory. This congestion of the capillary network is most noticeable at the crests of the inter-glandular prominences, giving to the structure a pustular appearance. The secreting cells becoming filled with granular matter and fat globules, the mucous membrane becomes puffed, somewhat softened, and cloudy in appearance; this swollen condition of the mucous membrane prevents the discharge into the stomach of the gastric juices, but the surfaces of the stomach are covered with ropy mucus of alkaline reaction. Extravasation of blood corpuscles, both red and white, often takes place. The solitary and lenticular glands become swollen and, at times, assume such proportion that they appear like millet seed strewn all over the mucous surface, especially about the pylorus; the interstitial tissues may become involved, and ulceration result. Usually the epithelial covering remains intact,

* Speaking of *erythematous* gastritis, Fenwick says: "It will be observed that the morbid appearances, which are strictly analogous to those of the skin in scarlatina, differ from those produced by catarrh, in the amount of mucus not being increased, and in the tubes being distended by an albuminous fluid, instead of by an increased growth of the cells themselves. It is, therefore, analogous to an erythematous affection of the skin, with which, indeed, it is associated in scarlatina; whilst the catarrhal form is analogous to the eczematous and other inflammations of the cutis, which are characterized by a more abundant formation of the cellular element."

but in severe cases it may be destroyed. Erosions are likely to occur, resulting in superficial ulceration, which may become quite extensive, and when the case is characterized by unusual intensity of morbid action, or when the local difficulty is based upon blood-poisoning, septic or gangrenous inflammations and sloughing may result. The danger of hæmorrhage occurring in the course of destructive processes which involve the capillary vessels and deeper-lying tissues, is quite evident.

The following description of a catarrhal condition of the stomach of St. Martin is of great interest: "There are sometimes found, in the internal coat of the stomach, eruptions or deep red pimples, not numerous, but distributed here and there upon the villous membrane, rising above the surface of the mucous coat. These are at first sharp-pointed and red, but frequently become filled with white purulent matter. At other times, irregularly circumscribed red patches, varying in size and extent from half an inch to an inch and a half in circumference, are found on the internal coat. These appear to be the effect of congestion of the minute bloodvessels of the stomach. There are also seen at times small aphthous crusts in connection with these red patches. Abrasion of the lining membrane, like the rolling up of the mucous coat into small shreds or strings, leaving the papillæ bare for an indefinite space, is not an uncommon appearance. These diseased appearances, when very slight, do not always affect essentially the gastric apparatus; when considerable, and particularly when there are corresponding symptoms of disease, as dryness of the mouth, thirst, accelerated pulse, etc., no gastric juice can be extracted."*

Post-mortem appearances throw little additional light upon the subject. The hyperæmia which during life forms so prominent a symptom of gastric catarrh, is absent after death, unless the type was one of unusual severity. It must be remembered that the post-mortem softness of the tissues, and their liability to tear easily, is the result of post-mortem disorganization of decay, and bears no relation to that softening of the mucous membrane during life of which mention has been made.

Symptomatology.—The first symptoms of an attack of acute indigestion frequently occur within a few hours after partaking of an unseasonable, heavy meal, or in the morning following a late and hearty supper. The first symptoms experienced are usually a feeling of malaise, of exhaustion, with heaviness in the head, and, especially in nervous persons, with dryness and heat of the hands; in short, a feeling of general indisposition. A more or less severe headache develops, generally frontal, possibly with slight visual disturbances. A sensation of discomfort at the stomach is experienced, with loathing of food, nausea, and vomiting.

* Beaumont: Experiments and Observations, etc., on Alexis St. Martin, page 99.

The matter ejected usually consists of a watery substance, mixed with food in a state of partial fermentation and, if the vomiting be continued for any length of time, with bilious matter. The ejection of the offending substances may end the trouble, the symptoms gradually and quickly disappearing, and a few hours' rest being sufficient to the restoration of health. If the offending substance is not removed, but passes out of the stomach into the intestines, or if the case be one of some severity, the intestinal canal partakes of the disturbance. If a diarrhoea sets in, the headache, nausea, and other symptoms described, usually grow lighter after a time, while pains in the bowels, with frequent watery, bilious, and often offensive, stools continue for some time, gradually lessening in frequency, and finally disappearing, with a rapid recovery of health. In case the bowels become constipated, the gastric irritation becomes more pronounced. Vomiting continues, the tongue is covered with a heavy white or yellowish or brown fur; the breath becomes offensive; the headache increases in severity, locating itself in the frontal, less frequently in the occipital, region; the pulse is disturbed, showing an appreciable softness and irregularity rather than an increased rate of the beat per minute. The feeling of malaise becomes intolerable; nervous symptoms appear, the patient showing marked sensitiveness to light and noise, demanding perfect quiet, and vigorously protesting against all disturbance; there is shuddering, yawning, and stretching; the sickness at the stomach becomes almost continuous, while vomiting aggravates the headache, without generally giving marked relief to other symptoms. The patient feels drowsy, and vainly seeks sleep, in the hope of finding in sleep relief from his suffering. Thirst rarely exists at this stage. Sleep finally comes and is usually profound, the patient awakening much rested and improved in every respect, but suffering from a feeling of exhaustion which is quite marked in view of the short time he has been sick.

The headache, in the course of these brief but violent attacks of indigestion, forms a very conspicuous and painful symptom, so much so that the people have given to this type of acute indigestion the name of "sick headache."

At times, recovery from these attacks is protracted beyond the length indicated here, and the morbid symptoms yield only reluctantly. The loathing of food, and the uneasiness and pain at the stomach, the latter of a heavy, dull character, continue; there is marked indisposition to exertion; great languor; heaviness of the head; a bad, often metallic, taste in the mouth; heavily furred tongue; eructations of sour, at times intensely acrid, watery substances; food tastes insipid; the patient often complains of thirst, and suffers from an annoying, gnawing feeling, with faintness at the stomach; he has eructations of gas, bearing the odor of sulphuretted hydrogen; there is a

tendency to salivation and heart-burn ; the urine is scanty, high-colored, acid, and contains lithates. The bowels are confined, or, if loose, a watery, offensive diarrhoea exists, accompanied with considerable griping. There are shiverings, heavy unrefreshing sleep, disturbed by anxious dreams, soreness of the lips and corners of the mouth, and, at times, herpes and urticaria. This condition, the *status gastricus* of older writers, wears away in the course of a few days, or assumes, in rather exceptional cases, the form of a chronic affection.

The *subacute gastritis* of some writers, called *gastric fever* by others, is a form of gastric catarrh rather more severe than the condition described. The mere shiverings become more clearly defined rigors ; the temperature rises several degrees above normal, usually not to exceed 100° F., save in children, where the thermometer may mark 103° F. ; the pulse is weak and compressible, and there are distinct evening exacerbations of the fever. There is pain in the epigastric region, radiating into the chest, back, and hypochondria, although many cases are characterized by a notable absence of pain. Anorexia usually exists, though some patients experience a recurring craving for food. Thirst becomes a marked symptom, but the stomach is too irritable to retain either drink or food, and their introduction then produces an aggravation. Vomiting continues, of glairy mucus mixed with water, food, bile, and small amounts of blood ; it is painful, and readily brought on by eating, but more especially by drinking water. The tongue preserves its characteristic coating, at first heavy, white, dirty, later becoming red, glaring, raw, and even fissured, with conspicuously large, red papillæ ; the lips are parched and cracked. The bowels may be constipated or loose. The prostration is quite marked, the headache is constant and severe ; sleep is restless, unrefreshing. There is present a considerable degree of nervous excitement, which is most marked in children and in nervous people. Frequent eructations of foul gas and flatulence of the bowels become a source of considerable annoyance, and are accompanied by dizziness and, probably, by irregularity in the action of the heart. In somewhat rare cases there may be observed dysphagia and partial aphonia. There is no marked tenderness to pressure in the epigastric region, and a hacking cough is occasionally observed ; the latter must be watched closely, the physician bearing in mind the similarity existing between this condition and certain cases of phthisis in the earlier stages.

This state of affairs is likely to run for a period of from six to ten days ; the prognosis is decidedly favorable, but a chronic irritation may remain, to be removed only by skillful and persevering medical treatment.

Gastritis proper is rarely found as an idiopathic disease, but is of not unfrequent occurrence as the result of the action of some irritant poison upon the stomach. Its symptoms are all of great intensity.

The mucous lining of the stomach and the underlying structures are violently inflamed. The pain at the stomach is very acute and sharp, often excruciating; pressure cannot be borne, even the pressure of the descending diaphragm during the respiratory movements is so painful that the breathing soon becomes superficial. Constant painful vomiting of glairy, stringy mucus, probably mixed with blood, is a very common symptom, and the stomach is so irritable that every attempt to eat or drink is followed by violent retching and vomiting. Thirst for cold drinks is intense, and indulgence is invariably followed by renewed vomiting; nevertheless, the patient cannot resist the craving for water, and drinks in spite of the consequences. Diarrhoea sets in soon, with colic, violent tenesmus, bloody, watery stools, and other symptoms showing that the intestinal lining membrane is becoming extensively involved in the inflammatory action. The tongue becomes dry and glazed; the countenance assumes a pinched look, expressive of the keen suffering and of the profound prostration of the entire system, which is becoming more and more marked; there is difficulty of swallowing and of articulation; the pulse is increasing in rapidity and lightness; the urinary secretion becomes scanty, and is often suppressed; hiccough sets in; the vomited matter appears black, like coffee-grounds; active hæmorrhage may take place, and death results from collapse.

If a fatal termination is averted, the stomach rarely recovers fully, and structural changes, as cicatrices from ulceration, are very likely to remain, producing characteristic and serious disturbances.

A very grave form of gastric catarrh occurs among young infants, more frequently among those fed artificially, and during the heated term. Its causes, in an overwhelming majority of cases, are found in bad feeding. The gastric symptoms are generally well marked. There is frequent, at times almost constant, vomiting of milk which is usually ejected in curdles or in solid lumps, or of very sour, watery substance mixed with milk; the stomach is exceedingly irritable, and refuses to retain nourishment or drink, the latter being eagerly called for by the little patient; the vomiting is often preceded by manifestations of severe pain in the stomach; the abdomen is hot and frequently, though not always, tender to pressure; the face and extremities are blue and cold; diarrhoea accompanies the gastric irritation; the stools are very frequent, varying in color, but being of watery consistency, and often remarkably copious and exhausting; emaciation and prostration take place rapidly; the face becomes pinched, the eyes lustreless, the fontanelles depressed, the pulse indistinct, and the urine scanty; brain-symptoms develop with coma, convulsions, and death.

Gastric catarrh which depends upon the excessive use of alcohol is characterized by profound anorexia, a habitually and heavily coated tongue, and persistent thirst. There is very little sensitiveness to

pressure. The condition depends chiefly upon the mechanical action of the alcohol upon the gastric mucous membrane.

Gastric catarrh occurring in connection with other diseases rarely presents violent symptoms, and may disappear with the cure of the disease upon which it depends. Whenever gastric disturbances occur during the existence of gout or of acute rheumatism, they are to be regarded with suspicion, and must receive the close attention of the attending physician. Should metastasis of the disease to the stomach take place, the case at once becomes alarming, and does not cease to remain so until the inflammatory action in the joints has been re-established, when the symptoms of gastric catarrh will rapidly disappear.

Diagnosis.—Usually, the symptoms of acute gastric catarrh are sufficiently pronounced to make a correct diagnosis a matter of comparative ease to the intelligent medical observer. The peculiar intolerance of the stomach, the character of the vomiting, the appearance of the tongue, the absence of a continuously high temperature, and, in many instances, the ability to find a specific cause for the attack, are reliable diagnostic symptoms.

The lighter forms of gastric catarrh occurring in the course of other diseases, more especially in connection with diseases of the lungs, are not always promptly recognized. It is, therefore, well to exercise considerable care in watching the totality of symptoms, and, in certain cases, to subject the lungs to a thorough examination. The presence or absence of physical signs referring to the lung will nearly always determine the nature of the difficulty, particularly with careful attention to the coating of the tongue and to the temperature of the body.

A differential diagnosis between the severer forms of acute gastric catarrh with a pronounced feverish condition—*i. e.*, the so-called gastric fever of some writers—and the earlier stages of *typhoid fever* or of *peritonitis* may present serious difficulties. In fact, it is not unfrequently impossible to arrive at a positive diagnosis until a sufficient time has elapsed to develop the pathognomonic symptoms of the latter diseases. The diagnosis of typhoid fever depends upon the existence of a more continuously high temperature, of the characteristic ileo-cæcal tenderness to pressure and gurgling, splenic enlargement, and the appearance of the characteristic eruption. Attention is also called, by some authors, to an herpetic eruption which often accompanies gastric disorders, and which is absent in typhoid fever. Peritonitis, particularly those cases in which vomiting is an established feature, is not so easily distinguished, and the physician, in differentiating, must largely rely upon the diffused abdominal tenderness and the tympanitis, none of which belong to the symptomatology of gastric catarrh.

Cardialgia or gastralgia may be taken for gastric catarrh. The paroxysmal character of the pain, the absence of excessive gastric irri-

tability, the ability to retain food, and the absence, usually, of tenderness in the gastric region, determine in favor of the former.

For evident reasons, it may become necessary, in a case of true gastritis, to determine if the disease is idiopathic or is caused by the introduction, accidental or deliberate, of an irritant poison. In cases of self-poisoning a motive for the act is likely to exist, and careful inquiry with reference to the motive must be made; in case of attempted murder by poisoning the patient is not usually able to render this assistance. The suddenness of the attack, the remarkable severity of the symptoms, and the early vomiting of blood found here, are rarely had in the idiopathic cases. Careful examination must be made of the lips, tongue, buccal cavity, and fauces, as irritant poisons, in their momentary retention in the mouth preparatory to the act of swallowing, are quite sure to leave their traces upon the superficial structure of the mouth.

Prognosis.—The prognosis is decidedly favorable in the lighter forms of gastric catarrh; it is doubtful in true gastritis, in cases of poisoning depending almost entirely upon the amount of local destruction done by the irritant action of the poison. Death, in gastritis toxica, is usually directly due to the shock sustained.

Treatment.—Careful attention to diet constitutes an important part of the treatment of acute gastric catarrh. The beneficent effect of physiological rest of the organ is becoming more and more understood by the profession, and abstinence from food, within limits of prudence, is being generally practiced in the treatment of this disease. By thus giving rest to the irritated or inflamed organ, many light cases make a prompt recovery without other treatment. It is evident that reasonable care and judgment must be exercised by the physician in determining the length of time for which the patient may be deprived of food with safety and advantage to himself. Usually speaking, the return of tolerance of food by the stomach is an indication that it may be given with safety in moderate amount. In many cases of considerable severity it is well to insist upon perfect rest of the stomach for a period of twenty-four, or even forty-eight, hours, allowing the patient to take small bits of ice to allay the dryness of the mouth and the active thirst which usually exist. When the fast is broken, considerable care must be exercised in the proper selection of food. It is advisable, at first, to restrict the diet to milk and lime-water, given in small amounts every two or three hours; milk and soda-water may be used in the same way. Later, barley-water, gruel, arrow-root, or sago may be administered, to be followed, as the patient improves, by chicken-broth, beef-tea, or mutton-broth. A return to solid animal food must always be made with the greatest of care, and should never be permitted until every symptom of nausea and of pain at the stomach, particularly after eating, has disappeared. Even then, it is

the part of wisdom to commence with the lighter meats, such as fish, oysters, young chickens, and game. The slightest disturbance of digestion should be considered a danger-signal, and rouse the physician to extreme vigilance. Vegetables and fruit must be used with great caution, and malt liquors, tea, and coffee should usually be absolutely forbidden.

As a general thing, it is well to bear in mind that *cold* foods are most refreshing, and seem to be borne well by the stomach; in some cases ice-cream is borne well, and small drinks of cold milk are not unfrequently very grateful to the patient.

In protracted cases, with great irritability of the stomach and much exhaustion, recourse to rectal alimentation may become a necessity. Before giving the enema, the rectum must be carefully and thoroughly washed by an injection of clean warm water; the injection itself must be given slowly, thrown up high into the rectum, should not exceed in amount half a teacupful at a time, and should be repeated at intervals of from two to three hours. The temperature of the enema must correspond to that of the blood. Warm milk or beef-tea, to which both Pepsin and Muriatic acid should be added, and defibrinated blood, meet the requirements. The value of beef-tea depending largely upon its proper preparation, the following rules, formulated by Dr. Charles Gatchell, will be found of service: Never let beef-tea boil; always begin preparations for making it with *cold* water. The finer the beef is cut, the better. There should be no fat, gristle, or bones adhering to the meat. The proper proportion of beef to water is a pound to a pint. Beef-tea that "jellies" when cold has not been properly made. After being made, carefully remove from the surface all traces of fat. To "warm up" beef-tea, put it in a cup and set the cup in a vessel of boiling water.

The following recipes, from the same source, are of great value: "Take one pound of fresh meat, cut very fine; soak in one-third of a quart of cold water overnight. In the morning remove the meat, saving the water in which it is soaked; put the meat into two-thirds of a quart of water, and let it simmer for two hours, keeping the water up to its original level by replacing what is lost by evaporation; now pour the beef broth into the cold liquor in which the meat was soaked, squeezing the meat as dry as possible. The meat which remains should be spread on a tin plate and slowly dried in an open oven; when perfectly dry, it can be easily reduced to a powder in a mortar; mix this meat powder in the liquor, and you have all the elements of the meat in a fluid form. Salt to taste, and add 20 drops of Muriatic acid and 3 grains of Pepsin. Or:

"Prepare a pound of beef in the usual manner, and soak it in a pint of cold water for two hours; now place the vessel containing the meat in a saucepan of water, and let the water in the latter boil for three

hours. Putting the meat and water into a stone bottle, and this into a kettle of boiling water, answers the same purpose. Replace water that is lost by evaporation. When done, strain and salt to taste. The last vestige of fat may be removed by skimming the surface with a piece of white blotting-paper."

If the pain and the tenderness in the epigastric region are very marked, the application of poultices of linseed-meal or of hot fomentations is advisable. If vomiting perseveres, tending to produce great exhaustion, or if it occurs as the result of exhaustion, stimulants, cautiously used, may afford relief. Iced champagne not unfrequently acts like a charm in such cases, and small pieces of ice, frequently given, or small amounts of Vichy or Seltzer, act both as a sedative and antacid. The dominant school, in such cases, have been in the habit of employing Opium with satisfactory results; indeed, not unfrequently the administration of an opiate appears both excusable and effective. Better results, however, may be obtained by the use of warm water. Dr. A. N. Pennoyer, of Kenosha, Wisconsin, in all cases of acute indigestion strongly recommends the administration of a half cupful, or more, of water as hot as it can be borne. If relief is not had, he gives warm water until free vomiting occurs, repeating the operation two or three times, even after free emesis has taken place. The patient is likely to protest after having taken two or three glasses, but may be persuaded by the promise of prompt relief to repeat the doses. From twelve to thirteen glasses of lukewarm water may thus be given, and copious injections of water be made into the bowels. The writer has found this treatment of acute cases of indigestion eminently satisfactory. The removal of the offending substance from the stomach is thus effected easily, and without that temporary marked aggravation which is likely to result from the employment of emetics.

The use of stimulants involves many objectionable features, and is entirely out of the question save in cases where prostration is extreme. As already stated, champagne has peculiar advantages; if champagne is not available, small doses of brandy should be given to the exclusion of all other stimulants.

The necessity of the most careful attention to diet in cases of acute indigestion which occur in young infants is quite apparent. The health of the nurse, and, in case cow's milk is fed, the health of the animal, the care which it receives, her feed and drink, the condition of the stable, all these should receive careful attention. Children brought up by hand necessarily suffer much from disorders of digestion, and too much attention cannot be given to the source of supply of the milk used. Very often, particularly during the hot summer months, the admixture to the milk of Lime-water or of Carbonate of soda is of much value. Cases often occur, however, where milk cannot be borne

under any circumstances; in such cases the use of oatmeal gruel, diluted at first with water, and later with the purest milk obtainable, proves a satisfactory diet. The value of certain artificial foods is generally recognized, and, in cities, condensed milk of a reliable brand is an easily prepared and valuable food for children.

During convalescence from a severe attack of gastric catarrh, pure Pepsin may be used advantageously.

Therapeutics.—Arsenicum.—Nausea and vomiting; worse from rising; burning pains in the stomach and abdomen, with pale or even hippocratic face and cold extremities; dry skin, either hot or cold; quick, light pulse; tongue dry and red, or sides furred, with red streaks down the middle; redness of the lips; characteristic thirst; anxious restlessness; quick prostration; watery or dark-brown diarrhoea, sometimes with blood; excellent remedy after the abuse of ice, ice-cream, ice-water, sour beer, vinegar; also in persons suffering from the effects of excessive chewing of tobacco.

Bryonia.—Stitching pain in the stomach, worse from motion, particularly from jarring; tongue coated whitish or dark yellowish brown; lips and mouth dry, but no thirst, or constant drinking, day and night, of large amounts; constipation of dry, burnt stools; of particular service during hot weather, when symptoms occur from taking cold drink when heated, and after the use of flatulent food.

Nux.—Sour or bitter taste in the mouth; tongue heavily coated, white or yellow; fulness and dull heavy pressure in the stomach; dizziness, with severe frontal headache and irritability of temper; the symptoms worse in the morning, in the open air, after eating.

Aconite.—After taking cold; stitch-like, burning, pressing pain at the pit of the stomach, with anguish and fear of death; dry, quick, hard pulse, with heat of the flesh, and constant, restless tumblings about in bed; fever, with great thirst and vomiting. Of particular value when the muscular coat of the stomach is involved.

Iris vers.—Intolerable burning distress at the stomach; colicky pains for a few minutes in the epigastrium; shocks of pain radiating from the umbilical region into the epigastrium; nausea, straining, belching of wind; vomiting of mucus and bile, with diarrhoea, accompanied with burning in the anus and great prostration; burning in the mouth, fauces, and œsophagus; sick headache

Podophyllum.—Everything in the stomach turns sour; belching of sour, hot flatus, with great thirst and vomiting, preceded by distressing nausea, and accompanied with such violent contractions of the stomach during vomiting that the patient screams with pain; vomiting of bilious matter, mucus, with blood; the tongue is furred, white, dry, yellow; foul taste in the mouth.

Pulsatilla.—No appetite; no thirst; tongue coated white or yellow, with tenacious mucus; edges feel sore as if scalded; mouth parched and dry, but patient calls for no water; everything tastes bitter, and there is a bitter taste in the mouth; dizziness when rising from a chair; chilliness; stitching pain in the stomach; worse from walking, and from a jar; perceptible pulsation in the pit of the stomach; pain in the stomach during inspiration and from pressure; tension from stomach to the chest; attack brought on from the injudicious use of ice-cream and fruit, rich pastry.

Hydrastis.—Dull, aching pain in the stomach, causing epigastric weakness and faintness; tongue coated white or with a yellow stripe; feels as if burnt or scalded; a vesicle forms on the tip of the tongue which is very sore; acidity; constipation.

Phosphorus.—Acute, burning pain in the pit of the stomach; soreness in the gastric region; shuddering; cramp in the stomach, radiating from the liver; vomiting of watery substances, at times with the admixture of blood; great thirst for cold water, which is ejected as soon as it gets warm in the stomach; weakness of reacting power; tongue dry, or coated white.

Chelidonium.—Tearing, darting, throbbing pains in the forehead and temples, with heaviness and coldness in the occiput, accompanied with vertigo, anxiety, melancholy, nausea, and bilious vomiting; the tongue is slimy, coated white or gray; heavy yellow coat to the tongue, with red margins, showing impression of the teeth. Useful when of hepatic origin.

Belladonna.—Acute pain in the stomach, worse from motion or pressure;

pressive pain extending to chest and shoulders; the pit of the stomach is swollen, with tension in the abdomen, across and below the umbilicus, worse from motion and pressure; deficient breathing, anguish, vomiting, gagging, hiccoughing; great thirst, but the patient dare not drink, because drinking aggravates all the symptoms; sleeplessness; tongue is covered with tenacious, yellow-white mucus, or is dry and furred; congestive type.

Antimon. crud.—Total loss of appetite; tongue coated thickly, yellow or white; great thirst at night; nausea; belching, with taste of the food that has been eaten; vomiting; no fever; indicated in saburral derangements, after the use of bad, sour wine.

Veratrum alb.—Violent vomiting, with continuous nausea and prostration; the pains radiate from the stomach upwards and to both sides, to the back between the lowest points of the scapulae; it becomes agonizing, and then gradually subsides; anguish in the pit of the stomach, with cold extremities; hippocratic face; slow pulse, coldness, and fainting fits; cold sweat and nausea, brought on by the slightest motion; hæmatemesis; tongue cold, covered white, with red tip and edges, or coated yellowish-brown.

Ipecacuanha.—Constant nausea from the stomach; easy vomiting; empty eructations, and copious accumulation of saliva; the pain most severe in the anterior abdomen, extending to the left hypochondrium, sides, back, base of the chest, with great bloating of the stomach, and agitation; headache as if the skull were bruised; diarrhoea; tongue clean, yellow or white, flabby, after eating sour things, especially sour and unripe fruit.

Sanguinaria.—Nausea, with headache, chill and heat; vomiting with severe painful burning in the stomach and intense thirst; red tongue; red dry lips; hot dry throat; tickling cough.

Euphorbia cor.—Sudden nausea, vomiting, and diarrhoea of watery fluids, with sinking, anxious feeling in the stomach; faintness, slow and weak pulse; cold skin; cold feet and hands; cold sweat on body and extremities; spasms of the legs and feet from fright, over-indulgence in ices, fruits, etc. (Jahr.).

Consult also: Apis, Carbo veg., Arnica, Cantharides, Mercury, Rhus tox., China, Chamomilla, Sepia, Hyoscyamus, Kali carb., Rumex crisp., Laurocerasus.

GASTRITIS TOXICA.

Synonyms.—Gastritis caustica, Inflammation of the stomach from poisoning.

A consideration of this subject properly belongs to special works on toxicology, but the convenience of the general practitioner may be served by a few remarks upon the subject in this place.

Of the different classes of poisons only the corrosives and the irritants have a marked effect upon the gastric structures; the neurotics affect the stomach only incidentally, and kill by their action on the great nerve-centres. The action of the irritant and of the corrosive poisons resembles each other, the latter being the more violent of the two. They act primarily upon the mucous membrane with which they are brought into direct contact, changing the consistency and color, and destroying the lining of the mouth, fauces, œsophagus and stomach. The inflammation thus produced, especially of the stomach, where they find a resting-place, is intense, resulting in ulceration and perforation, the edges of the perforation being ragged, torn, shreddy. The mineral acids, more especially sulphuric acid, are exceedingly violent in their action, and in the case of the latter the structures are

changed into a blackish mass from the action of the acid upon the blood-pigment. Other acids, when taken in a diluted form, have a similar, but less violent, effect, changing the superficial layers into a soft, pulpy, brownish mass. The caustic alkalies act with exceeding violence, even more so than the larger number of acids. The intestines, more particularly the small intestines, usually escape the destructive action of these poisons; the mercurial salts, however, not unfrequently exert a violent effect upon the large intestine, and particles of the poison are in some cases detected in the intestinal tract, a fact which may serve to identify the poison taken.

The symptoms of poisoning differ greatly; those poisons which act through the great nerve-centres produce disturbances unmistakably pointing in that direction. Space cannot be given to their consideration. The irritant and corrosive poisons all produce sudden and violent *gastric* and intestinal disturbance, with intense pain in the stomach and bowels; frequent, and often excessively painful, vomiting, soon showing admixtures of blood; diarrhœic discharges from the bowels, accompanied with great tenesmus, containing, like the ejections from the stomach, threads of membrane and bloody masses; great depression shows itself; the extremities become cold; the surface of the body is bathed in profuse, clammy, cold perspiration; the countenance is distorted, haggard, hippocratic; the pulse small, threadlike and imperceptible, and death soon results from shock.

The prompt recognition of the particular poison taken often presents much difficulty; the acids and alkalies, by their action upon the mucous membrane of the mouth and fauces, can usually be recognized; the character of other substances can be ascertained only by a careful chemical and microscopical examination of the vomited matter and stools. Usually, the patient, in case of accidental poisoning, or even when suicide has been attempted, is anxious to give the needed information, thus enabling the physician to take immediate and pointed measures to secure the recovery and comfort of the sufferer.

The *Prognosis* depends largely upon the nature of the poison swallowed, upon the amount taken, the promptness with which medical aid is summoned, and the efficiency of the physician in charge.

Treatment.—Removal from the stomach of the noxious matter taken is the first duty which requires the physician's attention. If the practitioner holds himself in particular readiness to answer such calls, he is armed with the various instruments, apparatus and preparations the use of which may be demanded. In general practice, and especially in country practice, such liberal preparations are not had, and the physician must often depend upon means most readily obtained. It is then best to evacuate the stomach by the use of any emetic that can be had *at once*; mustard-water, for instance, made by adding a

tablespoonful of mustard to a half-pint of warm water, or a solution of common salt, two tablespoonfuls in a half-pint of tepid water, can usually be procured immediately; copious draughts of tepid water, with a free admixture of grease, usually produce prompt results. A stomach-pump may be extemporized by passing through the œsophagus into the stomach the end of a long rubber tube; if the free end is raised above the patient's head, water may be poured into the stomach through a small funnel attached to the tube; the stomach filled, it can readily be emptied by lowering the free end of the tube below the level of the stomach. This simple process repeated, a complete emptying and rinsing-out of the stomach can be had.

Poisoning by acids requires lime-water, chalk, magnesia or ashes. Poisoning by alkalies demands acids. Narcotics require stimulation, strong coffee, inhalations of Nitrite of amyl, brandy, whiskey, flagellation. Belladonna antidotes Opium. Dialyzed iron, in large doses, frequently repeated, is an excellent antidote for Arsenic; and Chloral, Chloroform, and the administration of animal charcoal and Tannic acid, in large amounts, are to be used in poisoning with Strychnine.

Of the emetics commonly employed, Sulphate of zinc is given in thirty-grain doses, Ipecacuanha in twenty-grain doses; Apomorphia acts very promptly, and is an invaluable agent in such cases; from one-tenth to one-fourth of a grain may be given by the mouth or hypodermically. Salt and mustard may be used as already indicated. Tartar emetic should be administered in doses of three grains in water; it is, however, undesirable to employ this drug to any extent, as it produces violent nausea and vomiting, and seriously depresses the entire organism.

The following list of poisons and their antidotes may be found of service:

Acid. acet.—Soap and water. Lime-water. Chalk-water. White-wash and water. Magnesia. Milk. Oil. Thick gruel. Morphia. Use no stomach-pump.

Acid. arsen.—See Arsenic.

Acid. carbol.—Emetic. Stomach-pump. Wash out the stomach with soda or saccharated lime, dissolved in large quantities of hot water, until the water returned gives no longer the odor of carbolic acid. White of egg, freely. One ounce of Castor oil, or three ounces of Olive oil. Stimulate freely by applying heat to the extremities, friction on the surface of the body, the interrupted current, and inhalations of Amyl nitrite. Use, if necessary, one-sixtieth of a grain of Atropia, *hypodermically*.

Acid. carbon.—Fresh air; windows and doors wide open. Cold applications to the head. Cold douche. Stimulants. Ammonia to the nostrils. Galvanism. Friction and warmth to the extremities. Hot coffee per rectum. If oxygen can be had, give it by inhalation. Artificial respiration must be employed untiringly. Use catheter if depression is profound and long-continued.

Acid. citric.—See Acetic acid.

Acid. hydrochlor.—Give *immediately* large draughts of soap and water; bi-carbon. of potash or of soda. Ammonia or common washing-soda, well diluted with water, may be given. Magnesia or lime-water. Milk. Oil. White of egg in water. Gum and water. Linseed tea. Morphia hypodermically. Do not use stomach-pump.

Acid. hydrocyan.—Requires immediate and vigorous attention. Stomach-pump or prompt emetics. Stimulate freely with brandy, Ammonia, Chloric ether. If

swallowing is impossible, use diluted brandy, per rectum or hypodermically. Inhalations of Ammonia on a pocket handkerchief, to be used with caution. Hot and cold douche. Pour water from a height over the head and chest. Hypodermic injection of one-sixtieth of a grain of Atropia; or thirty drops of tincture of Belladonna, by the mouth. Mild interrupted current over the chest and region of the heart. Friction on the chest. Artificial respiration to be kept up persistently.

Acid. mur.—Carbonate of lime (chalk or whiting) to be used freely. Magnesia, soda, etc., in milk or in some mucilaginous drink.

Acid. nitr.—Treatment same as in Hydrochloric acid.

Acid. oxalic.—Same as treatment by other acids, only the alkaline carbonates should not be given.

Acid. sulphur.—Same as in Muriatic acid.

Acid. tartar.—Chalk. Whiting. Magnesia. Soda. Mucilaginous drinks. Linseed tea. Linseed oil, etc. Morphia, hypodermically. Stimulants, if necessary.

Aconite.—Half a fluid drachm of spirits of Camphor in a teacupful of hot water, to be given at once. Emetic. Stomach-pump. Warmth at extremities. Mustard leaf over the heart. Use tincture of Digitalis, twenty drops, hypodermically. Nitrite of amyl, by inhalation. Stimulants by mouth and rectum. One-sixtieth of a grain of Atropia, or twenty drops of tincture of Belladonna by mouth or rectum. If the pulse does not improve, repeat the latter. Keep the patient in a recumbent position, and maintain artificial respiration for no less than two hours, if necessary.

Alcohol.—Give at once active emetic. Warm mustard water or Sulphate of zinc; of the latter, fifteen to twenty grains. Cold douche to the head. Warm flannels and friction to the extremities, if cold. If the case is severe, use Ammonia, Digitalis, Caffeine, hypodermically.

Alkalies.—In poisoning with the alkalies, or any of their salts, as Ammonia, Potassa, Soda, employ, if called at once, the different vegetable acids, as vinegar, lemon-juice, freely diluted with water, or weak solutions of Citric and Tartaric acid. If some time has elapsed, use Oil of almonds, Linseed oil, Castor oil, and lard; later, wash out the stomach with warm water. Mucilaginous drinks. Nutriment per rectum. Stimulate, if necessary. If œdema of the glottis exists, the performance of tracheotomy may be imperative.

Amyl nitrite.—Evacuate the stomach promptly with active emetics or stomach-pump. Give an abundance of fresh air, and keep up, with all due perseverance, artificial respiration. The patient must be kept in the recumbent position.

Antimony, salts of.—Freely administer decoction of white oak bark, or Tannic or Gallic acid in any form. Milk. Carbonate or calcined magnesia in milk. Vomit the patient.

Arsenic.—Emetics are rarely needed; if used, follow by large draughts of hot water and salt, to wash out stomach. Hydrated peroxide of iron, fresh, from half ounce to an ounce, every ten minutes until better. Dialyzed iron in one-ounce doses repeatedly. If iron not at hand, give magnesia in unlimited quantities. Stimulants, if needed. Mucilaginous and albuminous drinks, as white of egg, linseed tea, and so forth. Warmth; hot blankets; hot bottles to feet; friction to extremities. Morphia, if necessary. When the more acute symptoms have subsided, use linseed poultices to the abdomen, and one-eighth to one-quarter grain of Morphine, hypodermically, if necessary.

Arsenious salts.—Same as Arsenic.

Atropia.—Stomach-pump, or emetic of mustard water, sulphate of zinc, or ipecacuanha; also, stimulants. Coffee; enema of one pint of hot, strong coffee. Mustard to calves of legs. Hot-water bottles to feet. Flagellation with wet towel. Hot and cold douche. Interrupted current to limbs. Pilocarpine nitrite (solution of one part in twenty) ten minims hypodermically. Repeat, if necessary, or two drachms of the tincture of Jaborandi by the mouth or rectum. Artificial respiration for two hours, if necessary.

Baryta (carbonate, chloride, nitrite).—Sulphate of soda or magnesia. Phosphate of soda. Fixed oils.

Belladonna.—Same as Atropia.

Bismuth.—Milk. Mucilaginous drinks. Emetics. Stomach-pump.

Camphor.—Emetics. Stomach-pump. Stimulants, to be used freely. Warmth.

Hot blankets. Hot-water bottles. Friction. Electricity. Hot and cold douche to head and chest.

Cantharides.—Mucilaginous drinks. Copious draughts of milk. Camphor-water. Later, emetics. Stomach-pump. Morphia, if needed.

Chloral hydrate.—Strong coffee. Hot bath or pack. Hot blankets. Friction. Stimulants. Ammonia. Caffeine. Strychnine, hypodermically; nitrate of strychnia; solution of strychnia (one part in fifty), two minims, hypodermically. Stomach-pump. Artificial respiration. Electricity. Hot coffee per rectum. Tincture of Nux vomica, mouth or rectum. Amyl nitrite.

Chlorine.—Sulphide of ammonia. Inhalations of aqua ammonia, to be given cautiously. Artificial respiration.

Chloroform.—*If inhaled:* Give an abundance of fresh air. Pull the tongue forward. Clear the mouth. Unfasten the clothing. Place head very low. Alternate cold and hot douche. Amyl nitrite. Ammonia. Electricity, placing one pole on the pit of the stomach, the other on the larynx; to be used for a short time only and very cautiously. Artificial respiration, about eighteen per minute. In apparently hopeless cases, two or three violent blows on the chest, delivered in rapid succession, may restore action of the heart.

If swallowed: Emetics. Stomach-pump. Large draughts of water, containing carbonate of soda in solution. Rouse the patient by all means. Employ flagellation. Mustard to the calves of the legs and over the heart.

Coal gas.—Fresh air in abundance. Artificial respiration kept up steadily and for a very long time. Ammonia to the nostrils. Friction to the extremities. Mustard to calves of legs and over the heart. Interrupted current to the extremities. Stimulants by the mouth or rectum. Enema of a pint of hot, strong coffee. Cold and warm douche to the head and chest. If oxygen is obtainable, inhalations of it may be employed to advantage. Bleeding is often indicated, and in very prolonged cases the catheter must be used.

Copper, salts of.—Milk. White of egg. Sulphide of iron; magnesia; sulphate of soda. Barley water. Gruel. Arrow-root. Mustard-water or ipecacuanha, to produce emesis, if necessary. One-half grain of morphia, hypodermically, or twenty-five drops of laudanum by the mouth. Linseed poultices to the abdomen. Avoid all acid drinks.

Corrosive sublimate.—See Mercury.

Croton oil.—Stomach-pump. Mustard-water. Sulphate of zinc. Ipecacuanha for emesis. Use demulcent drinks frequently, as barley-water, white of egg and water, gruel, arrow-root. Use stimulants freely—brandy, sal vol., chlor. ether. Linseed-meal poultices to abdomen. One-third to one-half grain morphia, hypodermically. Twenty minims of laudanum by the mouth, repeated in an hour, if necessary.

Digitalis.—Stomach-pump. Emetics. Twenty grains of tannic acid or gallic acid, in hot water, given frequently; strong hot tea or coffee. Stimulants per rectum, if not retained by the stomach. One one-hundred-and-twentieth ($\frac{1}{100}$) grain of Aconite (two minims of a solution of one to 240), hypodermically, or six minims of Tincture of aconite by mouth or rectum; to be repeated in a half hour, if heart's action is not perceptibly improved. The recumbent position must be strictly maintained, even for a long time after all the symptoms have subsided.

Ergot.—Stomach-pump or emetics. Active purgative. Tannic or gallic acid in half-drachm doses in water frequently, or strong tea. Stimulants. Inhalations of nitrite of amyl, or one-fiftieth ($\frac{1}{50}$) of a grain of nitro-glycerine by mouth, repeated frequently. Recumbent position. Warmth to extremities.

Ether.—Same as chloroform.

Fowler's solution of arsenic.—Lime-water. Eggs. Milk and lime-water. Equal parts of lime-water and fixed oils.

Glass.—Use bread-crumbs in large quantities to envelop the particles of glass. Active emetics, to prevent the glass getting into the bowels. Mucilaginous drinks.

Gold, salts of.—Strong solution of sulphate of iron.

Iodine.—Starch. Arrow-root. Paste of wheat-flour and cold water (iodine and starch form an insoluble compound), then active emetics. Nitrite of amyl. Morphia, hypodermically, as often as necessary, one-third of a grain.

Iron (chloride, sulphate).—Carbonates of ammonia, soda, and magnesia. Mucilaginous drinks.

Lead (acetate, carbonate, red oxide).—For soluble salts: white of egg and milk.

Glauber's salts, Epsom; Phosphate of soda. Emetic of sulphate of zinc. Stomach-pump. *Solid salts*: Diluted sulphuric acid. Castor oil. Poultices to abdomen. Morphine, hypodermically.

Lime.—Fixed oils. Stomach-pump. Rinse stomach freely with warm water.

Lye.—Same as alkalis.

Meats (spoiled), Decayed vegetables.—Vomiting. Purgatives. Free use of powdered charcoal.

Mercury, salts of.—White of egg in cold water or milk, in large amounts. Stomach-pump, or emetics. Flour-paste made with milk and water. Arrow-root. Sweet oil and milk. Gruel. Barley-water. In fact, any mucilaginous drink. Stimulants. Morphine, hypodermically.

Morphine.—See Opium.

Mushroom (Poisonous).—Stomach-pump, or emetic. Atropia, one-sixtieth ($\frac{1}{60}$) of a grain, hypodermically, repeated in half an hour, if necessary; or twenty drops of tincture of belladonna in water. Castor oil, one ounce. Stimulants. Warmth to extremities, and poultices to the abdomen.

Nux vomica.—Stomach-pump must be used at once, if at all. After spasms have set in, the use of the tube becomes impossible. Emetics, if necessary, must be given while patient is under the influence of Chloroform, or hypodermic injection of one-fifth ($\frac{1}{5}$) of a grain of Apomorphia. Animal charcoal in large amounts, or Tannic acid, or Tincture of iodine, followed by stomach-pump, or another emetic. Bromide of potassium, half an ounce in water, with or without ten grains of Chloral. Inhalations of Amyl nitrite. Relax muscular system by Chloroform or Ether. Curare, one-third ($\frac{1}{3}$) of a grain, hypodermically. Artificial respiration.

Opium.—Stomach-pump or emetic. Rouse patient. Flagellation with wet towel. Pinching. Electric shocks. Ammonia to the nostrils. Walking the patient is likely to add to his exhaustion, and is not recommended. Coffee. One pint of strong coffee, injected into the rectum. Pour hot and cold water over his head from a height, drying him thoroughly after it. Hypodermic injection of Sulphate of atropia (one-fortieth of a grain), or fifteen minims of Tincture of belladonna by the mouth, to be repeated every fifteen minutes, if necessary. One-twentieth ($\frac{1}{20}$) grain of Atropia is said to antagonize one grain of Morphia. Nitrite of amyI by inhalation. Artificial respiration should be kept up at least two hours.

Paris-green.—See Arsenic.

Picrotoxin.—See Nux.

Phosphorus.—White of egg freely. Mucilaginous drinks, with carbonate of magnesia in suspension. Produce emesis by giving three grains of Sulphate of copper in water, every five minutes until vomiting occurs. French oil of turpentine, half a drachm, every fifteen minutes. Avoid oleaginous mixtures; they dissolve phosphorus.

Silver (nitrite of).—Strong solution of common salt in water or milk. Stomach-pump. Later, mucilaginous drinks.

Stramonium.—Emetics. Alcoholic stimulants. Strong coffee. Tannin in mucilaginous drinks.

Strychnine.—Same as Nux vomica.

Tin, salts of.—Copious draughts of milk. White of egg and water.

Veratrum.—Sulphate of zinc for emesis. Stomach-pump. Full doses of Tincture of digitalis or of Opium. Stimulants. Strychnine, hypodermically.

Zinc (acetate, sulphate).—White of egg and milk. Solution of Tannin; or decoction of white oak bark. Solution of Carbonate of potassa or soda. Mucilaginous drinks. Stomach-pump.

CHRONIC GASTRIC CATARRH.

Synonyms.—Chronic gastritis, Inflammatory dyspepsia, Chronic inflammatory dyspepsia.

Definition.—A disorder of the stomach which depends upon a chronic inflammation of the gastric mucous membrane, causing impairment of the assimilation of food and of nutrition, with subsequent

disturbances of the excretory functions; it is accompanied by derangement of the appetite, uneasiness and tenderness at the epigastrium, thirst, vomiting of mucus, slight febrile movement, and general moral and physical depression.

Ætiology.—Chronic gastritis is likely to result from causes which may also produce the acute form of gastric catarrh. In fact, often it is the sequel of an acute attack badly treated; in others, by virtue of a previously weakened condition of the organ, or by repeated imprudence in diet, or by a failure to fully avoid those causes which in the person concerned create indigestion, there is left behind that low grade of irritation of the gastric mucous membrane which, once become chronic, constitutes the disease under consideration.

Chronic gastric catarrh occurs at all ages, with a preference for mature years, the fortieth to the sixtieth year; it is found more frequently in men than in women, and more often in persons of full habit. A tendency to this disease is hereditary; at least, observation shows that members of certain families are quite likely to develop, sooner or later, symptoms of chronic gastric catarrh; the probability is that this tendency, as in several other diseases, does not so much depend upon an inherited taint or upon an inherited peculiarity of temperament, as upon a natural weakness of the organ itself. A person afflicted with such a predisposition, if prudent and regular in his habits, may suffer no inconvenience from it, while one less prudent and less regular in habit may experience a great deal of trouble from the same source.

Previous diseases of the stomach which have left the organ in an enfeebled condition constitute an important predisposing cause of chronic gastritis. Among these diseases, acute indigestion and certain forms of dyspepsia stand prominent.

Among the exciting causes, errors of diet are of the most frequent occurrence. Eating too often, allowing the stomach no rest, is quite sure to bring on chronic gastritis; excessive indulgence in the pleasures of the table, persistent overloading of the stomach, the indulgence in articles of diet which are not suited to the digestive powers of the individual, and improper mastication, deserve mention here. The latter especially constitutes one of the most common causes of chronic gastric catarrh, and the national vice of eating so hurriedly that the food is forced into the stomach before it is duly prepared for reception there, has resulted in the alarming prevalence of this disorder which, for the sake of convenience, is generally classed under the broad title of "indigestion." Some authors maintain that too long-continued abstinence from food gives rise to chronic gastric catarrh.

The habitual use of alcoholic drinks deserves mention here; the richer in alcohol such drinks are, the greater their importance as an exciting cause; hence the especial danger of the free use of brandy.

A similar effect is produced by substances which mechanically irritate the coats of the stomach, and by various drugs which are generally given on account of tonic properties, such as Arsenic and Iron. Mercury, Cubebs, and a few others of this class, when taken in too large doses, or for a great length of time, act similarly.

Chronic gastric catarrh often coexists with chronic diseases of a wasting character, or with diseases which disturb the portal or abdominal circulation; examinations after death have repeatedly demonstrated its existence when during life no symptoms of it had been observed. It occurs in diseases of the liver, especially in cirrhosis, and of the heart; also in albuminuria, gout, phthisis, and various affections based upon the scrofulous diathesis.* Fenwick calls attention to its occurrence whenever the functions of the excretory organs are disturbed, or when constipation exists.

The coexistence of chronic gastric catarrh with cancer and ulceration of the stomach, or with pyloric obstruction, is of frequent occurrence, and the connection between them is so readily understood that it requires no explanation.

Pathology.—Usually in chronic gastric catarrh the mucous membrane of the stomach is covered by a thick, viscid, tenaciously adhering mucus. The membrane itself presents abnormal vascularity, is changed in color and thickness, and at times contains in its substance extravasation of blood, the result of rupture of the capillaries.

The color of the gastric mucous membrane varies. It is of a milky white when fatty degeneration of the glands has taken place, and of a dark-red, brown, or slate-color when there has existed disturbance in the portal circulation, as in cirrhosis of the liver or heart affections. The dark slate-color, most marked near the pylorus, according to Wilson Fox, is due to the presence of minute black spots which are thickly scattered over the mucous membrane, and depend on the presence of pigment derived by imbibition from the hæmatin of the blood, the result of previous capillary hæmorrhages in the superficial layers. The increased vascularity of the membrane is usually well marked, and erosions are often observed.

Thickening and hardening of the tissues are almost always present, and depend upon an increase of the interstitial tissue between the glands. The entire membrane is tough, and may be stripped off the underlying structures in big flakes. At times this thickening is fairly uniform; but often there is found that mammillated appearance, first described by Louis, which consists of soft gray, elevated spots, two or

* Dr. Wilson Fox states that chronic gastritis existed in nearly one-half of the number of cases of phthisis examined by him. Dr. H. Jones affirms that in 23 cases of catarrh of the stomach he found tubercles in 4, and disease of the lungs in 11 more, while in 8 there was disease of the kidneys, and in 3 diseases of the heart.

three lines in diameter, separated from each other by well-defined sulci, bearing a rough resemblance to a "nipple," as indicated by the name used to describe them. These excrescences consist of enlarged glands containing granular epithelium. The sulci, or furrows, which separate these elevations, are characterized by atrophy of the glands and thickening of their walls, the contents of which consist of fat-granules and a few granular cells.

At times the inner surface of the stomach resembles in appearance that of the small intestine. This condition is found when the chronic inflammation has existed for some length of time, and is due to the projection of villous growths from the tissue which separates the glands of the mucous membrane. These growths contain, at their centre, loops of capillary vessels; they may enlarge, unite at their base, and eventually obstruct the excretory ducts of the glands, thus producing atrophy of the glands. Atrophy of the glands usually occurs in scattered groups, having the appearance of white spots dotting the mucous membrane; in some instances it affects the deeper-lying tissue, leading to a more general breaking down, which may involve the capillaries and smaller arteries.

Sometimes cysts are formed by a thickening of the *membrana limitans*, an irregular narrowing of the tube, and obstruction resulting therefrom, with subsequent distension below the point of constriction.

The pathological changes in gastric catarrh not unfrequently involve the submucous and muscular tissues, either in the process of fatty degeneration or by a simple hypertrophy of the underlying, more particularly of the muscular, connective tissues. This thickening of the walls of the stomach may cause constriction of the pylorus, with simultaneously existing dilatation above the stricture.

With the exception of the increased vascularity of the mucous membrane, of which mention has been made, nearly all the structural changes and abnormal appearances indicated are most commonly found in the pyloric portion of the stomach.

Semiology.—Since chronic gastric catarrh occurs so frequently in connection with other diseases, it is not always an easy task to recognize its existence, or to describe its symptoms. This difficulty is increased by the fact that patients who suffer from this pathological condition at certain periods, and often for some length of time, seem perfectly free from any indication of gastric disturbance, until some indiscretion or error in diet precipitates the return of the difficulty; this latter feature is of some diagnostic value.

The gastric symptoms, of course, point in the direction of indigestion. There is rarely present any degree of pain at the stomach, but soon after eating, from a few minutes to half an hour or an hour, the patient experiences a feeling of fulness, oppression, weight, and vague discomfort at the stomach, with a sensation of constriction about the

waist. There is a marked bloating in the epigastric region, the result of the formation of gases, due to the retarded and impaired digestion, and to the decomposition of food in the stomach; the latter depends upon the changes in the gastric juice which has become alkaline, and to the inefficiency of the movements of the thickened walls of the stomach. This feeling of fulness is somewhat relieved by frequent eructations of gas, often accompanied by mouthfuls of partially digested food and of copious amounts of a fluid which is exceedingly rancid, sour, and at times painfully irritating to the œsophagus and throat; in popular parlance this latter symptom is called *heartburn*. The presence of well-defined pain at the stomach is rarely observed, and, when present, deserves most serious consideration, since it points to other, and grave, diseases of the stomach. There is likely to be present a constant tenderness, varying in degree, and most noticeable when the fulness and constriction is at its height; it is found in most all cases where there exists a congested state of the liver. Not unfrequently the patient complains also of a feeling of warmth at the stomach, with a raw and burning sensation within the organ. The flatulence may not be confined to the stomach, but may become intestinal as well, accompanied, in such a case, with a feeling of increased discomfort, particularly in the right hypochondriac region. These gastric and intestinal symptoms, more especially the acidity and burning at the stomach, are occasionally relieved by eating, particularly, in the writer's experience, of dry, coarse bread; the relief is usually for a short time only, and may be followed by an aggravation of all the symptoms. The acidity of the eructations is quite diagnostic and depends upon acetous fermentation, the natural consequence of conditions already mentioned, and no doubt frequently set up by the retention in the gastric mucus of bits of undigested food.

These disturbances are frequently accompanied by a tormenting nausea, but vomiting of food rarely occurs. Profuse vomiting of stringy, glairy mucus, however, occurs in cases depending upon, or complicated with, albuminuria, phthisis, and in the chronic gastric catarrh of drunkards. In these cases there takes place a profuse secretion of mucus, which is ejected in astonishingly large quantities. At times this vomiting is nearly constant; again, it occurs every few days only, usually after breakfast. Frequently, in such cases, there is little sickness, and a noticeable absence of gastric symptoms during the intervals between the attacks. The chronic gastritis of drunkards is characterized by the almost certain existence of this symptom; in such cases blood is often mixed freely with the mucus, and hæmatemesis is a not uncommon occurrence. These cases present also characteristic nervous disturbances, easily recognized derangements of the liver, and that painful sense of sinking and horrible feeling of

goneness at the stomach which can be relieved only by renewed indulgence in heavy stimulants.

The appetite is usually fitful; more frequently it is almost wholly wanting, or there exists a craving for highly-spiced dishes or for special dishes to the exclusion of staple foods. Sometimes the patient prefers to abstain from eating for a long time, and then suffers from faintness until he eats, usually voraciously, and with disastrous effects. Others have a normal desire for food, but a few mouthfuls suffice to bring on a feeling of repletion, and the patient either leaves the table, or continues the meal at the expense of his comfort.

Thirst is usually present. Drinks, hot or cold, are not only used freely at the table, but between meals and in the evening. Cold drinks are taken by preference, but they often so seriously aggravate the difficulty that the patient is taught to abstain from them, and to satisfy himself with warm drinks, not daring to partake freely of even these without experiencing much discomfort.

The tongue is variously coated. In many cases it presents only an occasional whitish fur on the dorsum. In others it is large, flabby, and shows the indentations from the teeth. When the liver is congested, the coating of the tongue is thick, yellowish, or of a dirty brown. In cases which appear in connection with those chronic diseases which are characterized by an elevation of temperature, and particularly in their latter stages, the tongue is of a bright red color, pointed at the tip, with marked prominence of the papillæ, and presents a raw appearance.

The mouth presents several other important symptoms. The breath is usually offensive, and the taste, particularly in the morning, is very disagreeable. The catarrhal state is often found well pronounced in the oral mucous membrane; the lips are dry and cracked, the fauces are inflamed and even slightly ulcerated; the pharynx partakes of the irritation, showing granular inflammation, with the secretion of ropy, tenacious mucus, and frequent hacking cough.

The gums become spongy, puffed, retracted from the teeth, and bleed easily; irritation of the salivary glands occurs, giving rise to profuse salivation, especially noticeable and annoying at night, when the saliva discharges freely from the mouth upon the pillow; this extension of the catarrhal state to the salivary glands leaves the tongue dry and feverish, or covered with a creamy white mucus.

Commonly the bowels are constipated, but if the intestine partakes of the catarrhal inflammation, a more or less habitual diarrhoea develops. If constipated, there is present considerable flatulence, with colicky pains and general intestinal uneasiness, pressure in the rectum, dull frontal headache, weariness, general indisposition. The stools, usually of pale color, are passed in dry, small lumps, with con-

siderable straining, and are often covered with glairy mucus. Hæmorrhoids are a legitimate result of this condition. These spells of constipation are at times relieved by a number of frothy, diarrhœic stools, containing food in a fermented state, often very irritating to the anus, and accompanied with colic and emission of flatus.

Symptoms of jaundice appear when the catarrh extends to the duodenum and causes obstruction of the biliary passages. This condition is of not uncommon occurrence, and deserves careful consideration at the hands of the practitioner.

The urine exhibits abnormal conditions. Its specific gravity depends largely upon the amount of fluids taken, and is usually higher in the evening than in the morning, owing to the increase of the urea as the result of food taken and of exertion made during the day. The deposits consist of urates, oxalates and earthy phosphates; the secretion containing a large amount of the phosphates is generally alkaline, cloudy when first voided, and after standing in the vessel becomes iridescent.

Chronic gastric catarrh generally produces a slight elevation of temperature, mal-nutrition, and subsequent nervous depression and irritability. The pulse is rarely disturbed save at times when the excessive flatulence interferes with the regular action of the heart, or when there exists a marked feverish exacerbation at stated periods; usually it is slow, regular, and full. A slight feverish reaction, accompanied with malaise and, perhaps, shivering, is not at all unusual; and cases are not unfrequent in which there is observed toward evening a decided elevation of temperature, with dryness and heat of the extremities, full and compressible pulse, dull frontal headache, and violent thirst. Other patients are habitually chilly, suffer severely from dull, heavy headaches, and are exceedingly sensitive to every change of temperature.

The effects of mal-nutrition are shown in the dry, sallow, wrinkled appearance of the skin, and in the predisposition to eruptions on the skin; this tendency is most noticeable in persons of a scrofulous habit, and in them the appearance of an eczema or impetigo is likely to be followed by a prompt amelioration of gastric symptoms. The hair becomes dry and prematurely gray, and baldness sets in; the nails and teeth become brittle, and are easily broken. The countenance appears old and weary, the extremities are habitually cold, and progressive emaciation of the whole body indicates the profound disturbance in the digestive functions.

The nervous system, in the later stages of chronic gastric catarrh, is visibly affected. Weariness and indisposition to make an exertion of any kind are observed; the patient complains of an infinite variety of aches and pains, usually lancinating, at times rheumatoid in character, in the trunk or limbs, in fact, almost everywhere; he becomes impa-

tient, timid, despondent, incapable of exercising his formerly sound judgment, irritable, fickle, and disagreeable to all about him, at times so profoundly depressed as to be a confirmed melancholic. Wakefulness and sleeplessness at night commonly coexist with this state of mind, while in other cases sleep is so profound and so heavy that the patient awakens tired, weary, wholly unrefreshed, and requires some time before he is able to enter upon the duties of the day.

The headache of chronic gastric catarrh bears no resemblance to the agonizing sick headache which accompanies the acute form. It is a dull, heavy, pressive ache in the occipital or frontal region, often consisting more of a feeling of discomfort than of a well-defined ache; it is occasionally associated with a mild degree of vertigo.

Diagnosis.—In a thoroughly chronic case, the diagnosis of chronic gastritis, though not extremely difficult, requires considerable care, especially so since practically an important part of the diagnosis consists in the determination of the primary cause, upon the prompt recognition of which depends, to a very large extent, the successful treatment of the case. A careful study of the symptoms, as above described, usually suffices for diagnostic purposes. A differential diagnosis, however, between atonic dyspepsia and chronic gastric catarrh, between neurotic and catarrhal conditions, and, finally, between ulcers and cancers, and catarrh, frequently presents some difficulty. Atonic dyspepsia, in contra-distinction to chronic gastric catarrh, presents a correspondingly small degree of gastric uneasiness and tenderness at the epigastrium. The absence of fever, the pale, broad, flabby tongue, the comparative mildness of the constitutional symptoms, the atonic deficiency of the appetite, the usual absence of thirst, and the uniformity of the course of atonic dyspepsia will determine the diagnosis. The gastric disturbances which arise from an abnormal condition of the nervous system, or in which free vomiting exists as the result of nervous derangements, are accompanied quite often with a high degree of epigastric pain and uneasiness without presenting those direct symptoms of digestive disturbance, as pyrexia, thirst, flatulence, acidity, and impairment of nutrition, which belong to catarrh. The vomiting, also, in the former differs from that of catarrh, and in the latter almost always contains mucus, which is not likely to be found in the former; symptoms belonging to the hysterical condition, if present, are easily recognized, and decide the diagnosis.

A differentiation between ulcer or cancer and catarrh of the stomach is particularly difficult in the presence of hæmatemesis. It must be borne in mind that in catarrh the vomiting of blood is nearly always associated with congestion and indications of obstruction to venous circulation, with evidence of disease of the liver, heart, and lungs; and the bleeding is not likely to be excessive or long continued. The sensitiveness to pressure in the epigastric region in ulcer or cancer is

much more severe than in catarrhal affections, and in the former is closely confined to one spot, while in the latter it extends over a larger surface. The existence of ulcer and cancer is also accompanied by a *rapid* loss of strength and flesh, and pallor of the face and lips, which are not found in catarrh. Finally, the existence of a tumor may be detected by physical examination, and in that case positively settles the question of diagnosis.

Treatment.—The treatment of chronic gastric catarrh differs in no respect from the treatment outlined in the chapters on acute gastritis and on atonic dyspepsia; the remedies to be employed and their indications are, in the main, the same; in the chronic form of gastritis, however, the antipsorics, so-called, occupy an important place.

To prescribe successfully, the case must be studied from all sides, and a remedy must be selected which covers both pathological and symptomatic indications; to depend upon one group of symptoms to the exclusion of the other is almost equivalent to failure. The dietetic hints previously given are to be carefully remembered, with a special reminder of the fact that the cravings of a morbid appetite in chronic affections of the stomach can rarely be satisfied with that safety to the patient which exists in similar conditions accompanying the acute disorder.

PENETRATING ULCER OF THE STOMACH.

BY J. G. GILCHRIST, M.D.

Ulceration of the stomach and duodenum, either separately or together, is a somewhat common affection, either idiopathic or symptomatic, and is spoken of by different authors as penetrating, chronic, or corrosive ulceration, or as simple gastric ulcer. The condition has been quite exhaustively studied, the bibliography being extensive, inasmuch as while a simple ulceration is the same in all tissues, yet the semeiology is quite confusing from the fact that so many gastric diseases present similar subjective features. It was formerly supposed that the affection must necessarily have a fatal termination; in fact, the earlier text-books quite unanimously so taught; later research and examination, however, goes to show that a large number of cases recover, perhaps the majority, as numerous examples of cicatrization are recorded. It might be said, in the order of frequency, that the termination usually is in recovery, more or less complete, fatal hæmorrhage, or perforation of the stomach (or duodenum), with death from peritonitis.

Symptomatology.—The symptoms of gastric ulcer depend largely upon the seat of ulceration, the cause, and the rapidity of develop-

ment. The more constant symptoms may be given as pain, hæmorrhage, and gastric irritability. There are many cases in which the symptoms are violent, the suffering intense, and yet the tissue changes are insignificant. In other cases there may be an entire absence of any indications of serious disease, and yet the gravest disintegration be going on. In still other cases the first indication of ulceration may be a sudden hæmorrhage, accession of severe pain, or an extensive peritonitis, showing perforation from an ulcer that had been entirely unsuspected prior to these severe symptoms. As a general thing, it may be stated, the symptoms are pronounced in proportion as the case is acute and the progress rapid; safety is, therefore, frequently predicated upon the chronicity of the process. Location has a very important bearing on the violence of the symptoms. Thus an ulcer at, or near, the pylorus, whether gastric or duodenal, will produce more violent symptoms than one nearer the cardiac orifice, particularly if on the lesser curvature.

Pain is certainly the most pronounced symptom of ulceration, so much so that when absent, there is wanting an important element of diagnosis. The pain is commonly described as being of two general characters, constant or intermittent. The cases I have seen are easily, as a rule, classified in this manner. In all cases the pain may be excited by pressure over the seat of ulceration. Considering these classes separately, we will find that in cases where the pain is constant, the sufferings are not always acute. Patients describe it as a dull aching or gnawing sensation, as though they had been lying down reading, with a heavy book resting on the epigastrium; there is a disposition to straighten up occasionally, or to draw a deep breath; and yet the gait is usually with the body slightly inclined forward. At first, pressure will relieve the pain temporarily; later, the epigastrium is tender to the touch; sometimes there is intolerance of the slightest touch, even the insignificant contact of the clothing. This pain frequently extends through to the back, at a point corresponding to the painful spot anteriorly. In the early stages, also, there is some considerable amelioration from eating, particularly from large quantities of food, but soon after it is followed by a decided aggravation. The pain, as a rule, gradually increases in intensity from month to month, and after some time is always aggravated by eating or drinking and by bodily motion.

Soon after eating the pain is often excessive, subsiding after the stomach is emptied (either by passage of the ingesta into the intestines, or vomiting), and there may be an entire absence of all uneasiness until the next meal. In some cases, a small amount of food, as a cup of milk, will arrest pain which is severe when the stomach is completely empty; under similar circumstances, a considerable quantity of food, particularly when eaten hastily, will bring on intense

pain, lasting until the stomach is emptied, or nearly so. Under all circumstances, however, so far as my experience goes, deep pressure in the epigastrium will cause pain, not merely during the continuance of the pressure, but lasting for some moments afterwards.

Remission of pain, it must be noted, may continue for days, weeks or months, but even then there is some tenderness, uneasiness, or other evidence of a gastric lesion. These variations in degree or variety of pain it is important to bear in mind, as, while the occurrence may be considered proof of ulceration, other circumstances corresponding, its absence is not by any means proof to the contrary. It is important to have some correct idea or theory of the causes of pain, and of the great variety in its manifestations.

Unquestionably, the occurrence of pain in all ulcerations, whether gastric or otherwise, is due to the implication of nerve filaments. In the case of the viscera the pain is reflex to some extent, as the sensory filaments do not convey the same impressions as when cutaneous nerves are irritated; increased sensitiveness, hyperæsthesia of visceral tissues, gives primarily reflex motory phenomena; indeed, as we shall shortly see, vomiting is a constant, or nearly constant, accompaniment of irritation of the stomach. Now, the occurrence of pain argues an irritation greater than is simply sufficient to cause these reflex muscular movements. Hence, one of two or three conditions must exist. First, there is the question of locality. An ulcer situated in the course of the lesser curvature, along what might be called the upper border of the stomach, can only be irritated by an unusual amount of foreign material in the stomach or violent muscular action in disposing of such material. In other words, there must be *contact* of the ulcer with something or disturbance from muscular action, which practically amounts to the same thing. Or there may be pain from simple distension, as occurs from accumulations of gas, a frequent condition in gastric ulceration. With the ulcer in this region of the stomach, it is farther removed from such influences than would be the case if it were on the larger curvature or at the pylorus. In the latter case, any food introduced into the stomach would cause pain, because it *must* come in contact with the ulcer. Hence, in one case a small amount of food would separate the walls of the stomach so that the ulcer would not be in contact with the opposite surface, and thus give relief of pain felt while fasting, and at the same time the motions of the organ would not be sufficiently violent to cause pain; in another case, any amount of food, no matter how small, must be brought into contact with the ulcer, and pain is then inevitable.

Secondly. There is a question of the *kind* of ulcer, and the rapidity of development. A chronic ulcer, small and, as is usual, proceeding so slowly that adjacent parts are protected by infiltration and plastic organization in advance of the ulceration, must give less pain than

would be the case under opposite conditions, viz., a rapid development and considerable inflammation.

Thirdly. Habits of life must exercise an important influence on the occurrence of pain. Those of sedentary habits, not addicted to the pleasures of the table, are not, as a matter of course, exposed to the same provocation to irritate the stomach as those differently circumstanced. Not to mention idiosyncrasy, sensitiveness to pain, and many other accidental factors, it can be at once perceived that the varieties of pain do not indicate so much the intensity of the ulceration as they do locality, provocation from habits and personal surroundings, and the causes both predisposing and exciting.

To sum up the question of *pain*, therefore, I can state that while it varies greatly in degree and kind, it differs from purely functional disturbances, as gastralgia, in that it may always be excited by pressure, even during long remissions, and is felt in a circumscribed territory.

Vomiting is a symptom of gastric ulcer scarcely second in importance to pain. It is rarely absent, and yet, like pain, there are instances of extensive ulceration in which neither nausea nor vomiting occurs. There is a wide difference, in different cases, in the frequency of vomiting as well as in the character of the dejecta. In some, the smallest quantity of the least irritating substances excites the vomiting; in others, while there may be frequent and copious emesis, there is neither nausea nor straining. Occasionally there is extreme nausea, with painful straining, and the amount vomited will be very small. As with pain, therefore, so with vomiting; the symptom is a characteristic one, highly so, and yet it may be absent entirely, or vary so widely in different cases that we are at once challenged to account for the variation. The location of the ulcer and the normal gastric irritability of the individual must both be taken into the account. Thus, an ulcer at the pylorus would have the effect to produce vomiting after the food had been some time in the stomach; one at the cardiac orifice would induce it early, almost as soon as swallowing, more of a regurgitation than a vomiting. An ulcer on the lesser curvature might cause vomiting in proportion as the quantity of food was large or small, or the muscular action more or less violent. The usual course of procedure is, first pain, followed by vomiting, after which the pain is less violent, but continues for some moments until the stomach is quiet again. Furthermore, there are individuals so exceedingly sensitive in this particular that they normally vomit on very insignificant provocation. Should such a stomach become the seat of an ulcer, vomiting is frequent and severe, an exaggeration of a normal peculiarity. There are cases, again, of an opposite character, in which vomiting rarely occurs.

There is much variety, also, in the character of the vomited matter.

In some, it will be the food unchanged; in others, partially digested; in others, quantities of mucus; in still others, more or less bloody. The location of the ulcer has much to do with determining these characters. Thus a pyloric ulcer would give rise to vomiting of partially digested food; so with one on the lesser curvature. A cardiac ulcer would occasion vomiting of unchanged food. The admixture with mucus would indicate an accompanying gastritis, with an acute ulceration; so also when blood is present. A chronic ulceration might determine more or less serum, or acid fluid, and rarely blood.

Hæmorrhage, to some extent, must always be a symptom or accompaniment of ulceration of the stomach. In chronic cases the hæmorrhage will be small, sometimes insignificant, but some loss of blood is characteristic of ulceration. Many circumstances govern the amount of hæmorrhage. Rapid ulcerations may open large vessels, and blood will then be poured out in quantities; irritation from the food, or muscular motions of the stomach, may cause slight bleeding. Accordingly, while hæmorrhage is an important diagnostic symptom, it may, and frequently does, require close inspection to detect it. It may appear as streaks or dots in the vomited matter; at other times as dark clots, almost black, of varying size. Occasionally it is bright-red blood, arterial and acid, when a large vessel is opened. Usually the color is dark, presumably from the action of the gastric juice on it, not necessarily venous, as the color might indicate. There are many cases where no blood appears in the vomited matter, particularly when the ulcer is well within the pylorus, or when vomiting is infrequent. The blood will then be found in the stool, in form of dark, tarry masses, more or less copious. Should a microscope be at hand, the fact of its being blood is readily determined; exposure to the air, however, will restore something of a red color. Hæmorrhage to any amount, however, is not of frequent occurrence; weeks may intervene between the appearances of blood in quantities. Traces of blood, nevertheless, will usually be found, if not in the vomited matter, in the stools.

These are the pathognomonic symptoms of gastric ulcer, prior to perforation. There are many associated symptoms, not characteristic, and yet assisting in establishing a diagnosis. The ordinary course of the disease would be as follows:

The earliest symptoms are various phases of indigestion. In some cases there is loss of appetite, in others it is greatly increased; in all, it would seem, there is some notable change. The bowels are frequently constipated, occasionally there is diarrhoea, and still less frequently the functions are unchanged. Soon, no matter what the state of the digestion may be, the patient is greatly troubled with flatulence, seemingly unconnected with eating, and, later, more or less pyrosis. The tongue may be reddened or fissured, dry or moist; frequently it

is unchanged, unless there is much gastritis, in which case it assumes the characteristic fiery appearance. Pains in the stomach now come on, vomiting and hæmorrhage, with gradual increase in the intensity of the symptoms, and a remarkable degree of physical prostration. Should cicatrization now occur the symptoms will not entirely subside, the contraction from the scar materially and permanently interfering with the function of the stomach. The general health suffers in these cases of ulceration far beyond what would be expected; the wearing character of the pain, the vomiting and hæmorrhage, inducing loss of sleep and impaired digestion, to say nothing of the consequences of loss of blood, produce a pallor, an expression of suffering and physical exhaustion, that bears an exceedingly close resemblance to carcinomatous cachexia.

Duodenal ulcers present similar symptoms to those above described, perhaps a little less pain, but other symptoms equally as marked and severe. The location of the pain is usually to the right of the median line, but may be so near the pyloric end of the stomach that mere location will not assist in differentiating.

Such are the symptoms of ulceration up to the stage of perforation or cicatrization. We have now to consider later manifestations. When cicatrization is not secured, the case usually terminates either in perforation with peritonitis, or perforation with abscesses in various parts of the abdomen.

Perforation usually comes on suddenly, after some straining effort, a severe vomiting, a fall, jar, or some unusual occurrence of an accidental nature. There is immediate and intense pain, associated, according to some observers, with a feeling of tearing. The least motion aggravates the pain, and as vomiting is usually persistent, the suffering rapidly becomes extreme. There are rigors, hiccough, and profound collapse; the surface temperature falls, the face is haggard and hippocratic, the pulse is small and rapid, often imperceptible, and the urine is suppressed; in short, there are the common symptoms of collapse and shock. There may be hæmatemesis, but not invariably. If the patient survives the immediate effects of the accident, life may be prolonged for days.

In cases of rapid ulceration, that is, cases in which no adhesions of the stomach to near parts has occurred, the immediate result of perforation is entrance of the contents of the stomach (or duodenum) into the peritoneal cavity. There are then the usual signs of peritonitis; the abdomen becomes exquisitely sensitive and painful; respiration is thoracic, entirely; the patient lies on the back, with the knees drawn up, and the muscles are drawn up into knots or hard as a board. Gas escaping from the stomach into the peritoneum, the abdomen becomes enormously distended; the liver being pushed backwards and upwards, there is tympanitic resonance all over the abdo-

men. Peritonitis caused in this way, the entrance of foreign material into the *sac*, is practically irremediable by any method of treatment. Occasionally, by *vis medicatrix naturee*, adhesions occur between opposing surfaces, and the foreign material becomes encysted, forming, later, abscess, which may point externally and thus save the patient's life. So, also, in cases that survive these early stages, fluid will collect, become encysted, together with the foreign material, and abscess form. Such abscesses contract adhesion to near parts, and may discharge into the rectum, the vagina, or bladder, as well as externally, or may open into the peritoneum again, and the process be repeated.

Perforation, however, is not always followed by peritonitis, at least immediately. In chronic ulceration, adhesions frequently form between the stomach and pancreas, spleen, liver, intestine, or parietes of the abdomen. When perforation occurs under these circumstances, there is, of course, no implication of the peritoneum. As a rule, the adhesions induce an inflammatory or irritative condition of the parts involved, and hence, perforation is frequently the opening of a visceral abscess *into* the stomach. It is obvious that these visceral complications must furnish a somewhat extensive catalogue of visceral complications. Abscess, having once been formed, is likely to be chronic, closing and opening again and again, inducing secondary abscess elsewhere, wearing out the patient ultimately, producing pyæmia or septicæmia, or establishing peritonitis which is rapidly fatal in the exhausted condition of the patient.

Ætiology.—As is the case in all ulcerations, cutaneous or visceral, one of three conditions of waste and repair must be present. There is increased waste, molecular death, with normal repair; there is normal waste, with deficient repair, atrophic states; there is an elimination of spoiled, dead matter, in masses. There is relative excessive waste under all circumstances, it is true, and sometimes the actual relation of waste and repair cannot be estimated or established. Nevertheless, it is essential that some theory should be formed, as treatment must be largely governed by the actual condition of affairs. Thus, under the first head, there is an actual morbid action at work, something destructive; under the second, there is some local or general innutrition; under the third, there is some mechanical or chemical cause for the death of the tissues. Under all circumstances, the ulcer should be placed in the acute or chronic class, for obvious reasons. When chronic, it is probably atrophic, and hence belongs to the second class; when acute, it is either symptomatic or traumatic, and falls within the first or third class. Even when purely traumatic, we can only consider the exciting cause, as mechanical lesions, which, in the absence of dyscrasia, should heal promptly. The maintaining and predisposing cause must always be a matter of conjecture; it can rarely be definitely settled; yet, when the ulcer falls under the first or

second class, being either symptomatic or idiopathic, there is usually a foundation for a rational theory of causation.

Under all circumstances, a preliminary to ulceration not directly traceable to traumatism must be a more or less active inflammation. Let us review the many exciting causes for this. A check of perspiration, or a suppression of some habitual excretion, such as urinary suppression, and effects of the local application of extreme heat, or exposure to cold, each and all have the effect to throw increased work upon other emunctories. Surgical students are familiar with the frequency with which duodenal ulceration follows extensive cuticular burning. The increased activity of other excreting or defecating organs determines a hyperæmia of those parts, which may readily pass over into an active inflammation, should there be any predisposition thereto from any reason, or should the irritation become unduly prolonged. With a suppression of cutaneous transpiration it is common to find the intestinal glands more or less successfully carrying on double work. There is a loss of compensation in the animal economy, partially understood, and from it we learn that the success of a compensatory hyper-activity depends entirely upon two factors: first, a normal functional and structural perfection of the organs engaged in the extra duty; and, second, not too great intensity or persistence in the exciting cause. It is not difficult to realize that, with a predisposition to imperfect excretion in one direction and a frequent demand consequently made upon other excretories to preserve the equilibrium, some structural change is more or less certainly to be anticipated. Statistics go far to sustain this position. Thus it is found, from various reports, that women suffer from gastric ulcer in the proportion of nearly three to one as compared to men. It is also found that among women a very large proportion of those who suffer in this way have been amenorrhœic, either habitually or from a suppression of menses from cold or some accidental cause. Various tables quoted by Wilson Fox, M.D. (*Reynolds's System of Medicine*, vol. iii., p. 84) show that the periods between the ages of ten and fifty, in women, in other words, the menstrual life, furnish by far the greatest number of cases. Thus a condensed table (*loc. cit.*, p. 84) from various authorities gives the following results:

AGE.	10-20	20-30	30-40	40-50	50-60	60-70	70-80	Total.
Males, . . .	2	9	6	8	5	2	1	33
Females, . .	13	21	9	15	6	8	3	75
Total, . . .	15	30	15	23	11	10	4	108

It appears that of a total of 108 cases, 75, or nearly three-fourths, occurred in women. Of this number, 58, more than two-thirds, suffered during the menstrual period, or between the ages of 10 and 50. Furthermore, the larger numbers fall under the ages from 10 to 30, viz., 34 cases, a period of life when exposure to accidental suppression of the menses is more common; and again, in the periods between the ages of 40 and 50, when menstrual irregularities from the approach to and completion of the climacteric are frequent. Whilst all authors, therefore, have recognized the fact that women are the chosen subjects for gastric ulceration, few, if any, seem to connect this fact with what I consider an equally important one, viz., that it is women only who habitually have an intermittent excretion capable of suppression. The records go to show that tuberculosis, chlorosis, anæmia, and other debilitating diseases, have frequently an association with gastric ulcer, all of which adds to the plausibility of my hypothesis.

The question of ætiology, therefore, may be thus summed up: An essential preliminary is an acute inflammation; the inflammation may arise from traumatic lesions, from an exaggerated functional hyperæmia, due either to a suppression of an habitual excretion or unusual energy or persistence in the excitant; it may arise from anæmic, or other, states that give low recuperative power or deficient repair. Specific morbid action, as carcinoma, gives similar results, but these last always require some exciting cause, productive of inflammation, precisely as is the case with idiopathic and traumatic ulcerations. In short, anything, local or general, constant or transitory, mechanical or vital, that causes hyperæmia or inflammation of the stomach or duodenum is the first step in the production of an ulcer. Anything that devitalizes the tissues is likewise causative of the initial lesion. The maintenance or development of the ulcer now depends upon the general health of the individual. When there is a normal relation between waste and repair, the ulcer speedily closes; when there is a *plus* or *minus* on either side, particularly as to waste, the ulcer will continue and develop.

Pathological Anatomy.—Gastric and duodenal ulcers, non-specific, present the same general characters as ulcers elsewhere. Thus they may be shallow, confined to the mucous membrane; or they may be deep, extending through the muscular layers, and even to complete perforation; they may extend superficially, or in depth, or in both directions. They may also be single or multiple. The rule seems to be, however, a single ulcer, but many others coming on successively. There are instances, quite numerous, of two or three shallow ulcers appearing simultaneously, or in quick succession, and coalescing. When the ulcers are multiple, they are likely to be shallow; when shallow, they tend to run together. Under similar circumstances perforation is less imminent than if the ulcer were single

and deep. The ulcers are usually circular or ovoid in form, and vary in size from a diameter of an inch to that of five or six inches. As to location, they are oftener found in the stomach, next frequently in the duodenum, occasionally in other parts of the intestinal tract, and very unfrequently in the œsophagus. Whether in the stomach or duodenum, they are nearly always found near the pylorus. They have been seen in all parts of the stomach. Fox (*loc. cit.*), quoting from Brinton, says: "In 220 cases in which the site was recorded, 86 were on the posterior surface; 56 on the smaller curvature; 32 on the pylorus; 13 on the anterior and posterior surfaces, which frequently existed together and were often opposite to one another; 10 on the anterior surface only; 5 on the greater curvature; and 4 in the cardiac pouch."

The inspection of a gastric ulcer will show the common signs of acute inflammation very distinctly. The tissues in the neighborhood of the ulcer are thickened, not from infiltration, but actual cell proliferation and organization. The ulcer being on a portion of the stomach in contact with other parts, as the spleen, pancreas, liver, duodenum, or abdominal parietes, as well as the diaphragm, the inflammatory action is usually extended thereto, and more or less intimate adhesions are formed. This materially modifies the case, and gives a different aspect to the occurrence of perforation. In the first place, inflammation of the tissue to which the stomach may have become adherent will not only alter or modify the function of that organ or part, but will materially change the semeiology of ulceration. The symptomatology will become so mixed up with indications of other visceral lesions, that much embarrassment may be found in diagnosis. Furthermore, there is a promise of abscess of the organ or part adherent, which may destroy life, inaugurate septicæmia or pyæmia, or permanently destroy the organic function and usefulness. As to the relation to perforation, there are some important considerations. In the first place, if the organ to which adhesions exist is a freely movable one, or moderately so, sudden movements may tear the ulcer open. Again, the perforation may be hastened by the morbid action extending to the stomach from the inflamed organ; as a favorable modification, the inflammation being of a low grade of intensity, or chronic, escape of the contents of the stomach into the peritoneal sac will be avoided.

Perforation, as a rule, particularly when the opening is into the peritoneal cavity, is rarely of great size; in fact, in some cases it is so minute that it may escape detection by ordinary examination. There are many cases of multiple perforation, the openings being exceedingly minute; this is particularly the case when the ulcer is broad and of large size. The ulcer being small, it is usually more or less funnel-shaped, and the opening is single. So far as fatality is con-

cerned, a small opening is equally as ominous as a large one, the resulting peritonitis being as severe when a small quantity of foreign material is present as when the amount is larger. Occasionally an opening will be very large, perhaps coextensive with the ulcer. In these cases there is probably an inflammation of a very high grade of intensity, one that terminates in gangrene with sloughing.

The occurrence of perforation bears some relation to the location of the ulcer. An ulcer situated in a portion of the stomach in which natural muscular movements are more violent, or where tension would be considerable under certain conditions, would be more likely to result in perforation than when the conditions were otherwise. There are another class of cases, according to many post-mortem records, in which repair will be active in one portion of an ulcer while the destruction is going on in another. Thus, some ulcers have been seen in which there was advanced cicatrization in the superficial portion, with characteristic contraction, and yet perforation had occurred. These cases seem to represent a complete reversal in the ulcerative process; early in the case they are funnel-shaped, the mouth of the funnel being in the stomach; later, contraction on the stomach-side and extension of the ulceration deeper has resulted in a narrow opening into the stomach and a broad ulcer on the external surface.

Cicatrization, taking all kinds and degrees of ulceration into the account, seems to be the rule. Fox (*loc. cit.*), quoting from reports of the examination of dead bodies in the hospital in Prague, says: "In a total of 10,203 bodies examined," there were "126 open ulcers and 224 cicatrices in the stomach and duodenum, representing a frequency of 3.4 per cent." These tables are quoted by Fox to show the frequency of the gastric ulcer, but they answer our purpose here as showing the tendency to cicatrization. In many of the cases quoted there was no history of ulceration, the individuals having died from diseases unconnected with stomach lesions. Cicatrization, however, does not always terminate the sufferings of the patient. In many cases the result is simply to change a graver into a milder malady. This is due to the contraction of the cicatrix, in obedience to the law of repair, from which the pylorus or cardiac orifice may become narrowed, perhaps almost or quite impermeable; the form of the cavity may also be altered sufficiently to greatly embarrass digestion. The more acute the ulceration, the greater the danger of embarrassing cicatrization, for the reason that a cicatrix is contracting in proportion to the depth of the ulcer; this is due to the implication of the muscular layers. Superficial ulcerations, in which the mucous membrane alone is involved, heal by a reproduction of the last tissue, and hence there is no alteration in form or function.

Hæmorrhage, which may occur in almost any amount, arises from various sources. It may be slight, and come from the rupture of

capillaries in the granulations, or their erosion by a rapidly extending ulcer; from a deeply congested mucous membrane, a sort of transudation; or from slight lacerations of the floor or margins of the ulcer by muscular action of the stomach, or jars, or tension. It may be more profuse from opening of veins or arteries. It may be fatal from similar causes or from the extension of the ulcer deep into the substance of the liver or spleen, from adhesions of the stomach to these organs. As a rule, however, hæmorrhage is from small vessels, veins, and capillaries, as larger trunks notoriously resist ulcerative action. Some authorities have pointed out that a large vessel in the base of an ulcer may on this account be considered a barrier to perforation.

The *mucous membrane* of the stomach is generally hyperæmic, and somewhat thickened; this is particularly the case in the immediate region of the ulcer. The distance to which the thickening and hyperæmia extends depends upon the acuteness of the ulcerative action.

Summing up the pathology, as outlined above, one fact becomes very apparent. The imminence of perforation, the danger of cicatricial contraction, the amount of bleeding, in other words: the promise of life, depends upon the character of the ulcer whether acute or chronic. The acute form is the more dangerous as there is less time for the organization of plastic barriers to perforation, hyperæmia is greater, and cicatrization is more certainly a source of future trouble from the depth of the ulcer.

Prognosis.—There can be little question that far more cases of gastric ulcer recover than perish; yet the disease is one of extreme gravity, and cannot fail to excite the solicitude of the medical attendant. Death may ensue from two general causes, *viz.*: perforation and exhaustion. As has already been stated, perforation may nearly always be considered as placing the patient beyond the hope of recovery; if death does not speedily ensue from acute peritonitis and shock, it will almost surely do so from secondary affections, such as abscess and consequent hectic, septicæmia, or pyæmia. When perforation occurs without passage of the contents of the stomach into the peritoneal cavity, owing to adhesions, the occurrence is not easily recognized. Under these circumstances, while immediate death is not always to be anticipated, yet the occurrence is scarcely less surely fatal. The promise of life is in proportion as the course of the disease is chronic and *continuous*. When continuous, if improvement occurs, no matter how gradual, the chances are in favor of recovery. In cases with remittency in the symptoms, it is very difficult to determine when morbid action ceases, and hence no promise can be made. With the subsidence of acute symptoms and a persistence of those of indigestion, there is a probability of some incapacitating cicatricial contraction, or adhesion, the significance depending entirely upon the character of the symptoms. For instance, should all symptoms of ulcer pass away, and

yet food be vomited or regurgitated soon after being swallowed, there would be ground for a suspicion of stenosis or atresia of the cardiac orifice. Should the food be vomited some hours after being swallowed, and changed, there would be presumption of similar obstruction at the pyloric extremity or in the duodenum.

Finally, it must be remembered that there is always a possibility that ulcers which have been healed may break open again, or new ones form, because the causes for the original ulcer will probably remain, rendering the individual liable to new or successive ulceration. Bearing all these facts in mind, a prognosis must always be guardedly given, even in cases purely traumatic.

Diagnosis.—Notwithstanding the symptoms of ulceration would seem to be pathognomonic and unique, yet it is often a matter of extreme difficulty to differentiate from other gastric diseases. Particularly is this true of gastritis, gastralgia, carcinoma, the passage of gallstones and indigestion, and to determine whether the lesion is duodenal or gastric. The diagnosis in general, that is, in the majority of instances, may be quite satisfactorily established by the limited area of the painful territory, the tenderness, more or less, on pressure, and the constancy of the pain as to location. It is distinctly localized, and even during the remissions so characteristic of the disease, the sensitiveness to pressure continues. The greatest difficulty will be found in the early stages, when the ulcer is either very small or scarcely formed. The symptoms then are not at all characteristic, and the question is largely one of mere conjecture. The obscurity in this stage is not lessened from the fact that treatment based upon the *symptoms* alone very frequently disposes of the whole matter, aborts it, and leaves the observer in doubt that can never be cleared up.

As to carcinoma, the differential diagnosis is more obscure and difficult. Further consideration of this subject must be postponed for the present.

A question of some considerable interest is to determine the location of the ulcer, whether it is duodenal or gastric, and if the latter, in what portion of the organ. There is great difficulty in deciding between the duodenum and pylorus. As a rule, when aggravations occur some time after eating, when it is supposed that the food is passing out of the stomach, the ulcer may be located in the duodenum; it must not be forgotten, however, that the time required for the food to pass through the stomach is far from being determined, and that the narrow boundary between the intestines and pylorus makes it very difficult to locate a lesion by subjective indications. Symptoms coming on immediately after eating would indicate ulceration at the cardiac extremity or on the floor. It is said that ulcers of the posterior wall give greater pain in the back than when on the anterior wall, and that ulcers anteriorly are more sensitive to pressure or touch. But these

symptoms are comparative, and, in the absence of a standard of comparison, are not of much value. It is also said that ulcers on the lesser curvature (superior surface) give the minimum of suffering.

Treatment.—The treatment of gastric ulcer depends entirely upon the stage of the disease at the time treatment is commenced. Thus in the prodromal stage, the object in view is to prevent the formation of an ulcer; the ulcer having formed, it is desired to promote early closure and cicatrization; this having been secured, stenosis or atresia of either orifice may demand attention. Should the process not be arrested, and perforation occur, the treatment is necessarily expectant, when the contents of the stomach pass into the peritoneal cavity; if the consequences are various visceral lesions, from adhesions, the object is to hasten the evacuation of the abscesses as they form, and promote closure of the cavities. This latter, as well as treatment for stenosis or atresia, must be largely referred to works on Surgery.

These varied indications, it at once appears, call for an equally varied treatment. Thus we have hygienic and palliative measures, remedies and surgical procedures of the most formidable character to study. In all stages, however, prodromal, active disease, or sequelæ, remedies on homœopathic indications will be demanded.

Hygienic measures are such as would be suggested by a review of the etiology and symptomatology. For instance, we learn that muscular actions of the stomach, distension, whether from gas or food, bodily motions and contact, greatly increase the sufferings. We should recognize the fact that whatever increases the sufferings, in the same proportion aggravates the disease. Hence the first indication is *rest*, both of the body and the part. If the attack is acute, the patient should remain in bed constantly during its continuance; if chronic, he must lie down during a paroxysm of pain or period of exacerbation. Food should be taken, as starvation increases the sufferings almost as much as over-feeding; but in order to keep the stomach as quiet as possible, it must be given in very small quantities, at frequent intervals, and of the lightest and most digestible character. Milk has long enjoyed a reputation as being the best article of diet. If it disagrees, it may be thickened with cracker-crumbs, or arrow-root. Buttermilk is often well borne when pure milk is objectionable. Give it once in two hours, day and night, in cupful doses, or even smaller, if necessary. It is even desirable to waken the patient at night, every two hours, and give a dose—a proper word, in this instance. In very many cases, the days may be comparatively free from pain, but paroxysms occur towards morning, at one or two o'clock. This is because the stomach becomes perfectly empty, and the ulcer is in contact with the opposite surface.

There are cases, however, where the smallest quantity of food is rejected or causes great suffering. In such an event we have a satisfac-

tory resource in rectal alimentation. It must not be forgotten that food is not only taken to support life, but to keep the walls of the stomach far asunder, if possible, to prevent contact between the ulcer and opposite surface. Such contact not only causes pain, but may result in adhesions or the formation of a second ulcer. If rectal alimentation is desired, we have a choice of several articles of food. H. Smith, M.D. (*Archives of Med.*, i., p. 120), says on this subject: "What is the best material to be employed? Milk, raw eggs, animal broths, etc., are usually employed. Since the publication of Professor Leube's paper on Rectal Alimentation, in 1872, the preparation which he recommended has come largely into use, and to this Dr. Flint gives the preference. It consists of the muscle of beef, partly digested by an artificial process, and brought to a sufficiently fluid condition to be administered by means of a syringe. Life has been sustained for periods of two or three weeks, or longer, with this preparation alone, and there can be no doubt that a considerable proportion of it is absorbed. Yet it is only imperfectly dissolved and semi-fluid flesh, containing a great deal of innutritious fibre, and, as such, appears to me to be greatly inferior to the perfectly fluid and wholly absorbable flesh which nature has prepared in the form of blood." The doctor has used defibrinated blood, defibrinated at the moment it is drawn, and finds that three to four ounces, injected into the rectum, will be entirely absorbed in the space of eight or ten hours. His method of procedure is given as follows: "In urgent cases, and especially when the stomach cannot be called upon to perform its office, defibrinated blood may be injected into the rectum in quantities of from one to three ounces, every two or three hours. For chronic cases, in which it is designed merely to aid stomach-nutrition, from three to six ounces may be given once or twice a day. Given at bed-time, it usually causes no discomfort during the night, and there is only the customary evacuation after breakfast the next morning. If thought desirable, another injection may then be given, the recumbent position being maintained for a few minutes, after which, as a rule, there is no consciousness of anything unusual in the bowel, and the patient may go about his daily occupation. Any ordinary syringe may be employed, care being taken to cleanse it thoroughly each time without delay, lest the valves become adherent and fail to act. It is not necessary that the blood shall be warmed in all cases; many patients can bear it perfectly well without. But if the rectum is at all irritable it is best to put the quantity of blood required into a small tin vessel and set it into warm water until it has acquired about the temperature of the body. Warming the injection also promotes the rapidity of absorption, and is therefore important when the supporting effect is required with as little delay as possible." And here I may remark, in passing, when the food is given by the stomach, it may be warm or cold as the patient

may desire. My friend, Dr. E. P. Gaylard, of Detroit, has made use of defibrinated blood frequently, and has found it to answer his expectations fully.

In leaving this part of our subject, it must not be forgotten that the treatment does not begin and end in rest; rest is only an adjuvant, important, and indispensable, but the *cure* must be secured by remedies properly selected and applied.

Remedies.—Among the earlier symptoms of ulcer, rather the prodromal symptoms, those of gastritis, gastralgia, or the many forms of dyspepsia are observed. This goes without saying, almost, inasmuch as inflammation is an essential causative factor. The remedies for this stage, therefore, will be sought under the head of indigestion or dyspepsia. Painful flatulence, however, is, perhaps, the most common preliminary annoyance, and for this I have generally found a remedy in either *Carbo veg.*, *Carbo anim.*, *Lycopodium*, or *Sanguinaria*. It is possible that these symptoms may be relieved, and yet the formation of an ulcer go on unchecked. As soon as the existence of the ulcer is made out, that fact must govern in selecting a remedy.

Arsenic, Phosph., Graph., Merc., and Atropia, have apparently been used with greater frequency than any others.

Arsenicum would be indicated when there is the characteristic burning pain, vomiting after drinking, intense thirst for small quantities, aggravation from cold, and amelioration from heat. Rapid emaciation, with dryness of the skin, and some tendency to diarrhœa or other disturbance of the bowels.

Phosphorus is to be preferred when there is vomiting of fluid as soon as drank; hæmatemesis; contractive pain in the pit of the stomach, extending to the left hypochondrium, afterwards to the heart and left shoulder.

Graphites has a constant gnawing pain in the epigastrium, with slimy mucous vomiting.

Mercurius when the pains are more severe at night, in bed; sweating easily; diarrhœa; more or less dysenteric.

Atropia is used chiefly for duodenal ulceration when there is extreme sensitiveness of the parts to touch or pressure, much belching of wind, with aggravation about two o'clock in the morning. Many use the remedy empirically for these ulcers, and certainly with remarkable success.

These indications are simply hints; it will be necessary to select a remedy with reference to the totality of the symptoms, which are so largely those peculiar to gastritis that reference must be made to the chapter treating of that condition.

When *perforation* occurs, the treatment is purely expectant. *Veratrum*, *Camphor*, or *Arsenic* will be of some service, particularly to meet the shock. *Aconite*, *Belladonna*, or *Ignatia* may be required for the peritonitis. Hot applications may do something to relieve the pain, etc., from peritonitis, but the chief reliance must be placed on appropriate remedies. *Jahr* places especial confidence on *Phosphorus*, probably on account of the hæmorrhage.

Hæmorrhage is usually unimportant, or rather the amount of fluid blood, either from the stomach or bowels, is so small that little atten-

tion is given to it. When it is profuse, or to an extent to produce the usual signs of severe bleeding, it must demand immediate attention. The first indication is to enforce perfect rest on the part of the patient. If vomiting is present, it must be controlled by ice held in the mouth, or by an appropriate remedy. Styptics should be given, salt and water, vinegar and water, or pieces of ice swallowed. The bleeding having ceased, the least motion may dislodge coagula formed in the opening into the vessel, and the hæmorrhage be repeated. Should the bleeding be arterial, from a vessel of size, the blood bright red, and exhaustion profound, I do not believe the patient can recover. The only hope is in procuring perfect quiet, and giving time for the thrombus to firmly plug the vessel.

There are many questions of surgical interest in cases of gastric ulcer; a discussion of them is out of place here. Thus, an incurable ulcer may be excised, the whole of the pylorus or a portion of the duodenum having been frequently removed with a good percentage of recoveries. A perforation may be rendered non-fatal by an immediate gastrostomy and excision of the ulcer, and either making a gastric fistula or suturing the stomach wound, at the same time removing the foreign material from the peritoneal sac. The stenosis or atresia of the gastric orifices may be overcome and cured by surgical operation. All such procedures, however, are too formidable for general practitioners to undertake, and the reader is referred to works on surgery for instruction on indications and methods of performance.

CANCER OF THE STOMACH.

BY J. G. GILCHRIST, M.D.

Cancer of the stomach is a disease characterized by the occurrence of carcinoma, either primarily or otherwise, in the stomach, pursuing the general course, presenting the pathognomonic symptoms and showing the pathological features characteristic of carcinoma elsewhere.

Ætiology.—In determining the causes directly operative in producing cancer in any locality, the student at once recognizes the necessity for grouping them into two classes, the exciting and the predisposing. The exciting causes, in this instance at least, may be defined as such influences as affect all men alike, occurrences to which all men are exposed. The predisposing causes, likewise, particularly with reference to the present subject, are such agencies and accidental conditions as affect the individual rather than the case. In other words, one set of causes are *general*, the other *special* in their nature. Conceiving cancer to be primarily a modification of cellular production or activity, it is possible for the disease to remain latent in the body, waiting for a favorable excitant to active development. The

first impulse is in a local demand for repair; the morbid action having become active, it then continues as a purely local affection for a certain time. Accident determines the locality, notwithstanding a preference exists for certain tissues. I am aware that what follows enters upon debatable ground, but my study and observation lead me to consider the statements veracious, unless I am very much misled in the interpretation of admitted facts.

The facts, as I take it, are these: A frequent seat of carcinoma is on the lines of demarcation between different tissues, as the skin and mucous membrane. Hence, we find the lips, nose, anus, etc., presenting many cases. Next we find that cell-producing parts are chosen seats; the glands are well known to be quite obnoxious to cancer-formation. Again, we find organs or parts that are frequently exposed to irritation are often the seat of carcinoma. This list includes the throat, the stomach, the uterus, and many other parts. As to tissue, therefore, we find the greater number of cancer-formations, and in the order of frequency, in the glands, the point of union of skin and mucous membrane, and the organs that are, by virtue of their function, exposed to irritation frequently. Next we learn that while there is no specific cancer *cell*, there is a characteristic cellular *structure*, this being an immaturity in proportion to malignancy, and a multiplicity of cell-formation. These facts, I believe, are generally admitted.

Now, a lesion, structural or functional, small or great, determines an attempt at repair, more or less successful in proportion as the material for repair is furnished in proper quality and quantity, and organization is adequate. Given organization, with deficient quantity, while quality is at par, and there will be a proportionately defective repair. Given a minus quality and organization, and carcinoma results. Given a minus of quantity and organization, ulceration is the product. Given a plus of quantity, and the remaining factors minus, and some form of tumor, other than cancer, will result, depending upon the other factors acting upon an over-abundant supply of organizable material.

All this leads to one conclusion: The first step in the formation of *any* tumor must be a local irritation or lesion, necessitating active repair or increased vital effort. The heterogeneity of the result in carcinoma is explained by the location, the union of unlike tissues; the immaturity of the product, to deficient vital energy generally. This deficiency may be congenital or acquired. It has been observed that the majority of cancerous subjects are mentally depressed, dyspeptics perhaps, but there is often, if not always, a history of some misfortune, some grief, some sorrow, or other morbid moral state that may justly be considered an essential factor in the case. With this lowering of energy of nutrition, repair is imperfectly performed, and the foundation for cancer is laid. As the disease progresses, the morbid action extends

from point to point; sometimes the elements are dispersed and the germs become centres of secondary morbid action. Thus, as time goes on, the disease becomes more and more general, until late in the case the primary tumor loses much of its significance except as an important element in diagnosis.

The stomach, from its function in the process of digestion, is liable to repeated physiological hyperæmia, which may readily become pathological if an unusual irritant is furnished. Some indigestible substance taken into the stomach furnishes the irritant, the physiological act now being carried over into a permanent pathological one. The glands found in the pyloric portion, and the slight alteration in tissue when the duodenum is reached, furnish the essentials to carcinoma if the predisposition exists.

What has been written refers more particularly to primary cancer; there are cases, however, in which the disease is secondary upon its appearance elsewhere. This question will receive attention later, but it may be noted in passing that the primary disease is unusually scirrhous, sometimes epithelial; when secondary, it is more likely to be colloid, melanotic, or a mixture of the two, or encephaloid.

Symptomatology.—Like many of the gastric diseases, the earliest symptoms of cancer of the stomach are far from being characteristic. They are those of dyspepsia, more or less constant, gradually becoming severe, until a stage is reached when the occurrence of more alarming symptoms suggests something of greater gravity. There is pain in the gastric region, oftener in the epigastrium, not severe at first, and coming on at long intervals. Later, there is some pain at all times, variously described as gnawing, boring, or burning. Some time after eating the pain becomes excessively severe, cutting or stabbing, gradually fading into the customary gnawing pain and uneasiness. This sharp pain is also felt after unusual exertion, as a long walk or violent exercise. Late in the case the pain becomes continuously severe, with periods of aggravation, and may be pulsating, probably from contact of the stomach, thickened and altered, as it is, with the aorta. Very early in the case vomiting is a common symptom, not accompanied by nausea, as a rule. As the disease develops, the vomiting occurs after any introduction of food, or even drink, into the stomach. At first the vomited matter consists of the food or drink swallowed, more or less altered as to the former; sometimes a little bile may appear towards the last of the act; when the disease has made some progress, blood may be mixed with the vomited matter, or a little bloody pus. The act of vomiting causes great aggravation of the pain, particularly towards the last. The vomiting, pain, loss of sleep, and imperfect nutrition, very soon lead to the legitimate result, and the patient becomes emaciated, haggard, and exhausted. The face becomes bloodless, and of the waxy appearance noted in extreme anæmia, but there is a yel-

lowish, cloudy tinge recognized as peculiar to the cachexia of carcinoma.

Sometimes from the beginning, always from an early stage, there is a fulness in the epigastrium, which, as the emaciation progresses and the disease gathers strength, is seen to be caused by a tumor. At first the swelling can be only indistinctly outlined, the margins not being readily found. As emaciation increases, and the tumor increases in size, its boundaries become defined. It is then of the typical scirrhus form and feeling, when the disease is primary, quite firmly attached, hard, and nodulated. As its size increases, in the leisurely manner characteristic of the disease, its weight becoming correspondingly augmented, the stomach is drawn down by the traction, until it may be found as low as the umbilicus, perhaps even lower. At times the tumor will disappear without any mitigation of suffering, which, together with the suddenness of the change, forbids any hope of a cure being in progress, even by the most inexperienced observer. This disappearance is now known to be caused by a twist in the elongated stomach or by the distended colon covering it. The tumor may ultimately break down and ulcerate, when the cachexia becomes rapidly worse; or it may atrophy and disappear, which is an exceedingly unfrequent occurrence. When ulceration does not occur, it is only because life has not been sufficiently prolonged to afford time for this natural termination.

While there is a single tumor for a long time, in the majority of cases other tumors appear sooner or later, being the result of an extension of the disease to the mesenteric glands. These secondary tumors are not as painful as the primary, but are equally hard and characteristic. They are occasionally so numerous that the abdomen feels to the hand like a hard nodulated mass, unyielding, and perhaps with integumentary as well as deeper adhesions.

As other general symptoms, when the tumor is fully formed, the bowels become irregular, constipation alternating with more or less troublesome diarrhoea. The skin becomes more or less jaundiced, as the whole system is brought under the influence of the disease, and life becomes a burden to the most resolute. There is fever of a low type, perhaps some suppression of urine, death closing the scene in from eighteen months to two years after the commencement of the disease.

There is much variation in the symptoms, both as to intensity and order of development; some of those mentioned may not appear at all. In some instances hæmorrhage is considerable, the blood coming up or passing through the bowels in large quantities, unconnected with the occurrence of vomiting. Vomiting itself is not always present, though usually a prominent symptom. There are even cases where there is neither pain, vomiting, nor hæmorrhage, the case pass-

ing into extreme cachexia with no tumor discoverable by palpation. Nevertheless these negative cases are very exceptional, the disease usually running the course already described. The appearance of the tumor must be considered the most important symptom. This does not occur, usually, until the disease has been in existence for some time; sometimes, as has been remarked, it does not appear at all. The variations in the symptoms, therefore, are not from any unusual character of the disease, but from the portion of the stomach affected. The pylorus being the common site, the symptoms above given are characteristic. When other portions of the stomach are affected the symptoms are correspondingly modified. Thus, if the cardiac orifice, there is immediate pain on swallowing food or drink, with immediate or speedy regurgitation. If the lesser curvature, the symptoms are more benign, and vomiting may not occur. If the greater curvature, the symptoms will resemble pyloric or cardiac tumor, as one or the other extremity is approached.

Prognosis.—The natural tendency of carcinoma of the stomach is towards death. There are a very few cases on record of what is called a "spontaneous cure," in which the tumor has undergone atrophy, or has been thrown out by ulceration. Such cases are so rare that the prognosis is always to be considered bad. The tumor being secondary, death usually occurs within a year; when primary, life may be prolonged to two years, or a little more. As far as remedies go, I am sorry to say that there are very few, if any, authentic accounts of a cure from their use. Treatment, other than radically operative, seems to exercise no influence whatever, either to cure or to prolong life, and rarely to palliate. The disease is practically incurable, so far as any knowledge of the profession to the contrary is concerned. As to the imminence or nearness of death, in a given case, the physician is never safe in dogmatizing. Death may occur from exhaustion or cachexia, the tumor remaining unchanged, occult, to the end. It may occur at any moment from hæmorrhage, either from a tearing of the morbid tissue in the act of vomiting, or from ulceration. The tumor may break down, forming a large gastric ulcer, when hæmorrhage or perforation with succeeding peritonitis will carry off the patient. Portions of the tumor becoming soft, indicate approaching disintegration and ulcer. Should the patient already be much exhausted, speedy death may then be safely prognosticated. If the bodily powers are but little impaired, the chief danger will be hæmorrhage and perforation, in addition to dispersion of the germinal elements, and secondary tumors in the mesentery and elsewhere. Surgery, it may be noted in passing, gives some better promise of cure.

Diagnosis.—It must be a natural inference from the foregoing that the diagnosis of cancer of the stomach is not at all times an easy matter. A tumor which can be discovered by palpation will at once, in

the majority of instances, settle the questions at issue. As it sometimes occurs that a case will go from first to last without any signs of a tumor, the physician is compelled to rely upon his judgment in searching for a rational cause for the evident serious illness of his patient. Ulceration of the stomach may be mistaken for carcinoma, but if other evidences are wanting, there are certain ætiological features that must go far towards indicating the true lesion. In the first place, carcinoma rarely appears before middle life, while ulceration is more frequent before this period. The pain of ulceration is not particularly acute at all times, in fact there may be long intervals of comparative freedom from suffering; in cancer, the pain, when present, is continuous, aggravated, of course, in various ways, but the pain is apparently unconnected with eating, drinking, or any local irritation. The tenderness to touch or pressure in cases of ulceration is unique, as compared to cancer; in the latter disease, there is no particular tenderness or pain at the time of handling or pressing on the tumor; the pain comes afterwards. The whole course of the disease in ulceration may be spasmodic, marked by periods of amelioration, of uncertain duration, during which the health may be greatly improved; the course of the disease is chronic, extending perhaps over many years. Carcinoma gives a continuous and uninterrupted development from bad to worse; there is no intermission; the emaciation and cachexia proceed without interruption.

The diagnosis in all cases where no tumor is discoverable is to be made on the principle of exclusion. Where there is neither tumor, pain, hæmorrhage nor vomiting, if ulceration on the upper surface of the stomach, some atrophic disease of the liver, or alcoholism should be excluded, such profound vital disturbance as always exists can only be attributed to cancer. The color of the skin should assist in these obscure cases. There is not the pallor characteristic of anæmia; it is a peculiar "earthy," yellowish-gray color that is eminently characteristic of the cachexia of carcinoma. The expression of the face is also *sui generis*, unlike that observed in any other malady, so far as I am aware.

Morbid Anatomy and Pathology.—As already stated, carcinoma occurs in the stomach in the same forms observed elsewhere, and observes the same general characters. Whilst all forms have been seen, yet by far the larger number are of the scirrhus variety, although many times the type is mixed. This is particularly true of primary tumors; secondary deposits oftener result in colloid or medullary. The encephaloid and colloid tumors are usually more extensive, that is, occupy more space than the scirrhus. Occasionally, however, scirrhus will cover a wide surface. The usual seat of the tumor, of any kind, is at the pylorus; next in frequency, perhaps, along the greater curvature, and next, the cardiac orifice. A peculiar feature is that,

while the disease rarely extends into the duodenum, when situated at the pylorus, yet the œsophagus is commonly invaded when at the opposite opening. When situated in either the pylorus or cardia, the disease usually extends completely around the orifice. The disease usually commences in the sub-mucous or sub-serous tissues, involving the mucous tissue last; at least, this is the rule quite generally observed in scirrhus and encephaloma, and probably true also of the other forms. The morbid tissue is seen infiltrated, as it were, along the interfibrillar spaces, in the muscular coats, looking like white lines of cicatricial tissue. The muscular fibres are thus more or less widely separated, seem to be thickened at first, but later become atrophied, and disappear. There is some strong ground for holding with Wilson Fox, M.D. (*Reynolds's Syst. of Med.*, iii., p. 113) [Note 3], that the disease first appears in the "secreting glands of the stomach." The disease is so commonly of glandular origin in external forms of cancer that it is reasonable to suppose it maintains this peculiarity throughout. At all events, from the fact that the pylorus is oftener affected, a portion of the stomach in which these glands are particularly numerous, it would seem that the point may be conceded. In the earlier stages of the disease there seems to be a somewhat widely disposed thickening of the tissues, rather than a defined tumor, marked, however, with nodular protuberances that may be considered centres of development, or glandular enlargements; Dr. Fox has found a distinct, glandular structure in these masses (*l. c.*). The mucous membrane is greatly thickened, and resists the encroachment of the disease for a long time. In fact, I have seen two cases in *post-mortem* examinations, in which the disease had terminated fatally, with little change in the mucous membrane, the direction of growth seeming to be outwards, towards the peritoneum. The tumor, having once commenced to form, grows steadily and slowly, contracting adhesions to contiguous parts, and throwing out prolongations, along fibrillar spaces, as is the usual order of development elsewhere. The peculiar contracting property of carcinoma is marked; the stomach becomes gradually thickened, particularly the portions in the near neighborhood of the tumor, drawn up, and diminished in capacity. The density and weight of the tumor has a tendency to draw the stomach downwards, sometimes making its long axis almost vertical. The tumor being at or near the pylorus, the cardiac portion often becomes thinned and dilated, although occasionally the whole organ is thickened and contracted. It must be understood, however, that even when the mucous membrane is little, if any, implicated, yet it is firmly adherent to the tumor, as is the case with every tissue brought into intimate relations with a cancerous growth.

A scirrhus tumor is not seldom marked by soft protuberances which may be either encephaloid or colloid, particularly when appearing

early in the history of the tumor. Late in the case, such soft places indicate points of disintegration, which, if life is sufficiently prolonged, will break down into ulcers, rapidly extending, and very speedily causing death. If not before, certainly with the commencement of softening, a rapid dispersion of the tumor occurs. The lymphatics will become enlarged, thickened, and ultimately destroyed; glands will be swollen and take on cancerous characters, until, in some instances, the peritoneum, intestines, and smaller viscera will become blended in an almost indistinguishable mass. Veins will become occluded and obliterated; small arteries may be perforated, giving rise to fatal hæmorrhage, or destroyed like the veins. Large vessels, even the aorta, may share a like fate, and the thoracic duct partakes in the general destruction. The extent to which this destruction of organs and parts may proceed depends entirely upon the endurance of the patient. Such is the natural history of the disease, and if all these possible changes are not found, it is because the patient succumbed before they could be accomplished.

As to melanotic deposit, it rarely occurs in the tuberiform variety; it is usually punctated, or infiltrated in streaks, oftener in connection with colloid or encephaloid. There are a few cases in which distinct masses have been observed, perhaps as large as a cherry.

Notwithstanding the natural termination of cancer is in ulceration, yet it very seldom occurs that perforations leaving an opening into the peritoneum are found. The chronicity of the process, together with the natural tendency of the disease to contract firm adhesions between near parts, sufficiently accounts for the rarity of such occurrences. Ulceration sometimes has more of the characters of gangrene and sloughing. Large masses, particularly of colloid and encephaloid growths, are thrown off, often producing violent hæmorrhage. This has led some to suppose that a spontaneous cure is possible, the tumor being thrown out entire. There are records of such an occurrence in external or cutaneous, but few, at least of undoubted authenticity, of visceral tumors.

Treatment.—Medically speaking, cancer of the stomach is an absolutely incurable disease. There are reports of cases going to show the contrary, but in every instance where I have traced them to their origin the reporter is doubtful of his diagnosis, the termination of the case was unknown, or there was little faith to be placed in the diagnosis. From a surgical point of view there is a much better prospect. Many cases have been cured, although the greater number die. Excision of the tumor has been curative in a goodly number of cases; the indications are that the growth shall be of short duration, cachexia not established, and no secondary formations. In cases of a later stage, where an operation of excision promises nothing, life has been greatly prolonged, and the patient made comparatively com-

fortable by attaching the duodenum to the greater curvature, or elsewhere, thus isolating the pylorus. But these questions do not belong to our present inquiry; the student must go to works on surgery.

Whilst medicine has nothing to offer for the *cure* of cancer of the stomach, it may do much to relieve suffering. And yet, even here the results are so slow and imperfect that I think humanity would commend those who give even the transient and unsatisfactory relief derived from opiates. It is admitted that such treatment is unscientific, and not curative; yet there is no treatment, so far as we know, that is curative, and the narcotic is not given with any idea of curing. The patient will die, do what you will, and if, as I have heard remarked, it is questionable whether it is desirable to prolong a life of such hopeless suffering, humanity would suggest the propriety of hastening death. Nevertheless, there are quite a number of perfectly authentic reports of cases in which pain had been mitigated and life unquestionably prolonged by a careful selection of remedies.

Phosphorus, *Lycopodium*, and *Arsenic* seem to be the remedies oftenest indicated. Probably *Arsenic* will oftener be useful than any other. *Lapis alb.* has been used empirically with some success.

HÆMATEMESIS.

Synonyms.—Hæmorrhage from the stomach, Bleeding from the stomach.

Definition.—Vomiting of blood, depending upon a variety of causes.

Ætiology.—Hæmatemesis must be considered in the light of a *symptom* which is liable to occur in connection with, and as a part of, a variety of morbid conditions, and which at no time is of pathognomonic value. It is due to bleeding from injured bloodvessels or is the result of changes in the constituency of the blood itself.

Hæmorrhage from the larger vessels is likely to arise from gastric ulcers, usually of the chronic variety. Copland, Virchow, Fenwick, and others have shown that an atheromatous condition of the arteries of the structures which surround the gastric ulcer frequently exists in such cases, tending to rupture of the vessels and hæmorrhage. The splenic artery, the coronary, and the superior pyloric, in the order of their mention, are likely thus to give rise to hæmorrhage. Not unfrequently, however, neighboring organs, as the liver, spleen, or pancreas, suffer from ulceration, and the bleeding takes place from them. The ulcer itself, even in cases of fatal hæmorrhage arising from it, may be exceedingly minute. The frequent occurrence of hæmorrhage from a gastric ulcer is shown by statistics; thus Dr. H. Bence Jones, in seventy-two cases analyzed by him, found gastric ulcers in no less than forty cases. In cancer of the stomach the tendency to active

hæmorrhage is not so pronounced ; bleeding here takes place in small quantities, and often with much persistency ; the blood is acted upon by the gastric juice, and assumes a "coffee-ground" appearance, which in itself always constitutes strong proof that bleeding in small quantities has taken place from some surface. Again, an aneurism may rupture and empty its contents into the stomach ; or hæmorrhage may take place into the œsophagus, either from an aneurism or from the rupture of a bloodvessel as the result of malignant disease. In either case the blood finds its way into the stomach, and is then ejected by the act of vomiting. Mechanical injuries, as in the case cited by Fenwick, in which the aorta was perforated by a fish-bone, may also cause violent and fatal hæmorrhage from the large vessels.

Hæmorrhage from the capillaries may result from blows upon the stomach, or from similar injuries, but more frequently depends upon obstruction in the portal circulation, such as occurs in cirrhosis and other diseases of the liver. Thrombosis of the portal vein, due to a clogging of the portal vein or of its large branches with blood-clots or cancerous matter, is a rare accident, and universally proves fatal. Certain affections of the heart, particularly a narrowing of the mitral orifices, and of the lungs, are often responsible for hæmatemesis. Fenwick is inclined to the belief that in the former the bleeding takes place from the hæmorrhagic erosions of chronic catarrhal gastritis which is so likely to coexist. The bleeding due to violent congestion produced by epilepsy and strangulation, conditions resulting in asphyxia, deserves mention here. The corrosive poisons, by their chemical action upon the mucous surface of the stomach, produce capillary hæmorrhage. The hæmatemesis of new-born children, which so frequently terminates fatally, is presumed to depend upon obstruction of the circulation, either portal, cardiac, or pulmonary, although the question of an inherited hæmorrhagic tendency might well be raised.

Hæmorrhage from the stomach may occur from changes in the blood itself which so affect this fluid that under the pressure of the circulation it transudes through the walls of the bloodvessels. The nature of these changes is not known,—it is an open question whether they depend upon a deficiency of fibrin in the blood or upon some change in its constituency which deprives it of the power of coagulation. It is likely that the hæmorrhages of malignant fevers, cholera, purpura, scurvy, and jaundice are due to this change in the constituency of the blood, although several authorities maintain that they depend upon altered conditions in the coats of the capillary vessels.

It has been repeatedly affirmed by excellent authorities that hæmorrhage from the stomach may occur in place of, and result from, circulatory disturbances caused by suppressed menstruation ; the correctness of this statement has been persistently denied by other, equally weighty, authorities. Valleix has analyzed a series of twenty-

seven cases of vomiting of blood; five of these cases, after a most thorough examination of all the circumstances bearing upon them, he was forced to consider cases of vicarious menstruation; at least no other hypothesis could account for their occurrence or for the concomitant symptoms accompanying them. A similar vomiting of blood has at times been observed to occur in pregnant women.

Symptoms.—A feeling of sudden faintness, accompanied with heat, fulness, and weight at the stomach, pale face, soft and feeble pulse, is followed by nausea of short duration, and vomiting of blood; prostration and, in severe cases, syncope soon result. The symptoms correspond in intensity with the rapidity of the bleeding and with the amount of blood lost. When the amount is small, the blood is seen in patches on the volume of digested food or of the mucus vomited. When the hæmorrhage proceeds slowly, the gastric juice acts upon it, preventing its coagulation, and the blood appears in a dark, digested mass, showing under the microscope flakes or granules of pigment, the remnants of the red corpuscles. Hæmorrhages from large vessels, when the blood is thrown up quickly and is not exposed to the action of the gastric juice, are bright, fluid, and, in some cases, of alkaline reaction. Frequently a portion of the blood passes into the intestines, and is discharged in black, tar-like stools.

The attack of bleeding may not recur for years, if ever; in some cases, especially in chronic ulcer of the stomach, it has been observed to recur at stated intervals. Fatal cases terminate by syncope.

Diagnosis.—It may become necessary to determine whether a dark chocolate-brown mass consists of blood, bile, or food chemically altered; to determine this question we depend upon the color of the vomited matter and upon the evidence of chemical analysis and of the microscope.

The blood ejected does not necessarily come from the stomach, as has already been pointed out; it may arise from some portion of the intestine, mouth, throat, œsophagus, or lungs, and it may be of some importance to establish, approximately at least, the source of its origin. This task is one of exceeding difficulty in most instances, because the blood taken into the stomach from other parts is subjected to the same influences which operate upon that coming directly from the stomach, and necessarily partakes of its characteristics. If blood is discharged from the bowels, we may approximate in some cases the locality from which it comes by remembering that the amount of fecal matter mixed with it grows less and less toward the lower portion of the alimentary canal.

A differentiation between hæmorrhage from the lungs and from the stomach is most frequently demanded. Physical examination of both the chest and epigastric region will establish the presence of diseases in either, and, in most instances, the evidence obtained will be

sufficient to determine the question. The quality of the blood in hæmorrhage from the lungs is likely to differ from that of the stomach; the former is frothy, light, aerated, bright, non-coagulated, and alkaline in reaction; that from the stomach is dark, rusty, grumous, and acid in reaction. If the flow of hæmoptysis or from parts above the stomach has been swallowed, and is then vomited, it necessarily partakes of the characteristics of the flow of hæmatemesis in proportion to the time it has been retained in the stomach. It is well to remember, however, that bleeding from the lungs is almost always preceded by vague sensations of distress in the chest, difficulty of breathing, tickling cough, and a bubbling sensation, and accompanied by the raising of characteristic sputa. Vomiting from the stomach, on the other hand, is usually preceded by symptoms of indigestion, pain, nausea, and other, and easily recognized, disturbances in the stomach or bowels. The entire absence of tickling cough, and the plainly expulsive effort of the act of true vomiting, would almost determine the diagnosis.

Prognosis.—In the absence of especially threatening symptoms the prognosis is usually favorable. Death results most frequently when the hæmorrhage depends upon organic diseases of the liver, and from three to five per cent. of cases die which depend upon the existence of chronic gastric ulcer. The clinical bearing and effect of the great exhaustion and of the anæmia which follow the profuse loss of blood, should at no time be overlooked.

Remedial Treatment.—Ipecacuanha.—The hæmorrhage comes on suddenly and is accompanied with constant nausea; the blood is dark and sour, or bright red; coldness and pallor of the face and surfaces; spells of fainting, with great anxiety. Pulse scarcely perceptible; oppression of breathing; pressure at the stomach; great thirst.

Belladonna.—Congestion. Fulness and warmth of the stomach; face congested and bloated, or deathly pale; ringing in the ears; flickering before the eyes; throbbing in the head and stomach; the blood feels hot.

Phosphorus.—Especially adapted to persons of hæmorrhagic diathesis; bright red blood; drowsy feeling, and heat in the pit of the stomach with distension. Pallor of the mucous surfaces, lips, tongue, and gums; thirst for cold water; pulse quick, prompt; empty, gone feeling in the abdomen and stomach; urine dark; skin warm, partially moist.

Arsenicum.—Quite useful in cases of cancer or ulcer in the stomach, with hæmorrhage recurring from time to time; constant nausea and retching; roaring in the head; faintness; cold face and collapsed features; burning at the stomach; great thirst, wants to drink often and little at a time; quick, thread-like pulse; trembling anxiety; stitching pain in the spleen.

Aconite.—A much-neglected, but very important, remedy. Vomiting of arterial blood, with sweetish taste in the mouth and marked distension in the region of the stomach; præcordial anxiety with coldness of the extremities, and small, hurried pulse; characteristic restlessness; excruciating pain in the stomach, with gagging and retching; fear of death, of being moved, of turning. Upon phlethoric young people with dark hair, Aconite acts with particular promptness. Hempel calls especial attention to the following symptom of Aconite, which often precedes hæmorrhage at the stomach, and the reliability of which has been verified by himself and the writer: "Sensation as of a cold stone lying in the stomach, notwithstanding repeated stools and vomiting."

Secale.—Passive hæmorrhage; blood is fluid, does not coagulate easily, and is of a very offensive odor; great prostration of the patient; he lies still; no pain. Face,

lips, tongue and hands deathly pale; abdomen cold and soft; cold sweat; quick, thread-like pulse.

Nux.—Hæmorrhage not very copious, but looks and tastes foul; fainting with weakness; pain in the spleen; vomiting with difficulty; constipation with black stools.

Carbo veg.—Utter prostration, bordering upon complete collapse. Frequent fainting; icy coldness of surfaces and of extremities, with hippocratic face; cold breath; small, almost imperceptible, intermitting pulse; wants to be fanned constantly and hard; blood bright red.

Veratrum alb.—Slow pulse; ashen color of the face; coldness of the surface; thirst for cold drinks; nausea brought on by moving or rising; cold sweat.

Hamamelis.—Fulness and pain preceding the hæmorrhage; bloody vomiting and stools; fulness and gurgling in the abdomen; weak and quick pulse with restlessness; cold profuse perspiration.

Crocus.—Blood is discharged in long black streaks.

Erigeron.—Hæmorrhage with violent retching and burning at the stomach.

Millefolium.—A domestic remedy which has done good service; severe retching and vomiting of the blood, yawning and stretching, with drowsiness; violent cramps in the bowels and stomach. Vicarious menstruation.

Consult also Arnica, Cactus, Ferrum acet., Hyoscyamus, China.

Auxiliary Treatment.—Rest is of the greatest importance. If the hæmorrhage is at all severe, the head of the patient must be kept lowered. If faintness exists, ice must be given freely, and brandy is to be administered *per rectum*; if given by the mouth, brandy not unfrequently aggravates the vomiting. Often ammonia applied to the nostril is grateful, but it must be given with great care. Nutritive enemata may be administered, if it becomes necessary to support the patient.

The use of styptics is at times advisable. Gallic acid, in ten-grain doses, frequently repeated, alum in two-grain doses, and the acetate of lead, are most reliable. The hæmorrhage arrested, the patient must be kept absolutely quiet, and the greatest pains taken to insure as near perfect rest to the stomach as can possibly be obtained. Abstinence from food, continued for some length of time, is indispensable, and when food is again given, it should be administered cold in liquid form, and in small amounts.

STRICTURE OF THE CARDIAC ORIFICE OF THE STOMACH.

Synonyms.—Stenosis of the cardiac orifice of the stomach, Obstruction of the cardiac orifice of the stomach.

Ætiology.—Reference to stricture of the cardiac orifice has already been made in the chapter on "Diseases of the Œsophagus." It is a condition of somewhat rare occurrence, and depends in a majority of cases upon the presence of cicatrices, of ulcers, scirrhus affections of the œsophagus at, or near, the cardiac orifice, aneurism and other tumors of the œsophagus, and upon the pressure resulting from them, or from the presence of foreign bodies lodged within the œsophagus. The swallowing of corrosive poisons, by their destructive action upon

the structures, may produce the same result. In exceptional cases, stricture temporarily exists as the result of spasm.

Pathology.—The pathology of stricture naturally varies as the obstruction arises from different causes. Permanent stricture of the cardiac orifice in a majority of cases points to the presence of cancer. The orifice itself is liable to be affected in cases of scirrhus; if the stricture is situated higher in the œsophagus proper, it usually depends upon the presence of epithelial cancer. The stomach itself presents no characteristic appearances; it is almost always diminished in size, at times remarkably so, but is not structurally altered.

Semelology.—The symptoms of stricture of the cardiac orifice may be summed up in the general statement that the introduction of food into the stomach becoming an impossibility, starvation must result unless the stricture can be relieved. The introduction of food into the stomach is difficult or impossible as the stricture is more or less complete.

If the obstruction, or stricture, is not complete, fluid may enter the stomach, while solids are promptly rejected; if complete occlusion has taken place, the passing of nourishment into the stomach is, of course, out of the question. The œsophagus then becomes dilated and forms a pouch in which the food is retained for a varying period of time, to be eventually returned with certain changes in its appearance and composition which are worthy of note. If rejected immediately, the food appears unchanged save by mastication; if retained within the œsophageal pouch for some length of time, fermentation and putrefaction have taken place in the food, it is mixed and covered with slime, and during the period of its retention gives rise to horribly foul eructations.

The act of swallowing is difficult, and not unfrequently partakes of the spasmodic; partial relief may be given by the passage of a narrow tube, if the nature of the obstruction permits, through which food can be administered. Pain in swallowing is not always conspicuously present unless ulceration exists, when it becomes very severe; it is usually referred to the ensiform cartilage; a sense of uneasiness and pressure frequently exists during the intervals between swallowing; the appetite is unimpaired, and patients suffer intensely from the desire for food; nutrition soon becomes seriously impaired; emaciation takes place, steadily progressing to absolute starvation, preceded, usually, by dropsical effusion in the legs and by hectic fever.

The point of obstruction can be located by the introduction of a bougie, an operation which requires to be performed with patience and great care, since laceration of the œsophagus is easily produced.

Diagnosis.—The recognition of the causes of the constriction depends to a great extent upon careful examination of the character of the food returned. Cancerous affections are recognized by the exist-

ence of characteristic constitutional symptoms and the presence of blood, pus, or of cancer-cells, demonstrable under the microscope. Constriction from the presence of cicatrices is not of very frequent occurrence, unless it be caused by the action of corrosive poisons. Spasmodic stricture points in the direction of hysteria. The difference between an organic stricture and that resulting from a simple spasm is easily shown by the introduction of the bougie, and dilatation of the œsophagus is determined by percussion.

Prognosis.—The prognosis is necessarily unfavorable.

Treatment.—The physician's usefulness in the treatment of obstruction is largely limited to a painstaking attention to the comfort of the patient, to the use of such means as promise to lessen his suffering, and to the employment of such means of feeding the patient as promise to sustain him. The diet is necessarily restricted to nourishing liquids, introduced by a tube as often and in such amounts as is convenient or possible. Nutritive enemata may be employed, and frequently are very serviceable.

One of the most annoying features of these cases is the intense thirst from which the patient suffers, and which to satisfy is practically a matter of impossibility. The use of baths has been recommended for this purpose, and small pieces of ice, allowed to remain in the mouth, are frequently a source of much comfort. Dilatation of the stricture must be employed, and may prove successful if the presence of cicatricial tissue is responsible for the constriction or occlusion. Gastrotomy has been performed as the last resort. The use of opiates suggests itself as, at times, indispensable. Constitutional remedies are of very limited usefulness, and must be selected by the totality of the symptoms present.

OBSTRUCTION OF THE PYLORIC ORIFICE OF THE STOMACH.

Synonyms.—Stenosis of the pyloric orifice, Constriction of the pyloric orifice.

Stenosis of the pyloric orifice may be the result of a loss of muscular contractility, based upon atrophy of the contractile tissue, or upon a change of the muscular into fibrous tissue. It may also arise from the presence of cancer, or of cicatrized tissue from an ulcer, or from ulceration destroying the muscular tissues. In rare cases it depends upon adhesion between the duodenum, pylorus, and neighboring parts; external pressure from tumors, as cancerous growths in the liver, pancreas, small omentum, and of the gall-bladder, may give rise to this condition.

The symptoms of stricture of the pyloric orifice of the stomach are the result of obstruction to the passage of food from the stomach into the intestines,—chiefly vomiting, signs of indigestion, dilatation of the

stomach with its attending symptoms, to be described hereafter, and gradual emaciation and loss of strength. Dilatation of the stomach is always present, and a description of that condition practically comprises all there is to be said in connection with this subject.

DILATATION OF THE STOMACH.

Dilatation of the stomach is almost always the result of constriction of the pylorus. Acute dilatation is an exceedingly rare disease, and one difficult of recognition. A case is cited, in the fourth volume of the *Pathological Transactions*, of a lady who had been under treatment for piles, and whose abdomen was noticed to have increased in size; she vomited immense quantities of fluid, which, stopping, was followed by great enlargement of the abdomen; a post-mortem examination showed a dilatation of the stomach sufficiently great to hold ten pints of liquid.

Dilatation of the stomach, independent of obstruction of the pylorus, probably depends upon malnutrition or enervation of the muscular coats of the stomach, the result of prostrating disease, affections of the cerebro-spinal centres, and, perhaps, of hysteria and hypochondria, in which cases the local disturbances must be the result of profound nervous prostration. Paralysis of the muscular coat, confined to the region of the pylorus, and preventing the propulsion of food into the intestines, may result in dilatation. Hodgkin considers an excessive and exclusive vegetable diet a probable cause of this affection; Bennett, of Edinburgh, attributes the occurrence of a case of dilatation of the stomach to the large quantity of effervescing drinks which the patient had taken, and Bamberger makes mention, as a probable ætiological factor, of dislocation of the stomach and dragging-down of this organ by omental hernias. In an overwhelming majority of cases, however, dilatation of the stomach is the result of obstruction at the pylorus, the causes of which have been enumerated.

Pathology.—The chief point of interest is the enormous size of the gland, which, upon section, contains a large amount of dark-colored fluid; the stretching of tissues necessitated by the remarkable enlargement results in the complete absorption of the rugæ and in certain peculiar effects upon the glandular structure. Fenwick states that in one case he found the tubes visible, but widely separated from each other, the gastric cells being large and fatty; in another case many of the tubes had been destroyed, and were replaced by fibrous tissue, the muscular tissue also being thin and fibrous; in other cases, he states, the muscular structure is hypertrophied, especially in the pyloric region. The mucous membrane is usually softened, and even destroyed, by the action of the acid fluid contained in the organ. Whenever the muscular coat is hypertrophied, the condition is not as dangerous

to the patient as when the structure is thin and almost paralyzed. The distended stomach naturally becomes dislocated, and its greater curvature has been known to reach down to the pubes; sometimes the pylorus may be held in place by adhesions formed, but usually the organ is dragged down by its own weight.

Symptomatology.—The subjective symptoms of dilatation of the stomach consist chiefly of disturbances of digestion, and of an unnatural, and often very prolonged, retention of food in the stomach. There are vomiting, eructations, and heartburn, not unfrequently acid from hyper-secretion alone; disturbances of the appetite; emaciation; constipation, with hard lumpy stools, and, later, dropsical effusions in the legs. The vomiting is not preceded by nausea, nor is it accompanied with much pain or straining; there is present only a feeling of great fulness at the stomach, and the organ is easily emptied, without, however, ridding itself completely of its contents. The vomited matter is chiefly composed of a frothy and acid substance, so sour that it sets the teeth on edge; it contains the vegetable parasites which exist during the process of gastric fermentation; there is also found more or less digested food, and at times, but rarely, an admixture of bile. The extent of the fermentative change which is produced depends upon the length of time during which the food has been in the stomach. The matter vomited is frequently very offensive, and the amounts are often enormous. Vomiting takes place, usually, at intervals of several days, the length of the interval depending upon the degree of obstruction, the measure of dilatation, and upon the extent of the existing paralysis of the muscular coats of the stomach.

If the paralysis of the muscular coat is marked, or if the stomach is very largely dilated, several days may elapse before vomiting takes place; the longer the interval, the larger the amount of matter vomited; *but at no time is the stomach entirely relieved of its contents.* Bamberger states that vomiting may cease if complete paralysis of the muscular coat should take place.

The appetite is variable; in cancerous conditions it is not only indifferant but bad; in many other cases it is naturally active, and it even may be excessive. Thirst is frequently present; the tongue shows no characteristic coating; the bowels are constipated, and the urine is acid, often depositing lithates.

It is usually not difficult to detect the presence of the stomach in the different regions of the abdomen by the well-defined outlines of the smaller curvature, which may be felt stretched across the floating ribs. There is generally present a hollowness in the epigastric region, with a marked fulness on the left, and a shallowness on the right, side of the abdomen. Vermicular movements of the stomach are frequently seen, and contraction of the organ is readily excited by touch or other external stimulation. Upon percussion, a tympanitic sound is heard,

which is dull in the inferior portion of the stomach, which contains the food. Auscultation gives a splashing sound whenever the patient moves. The tumor, at times, rises upward, crowds upon the diaphragm, and even displaces the apex of the heart upward and forward.

Diagnosis.—The diagnosis of dilatation of the stomach depends upon the recognition of the symptoms described, and usually is not accompanied with great difficulty. The vomiting and the characteristics of the matter ejected are important signs. In hysteria we find vomiting, in some respects not unlike the vomiting here described; in cancer vomiting may also exist, without being accompanied with much, or any, pain. Usually, however, in dilatation of the stomach the condition is so marked that fermentation of the food takes place, thus establishing an easy differential diagnosis. The presence of the tumor, the induration of the pylorus, which is nearly always present, and the vermicular motion over the dilated organ, are of great diagnostic value. Mere meteoristic distension of the abdomen often exists to a degree which is likely to mislead; if so, auscultation and the passage of the sound into the stomach must be called into requisition.

Prognosis.—The duration of this disease is chronic, and the termination usually fatal. If mere thickening of tissue or cicatrization of ulcers is the cause of the pyloric constriction, the disease runs a slower course than in the presence of malignant growths. The nature of the existing obstruction practically determines the final termination. In quite exceptional cases a process of sloughing may result, and a favorable termination may then be had.

Treatment.—It is self-evident that careful attention to proper feeding is of the last importance; food must not only be given at short intervals and in small amounts, but should consist of such articles of diet as are chiefly digested in the stomach; among these, meat and beef-tea deserve mention; food, also, already artificially digested, should be freely used; vegetables, starch, and fatty substances must be excluded; milk may be used in very moderate amounts. Rectal alimentation may become a necessity.

Measures calculated to restore tone to the muscular coats of the stomach come into play when the dilatation does not depend upon constriction of the pylorus. The physiological school employ light doses of strychnine to produce this effect. Recently, Dr. Kuessmaul suggested the *complete* evacuation of the stomach by artificial means, and a thorough cleansing of the organ by the free use of Vichy water, followed by the administration of remedies intended to neutralize the acidity of the mucus. It is asserted that under this treatment, of which *complete evacuation* of the stomach is the most important feature, the organ gradually regains its tonicity, the intervals between the vomitings grow longer, and the patient may eventually recover.

The homœopathic therapeutics are based upon symptomatic indications.

HYPERTROPHY OF THE WALLS OF THE STOMACH.

Synonyms.—Fibroid induration, Cirrhosis, Sclerosis, Plastic linitis.

Definition.—A condition of the stomach which consists of a general thickening of all its coats, especially of the muscular and submucous layer, with a corresponding contraction of the cavity of the stomach.

Ætiology.—The causes of hypertrophy are not understood. Statistics appear to prove that the condition occurs more frequently among men than among women, and, according to Brinton, at an earlier period than cancer, the average age in hypertrophy being thirty-four, while in cancer it is fifty.

Pathology.—Hypertrophy of the stomach seems to be the result of the abnormal development of fibrous tissue with induration and simultaneous wasting of muscular structure, the coats of the stomach varying in thickness from half an inch to an inch, and more. The result of microscopic examination is largely negative, and gives no evidence of the existence of cancer-cells; the condition of the coat to the "feel" and to the knife is tough and cartilaginous; a post-mortem examination usually reveals signs of general peritonitis, with deposits of lymph and frequent adhesions; the stomach appears like a round or oval tumor, firm to the touch, and of smoothness of surface; its coats are of a dirty gray; the walls are thickened at the expense of the cavity of the stomach, which is correspondingly reduced in size; the walls, upon division with the knife, do not collapse. The changes affect more especially the submucous tissue, but involve all the structures, the connective tissue included.

Symptoms.—It is difficult to recognize this condition in the earlier stages of its development; hence, our knowledge of its symptomatology is exceedingly meagre. Its approach is insidious, unless the disease occur as the result of a mechanical injury. There is present, at first, pain, more or less severe, but at no time sufficiently marked to greatly annoy the patient. Symptoms of indigestion show themselves, though not in a well-pronounced form, and the taking of food produces more or less discomfort and aggravation of the pain. With these symptoms the patient experiences shooting, darting, wandering pains in the back and shoulders. The tumor, as the hypertrophy becomes more pronounced, is more and more easily distinguished, and some tenderness to touch appears, which is quite marked when peritonitis exists. The tumor can be felt at any time in the epigastric or hypochondriac region, is slightly movable, and is resonant on percus-

sion. Occasionally the hypertrophy is limited to the pylorus, with a sense of obstruction in that locality. With the progress of the disease the gastric disturbances become more pronounced and painful. The appetite is bad, and complete anorexia, with subsequent emaciation, great physical weakness, and feebleness of the pulse, make their appearance. The bowels are constipated; vomiting, sometimes of food, or, again, of mucus, and, later, of blood, takes place, and the patient finally dies from dropsy or peritonitis. Many of the gastric symptoms which occur are due to the lessened capacity of the stomach.

Diagnosis.—Hypertrophy of the stomach may be confounded with cancer or with foreign bodies in the stomach. The differential diagnosis between hypertrophy and cancer is often very difficult. The smoothness of surface in the former; the absence of liver complications and of cancerous affections of other organs; the family history; the presence or absence of a marked cachexia, must be carefully considered. "The diagnosis between these two alterations is not always an easy one, since, as in other parts affected by scirrhus, large tracts of tissue may often be found presenting nothing but a dense fibrous structure and a void of the cell-structures which are usually found in the more open meshes of the stroma, though this, as pointed out by Rokitansky, can usually be found at the margin of the growth. In addition to the cancerous character of the margin, the scirrhous growth is also distinguished by its affecting all coats equally, by the fusion into a uniform mass of pearly whiteness, and presenting the grisly cartilaginous texture characteristic of this form, by an immovability except at the earliest stages, and the mucous membrane upon the tissues beneath, and by the destruction of the normal appearance of the muscular layer." (Wilson Fox.)

The presence of foreign bodies in the stomach is of comparatively rare occurrence, and is usually limited to idiots or aggravated cases of hysteria. Fenwick, to establish a differential diagnosis, recommends distending the stomach in all doubtful cases by making the patient drink freely of soda-water, by which means, in case of hypertrophy, a decidedly tympanitic sound will be obtained on percussion.

Prognosis.—The prognosis in nearly all cases is unfavorable; but the disease usually runs a course of several years before a fatal termination takes place.

Treatment.—Curative measures are almost out of the question. In homœopathic practice, remedies must be selected wholly upon symptomatic indications, and an almost endless list of possibly useful remedies might be furnished. Close attention must be paid to the diet of the patient, which, in all well-pronounced cases, is to be limited to broths or other nourishing liquids. Owing to the small calibre of the stomach, these can be given only in small amounts, and hence must be frequently repeated. When the pain, particularly in the

latter stages of this disease, becomes very violent, opiates may have to be given in order to afford temporary relief. The writer, in the treatment of a severe case of hypertrophy of the stomach in which the patient, during the months preceding his death, suffered intensely, succeeded in getting excellent effects from the frequent administration of water, given as hot as the patient could bear. It relieved both the pain and the vomiting, which, in this case, had become a tormenting symptom.

SOFTENING OF THE WALLS OF THE STOMACH.

Synonyms.—Gastromalacia, Post-mortem softening, Self-digestion of the stomach.

Definition.—Softening of the walls of the stomach, presumed to be due to chemical action upon the structures.

Dr. John Hunter first observed and described the condition of the stomach which is commonly termed gastromalacia; since his time it has been the subject of careful investigation and of earnest discussion, but no positive results have been reached.

Softening of the walls of the stomach is a condition often noticed in post-mortem examinations. The membrane of the stomach is exceedingly soft, pulpy, semi-transparent, gelatinous in appearance, and frequently somewhat thinner than natural. In some cases the process is superficial, affecting only the surface of the rugæ, the underlying tissues remaining normal. In other cases the entire membrane is involved, and instances occur in which the membrane has the appearance of a thin film of slimy mucus; the underlying structures are pulpy, tear upon the slightest pressure, and are frequently found perforated. Sometimes the entire organ is affected; at others, the process is limited to circumscribed portions, with a preference for the fundus or posterior portions. The limit of the portion affected may be well defined, or it may blend into the surrounding tissues. The coats of the stomach, in such cases, present a bluish-white appearance; if the changes are extensive, they possess a brownish or blackish color, due to the action of the gastric juice upon the extravasated blood. When perforation takes place, an effusion occurs into the peritoneal cavity or into the chest; the edges of this perforation are ragged, thin and, according to Hunter, "very much resemble that kind of solution which fleshy parts undergo when self-digested in the living stomach, or when acted upon by caustic alkali."

Dr. Hunter, in first describing this appearance, expressed his conviction that the changes noted are the result of self-digestion of the stomach after death, due to the action of the gastric juice on the coats of the stomach, which, he claimed, had been prevented during life by the influence of the vital principle. This statement attracted general

attention and led to careful and many-sided investigations, followed by a pretty general acceptance of the views advanced. Several authorities still hold that pathological conditions exist in which the changes noted by Hunter occur during life; the majority of medical men, however, presume that the changes, comprised under the term "softening of the walls of the stomach," are nearly always post-mortem changes. The following facts speak strongly in favor of the latter view:

a. The changes described have been found in persons apparently in perfect health, in whom not one symptom existed during life to indicate a lesion of the stomach. *b.* The forms of softening of the stomach described as ante-mortem—such as occur in diseases of very small children, affecting the brain and the gastro-intestinal tract—have been found after death, while during life the symptoms which are considered characteristic of softening of the stomach prior to death had not been observed at all. *c.* It is known that the gastric follicles, for a considerable period after death, give rise to a substance having the properties of gastric juice, and acting like it upon the entire mucous membrane, its reaction being decidedly acid; this fact would explain why softening may occur when the stomach is empty. *d.* Elsasser has demonstrated that milk and the amylaceous bodies after death continue to ferment, and may produce softening of both the stomach and intestines. *e.* The absence, in the living, of symptoms which would occur if there were going on during life the profound structural changes which terminate in ante-mortem softening of the walls. Among these symptoms vomiting of blood would almost unavoidably hold a prominent place.

In connection with these propositions, and explanatory of the fact that in many cases seemingly favorable to the development of ante-mortem softening, the stomach appears normal after death, or, at least, gives no evidence of softening, we must bear in mind that the acidity of the gastric juice is, undoubtedly, often neutralized by the alkaline reaction of blood in the abdomen. The difference in the structure of the stomach in different individuals must also be borne in mind. If soft and tender, it is of necessity acted upon with far greater effect than when tough and cartilaginous. The stomach of a healthy young child, for instance, under favorable circumstances, could not long resist the action of the agents pointed out, while large amounts of gastric juice could make but little impression upon tissues hardened by the existence of a scirrhus or cancerous affection.

Whenever softening of the stomach occurs before death, a morbid condition of the organ usually exists which results either in a very free secretion of gastric juice, or which gives rise to fermentative changes in the food; milk and amylaceous foods readily undergo such changes. Fenwick, in speaking on this point, mentions the fact that in animals who died from the cattle plague, he found the mucous membrane of the

stomach very soft. His admission, however, that there was present evidence of gastritis greatly lessens the force of his observation. Again he states that in certain disorders, as in cancer of the uterus, the mucous membrane of the stomach is usually found very soft without presenting the appearance of cadaveric changes, a condition which he attributes to imperfect nutrition.

Softening of the stomach is of interest only as a purely pathological question, and has no clinical bearing.

BRIEF REMARKS ON DISEASES AND ABNORMAL CONDITIONS OF THE STOMACH WHICH ARE OF UNFREQUENT OCCURRENCE.

Contraction of the Stomach.—This condition may be general or confined to some one portion of the gland. In the former, it is always the result of prolonged abstinence from food, and occurs in cases of slow starvation, usually depending upon such diseases of the œsophagus or of the cardiac orifice of the stomach as prevent the introduction of food into the stomach; in exceptional cases, very long-continued or excessive vomiting produces the same result. No structural changes occur, and the stomach can usually be distended by artificial means. Contractions which are limited to some one part of the stomach depend upon the drawing together of the orifices of the stomach, or upon contraction of structures as the result of cicatrization; in cancer or ulcer of the stomach this condition is of frequent occurrence. If the contraction occurs at the pyloric orifice, it results in hypertrophy of the muscular structure and subsequent dilatation of the stomach.

Atrophy of the Stomach, if limited to a portion of the gland, is not of uncommon occurrence, and does not necessarily interfere with the proper discharge of the physiological functions of the organ. According to Fenwick, this 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 by examination after death. The same author maintains that this condition is not of unfrequent occurrence in certain cases of cancer of the breast. He has examined the stomachs of a large number of such cases after death, finding in them a marked attenuation and diminution of weight of the mucous membrane and a remarkable deficiency of the amount of pepsin secreted. He explains upon this basis the fact that often persons die after an operation for cancer of the breast when there is but a trifling reappearance of the growth and no great amount of discharge or of bleeding. In the same manner he accounts also for the gradual loss of strength and of flesh so noticeable in these cases. The

same authority (Quain's *Dictionary of Medicine*) thus describes the anatomical characters of atrophy: "In atrophy of the stomach the mucous membrane usually escapes post-mortem digestion; it is thin, smooth, and firmly adherent to the subjacent coats. Microscopically, in the earlier stage of the disease, the solitary glands are enlarged and filled with cells and nuclei. The gastric tubes, and sometimes the subjacent muscular fibres, are displaced by these bodies, which are scattered everywhere through the membrane. The tubes adhere firmly to each other, but they still contain normal cells. Later in the disease the solitary glands appear empty in their centres, but surrounded by thick layers of nuclei; the tubes can no longer be traced throughout their whole extent, but can only be recognized as bulbs filled with fatty cells, or as lines of cells, whilst the whole tissue is obscured by fatty and granular matters. In the last stage the solitary glands have disappeared, and the tubes are replaced by fibres. In some cases observed by the writer, although the mucous membrane was very thin, it was so fatty that thirty-three per cent. was removed when digested in Ether. These anatomical changes seem to produce a concomitant decrease in functional power. Post-mortem digestion seldom occurs, even in the summer, and in one case in which the writer performed artificial digestion with the whole mucous membrane, only six-tenths of a grain of albumen was dissolved, and in two others the albumen was only softened. When a similar experiment was performed with the stomachs of persons who had died of other diseases, four grains of albumen was the average amount dissolved, the remainder being softened and translucent."

The *diagnosis* of this affection can be made only by exclusion of all other diseases that tend to produce anæmia.

Concretions and Foreign Bodies in the Stomach.—Concretions are composed of indigestible substances swallowed, and are found in the stomachs of idiots or lunatics, where they may be retained for a variable period; they produce a more or less violent degree of inflammation of the mucous membrane, possibly followed by peritonitis or perforation of the stomach. Paper, hair, cotton, and similar substances are frequently taken by such persons in surprisingly large amounts. A case is cited by Pollock, first reported by Holmes, of a young woman, aged eighteen years, who had suffered from a tumor in the epigastric region, and who frequently vomited after meals. After her death, "the stomach was opened and was found to contain a large, compact mass of hair and string, filling the organ in great part; a small portion was engaged in the pylorus. The hairs were long and black, and united to one another by the string and dry alimentary particles; the mass measured six inches in length, three-fourths of an inch in thickness, and two and a half inches in breadth. Another mass occupied the upper part of the duodenum and the commence-

ment of the jejunum. This portion of the intestine was considerably dilated; this mass contained fewer hairs and more oakum; it was fourteen inches long."

Bucknill relates a case of an insane epileptic, who died of peritonitis at the age of twenty-two years. "The stomach contained a perforation larger than a shilling, colored black, and with ulcerated borders, which were situated in the lesser curvature of the stomach. Upon opening the stomach, it was found to contain a mass weighing fourteen pounds, and composed entirely of cocoa fibres and pieces of twine. The mucous membrane was healthy except at the ulcerated spot."

The list of foreign substances occasionally swallowed embraces a large variety. Knives or forks, broken glass, and similar strange bodies are introduced into the stomach by persons mentally irresponsible, or as a result of accident. Heymann reports a case in which "a child slept with its mouth open, and a mouse suddenly entered it; the mouse was swallowed, and eventually expelled from the bowels." Pieces of coin, nails, needles, and other sharp substances are not unfrequently swallowed, and in some cases remain there for a remarkably long period of time, eventually producing fatal results unless they are expelled through the bowels. The nature of the articles introduced is frequently astounding. John Marshall reports a case in which "the stomach of a woman in middle life contained in its lower part nine ounces of needles of a reddish-black color, but not rusted, all of them bent or broken, and very sharp. The duodenum contained a mass of needles united into a sort of very solid bundle; they were of different sizes, like those in the stomach, and entirely obliterated the intestinal canal. They weighed a pound in all."

Sonnié-Moret relates the case of a woman in whose stomach were found "eleven packages of nails, bound together, and some pieces of brass from a pair of suspenders (160 grammes). These objects had a black color; the brass had been partially dissolved, and the ends of the brass were thin and very sharp; the iron was more deeply attacked; its surfaces presented ridges and notches, and some of the nails had become converted, so to speak, into threads. The inner surface of the stomach was pale red, with a few scattered spots of a deeper red; the greater cul-de-sac had a brownish tinge, and there were some spots of the same color near the pylorus. The external surface presented, upon the hypertrophied pyloric portion, some rust spots, the largest of which was found along the lesser curvature, about two inches from the pylorus, and was half an inch long and three inches wide. On this spot the muscular coat was softened as far as the mucous membrane, but the latter presented no change."

Poland saw an autopsy upon a young idiot whose stomach contained two pounds and eight ounces weight of foreign bodies, and who

died from a perforation of the anterior wall of the duodenum. The stomach and intestines contained a mass of spoon handles (31) five inches long, four half-handles, nine nails, half an iron heel, a screw, and four pebbles.

Perforation of the Stomach occurs as the result of simple or cancerous ulceration; the contents of the stomach escape into the peritoneal cavity suddenly and in large amounts, or slowly, from a perforation usually minute, setting up a peritonitis which in the former case is violent and rapidly tends to a fatal termination, while in the latter it is of a lower grade of intensity, and not unfrequently results in circumscribed inflammation, with subsequent formation of an abscess. The accident would occur oftener in the course of cancerous ulceration did not adhesive inflammation of the peritoneal covering of the stomach tend to the establishment of adhesion of the stomach, pancreas, and liver, and thus act as a safeguard against the occurrence of this accident. Dr. Graves cites a case of perforation caused by an abscess of the liver, which communicated simultaneously with the pericardium. Not unfrequently perforation is due to the presence of foreign bodies in the interior, such as knives, forks, wires, needles, etc., and, rarely, to some accident resulting in perforation from without.

The symptoms of perforation are exceedingly violent, and generally resemble closely those of sudden and violent peritonitis. A sudden and severe pain in the abdomen—not necessarily at the stomach—is quickly followed by retching and vomiting; the patient lies absolutely quiet, with the legs drawn up, and refuses to make the slightest effort or motion, refraining even from speaking, and attempting to suppress breathing; the countenance is pale, and expresses intense suffering; the pulse is quick, small, compressible; tongue dry; thirst usually intense; the abdomen is excessively tender to the slightest pressure; the patient dies in collapse or, after a brief temporary improvement of the symptoms, from peritonitis.

Abscess in the Walls of the Stomach is of very rare occurrence. The walls of the stomach may be the seat of cancerous inflammation, resulting in the formation of pus, which finds its way through the mucous membrane; fibroid thickening of the walls may lead to the same result; still more rarely, the submucous tissue becomes the seat of general suppuration, practically being a gastritis. Death generally results from pyæmia. The symptoms characteristic of this condition are not well defined, although Dr. Brinton gives a somewhat exhaustive description, bearing close resemblance to the symptoms of a violent gastritis, accompanied with a tympanitis which differs from that of general peritonitis by being limited to the epigastrium. The disease, in the course of a few days, progresses to a fatal termination, preceded by a profound prostration and delirium.

Rupture of the Stomach is usually the result of an external in-

jury received, especially at a time when the stomach is distended by food. Ziemssen states that he has seen 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.

Albuminoid Disease of the Stomach, also described as *Waxy*, or *Lardaceous*, Disease of the Stomach, has been mentioned in connection with chronic gastric catarrh, in the course of which it occurs; it usually coexists with similar structural changes in the liver, spleen, or kidney. During life it cannot be recognized, owing to the absence of characteristic symptoms. Examination after death shows a pale and bloodless condition of the membrane, which gives a peculiar and well-known brownish-red reaction when treated with iodine; there is found a destruction of the epithelial cells, and their complete conversion into an irregular, homogeneous mass.

Tubercle of the Stomach is of very rare occurrence. Wilson Fox states that he never saw it commence in the mucous membrane, but that he has found perforation of the stomach from tubercles which commenced in the peritoneum, passing from without inwards, in accordance with the recognized tendency of tubercles seated anywhere on the peritoneal surface. Bignon reports a case of perforation of the stomach by a tubercular ulcer which commenced in the submucous tissue of the great curvature; the ulcerative process had invaded the gastro-epiploic artery, causing copious bleeding; the ulcer was surrounded by tubercles.

The rarity of this affection is amply shown from statistics. Willigk observed it only five times in 1317 cases. Barthez and Rilliet state that the seat of tubercle of the stomach is usually in the great curvature, and that it may be associated with extensive ulceration.

D. DISEASES OF THE INTESTINES.

ENTERALGIA.

BY A. C. COWPERTHWAIT, M.D., PH.D.

Definition.—A neuralgic affection of the intestines, which is characterized by paroxysms of intense, sharp pain, lacking the gripping and twisting nature of colic pain, from which it is often distinguished with much difficulty.

Etiology.—A nervous diathesis is the most important predisposing element, but, as in colic, we find that age and sex exert an important aetiological relation. The disease is most likely to occur during adult age, and especially in women, in whom it is often associated with ovarian and uterine disorders and hysterical conditions. In general,

it may be said that all those predisposing elements which tend to produce neuralgic conditions elsewhere, are equally potent here.

Enteralgia is strictly a visceral neuralgia, and the same character of constitutional causes are required to produce it, which are capable of producing any other form of neuralgia. Heredity is an important factor. The various dyscrasiæ, such as malaria and syphilis, are undoubtedly causative. Any condition of lowered vitality or a depressed state of the bodily functions, anæmia, neurasthenia, or the exhaustion of nerve force induced by sexual excess, and gouty rheumatic conditions, are predisposing causes. So also weakness, resulting from acute, or more especially from long-lasting, chronic diseases, by impairing the tone of the nervous system predisposes to enteralgia. Especially is this the case in those affections in which there is, or has been, a continued loss of the vital fluid, as in menorrhagia and other hæmorrhages, or when there has been excessive lactation or a prolonged lochial discharge, or a profuse leucorrhœa, or any wasting discharge. In short, anything tending to deteriorate the blood, and to depress the nervous system, may produce enteralgia.

Enteralgia is frequently of reflex origin, as when it occurs in connection with hysteria. Its occasional association with caries of the vertebræ and affections of the spinal cord also serves to establish its reflex origin. This may also be a factor in its connection with Bright's disease and other structural lesions, but it is more than probable that the contamination and alteration of the blood in these pathological states is sufficient to account for the tendency to neuralgic disturbance often found associated therewith.

Indigestion and constipation may excite an attack of enteralgia. The use of indigestible food, or conditions of the system which cause a partial failure of the digestive processes, or the presence of impacted fæces, or flatulence, may produce a neuralgic condition; but these cases partake largely of the character of an intestinal colic, and should be distinguished from enteralgia.

Lead Colic, also known as painter's colic, plumber's colic, colic of Poitou, and colica pictorum, is distinctly a neuralgic affection, and should be so considered. It is caused by the absorption of lead into the system, and occurs amongst painters, plumbers, white-lead makers, and lead-paint manufacturers, type-founders, compositors, and others who work in an atmosphere which is loaded with particles of lead. In a comparatively rare number of cases lead colic is caused by ingesting food or drink containing lead, or by using medicinal preparations of lead.

Speaking of the manner of the introduction of lead into the system, Dr. Flint says* that it may take place through the lungs, the stomach,

* Vide A Treatise on the Principles and Practice of Medicine, by Austin Flint, M.D., page 478.

the mucous membrane in other parts, and the skin. Certain occupations involve the inhalation of lead. Persons employed in the manufacture of lead-paints are not exposed, and, of those who suffer from lead-poisoning, the largest proportion are of this occupation. Next to this class, painters are most exposed. More or less exposure, by inhalation, belongs to a great number of occupations, such as paper-staining, grinding of colors, glazing cards, manufacturing earthen pottery, plumbing, shot-making, etc. Lead poisoning has frequently occurred from sleeping in newly painted rooms. Lead may be introduced into the stomach through various articles of food or drink. The colic of Poitou was due to wine, and that of Devonshire to cider adulterated with lead in order to give it sweetness. This kind of adulteration has been practiced since the occurrence of the affection in the places just named, and it is perhaps yet resorted to. Liquid and solid articles of diet, especially if they contain a free acid, become impregnated with lead by being in leaden vessels, or earthen vessels glazed with lead. Some years ago, a large number of persons within a limited district in Ohio were affected with a disease which, for some time, was regarded as a novel epidemic, and received the name of dry cholera. It was found to have the diagnostic character of lead colic, and was traced to the common use of a cheap kind of earthenware made in that vicinity, into the glazing of which lead entered. Prof. Fenner, in the *Southern Medical Reports*, vol. i., describes an epidemic colic which he observed in New Orleans, and which he traced to lead contained in soda water; and Prof. Doremus, some years ago, demonstrated the presence of lead in considerable quantity in the soda water drawn from fountains in New York City. Water distributed in lead pipes is not unfrequently the vehicle of its introduction into the system. Lead sometimes enters into the substances, used in coloring confectionery, condiments, and other articles, in sufficient quantity to give rise to poisonous effects. Articles inclosed in lead-foil may become contaminated. Authentic instances of poisoning by the use of tobacco thus inclosed have been reported. The habit of chewing shot and pieces of the lining of tea boxes has been known to give rise to various manifestations of lead-poisoning, lasting for four years before the cause of disease was discovered. During the spring of 1866, two hundred and thirteen cases of lead-poisoning occurred in the Walkill Valley, Orange County, New York. After considerable research, it was ascertained that lead was contained in the flour and meal used in that part of the country. The source of lead was found to be the stones used for grinding the flour and meal. The stones were old, constantly needing repair, large cavities frequently occurring, which were filled with common lead instead of cement. The attrition of the grinding detached minute particles of lead, which, becoming mixed with the flour and meal, was transformed into the carbonate by the processes

of fermentation and baking. These are only a few of the divers modes in which lead finds its way into the alimentary canal. Its use as a remedy has given rise to colic and other morbid affections. It may be introduced through the skin, although, doubtless, with difficulty. Prof. Lewis Rogers, of Louisville, says that he has known the characteristic paralysis, called wrist-drop, fairly attributable to the long-continued application to the face and hands of a cosmetic containing lead; and Prof. Sayre has reported a case in which this manifestation of lead-poisoning followed the use of the article known as Bloom of Youth. Finally, instances of lead-poisoning by means of collyria and vaginal injections have been reported. Some persons are especially susceptible to lead-poisoning, owing to an idiosyncrasy. Persons who have once suffered from it are liable to future attacks.

Pathology.—The impairment of the vital fluid promotes enteralgia; this is especially the case when the intestinal tract becomes deficient in tone, and the peripheral extremities of the nerves become morbidly sensitive, so that slight causes produce pain, the presence of an offending substance in the bowels, or a distension by an accumulation of gas, being a sufficient causation. We have also mentioned the relations probably existing between various morbid states which induce structural lesion, and the neuralgia so apt to be associated with them. The blood in these cases becomes poisoned through the influence of the organic disease, and the cerebro-spinal and organic centres are secondarily affected.

When enteralgia results from malaria, and other similar blood-states, the nerve centres become secondarily influenced and transmit this influence to the affected part. When we come to a study of the anatomopathological changes induced by enteralgia, we are made painfully aware of our lack of reliable information upon this subject, and of the great difficulty of discovering the essential nature of the disease. It is comparatively easy to understand how a hyperæmia may produce irritation and reflex phenomena, and that this condition is most likely to exist at the origin of the nerve rather than along its course. It is, however, true that the nerves themselves are sometimes involved in this hyperæmic state, even to the extent of inflammation, enlargement, and softening or induration, the neurilemma being the part mostly affected. This fact has led some pathologists to hold that a slight neuritis is at the bottom of all neuralgias—a proposition not to be disproved by merely negative testimony. But when we consider that in a large majority of cases the most careful investigations have failed to discover any changes whatever, we must conclude with Anstie that the various pathological conditions found in connection with neuralgic states, have been simply accidental, and are rarely to be regarded as the effect or cause of the disease. At all events, Dr. Erb

is correct in the statement that the pathogeny of neuralgia is still extremely obscure, and for the most part rests on hypothesis.

Symptomatology.—Romberg describes enteralgia as follows: "There are attacks of pain spreading from the navel over the abdomen, alternating with intervals of ease. The pain is tearing, cutting, pressing, most frequently twisting, pinching, introduced and accompanied by peculiar bearing-down pains. The patient is restless, and seeks relief in changing his position and in compressing the abdomen; his hands, feet, and cheeks are cold; his features are pinched, the wrinkled brows and contracted lips betray his agony. The pulse is small and hard. The skin of the abdomen is tense, whether puffed up or drawn inward. There are often nausea, vomiting, and desire for stool. Sometimes there is also tenesmus. There is usually constipation, but sometimes the bowels are regular, or even too loose. Such an attack may last from a few minutes to several hours, relaxing at intervals. It ceases suddenly as if cut off short, and there is a feeling of the greatest relief. The course is periodical, but less regularly so than in other neuralgias."

When enteralgia occurs in connection with other diseases, it may only be considered as a symptom, and its characteristics are modified according to the nature of the affection which has produced it. So does the duration of the disease vary, according to the nature of its fundamental cause, from a few minutes to several hours, or days, sometimes ceasing with a single paroxysm, and again continuing with more or less regular intervals for an indefinite period.

In lead-colic the symptoms are usually developed gradually, being preceded by, or coincident with, symptoms of lead-poisoning. The patient is anæmic, the skin looks dirty and earthy, the gums are dark, the teeth discolored, the breath fetid, and the patient complains of a sweetish, metallic taste in the mouth. The discoloration of the gums is an important indication, and occurs in a large majority of cases. It appears on the gums at their junction with the teeth, and is of a blue or slate-gray color. It not only occurs before the attack, but usually remains during the continuance, and even after the cessation of the disease. The pain is at first slight, and extends from the epigastric or the umbilical region around to the back and extremities. This gradually increases, and, though at first dull, often becomes acute and lancinating in its character, the patient uttering loud groans and cries, and assuming various unnatural and often absurd positions. The abdomen becomes retracted, hard, and resisting, from tonic contraction of the abdominal muscles; the pulse becomes slow, the voice hoarse, the skin cool; nausea, vomiting and hiccough are not uncommon; strangury may occur; the mind is anxious and depressed. There is almost always obstinate constipation, with stools consisting of small, hard lumps or round balls. In exceptional cases the abdo-

men is tympanitic, and pressure causes an intense aggravation, but usually the retraction, which is considered pathognomonic, is present, and hard pressure temporarily relieves the suffering, though light pressure may aggravate it. Often there is found a coexisting paralysis of the exterior muscles of the forearm, known as "wrist-drop." The course of the disease presents a remittent type, the paroxysms giving way to more or less lengthy intervals of comparative ease, the patient being at times entirely free from pain; usually, the pain does not entirely disappear. The duration of the attacks varies, sometimes lasting only a few hours, never to recur, while in others relapses at irregular intervals are prone to occur, and may continue for an indefinite period.

Diagnosis.—The symptoms of enteralgia are so characteristic that it is not usually difficult to distinguish it from other affections. It may be confounded with intestinal colic, but if we bear in mind the causes, and take into consideration the constitutional, predisposing elements which may be present, an error should not often be made. Many authors make no distinction between enteralgia and intestinal colic, and since the treatment is in most cases essentially the same, a mistake in the diagnosis might not be a serious matter. It is safe to say that the causes of enteralgia are usually of centric origin, while those of colic are more likely to be local or peripheral. The pains are more darting than those of colic, and partake less of the griping or twisting character.

Enteralgia is easily distinguished from enteritis and other inflammatory affections by the absence of the local and general signs of inflammation. The pulse remains unaltered, the skin cool, the tongue moist, there is no thirst, the bowels are constipated, the abdomen, if distended by flatulence, is not sensitive, and pressure may even perceptibly relieve the suffering; the pain moves about from place to place, while in inflammation it is stationary.—When the attack is due to lead-poisoning, the symptoms are remarkably pronounced and can not be mistaken.

Prognosis.—The prognosis is always favorable, and even the most inveterate cases of lead colic do not prove fatal. When a patient dies, presumably from enteralgia, it will be found that this condition was only secondary to some structural disease which had been overlooked during life.

Treatment.—The preventive treatment of enteralgia consists in applying such measures as would tend to remove the predisposition of the system to neuralgic affections. The use of nourishing food, together with proper exercise and an abundance of sunlight, the proscription of all excesses, especially sexual, and the adoption of the usual methods for the restoration of the tone and vigor of the system, are essential. In cases of lead-colic the continued exposure to the

poison must be avoided, even if the patient be compelled to suspend his occupation. If the source of the poisoning be obscure, it should be sought for until found and removed. Persons obliged to work in an atmosphere charged with lead may do much to ward off lead-poisoning by having the apartments well ventilated, bathing the body frequently, and carefully cleaning the mouth and teeth. Such persons should employ a diet of fruit and vegetables, with oatmeal and Graham flour, in order to keep the bowels in a healthy condition without the aid of purgatives. Drinking largely of milk or, it is asserted by others, the use of Sulphuric acid acts as a prophylactic and antidote in lead-colic. A drachm of dilute Sulphuric acid in a quart of sweetened water may be taken in the course of twenty-four hours. A nourishing diet is of the utmost importance, and animal fats are especially desirable.

Persons suffering with enteralgia should be well protected from cold and atmospheric changes by dressing warmly, wearing flannel next the skin, throughout the year. Rest is of the utmost importance, and should be strictly enforced as an essential condition of a permanent cure.

Therapeutics.—Nux vomica.—Enteralgia arising from indigestion or from over-eating; in persons of sedentary habits, or in those who dissipate; hypochondriacal mood; over-sensitive; great dread of and incapacity for literary work; irresistible sleepiness during the day, especially after meals, but wakefulness at night; pains periodical after breakfast, or after meals; relief from bending double; constipation; characteristic headache.

Colocynth.—Enteralgia from cold, or from excessive use of fruit. Pains occur in paroxysms; contractive, twisting, griping, cutting pains, mostly about the umbilicus; has to bend double, being worse in any other position; better by pressing some hard substance against the abdomen; great restlessness, and loud screaming on changing position; relief from coffee and smoking tobacco, and from the passage of flatus; other food and drink aggravates.

Discorea.—Constant dull, heavy, or cutting, griping, twisting pains in the abdomen, which do not intermit, and are relieved by stretching the body out or by walking about, being aggravated by rest. The pains in the abdomen suddenly shift and appear in distant localities, as in the fingers and toes; hyperæsthesia of the abdominal nerves. Stools dark-colored, bilious, very offensive; constant, ineffectual desire to go to stool.

Arsenicum.—Due to malarial influences, or some constitutional cachexia, or organic disease; also in cases coming on suddenly from drinking ice-water or eating ice-cream. Violent, periodical burning or cutting pains, with intolerable anguish and restlessness; great weakness and prostration, the strength suddenly sinking. Pains usually worse at night, after eating and drinking, and better from warm applications; nausea, vomiting, and dark-colored, watery, offensive diarrhoea; sometimes constipation.

Belladonna.—Sensation as if a spot in the abdomen were seized with the nails, a griping, clutching, clawing pain; violent, cutting pressure in abdomen, now here, now there; the pain comes on and disappears suddenly; tenderness to slight pressure, but relieved by hard pressure across the abdomen; worse after 3 P.M., and after midnight; tendency to cerebral congestion; thirst, but drinks little, as drinking aggravates.

Chamomilla.—Peripheral neuralgia; griping, tearing pain in region of navel, and lower down on both sides, with pain in small of back as if broken; flatulence; the abdomen is distended like a drum; flatus passes in small quantities, without relief; better from warm applications; sensation as if the bowels were drawn up in a

ball, and as if the whole abdomen were empty; pains appear at night or in the morning after eating, or from anger.

Alumina.—Lead colic. Spasmodic pains in hypochondria and stomach, with dyspnoea, or passing down in the groins, like hernia.

Cinchona.—Enteralgia from malaria, from sexual exhaustion, loss of vital fluids, or from the passage of gall-stones. Pain in hepatic region as from subcutaneous ulceration, worse from touch; violent, pinching pain, relieved by bending double, returning every afternoon or at night; tympanitic distension of the abdomen.

Coffea.—Excessive pains as if the abdomen would burst, driving to desperation; great nervousness; suffocative fits; convulsions.

Caprum.—Violent intermittent, cutting, drawing pains; cramps in the abdomen; abdomen drawn in and sore to the touch; spasmodic movements of the abdominal muscles; restless tossing about and great uneasiness, with piercing screams; aggravated by drinking cold water.

Opium.—Lead colic. Violent griping and cutting in the abdomen; pressive pain as if the intestines would be cut to pieces; abdomen hard and distended; constipation from inactivity of the bowels, and from spasmodic retention in the small intestines; retention of urine.

Platina.—Lead colic. Pressing, bearing-down pain in abdomen, extending into the pelvis; the patient screams, and tries to relieve the pain by turning in all possible positions.

Plumbum.—Excruciating pains in umbilical region, shooting to other portions of the abdomen and body, somewhat relieved by pressure; abdomen retracted to the spine, as if drawn in by a string; recti muscles hard and knotty; better from rubbing or hard pressure; obstinate constipation.

Consult *Aconite, Asa f., Cocculus, Colch., Ignatia, Iris vers., Lycop., Merc., Phos., Puls., Rhus tox., Sepia, Stannum, Verat. alb., Zinc.*

Of the auxiliary measures, warm bathing is the most important. A hot mustard foot-bath sometimes is of considerable service.

Hot fomentations and a copious enema of warm or hot water frequently give immediate relief.

In cases where the pain is violent, and relief is not obtained from the remedies given, Chloroform may be administered internally, and also applied externally, either alone or combined with Laudanum. If this still fails to relieve, recourse should be had to the hypodermic use of Morphia.

ENTERITIS.

BY A. C. COWPERTHWAIT, M.D., PH.D.

The term Enteritis is, by custom, limited to the designation of a catarrhal or croupous inflammation of the mucous membrane of the small intestines; yet, it technically covers all forms of inflammation of the bowels, including that which affects only the serous and muscular coats as well as that which involves the entire thickness of the intestine. Inflammation of the duodenum and of the cæcum and its appendix are so liable to occur as separate affections that they are not usually included in the term enteritis, and will be separately considered. That form of inflammation which affects the serous and muscular coats of the intestines, rarely occurs idiopathically, but usually as an extension of a peritoneal inflammation, or, less often,

the muscular coat and its connective tissue become involved in the inflammation originating primarily in the mucous membrane. It offers no special pathological features nor diagnostic peculiarities other than those belonging to the primary lesion with which it is associated. It is rarely recognized during life, nor does post-mortem examination usually reveal its existence.

Varieties and Ætiology.—Inflammation of the mucous surface of the intestines rarely occurs after infancy, though it may be met with in persons of all ages. This could not be said were we to assume that all cases of diarrhœa were not to be distinguished from true catarrhal inflammation, as functional diarrhœa may be said to occur with comparative frequency in all ages, though infants are more prone to intestinal disorders, especially inflammation and diarrhœa, than are adults. Catarrhal inflammation is ordinarily due to some direct irritation of the mucous lining by food or other materials, such as alcoholic liquors, acid poisons, and drastic purgatives, or to the effect of a cold; it is also frequently associated with various exanthemata, and with dentition. It arises also from reflex disturbance due to causes not readily discovered. Another variety of catarrhal inflammation of the intestines occurs only during infancy, and is called *enteritis folliculosa*, or *entero-colitis*. It is chiefly a summer malady, attaining its maximum prevalence and mortality in July and August, when the temperature is at its highest. It is not, however, the heat alone which produces the disease, for it thrives best in large cities, on newly made ground, and in low and swampy localities. In the country, on high ground, it is scarcely known. Hence it is supposed that noxious inhalations from various sources, mostly from vegetable and animal decomposition, which arise as a consequence of the heat, combine with the latter and form the exciting cause.

Errors of diet are essential causes of enterocolitis. Bottle-fed infants rarely escape its effects, and even nursing infants who are allowed to have improper articles of food more or less regularly are inclined to the disease. It also frequently follows weaning. In my own experience, infants who are nursed at the breast and properly cared for rarely have this disease, or, if they have it, the attack is usually mild and easily controlled. Teething children are especially liable to this disease, but it is a question whether, or not, dentition is in itself an exciting cause, it being usually presumed that the diarrhœa, occurring during that period, is entirely non-inflammatory. My own experience leads me to believe that dentition is a distinct cause of enteritis folliculosa, though, of course, more liable to produce it when assisted by the other causes before mentioned. Enterocolitis may also be produced by exposure to cold, especially during sudden changes of temperature in summer.

Croupous inflammation occurs mostly during adult life, and rarely

in childhood or after forty-five. It is most likely to occur in nervous, hysterical, or hypochondriacal persons, especially women. It is supposed to be caused by the same agencies that may cause catarrhal inflammations, especially those which produce direct irritation of the mucous membrane. Such, however, can only act as exciting causes, for in true croupous inflammation a favorable condition of the system must exist for its propagation. True diphtheritic enteritis may occur by extension of the diphtheritic process downwards, and then constitutes a specific disease, due to specific causes. Membranous formations may also occur in the early days of dysentery, but they are quite distinct from the non-contagious croupous inflammation of the intestines. That form of enteritis which involves the entire structure of the bowels, and for which there is no distinguishing term, is rarely a primary disease, and is most often met as associated with strangulated hernia and intussusception, resulting mainly from distinct mechanical causes, interfering with the intestinal circulation or producing direct injury to the coats of the bowels, as by the presence of impacted feces or the passage of gall-stones. It may also result from an extension of peritoneal inflammation.

Pathology.—In the milder forms of catarrhal inflammation we find only the ordinary evidence of catarrh as it occurs in other mucous membranes, being a slight redness and tumefaction, with more or less mucous coating. This may proceed in intensity to complete congestion, the membrane becoming softened and thickened, the process involving, not unfrequently, the submucous tissue. The secretions are abundant, ropy or watery in appearance, and often very irritating, and are sometimes mixed with blood. Superficial erosions or slight ulcerations are not uncommonly observed. In the croupous variety there is a greater intensity of the inflammatory process, and a membranous or diphtheritic deposit is found over the surface, mostly of the ileum and colon, being of a white or grayish-white color, and firmly adherent. It consists of corpuscular elements, granules, free nuclei and small, shrivelled, irregular, and rather granular cells, cemented together by a coagulable exudation, and prolonged for the most part by rootlets from its under surface into the Lieberkühnian follicles. Chemically, these masses are said to have the same reaction as mucus, as might be inferred from the results of the microscopical analysis. The pathological anatomy of enteritis folliculosa is nowhere so graphically described as by Vogel in his masterly description of that disease.

“The submucous tissue is found markedly infiltrated, so that the bowel has perceptibly increased in weight, and the signs of an acute intestinal catarrh are present upon the entire mucous membrane of the large, and upon an extensive tract of the small, intestines, *i. e.*, instead of the normal cylindrical epithelium, none but mucous corpuscles are seen. The solitary glands and Peyer’s patches are in some

parts intensely swollen, and at the first glance are seen to project, like white nodules, above the level of the mucous membrane; in other parts, however, they are already ruptured, and then represent empty, minute, crater-like excavations. These excavations occur upon the summits of the elevations originally produced by the swelling of the follicles. The mesentery is injected and turgid, the chylopoetic vessels are plethoric and of a pink color, the mesenteric glands in those regions corresponding to the intestinal catarrh are increased in size from two to four fold; in recent cases, when cut into, the incised surface presents a rose color, but when of longer duration a yellowish-white color. The microscopic elements are the same as in normal mesenteric glands, but when the color is yellowish, and the gland is increased in hardness, the connective tissue will be found to predominate. Here, too, as in simple intestinal catarrh, notwithstanding the long existence of the diarrhoea, remarkably little pigmentation of the mucous membrane is found. The essential anatomo-pathological difference between intestinal catarrh and enteritis folliculosa consists in the circumstance that in the latter the mesenteric glands participate in the disease. It is much to be regretted that neither by injection nor any other manner can it be experimentally proven that the absorption of the chyle is hindered by these hypertrophied mesenteric glands, and thereby the nutrition and progressive development of the child interfered with. But when in an atrophied child whose condition was originally introduced by enteritis folliculosa no changes but those indurated and hypertrophied mesenteric glands are found, the supposition becomes very probable that the passage of the chyle has been mechanically interrupted, and thus the children, although they have consumed an enormous quantity of food, and have had no diarrhoea for weeks preceding death, have, nevertheless, languished to a certain extent for want of a sufficient supply of chyle. The term *tabes mesenterica* of the older physicians is, therefore, by no means so incorrectly founded and obsolete as some of the later writers are inclined to represent. The older erred only in this, that they thought they *could feel the enlarged glands*. In this glandular hypertrophy the intestines always become tympanitic and distended, and then it is altogether impossible to feel these small tumors, which scarcely ever attain to the size of a hazel-nut, between or beneath the tense bowels. At any rate, they must be forcibly compressed against the vertebral column, if it is desired to feel them. In instances of *developed tuberculosis of the mesenteric glands*, as it sometimes occurs in children several years old, the firm, hard, solitary tubercles may indeed be felt through the abdominal walls. But these are larger glands agglomerated into patches or masses, and traversed by deposits of cheesy tubercle. Such slight enlargement as is observed in enteritis folliculosa can never be detected during life by the sense of touch."

If the entire structure of the intestine is involved, we find the affected part, which is usually in the small intestine, much dilated, while the external or serous covering presents a dark purplish appearance, dotted here and there with patches of superficial congestions or extravasations, more or less covered with an exudation of lymph. The mucous and submucous tissues present a similar, though more intensified, condition, the color being often nearly black, and the tissues soft and swollen, emitting an offensive, gangrenous odor. Frequently the mucous surface will present instead a pale appearance, the lymph-exudation being more or less mixed with pus, but having the same offensive odor. The intestine below the inflammation is found contracted and empty, save a little sanguineous exudation, while above it is usually dilated and full of fecal matter, with more or less of the sanguineous exudation. More or less ulceration may follow these forms of inflammation. Especially is this the case after chronic catarrhal inflammation. The dark red and swollen mucous membrane softens and is destroyed by suppuration in its tissue; the result is a loss of substance which exposes the submucous or muscular tissue. If the ulcer heal at this stage, the loss of substance is filled with granulations, and a firm cicatrix remains which almost always constricts the intestine. In other cases the muscular and serous coats are always destroyed and the intestine perforated, while the destruction proceeds from within outward; a partial peritonitis may occur, and cause a union with neighboring portions of intestine, thus preventing the escape of the contents of the bowels into the abdomen (Niemeyer). Follicular ulceration may follow ulceration. It is destructive in its character, and occurs almost exclusively in the large intestines.

Rokitansky states that at first the follicles are greatly swollen and surrounded by a dark-red, vascular ring; subsequently they ulcerate from within, and the pus breaks through; there is a small follicular abscess, which has red, spongy walls, and a small ulcerated, firmly-fringed opening. While the ulceration gradually destroys the whole follicle, the hyperæmia of the adjacent mucous membrane gradually disappears; the ulcer is then about the size of a lentil seed, round or oval. The ulceration soon extends to the surrounding mucous membrane; the round form of the ulcer is lost; large, irregular ulcerations occur, or, for a considerable distance of the intestine, some islands and irregular projections of the membrane are preserved, while elsewhere the submucous or the muscular tissue is exposed. In the intestines we usually find a grayish-red, half-fluid floccular substance, mixed with undigested ingesta.

Bristowe* says that the changes which take place in chronic enteritis consist generally in slight condensation and hardening of the mucous

* Reynolds's System of Medicine, vol. iii., p. 162.

tissue, more or less distinct congestion, or black pigmentary deposit in the villi and interfollicular spaces, some degree of atrophy of the Lieberkühnian follicles, and granular or fatty degeneration of their epithelial contents, together with an analogous condition, more or less pronounced, of the epithelium of the mucous surface generally. The solitary and agminated glands are sometimes atrophied, sometimes larger and more obvious than natural. The changes indeed are chiefly changes of degeneration, and in that sense, as probably also clinically, are related to the lardaceous degeneration which occasionally happens in persons laboring under chronic tuberculosis, or bone-disease attended with suppuration and secondary syphilis. Lardaceous degeneration occurs later in the bowel, and then in the liver, spleen, and kidneys; it is found chiefly in the lower part of the ileum and the large intestine; it affects, in the first instance, the small arteries and capillaries around, and in the solitary and agminated glands, which bodies become swollen, and then gradually tends to involve the whole thickness of the intestinal wall, the muscular fibres and other tissues becoming finally infiltrated. The bowel thus becomes thickened, and at the same time harder than natural, and often, in the later stages, erosion of the affected glands occurs, leading in Peyer's patches to a reticulated condition of surface. The above chronic affections of the mucous membrane are generally associated with diseased conditions of other organs, to which indeed they are secondary, and not unfrequently the stomach at the same time is the seat of some chronic morbid process. The presence of these complications, and the fact that, clinically, ulceration of the bowels, together with tubercular and other morbid processes, passes in a large number of cases for chronic inflammation, render it difficult to isolate the clinical phenomena due especially to the bowel affections now under consideration. They doubtless vary greatly, but may be briefly summarized as containing in various proportions both relatively and positively imperfect digestion of the alimentary matters received into the intestines, excessive secretion of more or less watery mucus, increased peristaltic movements with griping pains, looseness of bowels, with discharge of watery or yeasty, or otherwise unhealthy and offensive, evacuations, and innutrition from the imperfect absorption of food.

Symptomatology.—Catarrhal inflammation is usually characterized by pain and tenderness over the abdomen, which is especially aggravated by hard pressure, also diarrhoea, and sometimes nausea and vomiting. The pains are mostly colicky and griping in their character, and occur chiefly in the umbilical region. Diarrhoea is not always, but usually, present, is accompanied by great rumbling, and is aggravated by taking food or drink; the stools are more or less frequent, being at first feculent, but soon assuming a watery, gelatinous character, and becoming very irritating. Tenesmus is not present,

unless the lower part of the large intestine is involved in the inflammatory process. There is usually considerable febrile disturbance, though this may not seem in proportion to the severity of the attack. The patient complains of headache, languor, aching in the limbs, more or less chilliness, with increased pulse, these symptoms showing the usual peculiarities of an ordinary catarrhal fever. The tongue is generally dry and furred, the breath offensive, and the appetite impaired.

If the disease be confined to the rectum, as is sometimes the case, there is a constant desire to go to stool, the passages are mucous, or consist of bloody mucus without any fæces, but there are none of the characteristic pains in the abdomen which are present when the ileum and colon are involved.

The symptoms of croupous inflammation may differ only in degree and gravity from those of the catarrhal variety, or may assume an entirely different form, and cannot be said to preserve any characteristic identity. The patient presents no appearance of fever, but seems depressed in both body and mind. He first complains of soreness in the abdomen, which is more or less distended, and there is obstinate constipation. Severe colicky pains, especially about the navel, occur in repeated paroxysms for several hours, and finally subside leaving the abdomen sore and very sensitive to pressure, the absence of fever only distinguishing it from the first stages of peritonitis.

Diarrhœic stools may now occur, containing considerable mucus, and accompanied by much tenesmus. This lasts for a day or two, when the tenesmus becomes very violent, and after great straining shreds of membrane are discharged, and sometimes cylindrical casts of the bowel. This is followed by great relief, and the patient feels well, save the extraordinary debility, emaciation, and great weariness and languor. Usually these attacks are repeated from a few days to several weeks apart, and may continue until the patient finally dies from exhaustion. Sometimes long intervals of comparative health may occur, and then the attacks return with renewed violence. At other times the paroxysms are less acute, and continue at more or less regular intervals for months and, sometimes, years. The patient usually suffers during the intervals with all the symptoms of disturbed digestion and defective nutrition. The head aches almost continually, the mind is impaired and much depressed, and in women the sexual system is deranged and subject to various diseases, hysteria being nearly always present. Such may be the course of croupous enteritis, subject to many variations which it would be useless to enumerate.

In *enteritis folliculosa* the symptoms are at first those of catarrhal inflammation. The stools are especially foul and irritating in their character, and have a greenish color; the fever is more intense; vomiting is very free; the tongue is red and smooth, or covered with a

white fur, and an apthous condition of the tongue and buccal cavity usually exists. The child emaciates rapidly, and becomes very flabby and relaxed; the fat and muscles disappear and the skin becomes wrinkled, giving the child a remarkably aged appearance.

The inguinal glands become enlarged, the eyes sunken, the abdomen tympanitic, and the child dies from exhaustion or from the super-vention of cerebral complications, as convulsions or coma. Both the catarrhal and croupous varieties of enteritis usually run a brief course, convalescence being declared in a week or ten days. Sometimes, however, they lead to persistent modifications of the mucous membrane, and there is present chronic intestinal catarrh or chronic enteritis. Here the symptoms frequently differ little from those of acute enteritis, save that they are both milder and more persistent. Often no other symptom than a chronic diarrhoea is present, the stools being liquid, pale, fermented, and very offensive or lenteric, varying much in number and quantity. In many cases uneasy, griping sensations and gurgling are experienced from time to time, or there may be some degree of soreness over the abdomen. Gastric symptoms are generally present, and the tongue often presents an abnormal character. Owing to interference with digestion and nutrition, more or less atrophy is usually present, and a slight pyrexia, especially toward evening, is often observed. Sometimes chronic inflammation is not accompanied by diarrhoea, and the patients are constipated. In such cases the patient generally suffers more from disturbance of other organs. The abdomen becomes distended with flatus which, having no outlet, presses upon the diaphragm, impairs respiration, and by compression of the arteries causes congestion of other organs, more especially of the brain, giving rise to nervous and mental disturbance, the patient being morose, irritable, and inclined to think and talk only of himself and his sufferings. Chronic enteritis may become associated with ulcerations or amyloid or lardaceous degeneration.

In inflammation of the entire thickness of the bowel the symptoms are essentially distinct from those already described. They may creep on slowly and insidiously, or be manifested suddenly and with great intensity. The pain is severe, and is greatly aggravated on pressure and by motion, and is associated with colic, tormina, obstinate constipation, nausea and vomiting, intense thirst, furred tongue, marked febrile disturbance, and a distressed, anxious expression of countenance.

After a time the abdomen becomes tympanitic, while the painful sensations subside in a measure, even to complete cessation. The constipation and vomiting continue, the latter gradually becomes stercoraceous, hiccough sets in, the tongue becomes pointed, the body cool and clammy, the pulse feeble and irregular, and the patient dies from asthenia.

Diagnosis.—Acute enteritis is chiefly distinguished from simple diarrhoea, dysentery, typhoid fever, peritonitis, gastritis, typhlitis, and colic. Diagnosis from simple diarrhoea is often difficult, though not really essential. Many cases of simple diarrhoea result from a slight enteritis, and it is often impossible to separate them. In dysentery, the presence of the characteristic tenesmus and bloody mucous stools, together with an absence of the colic-pains about the umbilicus, are sufficient to establish a correct diagnosis. Typhoid fever may be excluded by the absence of its characteristic features of slow and regular development, associated with adynamic conditions, while the severe umbilical pains of enteritis are not a feature of typhoid fever. Enteritis simulates peritonitis more than any other affection, but in the latter the pains are more intense, and the tenderness and tympanitis greater. The abdominal muscles are rigid in peritonitis, which is not the case in enteritis, and there is present more profound constitutional disturbance. In cases of severe localized enteritis, involving the whole bowel, it is not easy to make a diagnosis, in fact in such cases the peritoneum is usually involved along with the other intestinal coats, and this is more evident if the pain and tenderness are marked, superficial, and extensive.

Gastritis may be suspected when nausea and vomiting are the prominent features, and when the tongue presents the characteristic red, irritated appearance of gastritis, especially at the tip and margins. Sometimes both diseases exist at the same time, especially as the result of poisoning by irritant substances. In typhlitis the symptoms are more localized in the right iliac fossa. Colic is recognized by the characteristic pain, the absence of fever and other constitutional disturbances, and the presence of constipation rather than diarrhoea.

Prognosis.—Ordinary catarrhal enteritis seldom results fatally, except when occurring in connection with other diseases or in persons of a feeble constitution. Copious inflammation is more apt to result unfavorably, though even here a fatal result is rather the exception. Persons once having had croupous enteritis are liable to a renewal of the attack after a few weeks or months, or even years.

Follicular enteritis often proves fatal, but under careful homœopathic treatment we are usually able to offer a favorable prognosis. Inflammation involving the entire thickness of the bowel, whether uncomplicated, as here considered, or connected with strangulated hernia, intussusception, or some other grave lesion, is a rapidly fatal disease, usually producing a fatal termination inside of a week, and sometimes within one or two days.

Treatment.—Inflammation of the serous and muscular coats of the intestines, and that form of inflammation which involves the entire structure of the bowel, so rarely occur primarily that their pro-

phylaxis is best considered in connection with those diseases with which they are usually associated.

Catarrhal and croupous inflammation occurring in the adult may only be avoided by attention to those hygienic measures which serve to impart tone and vigor to the general system, and which regulate the functions of digestion. Wholesome diet, exercise, bathing, and regularity in habit, if persevered in, will do much to overcome any existing predisposition to these affections.

It is in the enteritis of childhood, especially in that form described as enteritis folliculosa or entero-colitis, that preventive measures are most important. These consist chiefly in attention to diet, dress, and habitation. The child should be kept at the breast, unless it is evident that, from any cause, the mother's milk has become unhealthy, when a wet nurse should be procured, or, failing in this, the artificial diet should be made to correspond as nearly with the human milk as is possible. Cream diluted with two parts of water, and sweetened with sugar of milk, is an excellent and easily obtained substitute. Fresh milk, diluted with barley water, or with a solution of gelatine, is used by many. It is of the utmost importance that the milk be pure and sweet, and that the bottle from which it is fed, or the vessels which contain it, are kept scrupulously clean and sweet. Sometimes milk in any form will aggravate the disease, when recourse may be had to boiled flour, Graham meal, or oatmeal, largely diluted with water, or, sometimes, Horlick's or other prepared foods may answer a still better purpose. In my own practice I have had the best results from the use of flour browned in the oven, and prepared in water previously sweetened with sugar of milk. In case the child has been recently weaned, it is best to return it at once to the breast.

The dress should be such as to protect from atmospheric changes. Except in the hottest weather, flannel should be worn next to the skin. In summer this may consist of a light silk flannel, or of soft cotton and wool flannel. In removing this garment during the hot weather, great care should be exercised, and it should be returned on the first indication of a cool or damp change.

Sometimes the disease may arise from atmospheric influences other than those from which dress may afford protection. The noxious gases which arise from animal or vegetable decomposition in the summer months often, especially in cities, give rise to intestinal inflammation, and it is desirable, when a possible thing, to remove to a more salubrious locality, any high open country in the immediate vicinity answering the purpose, probably, fully as well as a seaside or mountain resort requiring a long and tedious journey to reach it. Those not able to make such a temporary change of residence should keep their child much in the open air, taking it daily to some public common or park, and permitting it to ride and play during most of

the day, not, however, forgetting the necessity of protecting it from the sun during the heat of the day, and allowing it to have its accustomed midday sleep.

The more extended remarks on the subject of prophylaxis and hygiene in the article on cholera infantum apply equally well here, and to them the reader is referred.

In older children a judicious diet of milk, eggs, meat, and vegetables is desirable, avoiding all starch, fatty and saccharine articles of food.

Aconite is frequently the remedy in the first stage of any intestinal inflammation, especially when resulting from cold. There is a rapid pulse, considerable heat, intense thirst, and great restlessness. There may be a swollen, hot, and tender abdomen, and stools resembling chopped herbs.

Aethusa is especially useful in children when there is a great intolerance of milk, which is forcibly ejected as soon as swallowed; vomiting of curdled milk and cheesy matter; dozing after the vomiting spells; abdomen swollen and tense; stools bright yellow, or greenish, watery; pulse small but very rapid; linea nasalis; convulsions with clenching of the thumbs, turning downwards of the eyes, and foam at the mouth.

Apis mel. is indicated when, in children, the inflammation has been protracted until anæmia and nervous exhaustion have reached such a degree as to terminate in hydrocephaloid. The patient may have greenish-yellow stools mixed with mucus, or they may be thin and watery; abdomen sore and distended; urine scanty; no appetite or thirst; sopor, interrupted by piercing shrieks; squinting, grinding teeth, boring head into the pillow.

Arsenicum is useful in severe attacks, or in the last stages of any form of enteritis. Abdomen distended and painful; stools acrid, black, dark colored, green, bloody, or watery; painless, offensive, involuntary; burning pains in stomach and abdomen; pulse quick, weak, and irregular; great thirst, but drinks little at a time; great restlessness and anxiety; weakness and prostration; face hippocratic, pale, covered with cold sweat. All symptoms worse after midnight.

Belladonna.—Sudden attacks, or sudden aggravation of an existing attack. Abdomen distended and very sensitive to touch; tenderness aggravated by the slightest jar or motion; stools of green mucus, or containing lumps like chalk; temperature much increased, face red, pulse accelerated, delirium; startings and twitchings during sleep.

Bryonia.—Aggravated by the return of every spell of hot weather, or when hot weather seems to develop the attack. Abdomen distended, sensitive, and sore; offensive, bilious, acrid stools, or constipation with stools large, hard, and dry as if burnt; tongue thickly coated white; great thirst for large quantities of water; lips dry and parched; pains worse on motion.

Calcarea ostrearum.—Especially useful in chronic varieties; fair plump children; during dentition, open fontanelles; in scrofulous persons of a leuco-phlegmatic temperament. Abdomen hard and very much distended; stools undigested, white, clay-colored, sour; patient emaciated, flabby, skin dry and shrivelled; head sweats when sleeping.

Calcarea phos.—Chronic varieties, during dentition or in old people. Delayed closure or reopening of fontanelles. Offensive stools; aching soreness and pain around the navel, relieved by passing flatus; pain in abdomen, heartburn and other gastric symptoms after eating.

Carbo veg.—Last stages. Especially old people and children; venous system predominant. Vital forces nearly exhausted, cold surface, especially below knees to feet; lies as if dead; breath cool; pulse intermittent, thready; cold sweat on limbs; voice hoarse or lost.

Cinchona.—Abdomen distended and tympanitic; flatulent, painless, debilitating diarrhoea, watery or containing portions of ingesta; aggravation from eating, especially fruit; attack may have originated from eating fruit. Malarious origin; worse every other day; great debility and prostration.

Helleborus.—Abdomen distended; gurgling as if the bowels were full of water; stool consisting solely of clear, tenacious, colorless mucus; weakness; features

sunken, face cold, pale, covered with clammy sweat; pulse thready; head hot, heavy; boring head in the pillows; hydrocephaloid.

Mercurius.—Abdomen hard, distended, and painful; bruised feeling in intestines; violent colic, with cutting and stinging pains, as if caused by knives, worse from even touching anything cold; stools slimy and bloody, or dark green, with much straining; worse at night; sweat without relief.

Mercurius corr.—In advanced stages of any variety, with phagedenic tendency. Abdomen distended and very painful to the least touch; violent burning, especially in rectum and anus; stools frequent, nothing but mucus tinged with blood; corrosive ichor oozes from the anus and excoriates the parts; very distressing tenesmus and burning; lies on back with knees flexed; pulse small, intermittent, irregular; surface cold and covered with a clammy perspiration.

Nux vomica.—In children where some marked error in diet has caused indigestion; also in older persons when the attack is the result of long-continued errors in diet, sedentary life, and constipation; bruised, sore pain in intestines; frequent and ineffectual desire for stool; vomiting; bad taste in the mouth; tongue coated thick white. After the use of cathartics and patent medicines.

Phosphorus.—Abdomen tympanitic, very painful to touch; painless, watery discharges, especially in the morning after getting up; in children the watery stools contain little lumps of undigested casein, that look like tallow; in debilitated, consumptive patients; in lying-in women; great emaciation, weakness and prostration.

Podophyllum.—One of our best remedies in entero-colitis. Stools changeable in character, worse in the morning; profuse, gushing, painless, fetid; green, sour; yellow; undigested; slimy; clay-colored or like chalk; vomiting of green frothy mucus or of food; during dentition; moaning during sleep, with half-closed eyes, and rolling the head from side to side (incipient hydrocephaloid).

Sulphur.—In scrofulous or delicate people or children. When there are repeated relapses, or when the case seems to linger, and remedies do not act. Abdomen distended, tense, and sensitive to touch; stools watery, green, or yellowish, often streaked with blood; very excoriating; worse in the morning; prolapsus ani; itching, burning, sweating in the anus; milk disagrees and causes much distress.

Veratrum alb.—Attacks coming on suddenly during the hot season, with choleraic symptoms; severe cases in the last stage; violent forcible vomiting; worse from the least motion, or after drinking, with cold sweat, especially on the forehead. Pulse almost imperceptible. Prostration with cold sweat and cold breath. Stools copious, watery, greenish, mixed with flakes. Excessive thirst for cold water.

Consult also: Antimonium crud., Argentum nit., Baptisia, Benzoic acid, Bismuthum, Chamomilla, Camphora, Colocynthis, Croton tig., Dulcamara, Ferrum, Graphites, Hepar, Ipecacuanha, Iris, Kreasotum, Magnesium carb., Rheum, Oenothera biennis, Phosphoric acid.

DUODENITIS.

BY A. C. COWPERTHWAIT, M.D., PH.D.

Definition.—Inflammation of the mucous membrane of the duodenum; duodenal catarrh.

Ætiology.—It is usually considered that an inflammation of the duodenum most often arises from the extension of a gastric inflammation induced by indiscretion in eating, the indigestible food passing from the stomach into the duodenum in an unchanged condition.

On the other hand, duodenitis may arise from an extension upward of an inflammation of the lower portion of the small intestine. It may also occur independent of either gastritis or enteritis, and under

such circumstances usually results from climatic changes, malarial influences, or from some severe and prolonged external irritation which produces hyperæmia, and, finally, inflammation, in a similar and equally mysterious manner, as a severe burn on the skin produces a sloughing ulcer at the upper part of the duodenum within a few days after the burn occurs.

Pathology.—The duodenal mucous membrane becomes red and greatly swollen and cedematous, especially about the orifice of the common bile-duct, which empties into that part of the canal and whose orifice is thus occluded, this giving rise, as is usually supposed, to the catarrhal jaundice which is so characteristic of this affection, though Dr. Flint considers it more probable that this jaundice results from an extension of the inflammation into the duct.

Symptomatology.—When duodenitis occurs as an extension of a gastric inflammation, it is preceded for days or, possibly, weeks, by symptoms of gastric catarrh, pain and disorder of digestion, nausea and vomiting. Symptoms somewhat similar often accompany duodenal inflammation, even though there be no gastritis. Obscure pain felt in the right hypochondriac and umbilical regions, uneasiness and distress occurring about three hours after food has been taken, and tenderness below the epigastrium over the site of the duodenum, are characteristic features of the disease. Occasional attacks of hepatalgia may occur, the paroxysms of pain being quite severe, but with no increase of the local tenderness. About the third day, or from that to the seventh, the conjunctiva begins to turn yellow, the tongue is coated, the breath fetid, there is considerable headache, more or less stupor, and great depression of spirits. The yellowness increases, and continues to extend until the icterus becomes universal, when we have presented, to a greater or less extent, the symptoms usually accompanying jaundice. While this icteric condition is considered characteristic of duodenal catarrh, and a diagnostic feature, yet it may occasionally be absent, and in such cases the true nature of the disease is often not accurately determined, sometimes not even suspected. After two or three weeks the local symptoms subside, the icterus gradually disappears, and the patient is well, save the great debility which remains and which is usually quite out of proportion to the severity of the disease. Sometimes the acute merges into a chronic form, and becomes associated with various forms of hepatic derangement, which are indefinite in their course and termination. Occasionally a case is less severe from the beginning, but more protracted in its course, often lasting several months. Such is the chronic variety, which presents no features distinctive from the acute.

Diagnosis.—Duodenitis need not be confounded with gastritis if we bear in mind the local pain and soreness, the fact that food does not cause distress until three hours after eating, and the icterus occur-

ring within a few days. In hepatic colic the pains come on suddenly and with extreme severity, producing a cold surface, weak pulse, and incessant vomiting, and then, after a time, cease as suddenly as they came, leaving the patient entirely relieved.

The presence of gall-stone also confirms the diagnosis. In hepatalgia there is no local soreness, and the neuralgic pain ceases after a time, leaving no constitutional symptoms.

Prognosis.—The prognosis in uncomplicated duodenitis is always favorable.

Treatment.—In the treatment of duodenitis the diet is of great importance. An exclusive milk diet is highly recommended and well worthy of trial. Dr. Bartholow says that “the diet should be restricted to those substances convertible into peptones in the stomach, as milk, whey, buttermilk, eggs, animal broths, and all saccharine, starchy, and fatty constituents should be avoided. Fresh meats, game, poultry, and fish, without butter or fat, are admissible if the stomach is equal to their digestion. The most rapid progress can be made by adhering to an exclusive diet of milk, and, as there is complete anorexia, this is usually not difficult.” The patient should remain quiet in bed. Hot poultices or fomentations, or the ice-bag, may be applied externally.

Podophyllum.—I have found this the most important remedy. Fulness, with pain and soreness in the right hypochondria; diarrhoea, stools constantly changing in appearance, green, yellow, clay-colored, like chalk, or watery; worse in the morning; affection of the biliary ducts and tendency to jaundice.

Mercurius is the remedy next in importance. Region of duodenum swollen and sensitive, with cutting pains as from knives; tongue swollen and thickly coated white; stools green, or of green mucus; icterus. All symptoms aggravated by cold. Attacks caused by exposure to cold.

Chelidonium.—Abdomen hard and distended; hepatic region sensitive to touch; griping, cutting, or stitching pains; stools thin, bright yellow; urine dark yellow; tongue thickly coated yellow; bitter taste; complete icterus; pain in or beneath the right shoulder-blade.

Arsenicum.—Chronic form, especially when occurring as an extension of gastritis or enteritis. Also in later stages of severe acute attacks. Intense burning pains about the region of the duodenum; obstinate vomiting; stools black, green, dark-colored, watery, offensive; great restlessness and prostration.

Kali bichr. is supposed to have a specific action on the duodenum. Abdomen distended; stitches extending through to the spinal column; vomiting; stools of brown, frothy water; tongue coated thick, whitish yellow.

Consult also: *Aconite*, *Belladonna*, *Cinchona*, *Nux vomica*, *Phosphorus*, *Sulphur*.

CONSTIPATION.

BY A. C. COWPERTHWAITTE, M.D., PH.D.

Definition.—By constipation we understand a retarded and insufficient evacuation from the bowels of hard dry fæces.

Ætiology.—Constipation may be caused by a mechanical obstruction in some part of the intestinal tract, directly interfering with the

passage of the fæces. This is sometimes termed obstipation, and will be separately considered. Constipation may be due to a great variety of causes, chief of which are errors in diet and the habitual neglect of the act of defecation, from carelessness, want of time, or undue modesty. If the former, the use of a large amount of indigestible food, which forms dry fæces, and the excessive use of coffee, are important factors. Constipation will also result from the habitual use of opium and from lead poisoning. Sedentary habits favor constipation, especially when accompanied by an irregular and injudicious diet. It may be brought about by any of the causes which produce weakness of the muscular fibres of the intestines—anæmia, chlorosis, and other enfeebling diseases, chronic enteric catarrh, the habitual use of purgatives, or, more often, dilatation of the bowels from habitual neglect, thus resulting in deficient peristaltic action. Constipation may also result from an abnormal loss of fluids by perspiration, diuresis, or excessive lactation, rendering the fæces preternaturally dry; from an inactive state of the rectum; from ovarian or uterine derangements, which partially account for the special predisposition to constipation in the female sex; from hepatic derangements; from various chronic affections, especially those connected with the nervous system. Constipation also frequently accompanies acute febrile diseases, such as typhoid or scarlet fever, but under such circumstances should always be considered as a favorable symptom, and not be interfered with by the use of purgative medicine.

Pathology.—Constipation, in the sense in which it is usually considered, may not always constitute an abnormal condition. Ordinarily, a person should have one free evacuation each day to be in good health, yet this is not an invariable rule, as many persons who enjoy good health have two or three evacuations daily, or, on the other hand, only defecate once in every few days. In fact, instances are not as rare as may be supposed of persons who habitually go from four to six weeks without an evacuation. A case of this kind has been under my observation more or less for the last twelve years. A single man, of spare habit, now about fifty years of age, a stone-mason by occupation, whose habits of life have, with the exception of the use of tobacco, been very simple and regular, and whose health has always been unusually good since his youth, has not had evacuations from the bowels oftener than once in six weeks, and when occurring oftener than this, they have caused him more or less discomfort. This is quite an unusual case from the fact that the prolonged retention of fæces appears to be entirely habitual, and does not appear to affect his health. It is quite apparent that what constitutes an abnormal retention of fæces in one person, may not be so in another. The most important pathological changes which characterize constipation are those which naturally result from the irritating presence of the retained hard and dry fæces, redness and

congestion of the mucous membrane being the first, and sometimes the only, symptom produced. This congestion may, however, go on to inflammation, ulceration, and even perforation of the bowel, which is first greatly dilated and hypertrophied. Such instances are perhaps rare, the most common result being a retardation of blood in the hæmorrhoidal veins, giving rise to hæmorrhoidal tumors. Dr. Bristowe records* two fatal cases which give an excellent illustration of the conditions resulting from long-continued constipation. The first case was that of a little girl, eight years old, whom he saw casually only during life, and of whose history he obtained, after her death, some not very perfect details. She had long suffered from tendency to constipation, and it was stated that she had occasionally gone as long as three weeks without an evacuation. At the time of her admission into the hospital, there had been no relief of the bowels for some weeks. She was then pale and thin, had a large, tense belly, without pain or tenderness, a clean tongue, and poor appetite. She had a "strumous" look, and was supposed to be suffering from abdominal tubercle. She became gradually more and more emaciated and anxious-looking, while the belly grew larger and more tense. She never had any distinct abdominal tenderness, but suffered at times from colicky pains, and often (especially toward the close of life) complained that she was so full she felt as though she would burst. During the last week, or two, the tongue became somewhat foul, and she had frequent vomiting, but never of stercoraceous matter. She passed only little urine, which was high-colored. She sank gradually from exhaustion, and died exactly three weeks after admission. At the post-mortem examination, the form of the distended intestine was distinctly impressed on the tense and thin abdominal walls, and on opening the abdomen the enormously enlarged colon was first alone visible. The distension began at the cæcum, and extended to within two inches of the anus, where it ceased abruptly. In the greater part of its extent the bowel measured from nine to ten and a half inches in circumference, the greater amount of distension being manifested in the sigmoid flexure. The muscular walls were hypertrophied from the ascending colon to the lower end of the sigmoid flexure; and, in the latter situation, where the hypertrophy was greatest, they measured one-eighth inch in thickness. The mucous membrane seemed healthy in the greater part of its extent, but it presented some congestion here and there, and at distant intervals large patches in which there were groups of small circular shallow ulcers. The bowel contained no flatus, but was completely full of thick, semi-solid, olive-green colored fæces. These were more solid in the rectum than elsewhere, and immediately above the anus formed an indurated conical lump. The small intestines were

* Reynolds, vol. iii., page 168.

also considerably distended, though much less so than the larger bowel, and were filled throughout with semi-fluid olive-green colored contents. The stomach was small and healthy, and empty. There was no other disease. There can be no doubt that death was caused from simple constipation neglected, that the indurated faecal lumps above the anal orifice had formed a plug which the bowel was unable to expel, and which the accumulation of more and more faeces above and around it had served only to fix more firmly. That the bowel had striven to expel its contents was shown by the hypertrophied condition of its muscular coat. The second case, above mentioned, was that of a young man aged twenty-four, who also had been the subject of habitual constipation; and who, on one occasion, after the persistence of constipation for an unusually long period, was attacked with diarrhoea which lasted about six weeks and was followed by sudden peritonitis, of which he died. There was found after death inflammation of the peritoneum, due to a perforation in the transverse colon, great dilatation and thickening, yet almost complete emptiness, of the whole length of the large intestine, and just the same kind of ulceration of the mucous membrane in patches as that described above.

It was in one of these patches that perforation had taken place. Here, as in the former case, it is obvious that long-continued constipation had caused permanent thickening and dilatation of the large intestine, and ulceration of the mucous surface; but here, additionally, after the relief of the constipation, the ulceration had provoked and maintained a condition of diarrhoea, and ultimately caused perforation.

Symptoms.—In addition to the symptoms of retained faeces, constipation may give rise to a long train of subjective phenomena so varied in character that they can hardly be compassed in this article. Local uneasiness, pressure or weight in the perinæum, a sense of abdominal distension, flatulence and colicky pains, together with dullness of the intellect, headache, languor, palpitation, furred tongue, bad breath, loss of appetite, with general dyspeptic symptoms, and the usual phenomena attendant upon a too prolonged retention of the faeces, while severe straining at stool may cause cerebral hæmorrhage and hernial protrusions. Sometimes the difficult defecation is accompanied by much pain, and leaves behind more or less aching, burning, and soreness in the anus, from the passage of the hard mass of faeces, which not unfrequently so irritates the mucous membrane as to produce dysenteric symptoms. The general effects upon the system are sometimes well marked. The nervous system becomes depressed and irritable, and anæmia and emaciation may result from the disturbance of the nutrition.

Diagnosis.—The diagnosis of constipation rarely presents any

difficulty. If the accumulation of retained *fæces* is very large, it may simulate an abdominal tumor, or by its irregular character may lead to suspicion of the existence of a cancerous mass. It should be borne in mind, however, that the enlargement, if due to *fæcal* accumulation, will correspond in form and position to the shape of the *cæcum*, or to some part of the colon, and will usually have a slight doughy feel, yielding to pressure, and retaining its altered shape after the pressure is removed. In such instances resort should be had to the thorough use of enemas before a positive opinion is given.

Prognosis.—When constipation is not due to incurable diseases or to mechanical obstructions which cannot be removed, or has not progressed to a point where ulceration is extensive and perforation threatening, a favorable prognosis may always be given. Much of the result of treatment, however, will depend upon success in controlling the habits of the patient, and upon enforcing proper dietetic regulations, without which, in most cases, little can be accomplished.

Treatment.—It is comparatively seldom that constipation occurs primarily, except from errors in diet and irregular habits, such as have been enumerated. In such cases it is only necessary to enforce such rules of diet and living as are best adapted to the individual. Prompt obedience to the calls of nature and a judicious system of diet are usually sufficient to prevent the occurrence of constipation. Too much importance cannot be attached to the habit of regularly and systematically attending to the calls of nature. Daily, at some convenient hour, perhaps soon after a meal, at which time there is a natural tendency to peristaltic movements, the patient should retire to the closet and at least solicit an evacuation, though not persist in fruitless efforts by violent straining. Plenty of time should be allowed, and no excuse be permitted to interfere with the performance of this important duty. At first, there may seem to be no beneficial result, but after a time, if the habit is persevered in, nature will respond. It is probable that without the strict observance of this rule no case of habitual constipation can be permanently cured. The necessities of nature, from press of business or from notions of false delicacy, are too often neglected, especially in the case of girls attending school, or in those who are employed as saleswomen, clerks, and seamstresses in large establishments where proper and convenient resorts are not provided.*

In the matter of diet the use of oatmeal and cracked wheat, or bread

* A proposition has just been made by a physician in New York to the effect that a commissioner be appointed by the city, whose business it shall be to visit all places of business where help is employed, for the purpose of examining and regulating water-closet privileges, with legal authority to require every person employing help to provide and properly maintain such conveniences. No better move for promoting the public health could probably be inaugurated.

made from "graham" or bran flour, together with laxative fruits, such as apples, figs and prunes, are the most important. Often, the adoption of such a diet, with the free use of such vegetables as leave after digestion a bulky residuum—cabbage, lettuce, etc., is all that is required to overcome habitual constipation. A ripe apple or a glass of water taken in the morning before breakfast is very beneficial. Drinking a cup of hot water several times each day, often cures after other measures have failed.

It is often necessary to resort to enemas, which may be used at the same hour daily, in conjunction with the appropriate homœopathic remedy, until the action of the latter renders the enema unnecessary. It is no doubt true that the long-continued use of enemas tends to produce paresis of the rectum, or, at least, the rectum grows so accustomed to the fœcal distension that after a time it fails to excite the peristaltic action, and the enema becomes of comparatively little benefit. Physical exercise, such as walking, or riding horse-back, not carried to excess, is of much benefit, and friction over the bowels, made with a flesh-brush or crash towel, should be liberally practiced.

Therapeutics.—**Nux vomica** is especially indicated in persons who lead sedentary lives; who are irritable and hypochondriacal; who freely use coffee or liquors and purgative medicines, and are subject to hæmorrhoids; the feces are large and hard—frequent and ineffectual desire for stools; headache, especially in the morning; unrefreshing sleep; dyspepsia. The constipation of *Nux vomica* is due to an irregular or spasmodic action of the intestine, and not to inactivity.

Bryonia.—Stools large, hard and dry, as if burnt; passed with great difficulty; bitter taste in the mouth; tongue thickly coated white; pressure as from a stone after eating; disposition to headache, with irritability and anger of the patient.

Opium.—Inactivity of the bowels; stools composed of hard, round black balls; no inconvenience from the accumulation on account of the even sensibility in the parts; incarcerated hernia; lead-poisoning.

Alumina.—Inactivity of the rectum; even the expulsion of soft stool requires great straining; no desire for stool and no ability to pass it until there is a large accumulation; stools hard and knotty, like sheep-dung, with cutting in the anus, followed by blood; constipation in nursing children; from lead-poisoning.

Lycopodium.—Ineffectual urging, owing to contraction of the rectum, which protrudes during stool; small stool, with sensation as if much remained unpassed; large accumulation of gas in the bowels, with much rumbling; torpor of the bowels; in nursing children and in elderly people.

Plumbum.—Stools small, hard, in lumps or balls, like sheep-dung; colic; retracted abdomen; painful contraction of the anus; when Opium is indicated and has failed.

Sulphur.—Stools scanty, difficult and insufficient; hard as if burnt, ineffectual urging; itching and pressure in rectum during a stool; burning in anus after stool; habitual constipation, especially in persons subject to hæmorrhoids or in scrofulous persons.

Consult also *Æsculus hipp.*, *Ammon. muriat.*, *Calcarea ost.*, *Graphites*, *Hydrastis*, *Magnesia mur.*, *Nitric acid*, *Phosphorus*, *Platina*, *Silicea*, *Zincum*.

INTESTINAL HÆMORRHAGE.

BY A. C. COWPERTHWAIT, M.D., PH.D.

Synonym.—Melæna.

Ætiology.—Intestinal hæmorrhage often arises from some morbid condition which produces obstruction of the portal circulation, as in obstructive diseases of the liver, especially cirrhosis, and in chronic diseases of the heart and lungs. It may also arise from diseases and injuries which involve the walls of the vessels, as in ulceration; such are the hæmorrhages which occur during typhoid fever, dysentery and intestinal tuberculosis, or which result from mechanical or chemical injuries, and consequent degeneration, or after the use of violent purgatives, irritant poisons, the passage of hardened fæces and rough calculi. Hæmorrhage also occurs from the intestines, as from other mucous surfaces, as a result of certain morbid blood states, as in scorbutic affections, purpura, etc. Also in yellow-fever and malignant jaundice, though in these it may sometimes arise secondarily from the ulceration and degeneration of the intestinal mucous lining which may take place in these affections. It may occur as a vicarious discharge, taking the place of normal menstruation, just as vicarious hæmorrhages occur from other mucous surfaces.

It also accompanies hæmorrhoids, either from rupture of the greatly distended and thinned walls of the hæmorrhoidal veins or inflammation and erosion of the tumors. It occurs in intussusception of the bowels, from the venous congestion which results as a consequence of the mesentery being dragged into the sheath along with the invaginated part, and the vessels being thereby compressed; hæmorrhoids and intussusception being elsewhere considered, the hæmorrhage so occasioned will not be considered under this head.

The bursting of an aneurism, emptying its contents into the intestine, or the passage of blood from the stomach into the bowels, after hæmatemesis, also accounts for the occurrence of hæmorrhage from the bowels. Bamberger gives the following ætiological scale which shows the order of frequency of the occurrence of intestinal hæmorrhage: dysentery; typhus; cancer (of the large intestine); mechanical hæmorrhage; poisoning; foreign bodies; tuberculous, follicular, catarrhal ulcers and inflammations of the mucous membrane; the round duodenal ulcer; aneurisms; and, finally, vicarious hæmorrhages.

Leube* holds that gastric hæmorrhages occur more frequently in women, but that the reverse is the case in regard to hæmorrhages from the intestines.

Pathology.—In persons who have died from profuse intestinal hæmorrhage the body presents the signs of general loss of blood. On

* Ziemssen, vol. vii., page 448.

opening the abdominal cavity, the mesentery, in some instances, appears engorged with blood, especially in cases of congestive hæmorrhage, and the intestine, on section, is found to be intensely hyperæmic; at other times, however, the mucous membrane is very pale, in consequence of the copious hæmorrhage which has occurred during life. In still other cases the mucous membrane has a dark speckled appearance, which is produced partly by ecchymoses and partly by effused blood, which may be pressed out of the orifices of the follicles. The cavity of the intestines is filled with dark, blackish-brown, tarry clots of blood, although at times the blood is red and of a more fluid consistence. After removing these clots, it is generally possible to discover the cause of the hæmorrhage, either in the form of an eroded vessel lying in the base of an ulcer, an invagination, an embolism of the superior mesenteric artery, aneurism, cancer, etc., or in the form of an intense enteritis, an amyloid degeneration of the intestine, or diffused congestion in the ramifications of the portal vein. In cases of capillary hæmorrhage the explanation of the bleeding will not be found until inquiry is made into the pathologico-anatomical condition of the liver, heart, etc. (Leube.)

Symptomatology.—The symptoms produced by intestinal hæmorrhage vary according to the nature of the diseased condition which causes it. If considerable, we obtain the usual symptoms of intestinal bleeding,—deadly pale face, glassy eyes, cold skin, weak pulse, ringing in the ears, giddiness, glimmering before the eyes, and faintness. Sometimes consciousness is entirely lost, and the patient dies at once, without any escape of blood externally; usually, however, there is experienced a sudden and irresistible desire to evacuate the bowels, and there is had one or more discharges of fluid and clotted blood, or of a blackish, semi-fluid, tarry mixture. If the quantity is small and comes slowly from the upper part of the small intestines, it is usually more or less dark, being often quite black, and presenting a tarry, sooty aspect; occasionally it resembles coffee grounds. If originating from the same source, being at the same time copious and speedily expelled, it may be little altered, though it is usually of a very dark color. This change in the character of the discharge is due to the action of the acid contents of the intestines, transforming the hæmoglobin of the blood into hæmatin. When coming from the large intestines, especially near the anus, the blood is generally quite bright and unchanged. If the bleeding originates in the rectum, the discharges may take place before, with, or after, the passage of fæces, which may be covered with blood, but are not mixed with it. Should the blood continue to escape in only small quantities and slowly, it causes gradually increasing weakness and anæmia; but if the discharge is copious, and the attacks are repeated in quick succession, we get the evidences of collapsæ before mentioned. If the hæmorrhage is arrested, normal stools appear

in due time, and the patient slowly regains his health and strength. Relapses are quite common, and depend not only upon the habits and conduct of the patient during convalescence, but also, and largely, upon the ætiological conditions present.

Diagnosis.—It is of first importance to determine whether, or not, the discharge consists of blood, as the black, tar-like appearance of the stool may arise from the use of iron, or more often from the admixture of bile. This may easily be settled by a microscopic or spectroscopic examination for hæmatin; but a simpler and much more available plan is to throw the discharged mass into water; if containing blood, it will color the water red; if it only contains bile, the water is colored green or yellowish.

It must next be determined from what locality the hæmorrhage arises. The symptoms already given usually are sufficient to approximately locate the origin of the hæmorrhage. So also, if the character of the disease which causes the hæmorrhage is once ascertained, we can readily locate the point of discharge. For instance, if we discover that the bleeding is hæmorrhoidal, or occurs in typhoid fever, in dysentery, etc., we can at once, and positively, locate the source of the bleeding.

Prognosis.—Intestinal hæmorrhage, when not resulting from hæmorrhoids, may also be considered a grave symptom the full import of which can only be understood by a knowledge of the morbid state which is producing it. Mild hæmorrhages may often be not only harmless but apparently beneficial; they are at times followed by the relief of distressing symptoms, and often, in grave acute diseases, mark the critical period where convalescence begins. When, however, the hæmorrhage becomes profuse, whatever be the cause, it may well excite serious apprehensions. The patient may succumb at once, or the hæmorrhage, even if checked, may recur.

The prognosis properly depends upon the amount of blood lost and upon the nature of the morbid condition which forms the primary ætiological factor in the case.

Treatment.—Intestinal hæmorrhage then is but a symptom of the disease with which it is associated. While the treatment must be chiefly medicinal, the same general principles and methods are, to a considerable extent, required in its management upon which dependence is placed in managing other forms of hæmorrhage. Persons subject to bleeding from the bowels should scrupulously avoid violent exercise at all times, and during the attack, and for some time after, absolute quiet is indispensable. Sometimes, ice-bags applied to the abdomen are of great service. The continuous injection of hot water is one of the safest and most reliable auxiliary measures.

Drinking of alum whey has been highly recommended.

It is very seldom that the proper remedies fail to check the hæmorrhage, and the auxiliary measures so necessary in the ordinary treat-

ment of this symptom, are seldom required by the homœopathic physician.

Therapeutics.—*Ipecacuanha*.—Hæmorrhage of profuse, bright red blood; heavy, oppressed breathing; nausea and inclination to vomit.

Hamamelis.—Passive hæmorrhage of dark venous blood, sometimes in large quantities.

Erigeron.—Profuse flow of bright red blood; every movement increases the flow.

Cinchona.—Passive hæmorrhage after exhausting diseases; great debility; abdomen tympanitic; coldness and blueness of the skin; suitable to persons who have lost much blood, even in severe cases; heaviness of head, ringing in ears, vertigo, vanishing of senses, sopor, fainting fits, cold extremities, face pale and sunken.

Arsenicum.—Tedious, long-continued passive hæmorrhages, resulting from constitutional diseases, such as carcinoma, typhoid fever, purpura, etc.; great debility, and lancinating burning pains; great mental restlessness and anxiety; face pale, sunken, deathly, or having a yellow, cachectic look.

Carbo veg.—Passive venous hæmorrhage, after protracted and exhausting diseases; vital forces nearly exhausted; cold surface, especially below knees to feet; lies as if dead; breath cold; pulse intermittent, thready; cold sweat on limbs; especially in old people or children.

Sulphuric acid.—Hæmorrhage of black blood; extreme weakness and exhaustion; weak feeling in abdomen; profuse perspiration; especially in old people.

Consult *Aconite*, *Arnica*, *Crocus*, *Millefolium*, *Nitric acid*, *Phosphorus*, *Sulphur*, *Terebinthina*.

TYPHLITIS.

BY A. C. COWPERTHWAIT, M.D., PH.D.

Synonyms.—Typhlitis stercoralis, Typhlo-enteritis, Cæcitis.

Definition.—This affection consists in an inflammation of the walls of the cæcum and its appendix, the vermiform process. Perityphlitis signifies an inflammation of the connective tissues around the cæcum. The terms typhlitis and perityphlitis are often used indiscriminately, but they represent diseased processes in two distinct classes of tissues, though their relations are so intimate that it is necessary to consider them together. The cæcum is quite liable to any of the diseases which may attack the intestinal canal, but it is only the form of the disease here defined which presents any characteristic aspects or the nature of which is such as to require separate consideration. Ulceration and perforation are secondary only to this condition, and will also be considered under this head.

Ætiology.—This disease may not only be occasioned by the ordinary causes which produce intestinal catarrh, but, owing to its peculiar anatomical character and physiological relations, the cæcum is especially prone to harbor the nuclei of irritating products. Any foreign body, such as an intestinal or biliary calculus, or a grape-seed, cherry-pit, or shot, or a hardened fæcal mass, becoming gradually enlarged by the secretions or excretions which adhere to it, forms a body which eventually resembles fruit-stone, and which is all-suffi-

cient to excite inflammatory action, possibly followed by softening and perforation.

Pathology.—The pathological changes may be essentially the same as those found in catarrhal inflammation of other portions of the mucous membrane. If the inflammation is limited to this locality and results from the irritation of a foreign substance, the action is intense, and ends in ulceration and consequent perforation. If this should occur on the posterior wall of the cæcum, which is not covered by the peritoneum, the intestinal contents escape into the surrounding connective tissue, exciting inflammation, and resulting in the formation of a fæcal abscess. This abscess may point and discharge externally, or a fistulous communication with the intestine will be established, which either remains permanently open, or gradually closes and heals over.

Sometimes this condition of ulceration involves the entire cæcum and appendix, converting it into a disorganized mass, with perforation directly into the peritoneum, exciting a rapidly fatal peritonitis or a local peritonitis with limiting adhesions, or else perforates the peritoneum, resulting in abscess. In the latter case the purulent collection sometimes makes its way downwards under Poupart's ligament, along the sheath of the femoral vessels; at other times it descends into the pelvis, and perhaps opens into the rectum; or it points directly over the crest of the ilium, or backwards towards the lumbar region, or in other directions, though it is most apt to present itself as a lump immediately over the site of the cæcum. This abscess may, according to its course, burrow largely and cause extensive non-healing sinuses, or may discharge its contents at once, the orifice promptly healing over. Inflammation of the cæcum may occur without the presence of irritating products, and gradually assume a chronic form without ulcerative tendency. In such cases the inflammatory action may extend to the adjacent connective tissue (perityphlitis), which becomes thickened, and permanent stenosis results.

Symptomatology.—The symptoms of typhlitis are quite diverse in their character, no two cases being distinctly alike, yet probably all sufficiently typical for purposes of diagnosis. Sometimes a case is ushered in with great intensity and without premonitory symptoms, though, as a rule, the patient complains of more or less dyspeptic symptoms, has considerable colic, and is troubled with an alternate diarrhoea and constipation. The constipation soon becomes marked, and the accumulated fæces form a distinct tumor in the right iliac region, which is tender on pressure, and from which pains extend in the course of the ascending colon and down the right thigh. Gases begin to accumulate above the obstructed point, antiperistaltic movements are established, and vomiting sets in, which consists at first of the contents of the stomach, then of green bilious masses, and ulti-

mately of stercoraceous matter. In case a favorable issue is to be anticipated, the patient at this point has a copious and natural movement of faecal matter, the pains begin to subside, and the general condition of the patient rapidly improves. Sometimes, on the contrary, perforation takes place suddenly at this stage, and the patient passes rapidly into fatal collapse. Again, the symptoms of an immediately fatal collapse may not supervene. The local pain, tenderness, and swelling continue to increase, the inflammation from the serous covering of the cæcum and ascending colon extends to the peritoneum of the neighboring intestine and abdominal wall, and involves the connective tissue, uniting the ascending colon to the iliac fascia. The subsequent history is that of a peritonitis, or a perityphlitis is set up, as shown by local redness, a firm swelling, œdema of the skin, increase of pain and tenderness, with pains in the right thigh, or a feeling of numbness and weight, occurring in paroxysms. The psoas and iliacus muscles are infiltrated and cannot contract, so that the patient cannot raise his thigh. At the same time there are rigors and pyrexia, followed usually by the signs of the formation of an abscess, which may open in various directions, either externally or internally, sometimes thus exciting a peritonitis. In the last two types the dorsal decubitus and the sitting posture are characteristic, the body being turned toward the right side and somewhat flexed, in order to render the abdominal muscles less tense and to relax the psoas and iliacus. The symptoms may gradually improve, the secondary inflammations disappear, the exudations become absorbed, and the patient slowly recovers; or, more often, the inflammation of the peritoneum becomes more diffuse, the exudation is not absorbed, hectic symptoms appear, and the patient finally succumbs. When perityphlitis results in the formation of an abscess, the pus has a faecal odor and may be mixed with actual faeces or intestinal gas. It consists mostly of purulent masses mixed with degenerated connective tissue. If the abscess escape externally or into the ascending colon, the patient, if strong, may recover; but if the discharge takes place into the abdominal cavity, the resulting peritonitis soon causes death. If inflammation of the appendix occurs without implication of the cæcum, as is sometimes the case, the severe tenderness and pain do not exist in the cæcum, but lower down, in the neighborhood of Poupart's ligament. There is also pain in the groin, which extends down the course of the anterior crural nerve and through the hip. The patient keeps the thigh flexed continually, and every effort to straighten it is attended with excruciating pain. In these cases the external tumefaction does not appear, and intestinal movements are not interfered with, though they increase the patient's suffering, as does even the passage of flatus. Peritonitis is more likely to arise than in cases in which the cæcum alone is involved.

We have now only to briefly consider the symptoms accompanying ulceration of either the cæcum or appendix vermiformis, the latter being most often the seat of the perforating ulcer. The nature of these symptoms, however, is such that it is almost impossible to determine whether the one point or the other is involved; nor does this practically affect the management of the case or its termination. While ulceration and subsequent perforation are the chief causes of the peritoneal inflammation which accompanies typhlitis, yet, as has already been seen, peritonitis may occur from contiguity of tissue without ulceration and perforation having taken place; such cases, however, are exceptional. Ordinarily, a rapid and diffuse peritonitis indicates that ulceration has occurred and resulted in perforation.

Pain in the right iliac region is supposed to indicate ulceration of the appendix, but it is quite difficult to satisfactorily settle the presence of ulceration before the symptoms of peritonitis or perityphlitis are manifest, for even then threatening, apparently pointing to perforation, may occur in cases which ultimately result favorably. The tendency, however, is to ulceration and consequent perforation; and the symptoms which are characteristic of this accident, particularly those of collapse, rarely mislead.

The duration of typhlitis varies according to the severity of the case. Mild cases may result favorably in a few days; more severe cases run from two to three weeks, or terminate in peritonitis, following the usual course of that affection. If perforation takes place into the peritoneum, death usually results within a few days. If the case assumes a chronic condition, with or without peritonitis or formation of fæcal abscess, the duration is quite indefinite; it may cover a period of months or years, or come to a suddenly fatal termination at a comparatively early stage.

Diagnosis.—Typhlitis is most often distinguished from other affections of the bowels by the locality of the pain and the soreness and swelling which accompany it. We may find it difficult to differentiate between typhlitis and simple acute peritonitis, located in the right ileum, or we may mistake the perforation occurring in typhoid for that of cæcitis; in women, an inflamed cyst, or an extra-uterine pregnancy, or a cellulitis, may embarrass our diagnosis. Cancer at, or near, the cæcum might present symptoms pointing in the direction of typhlitis, but the presence of a nodulated tumor and the cancerous cachexia would usually establish the nature of the existing disease.

Prognosis.—Except in very mild cases, the prognosis is grave and must be guarded. Under proper treatment a majority of cases recover, but the final result in each individual case cannot be predicted with certainty. Dr. Flint says that in none of the cases falling under his

observation has perforation of the intestine taken place, and the termination has, in every instance, been favorable.*

Dr. Sands † has recorded the history of twenty cases of perityphlitis, nineteen of which occurred in private practice. Amongst these, resolution took place in seven; recovery after operation, eight; recovery after rupture of abscess into bladder, one; recovery after rupture of abscess into rectum, one; death after abscess had been opened, one; death after unsuccessful attempt to reach the abscess, one; death without operation (from secondary meningitis), one.

Niemeyer claims that typhlitis and its sequelæ do not often endanger life, but we must hesitate to assume too much assurance of safety, for at the best typhlitis involves grave and dangerous features which are only to be avoided or overcome by the most careful and judicious treatment.‡

Treatment.—Belladonna.—Great pain in the ileo-cæcal region; cannot bear the slightest touch, even of the bed-covers; swelling and redness externally; nausea and vomiting; lies quiet on the back, with limbs flexed; high fever with red face, hot skin, and full, strong pulse.

Bryonia.—Ileo-cæcal region very sore and sensitive to touch; cutting or stitching pains, especially on deep inspiration; worse from the slightest motion; after exudation has taken place; tongue white and dry; bowels constipated.

Hepar.—Ileo-cæcal region swollen, deep and hard, in a circumscribed lump; threatening suppuration.

Mercurius.—Painful, hard, hot and red swelling in the ileo-cæcal region, painful to the touch; face red, or pale and sickly; tongue red and dry, or white and flabby; alternations of chilliness and heat; constipation, or frequent slimy discharges with straining; sweat without relief.

Rhus tox.—Hard, painful swelling of nearly the entire right side of the abdomen; pain worse on sitting, or when stretching out the right leg; lies on the back, with right leg drawn up; great restlessness and uneasiness; constant desire to move, but cannot do so on account of the pain it produces.

Also consult Ammonium, Arsenic, Colchicum, Colocynthis, Ginseng, Graphites, Lachesis, Nitric acid, Nux vom., Opium, Phosphorus, Platina, Plumbum, Silicea, Sulphur, Zincum. If abscesses have formed: Hepar, Graphites, Lachesis, Mercurius, Silicea, Sulphur.

Auxiliary Treatment.—Much attention must be paid to the auxiliary measures in the treatment of typhlitis. Absolute rest is very essential. The patient should be kept on a nourishing diet, which should be soft and bland in its nature, so that the bowels may not become overloaded by the fæcal residuum. Impaction should be prevented, if possible, by the use of copious *enemata* of warm soapsuds. Often, it will be found desirable to use a long rectal tube to convey the fluid beyond the sigmoid flexure. Much benefit may be derived by applying externally hot poultices of bread and milk, flaxseed, slippery elm or cornmeal, or hot fomentations. Bartholow prefers the

* Clinical Medicine, 1879, pp. 282 and 310.

† N. Y. Medical Record, January 19, 1878.

‡ Practical Medicine, vol. i., p. 578.

external application of ice, in an ice-bag, but this practice is not in accordance with the writer's experience.

When it is ascertained that pus is present, which may be accomplished early by the use of an aspirator, it should be evacuated at once by an incision, and this incision should be kept open for free drainage. The operation usually made for perityphlitic abscess is performed by making an incision, two inches in length, parallel to Poupart's ligament, over the centre of the tumescent region. After cautiously dividing the abdominal wall to the level of the fascia transversalis, the hypodermic syringe is used to determine the exact locality of the abscess. Then a deep incision, half an inch in length, completes the operation. The wound should be kept open several days for drainage.*

COLIC.

BY A. C. COWPERTHWAIT, M.D., PH.D.

Definition.—An intense twisting, griping pain in the abdomen, occurring in paroxysms, and primarily without constitutional disturbance. It may occur secondarily as a symptom of different inflammatory affections of the abdominal viscera.

History.—Many different conditions, mostly spasmodic, have been termed colic, and have been described in text-books under that head since very early times. It is, however, probable that the true intestinal colic formed a large proportion of the cases occurring, and that it was this affection to which most of the ancient writers referred. Even at this day the term colic is used, erroneously, to indicate painful disturbances of various parts,—the terms hepatic colic, nephritic colic, and uterine colic only indicating sudden painful spasmodic affections in these organs, the two former especially referring to the pain caused by the passage of calculi from the liver and kidneys respectively.

Lead-colic or painter's colic, also known as plumber's colic and colica pictonum, is a distinctly different affection, and results from lead-poisoning; being decidedly neuralgic in its character, it has been considered under the head of enteralgia.

Ætiology.—The causes of colic are predisposing and exciting. In the former, age, sex, temperament, and occupation figure as important elements. Colic is more apt to occur in childhood and youth, also in the female sex; it is more prone to attack persons of a nervous or a lymphatic temperament, and those who are employed in sedentary occupations. The exciting causes may be such as act either directly upon the intestinal tract, or indirectly through the nervous system. Of the former, the presence of some indigestible article of food or of an excessive quantity of food in the bowels is the most common. Or-

* Dr. Sands in N. Y. Med. Record, January 19, 1878.

dinary wind colic, or flatulent colic, so called, most often arises from a decomposition of the contents of the intestines. Owing to peculiar idiosyncrasies, certain varieties of food alway produce colic in certain persons, but have no effect whatever on others. Exposure to cold, especially when overheated, and excessive fatigue, often produce colic, probably owing to the fact that these conditions interfere with the functions of digestion.

Biliary derangements are said to produce colic, and under such circumstances the condition is known as "bilious colic," a faulty term, as the supposed hepatic derangement may not have, and often has not, any existence in fact. If biliary matters are vomited, and the skin and sclerotic present more or less of an icteric hue, there may be some reason for thus designating the affection. It is said that a nervous diathesis and gouty and rheumatic conditions predispose to colic, but it is probable that at least the former only favors the neuralgic condition of the intestines known as enteralgia.

Pathology.—As has been intimated, many authors consider colic and visceral neuralgia identically the same affection. A difference between them is quite apparent, but it must be admitted that it is difficult to determine just what relation the paroxysms of pain in colic bear to those which result from distinct nerve irritation, as in enteralgia. Probably, in enteralgia the nerve is irritated at its origin, while in colic the irritation exists at the peripheral expansion. It is evident that the chief pathological feature of colic is spasms of the muscular tube of the intestine, and this arises from direct or indirect irritation of the peripheral extremities of the intestinal nerves.

The most common form of simple colic, designated as flatulent colic, always arises from a decomposition of the intestinal contents, and involves only a condition of distension. The contraction of the bowel driving the incarcerated gas against a fæcal obstruction, or some other hindrance to its exit, causes an accumulation which by its pressure distends the intestinal wall and produces the colicky pains.

This condition, however, being entirely functional, leaves no traces behind, and, unless colic has recurred in connection with some inflammatory affection of the bowels, no pathological changes are established.

Symptomatology.—The essential feature of colic is an intense pain in the abdomen, most frequently about the umbilicus but also recurring elsewhere, and changing from place to place. This pain is of a twisting, griping, or crampy character, and occurs in paroxysms lasting a few minutes, passing off only to return with equal severity after a more or less brief interval. During the paroxysms the patient is in great agony, groaning with the severity of the pain, and continually seeking relief by changing position or by pressing the hands or some hard object against the abdomen. In most instances he bends the body double, or draws up the limbs, or employs hard pressure to

mitigate the suffering; when this relief from pressure does not exist, the presence of inflammatory condition may be suspected, although a certain degree of soreness and of tenderness, especially in the cæcal region, may be had without inflammatory action. In simple colic the abdomen is usually somewhat bloated, and there is great rumbling and gurgling in the bowels, due to the moving about of fluid and gaseous contents, caused by the irregular contractions which occur. Nausea and vomiting are sometimes present, and constipation almost invariably so, a diarrhœic stool, when occurring, usually putting an end to the attack. In some cases the body is covered with a cold clammy perspiration; the pulse becomes feeble; the voice hoarse, and the face wears an anxious, frightened expression, thus simulating somewhat an attack of cholera morbus. Usually the pulse is unaffected; it certainly never becomes full and rapid, a fact which also aids in excluding the presence of any inflammatory condition. The attack generally lasts only a short time, sometimes a few minutes or hours, passing off with a trifling diarrhœa or free discharge of flatus. In some cases the attack persists for some time, owing to failure to dispose of the exciting cause.

Varieties.—A classification of the forms of colic is based upon the presumable cause. *Flatulent colic* refers to that form of colic which is characterized by an excessive accumulation of gas, the expulsion of which affords relief. Colic is sometimes termed *crapulous* when it arises from overeating or indigestion; *verminous* when it occurs from the irritation of worms; *stercoraceous* when it is supposed to result from the retention of fæces. Colic resulting from exposure to cold or wet is supposed to involve a condition of the muscular coat of the intestines which is similar to that present in rheumatism, and is by some authors termed *rheumatic colic*.

Diagnosis.—Colic may be distinguished from enteritis and from peritonitis by an absence of the signs of inflammation, high pulse, high temperature, and tenderness of the abdomen. In peritonitis, as in colic, the patient is inclined to draw up the knees, but the absence or presence of the inflammatory symptoms establishes the diagnosis. Colic not unfrequently precedes or accompanies various grave diseases and structural lesions, and it is sometimes difficult to determine whether, or not, the condition present is simply a functional affection; but by a careful examination of the objective and constitutional symptoms no serious error is likely to be made.

Prognosis.—The prognosis of uncomplicated functional colic is invariably favorable, even though the attack be of the greatest severity.

When associated with other diseases, it is only a symptom, and does not usually figure as an important element in the prognostic indications.

Treatment.—The preventive treatment of colic consists principally

in abstinence from food which tends to produce flatulence, especially fruits and vegetables, and in protection against the ill effects of sudden atmospheric changes; by the use of properly warm clothing, as flannel worn next to the skin, at least over the abdomen, and due care in keeping the feet warm and dry.

Therapeutics.—**Colocynthis** is the chief remedy. The pain is of a cutting, twisting, griping, contractive character, mostly about the umbilicus, and makes the patient bend double; the pain is made worse by assuming any other position; great restlessness and loud screaming on changing position; worse at intervals of five or ten minutes; a discharge of stool or flatus affords temporary relief.

Dioscorea.—Flatulent colic, severe cutting, griping pains about the umbilicus. Worse on bending double, relieved by stretching the body out, or by walking about.

Chamomilla.—Flatulent colic of infants. Griping, tearing pain in the region of the navel; abdomen distended with flatus. Child restless and irritable, only quiet when carried.

Carbo veg.—Flatulent colic, abdomen full to bursting; worse from least food; better from passing flatus.

Nux vomica.—Colic from indigestion. Griping, pinching pains, worse after meals, especially after overeating, making the patient bend double. Especially useful in debauchers; also in persons of sedentary habits who are subject to constipation and hæmorrhoids.

Consult also *Lycopodium* (flatulent colic); *Cina* (colic from worms); *Cinchona* (colic from gall-stones); *Cocculus* and *Valerian* (hysterical colic).

Hot fomentations assist in affording relief, and a copious enema of hot water is of great value, often removing the entire trouble at once. In obstinate cases in which remedies seem of no avail, a few drops of Chloroform will sometimes give immediate relief; Morphine should never be used.

COLITIS.

BY A. C. COWPERTHWAITTE, M.D., PH.D.

Synonym.—Colonitis.

Definition.—An inflammation of the colon, supposed to be distinct from dysentery.

Ætiology.—Colitis may be caused by any of the factors which are capable of causing inflammatory conditions in other portions of the intestinal tract; it is especially liable to occur from exposure to cold or from the presence of irritating substances in the colon.

Pathology.—While colitis offers many features in common with dysentery, the two conditions are nevertheless held to be essentially distinct affections. In dysentery, the primary seat of the disease is in the mucous membrane of the colon and rectum, while in colitis the inflammation begins in the submucous tissue of the colon, the mucous membrane being secondarily affected. The course of this disease is usually rapid, however, and the mucous membrane becomes so soon involved, and in a manner so identical with dysentery, that it is prac-

tically impossible to differentiate between the two, as it is also impossible to detect any difference in the character of the structural changes which occur.

Symptomatology.—In colitis the pains are mostly localized over the affected part, and are of a colicky nature. There is present considerable diarrhœa, the stools often containing mucus and pus; the distinct mucous and bloody stools and the violent tenesmus of dysentery are not present unless the latter disease has been induced from an extension of the inflammatory process through contiguity of tissue. According to Leube,* if the disease assumes a chronic form, there is usually an alternation of constipation with the diarrhœa; the patient suffers also with meteorism, flatulence, dyspnœa, in consequence of the impeded movements of the diaphragm; troublesome palpitation, derangement of nutrition, resulting from lack of absorptive power on the part of the intestines; uncomfortable feelings in the abdomen, nausea, eructations, and sometimes even vomiting. The vomiting is probably due, in most all cases, to a coexisting gastric catarrh, particularly in those cases in which the entire mucous membrane of the digestive tract is in a condition of passive hyperœmia and chronic inflammation, resulting from obstructed circulation, as in emphysema, cirrhosis of the liver, etc. Finally, there is marked depression of spirits, and even true *hypochondria*.

Diagnosis.—The presence of an inflammation in some portion of the intestinal tract is easily determined, but it is often difficult to exactly locate the trouble. The localized pain and the mucous diarrhœa without tenesmus speak strongly in favor of colitis, but these symptoms are so quickly followed by symptoms of true dysentery that we are often left in doubt as to the primary trouble.

Prognosis.—The prognosis in uncomplicated cases of colitis is favorable; the presence of dysentery naturally modifies the prognosis.

Treatment.—This is essentially the same as in dysentery, to the article on which the reader is referred.

DYSENTERY.

BY A. C. COWPERTHWAIT, M.D., PH.D.

Synonyms.—Dysentery, Dysenteria, Flux, Bloody flux, Fluxus, *Tormina intestinorum*, *Colonitis*.

Definition.—An inflammation of the large intestine, accompanied by tormina, followed by scanty mucous and bloody stools, straining and tenesmus. The inflammation may involve only the rectum or colon, or both, and may extend beyond the ileo-cæcal valve and include a portion of the small intestines, though this is rarely the case.

* Ziemssen, vol. viii., p. 374.

The disease is considered by some as a specific febrile affection, and may occur sporadically or as an epidemic.

History.—Dysentery has been known since the earliest times, and has ever proved one of the most fatal of scourges. It is especially prevalent in tropical countries and in localities where there is a forced abstinence from ordinary fruit and vegetable diet, coupled with exposure and hardships. Even in temperate climates dysentery has proved a formidable disease, but within the past few decades it seems to have lost much of its fatality, a fact largely due to improved methods of treatment and to more systematic sanitary regulations.

Probably its less frequent occurrence than formerly in armies is due to the same considerations, and to the fact that canned fruits and vegetables are now so freely used in army life, in the place of the old-time diet of hard tack and salt meats, with occasional feasts on unripe or decayed fruits and vegetables. Dysentery has received the attention of all medical writers since the days of Hippocrates.

Ætiology.—Whether endemic or epidemic, we recognize both an acute and chronic form of dysentery, the latter always originating from the former. Those who consider dysentery a specific disease look for its cause in a contagious specific poison, propagated from one individual to another through the medium of the excretions and inhalations, such propagation being favored by predisposing influences to be described later as the general causes producing intestinal congestion and inflammation. Such causes certainly produce sporadic dysentery, and to what extent they are prime factors in the production of the epidemic form, we may not know, though their influence is too apparent to be rejected as at least predisposing elements in the causation of the disease. Recent investigations do not warrant the assumption that dysentery is due to a specific contagion.

Dysentery is essentially a disease of hot climates and, when occurring in temperate regions, it prevails in autumn when the days are hot and the nights chilly, especially in persons much exposed to night air; it also results from the use of impure water and unwholesome food, from the former especially when it contains a decayed animal poison; the emanations from decomposing animal and vegetable matter are also fruitful causes. Bad ventilation, over-crowded rooms and filth are prolific sources; it is on this account that it prevails so extensively among soldiers and in jails and tenement-houses—anywhere, in fact, where a large number of human beings are crowded together under unfavorable hygienic conditions. Dysentery is said to be also of malarial origin; at all events, it is especially prevalent in malarial regions, probably on account of the congestion of the portal circulation due to the paroxysms of ague.

Pathology.—Dysentery consists anatomically of an inflammation of the large intestines, resulting in ulceration and exudation of the

mucous surface. Hyperæmia first appears, but the mucous surface soon becomes very red and thickened, especially about the summits of the mucous folds, the solitary glands and mucous follicles becoming quite prominent, and the membrane swollen and soft, and covered with a mucous secretion which is by many looked upon as diphtheritic or fibrinous in its nature. Some authors hold that it is catarrhal in sporadic, and diphtheritic in epidemic, dysentery, which theory pathological investigations seem to substantiate, although it cannot be admitted that dysentery possesses the contagious properties of diphtheria. This theory may, however, account for the disease-producing properties of the intestinal excreta, for, no matter what our views may be regarding the contagious character of dysentery, it is a well-established fact that the emanations arising from dysenteric dejections propagate the disease. The next step is disintegration of the mucous membrane, which becomes gradually detached in portions, leaving a deep-red, congested surface with ragged edges, which soon becomes the seat of an ulcer, irregular in form, dark-colored and covered with a slough. The fibrinous exudation is at first grayish or yellowish-gray, and covers uniformly the entire mucous surface. This exudation consists of a fibrinous substance with abundant granules, nuclei germs, epithelium cells and young nucleated cells. The exudation partakes of the degenerative process, and soon presents a dense parchment-like, unyielding tissue which becomes gangrenous or is the seat of numerous rapidly spreading ulcers. Sometimes the coats are so rapidly destroyed that perforation takes place, but this is not usual. In such cases the peritoneum presents a dirty-gray discoloration, has lost its lustre, and, here and there, dilatation and injection of its capillary vessels is visible. Should the disease terminate favorably, which it may do if the gangrenous destruction is not extensive, granulations spring up and cicatrization ensues, sometimes resulting in contraction, and leading to serious consequences.

Sometimes there are found associated with dysentery enlargement, redness, and softening of the mesenteric glands; serous inflammations, especially peritonitis; hepatic abscesses due to embolic obstruction of the portal veins, enlargement of the pancreas and spleen; extensive bronchitis, or lobular pneumonia and pyæmic abscesses.

Symptomatology.—The characteristic symptoms of dysentery, and the symptoms which always indicate its presence, are griping pains in the abdomen, followed by scanty stools of mucus and blood, accompanied with much straining and tenesmus. Most cases are ushered in with a preliminary stage, though the epidemic form may begin suddenly and without warning, save a severe chill. The preliminary symptoms are usually simple diarrhœic stools, slight colicky pains, thirst, and loss of appetite, the characteristic dysenteric symptoms developing gradually. Notwithstanding the severe and long-

continued straining, the stools are scanty, and composed of mucus or of mucus mixed with blood; sometimes, however, nothing but blood is passed, and occasionally a few hard scybala accompany the evacuation. The griping and tenesmus are at once relieved by the evacuation, and pain only is felt after hard pressure over the region of the colon; soon the griping pains return, and the scene is repeated, the paroxysms and stools occurring in severe cases as often as every half hour, and even much oftener, the general average being from ten to twenty times in twenty-four hours. In some instances the stool affords no relief; a burning pain in the rectum and a bearing-down sensation in the hips remain, forcing the patient to continued but futile efforts to discharge what appears to him to be a foreign body in the rectum.

In mild cases these symptoms gradually disappear after three or four days,—no fever is developed, and the patient slowly recovers, the convalescence being tardy from the dropsical conditions so apt to supervene after mild cases, the blood being loaded with albumen. In the severer cases, either sporadic or epidemic, at this stage the temperature and pulse rise, the tongue becomes coated, the urine scanty and passed with difficulty; there is considerable nausea and vomiting, the bloody stools are more frequent and have a fetid odor; the mucus in the dejections becomes a purulent fluid, and contains numerous shreds and flocculi, and occasionally masses of decomposing sloughs of the mucous membrane, the stool often presenting the appearance of scrapings from a hog's intestines. Sometimes the evacuation from the bowels resembles water in which raw beef has been soaked—a dangerous symptom,—at other times it is dark and tarry, and highly offensive, especially when gangrene of the mucous coat of the intestine has set in. In fatal cases at this stage adynamic symptoms are developed; the heart's action becomes feeble; the pulse frequent, but weak and thready; the mind delirious, the mouth and teeth covered with sordes, the stools are passed involuntarily, the abdomen is tympanitic, the skin cold, there is obstinate hiccough, and the patient dies by slow asthenia.

If the patient recovers, the adynamia does not appear, or if so, in a much less degree; the general symptoms gradually subside, the evacuations become less frequent and contain less mucus and blood and more feculent matter, and the patient slowly convalesces.

If the disease passes from the acute into the chronic form, as it may, especially in hot climates, the fever subsides, the tenesmus and other morbid sensations are less marked, the stools contain more fecal matter, often assume the form of an ordinary diarrhœa, but are not always free from muco-bloody masses or a puriform fluid from the ulcerated mucous membrane; the patient becomes very much emaciated and anæmic; the features shrunken and distressed in appearance; the skin dry and bran-like; the appetite impaired; the tongue

red and fissured; a hectic fever is developed, followed by night-sweats and dropsical symptoms, and death finally ensues. If the patient suffering from chronic dysentery recovers, as is sometimes the case, he usually suffers more or less with chronic constipation and its attendant evils for a long time.

Varieties.—Dysentery may be divided into *sthenic*, or inflammatory, and *asthenic*, or typhoid forms; some authors add *bilious*, *malarious*, *malignant*, and *scorbutic*, but subdivisions beyond the first mentioned are impractical.

Diagnosis.—The symptoms of dysentery are quite characteristic, and an examination of the stools, taken in connection with the subjective symptoms, make the diagnosis of this disease a comparatively easy matter.

It is sometimes difficult in the first stage of sporadic cases to distinguish it from diarrhoea, but dysenteric symptoms soon develop and put an end to all such doubt.

Proctitis, or catarrh of the rectum, is sometimes mistaken for true dysentery. In such cases the dysenteric symptoms are milder, and the mucous stools never become foul, nor do they contain the shreds, flocculi and gangrenous sloughs which occur in dysentery. Hæmorrhoids have been confounded with dysentery, but such a blunder would be almost inexcusable.

Prognosis.—The prognosis must be guarded in the first stages of all cases, whether sporadic or epidemic, for we never know what to expect, the general condition of the patient and the surrounding circumstances having so much to do with the development and course of the disease. Sporadic cases usually recover, and a favorable prognosis may be given in epidemic cases when they continue mild, or even in severe cases when there is an absence of adynamia and the signs of collapse. The most unfavorable symptoms are the gangrenous stools, severe hæmorrhage, a subsidence of the pain while the other symptoms are growing worse, and suppression of the urine. Protracted cases are most amenable to treatment, and usually recover.

Treatment.—The possibilities of contagion render the prophylaxis of this disease of the utmost importance. During the prevalence of an epidemic all persons, whether directly exposed to the disease or not, should adhere to a plain, nourishing diet, with a moderate quantity of ripe fruit; they should be much in the open air, avoid exposure and fatigue, wear flannel, at least over the abdomen, and eschew unripe fruit and alcoholic stimulants.

During the early part of the disease the diet should be restricted to a small quantity of light food, milk, eggs, custards, corn-starch, arrow-root, mutton, oyster-soup, broth of mutton or beef, avoiding solid and especially coarse foods. It is the aim to have as little residuum as possible left to increase by friction the irritation of the mucous mem-

brane. In case the symptoms denote a failure of the vital powers, egg-nog may be freely given in connection with a concentrated nourishing diet of beef-tea, or something of a similar nature. In such cases champagne may be used for the vomiting which is liable to be present.

The apartments should be well ventilated and the sunlight be permitted to enter; the patient should be sponged occasionally with tepid water, and an enema is often grateful, using either warm or cold water, as may prove most agreeable to the patient.

Injections of starch or flaxseed emulsion are a soothing application, and cover the inflamed and irritable membrane of the rectum. If the tenesmus is excessive, from five to ten drops of Laudanum may be put into the starch or flaxseed injections to allay the irritability of the muscular fibres. Especial care should be taken to remove the dejections at once from the room, not throwing them into the privy vault, but into a separate pit, where they should be immediately disinfected. The bed-pans, vessels, and syringes must not be used for other persons, and all ordinary precautions must be taken to destroy the virus and to prevent the propagation of the disease.

The medicinal treatment of dysentery, unlike that of diarrhœa, is confined within a small range of remedies. While many medicines outside of this range may occasionally be called for in individual cases, it is rarely found necessary or desirable to employ them, as they are very seldom indicated.

Mercurius, in its various forms, constitutes the chief remedy. Indeed, were specific medication possible, we could agree with Behr,* that the corrosive sublimate "corresponds to the symptoms of ordinary dysentery so perfectly that it may safely be regarded as a specific for the whole process." Such a doctrine, however, is entirely contrary to the spirit and teachings of homœopathy; a specific for any disease does not exist. Dr. Bell † says Merc. corr. "is too frequently employed in dysentery, to which it is only applicable when occurring in great intensity and accompanied by the characteristic urinary symptoms." The indications for its use are as follows:

Mercurius corr.—Stools frequent and scanty, composed of nothing but mucus tinged with blood, or containing shreds of mucous membrane, like the scrapings of a hog's intestines; offensive; accompanied by very distressing, persistent tenesmus, and cutting, colicky pains; after stool, burning and tenesmus of the rectum and bladder.

Mercurius sol.—Dr. Dickenson ‡ says this remedy "is better adapted to sporadic dysentery, and is seldom indicated in malignant types." It is especially useful in cases occurring from exposure to cool night air during hot weather. Stools composed of green, bloody mucus, or of pure blood, and very excoriating; colic, burning, and tenesmus before, during, and after stool; chilliness between the stools; the tenesmus and urging before and during the stool is rather increased after the stool—a constant ineffectual urging, as if the patient would never get done, the pains sometimes extending to the back. The abdomen generally feels cold, bad taste in the mouth; tongue coated white, or swollen, soft and flabby; rheumatic pains in limbs; worse at night.

Nux vomica.—After the abuse of diarrhœa-mixtures, or of alcoholic spirits, and in persons of sedentary habits who are usually constipated, dysenteries of an inter-

* Science of Therapeutics, vol. i., page 463.

† Homœopathic Therapeutics of Diarrhœa, Dysentery, etc., page 123.

‡ Homœopathic Principles and Practice of Medicine, page 151.

mittent type, constant disposition to stool, with inability to pass anything but a little slimy, bloody mucus; small, hard, roundish lumps of fecal matter, streaked with bright red blood; tenesmus, relieved after stool; pressing pain in the back, as if broken, before and during stool.

Aconite.—After suddenly checked perspiration from exposure to cold; attacks occurring when the days are warm and the nights cool; first stage, with chill, high fever, dry skin, thirst, restlessness; stools frequent, small, composed of bloody, slimy mucus, with tenesmus, which is relieved after the discharge.

Arsenicum.—Stools of thick, dark green mucus; dark, bloody, watery, very offensive, smelling like carrion or discharge from putrid ulcers; frequent; scanty; excoriating; tenesmus and burning in the rectum and anus; great exhaustion after each stool, and some short relief from the pain; great thirst, but drinking little at a time; tongue whitish, fiery red, smooth, and dry, or dry and brown; nausea and vomiting; face pale and sunken; great anguish and restlessness; pulse rapid and scarcely perceptible.

Baptista.—Dysentery with typhoid tendency; stools frequent, small, thin, dark, fecal, very offensive and acrid; pure blood; dark brown mucus and blood; tenesmus; tongue dry, brown down the centre; sordes on lips and teeth; breath fetid; face dark red, with a besotted expression; prostration more profound than the severity of the attack would seem to justify.

Belladonna.—Especially useful in the dysentery of children; plethoric young persons; stools greenish, slimy, bloody, with great tenesmus and urging; frequent; scanty; tenesmus so severe as to cause shuddering; abdomen distended and very sensitive to touch; tongue red and dry at the tips, or white in the centre, with red edges; starting in sleep; stupor; delirium; face flushed; head hot while hands and feet are cold; rolling head from side to side; throbbing of the carotids.

Cantharides.—When complicated with irritation of the urethra and neck of bladder, causing dysuria. White or pale reddish stools, like scrapings of the intestines; or bloody watery, skinny, like the washings of meat; with stool: cutting in abdomen; after stool: shivering; violent burning pain through the whole intestinal tract; distension and tenderness of the abdomen; thirst, but loathes any fluids; frequent, painful, ineffectual urging to urinate, with burning after urination; collapse.

Capsicum.—Frequent mucous stools, mingled with dark blood; violent tenesmus, and burning in both rectum and bladder; drawing pains in the back during stool, which, with the tenesmus, are continued after stool; after every stool thirst, and after every drink shivering; stool after drinking; abdomen enormously distended; taste as of putrid water; pains aggravated by currents of air, even warm air.

Colchicum.—Autumnal dysentery. Stools of transparent jelly-like mucus, or bloody mucus, containing large quantities of small, white membranous particles; violent tenesmus; griping colic before stool, relieved after; constant ineffectual urging to stool, owing to a spasm of the sphincter ani, with a shuddering on the back; prolapsus ani; coldness and œdema of the legs; cramps in the calves; æcites; urine dark brown and scanty; great prostration; aversion to the smell of food.

Colocynthis.—Mostly indicated in the first stages, with the characteristic pains. Stools greenish, slimy and bloody, like scrapings of the intestines; renewed after the least food or drink; abdomen bloated; violent pains in the abdomen, as though the intestines were squeezed between stones, which compels the patient to bend double; pain relieved after each stool; weakness, paleness, and great prostration after stool.

Ipecacuanha.—Autumnal dysentery. After eating unripe fruit, vegetables, and sour substances. Stools of green mucus, green as grass; fermented; colic; persistent nausea and vomiting; worse in the evening.

Nitric acid.—Subacute or chronic dysentery, especially when the bowels are ulcerated and pus discharged; typhoid type with diphtheritic deposit on mucous membrane of the intestines. After the abuse of mercury or in syphilitic patients; green or bloody mucous stools; flakes of false membrane; putrid; fetid; acrid; tenesmus during stool, great exhaustion after.

Sulphur.—When other remedies have failed; especially useful after Aconite has removed the acute symptoms; chronic variety; ulceration of mucous membrane. Stools of blood-streaked mucus; fetid; slimy; excoriating; colic, straining, and violent tenesmus; tenesmus continues a long time after the discharge; worse at night or in the early morning; prolapsus ani; dryness of mouth and tongue; tongue coated white with red tip and edges; nausea; vomiting; offensive odor of the body.

Consult also Aloes, Apis, Alum, Argentum nitr., Arnica, Bryonia, Carbo veg., Cinchona, Dulcamara, Hamamelis, Kali bichr., Lachesis, Magnesia carb., Phosphorus, Pulsatilla, Plumbum, Veratrum, Zincum.

DIARRHŒA.

BY A. C. COWPERTHWAITÉ, M.D., PH.D.

Synonyms.—Ileitis, Ileo-colitis, Catarrh of the ileum, and of the ileum and colon.

Definition.—By diarrhœa we understand a morbid frequency of loose alvine evacuations, without tenesmus, the stools being otherwise altered in character.

Diarrhœa may occur primarily as a functional derangement of the small intestines, independent of inflammation or any pathological state. Secondly it occurs as a symptom of inflammation of the intestines, and also of some functional affections, such as cholera and dyspepsia, and accompanies certain grave constitutional diseases, such as tuberculosis of the intestine, cancer, and typhoid fever. It may, therefore, be considered a symptom rather than a disease *per se*, yet occurring as a result of such a variety of causes, both local and constitutional, that it merits special notice.

Ætiology.—Diarrhœa is practically the result of an irritation of the mucous lining of the intestines. Of the agents which directly produce this condition, we find indigestible foods, unripe fruits, and impure or irritating drinks, as well as purgative medicines and irritant poisons the most important ætiological factors; indirectly, the same condition may be produced from exposure to cold or wet, or sudden atmospheric changes, vicissitudes of temperature, and excessive fatigue; in the same manner mental emotions often produce a functional diarrhœa. The writer knows of a young clergyman who, when about to preach his maiden sermon before a large audience, was obliged to hurriedly leave his pulpit and evacuate the bowels. Flint reports the case of a surgeon who, when about to operate for hernia, was so overcome by anxiety incident to his sense of responsibility, that he was obliged to relinquish the scalpel and precipitately retire to evacuate the bowels. Thus fright or anxiety are shown to be important causes of a functional disturbance of the bowels.

Among the indirect causes of diarrhœa belong dentition, as well as those constitutional disturbances which result in looseness of the bowels as a secondary effect of systemic poisoning or exhaustion; to the latter belong tuberculosis, pyæmia, albuminuria, cancer, gout, and enteric fevers. Chronic malarial diseases and exposure to malarial influences may also produce diarrhœa, and it may occur from exposure to the emanations which arise from decomposing animal matter.

As a familiar instance of the latter, I would quote the diarrhœa so frequently occurring in medical students while engaged in the dissecting room. Diarrhœa may also result from a mechanical congestion of the intestines, due to some obstruction in the portal circulation, and from the rapid suppression of discharges, or the absorption of dropsical fluid, or the disturbance of the functions of other organs, being in such instances vicarious in its character.

Pathology.—Diarrhœa is a symptom rather than a disease in itself, a morbid action of function, not a structural disease. Those pathological states which induce diarrhœa, or with which it may be associated, are discussed elsewhere. It may be stated, however, that it is often quite difficult to determine whether the diarrhœa is purely functional or whether it depends upon a slight inflammatory condition; it is certainly safe to say that the irritating causes which may develop a functional diarrhœa are quite sure to develop more or less congestion in the mucous surface, varying from a very slight degree to a condition of subacute inflammation. An increased peristaltic action, with increased transudation, and an excessive secretion from the mucous follicles, with the varying degree of congestion named, are the only pathological elements that may accompany a purely functional diarrhœa.

Varieties and Symptoms.—Nosologists have divided diarrhœa into many varieties, founded upon the character of the discharge; these divisions, though convenient, are nevertheless arbitrary, often misleading, and certainly of no practical use in the treatment of the disease.

In *feculent* or *fecal* diarrhœa the stools are abnormally soft or liquid, but not especially changed in their character, and have a normal odor. Such cases may be painless or preceded by griping colicky pains, usually relieved by the evacuations. A *bilious* diarrhœa presents a yellow or green stool, the color supposed, somewhat rashly, to result from an admixture of bile; here constitutional disturbances are more marked. We find present: nausea, coated tongue, bad taste in the mouth, headache, and, with the stools, scalding at the anus, and distinct, sometimes very distressing, griping pains, which are relieved by the evacuation. This form of diarrhœa is undoubtedly due to deranged biliary function, but is not diagnostic of any particular hepatic disease. It is more apt to merge into an inflammatory diarrhœa or dysentery than are the other varieties.

A *serous* diarrhœa has watery stools. They are usually copious, and are accompanied by more or less constitutional disturbance, loss of appetite, nausea, tenderness of the abdomen, scanty and highly colored urine, quickened pulse, slightly increased temperature, griping, gnawing pains, and other evidences of a subacute inflammatory condition.

In *hæmteric* diarrhœa the stools contain undigested aliment. This is

essentially a diarrhœa due to atony, and differs distinctly from all other varieties. The digestive, assimilative, and absorbent functions seem to be in a state of total suspension, and the food passes through the alimentary tract in an unchanged condition. The appetite is voracious, but the strength rapidly fails, and death may result from anæmia and exhaustion.

Any form of diarrhœa is termed *colliquative* when it produces a rapid exhaustion of the system. Such may occur from extreme vicissitudes of temperature, exposure, excessive fatigue, deprivation of food; in women, from prolonged lactation; it is found in persons who are anæmic, or who have become enfeebled from tedious chronic diseases, there being no definite intestinal lesion. A more scientific division of diarrhœa, as made by some authors, gives: (1) diarrhœa from irritation; (2) congestive or inflammatory diarrhœa; (3) diarrhœa from atony. The first variety includes all cases of feculent diarrhœa and those which result directly from irritation of the intestines. The second variety includes all cases caused by, or accompanying, an increased vascular action in the intestinal mucous membrane, the cutaneous eliminations of fluids being at the same time obstructed. Here are included the cases which result from exposure to cold, from taking ice-cold drinks while over-heated, from suppression of perspiration, or of an accustomed discharge. The third variety includes the cases which are usually described as lenteric, being characterized by undigested stools. To these divisions other authors add (4) *chronic* diarrhœa, including the chronic forms of all the varieties heretofore mentioned, and which need not be recapitulated. There is, however, a form of chronic diarrhœa, characterized by pale stools, and sometimes known as diarrhœa alba, or white flux, which deserves a passing notice. It is especially prevalent in India, but is not unknown to any European nation, and is supposed to be due directly or indirectly to the influences of malarial poisoning. The disease is very insidious in its approach, the stools not being very frequent at first, and attracting but little attention. The fæces are yellowish, or pale drab, or whitish in color, the paleness increasing as the disease advances. They also become more and more watery, gradually lenteric, and sometimes dysenteric in the latter stages. There may be present symptoms of disturbed digestion. The tongue and mouth are sore and red, being studded more or less with aphthous ulcers. The appetite is usually lost, but may be capricious, sometimes voracious, and the abdomen is distended with flatulence. The body becomes anæmic and emaciates rapidly, dropsical swellings occur, and the patient finally dies from exhaustion or in convulsions. Such indeed is the usual course of all chronic diarrhœas when they proceed to a fatal termination.

Diagnosis.—It is an easy matter to diagnosticate a simple case of feculent diarrhœa, but often quite difficult to distinguish between the

different forms of this disorder, and to establish the extent of inflammatory action, or to discover the pathological state which is responsible for the diarrhœic condition. The absence of pain, tenderness, and fever excludes acute inflammation, and, as a rule, lesion of the mucous membrane also. The latter, however, may be suspected when the diarrhœa follows a dysenteric attack or enteritis, or is of long standing and resists all judicious treatment. A bilious diarrhœa may easily be mistaken for dysentery in the first stages. If there is much straining, and if, after washing the discharges, shreds of mucus are found, with flocculent masses and strings adhering to the vessel, the case is one of dysentery.

Prognosis.—The prognosis depends entirely upon the extent and character of existing constitutional disturbances. In simple diarrhœas from irritation the prognosis is favorable; the same is the case in the earlier stages of the inflammatory forms. Diarrhœa accompanying tuberculosis or cancerous diseases, or occurring with long-standing hepatic and splenic disorders, is a serious complication; the prognosis of chronic diarrhœa is generally unfavorable, but with a proper *regimen* and the carefully selected homœopathic remedy, most cases may be controlled.

Treatment.—Since diarrhœa, in the great majority of cases, arises from errors of diet and from careless habits, it is evident that few cases of uncomplicated diarrhœa would occur if due care were exercised in matters of diet, clothing, and regimen. In the treatment of this disorder the observance of sound hygienic and dietetic rules is of the utmost importance; and, in fact, indispensable to the cure. In mild cases of the feculent type, a light farinaceous diet, or an entire abstinence from food for a short time, is desirable. In all cases, uncooked vegetables and green fruits are to be interdicted, though ripe fruits may be eaten in moderation. As a rule, milk combined with farinaceous foods, such as arrow-root, and corn-starch, and broth, are the safest diet; milk alone must be avoided. If the casein is found unchanged in the stools of children, milk with limewater will sometimes alone stop the diarrhœa. Chickens, pigeons, mutton, and eggs are usually to be allowed. All tough meats, such as beef and pork, and particularly veal, are to be avoided. Above all, the nature of the diet depends very much upon idiosyncrasy. In chronic diarrhœa a more nourishing diet is desirable, which must be graded according to the condition of the stomach and the power of the digestive system. Protection from atmospheric changes is a very important item in all cases, and to this end the patient should continually wear flannels next the skin.

Light exercise and an abundance of open air and sunlight are important hygienic conditions. Often a change of climate is of great benefit, especially from a damp and heavy atmosphere to a dry brac-

ing air. A sea voyage or short trips on the lakes are often of great benefit, and sometimes even cure well-marked cases.

Fæcal or *feculent* diarrhœa may require: Aconite, *Æsculus*, Aloes, Baptisia, Calcareæ, Chelidonium, Colocynthis, Hepar, Iris, Leptandra, Nux vomica, Podophyllum, Rheum.

Bilious diarrhœa: Aconite, *Æthusa*, Aloes, Arsenic, Chamomilla, Cinchona, Cina, Colocynthis, Dioscorea, Ipecacuanha, Leptandra, Mercury, Phosphorus, Podophyllum, Pulsatilla, Sulphur, Veratrum.

Serous diarrhœa: Aconite, Aloes, Apis, Arsenic, Baptisia, Belladonna, Bismuth, Calcareæ, Camphor, Carbo veg., Colchicum, Colocynth., Conium, Croc. tig., Dioscorea, Ferrum, Gratiola, Hyoscyamus, Ipecacuanha, Iris, Kali bichr., Leptandra, Mercury, Natrum sul., Phosphorus, Phosphoric acid, Podophyllum, Pulsatilla, Rhus, Secale, Sulphur.

Lienteric diarrhœa: *Æthusa*, Aloes, Antimonium crud., Arsenic, Calcareæ, Chamomilla, Cinchona, Colocynthis, Ferrum, Graphites, Hepar, Iris, Leptandra, Magnesia carb., Phosphorus, Phosphoric acid, Podophyllum, Sulphur.

Colliquative diarrhœa: Arsenic, Baptisia, Bismuth, Carbo veg., Cinchona, Colchicum, Ferrum, Iodum, Iris, Mercury, Phosphorus, Secale, Thuja, Veratrum.

Podophyllum is probably the most useful remedy, especially in the diarrhœa of infants during dentition, and when occurring during hot weather. Stools changeable; watery, with meal-like sediment; yellow, liquid; green, sour, watery; undigested; clay-colored; chalk-like. Profuse, frequent, gushing, painless; preceded by griping colic; worse in the morning. Prolapsus ani. Exhaustion. Rolling head during dentition (hydrocephaloid).

Chamomilla.—Especially in children, during dentition; also in summer after checked perspiration, or after eating indigestible food. Stools white, slimy, watery; yellowish, like scrambled eggs; hot, small, frequent; smell like rotten eggs; sour. Colic before or during stool, relief after. Child peevish and whining, wants different things, but repels them when given; cries, and is only quiet when being carried.

Mercurius.—Diarrhœa occurring in damp, cool weather, or in hot weather, with cool nights; from exposure to night air. Stools green, slimy, brownish, scanty, occasionally streaked with blood; sour; corrosive. Colic, burning and tenesmus before, during and after stool; chilliness between stools.

Colocynthis.—Only required when the characteristic colic pains are present; griping, twisting, cutting pains, bending the patient double, relieved by the evacuation. Stools copious, fæcal, fluid, yellow, frothy, with discharge of much flatus; aggravated by the least food or drink.

Cinchona.—Diarrhœa during or after severe or chronic wasting diseases; from exhaustion and debility, especially after loss of fluids (lactation, hæmorrhages, etc.); from eating fruit. Painless, watery, undigested stools; worse after meals and at night; tympanitis; colic before stool, great exhaustion after.

Ipecacuanha.—Especially in children, during dentition; in autumn, after eating unripe fruit and vegetables. Stools green as grass, fermented, attended with colic, and vomiting of a green, jelly-like mucus; persistent and distressing nausea.

Aconite.—Diarrhœa from cold or damp, or after checked perspiration; from getting overheated; from getting wet; from anger or fright. In summer when the nights are cool. Stools watery; green, like chopped herbs; scanty, loose, frequent. In the beginning, with heat, thirst, hard, full and frequent pulse.

Æthusa.—In children, in summer and during dentition. Stools bright yellow or greenish, watery. Intolerance of milk, which is forcibly ejected as soon as swal-

lowed; vomiting of curdled milk; stools or vomiting followed by exhaustion and dozing; spasms, with clenched thumbs.

Aloes.—Stools bright yellow, pappy; watery, containing lumps of jelly-like mucus. Worse in hot, damp weather; early in the morning; after eating and drinking. Want of confidence in the sphincter ani; rectum feels full of heavy fluid, which seems to fall out without any exertion.

Arsenicum.—Diarrhœa of malarial origin, or after chilling the stomach with cold substances; also in chronic diarrhœa. Stools of slimy, green mucus; bloody, watery; dark-colored, offensive; painless; offensive; acrid; involuntary. Burning in anus and rectum. Vomiting after eating and drinking. Great restlessness and anguish. Burning thirst, drinks often, but little at a time. Great prostration; emaciation; rapid, scarcely perceptible pulse.

Calcareæ ostrearum.—Children during dentition; fat, scrofulous children; open fontanelles. Chronic diarrhœa. Stools white, chalk-like; undigested: first hard, then pasty, then liquid; offensive, like bad eggs; sour. Debility. Profuse sweat on head when sleeping, wetting the pillow; feet constantly cold and damp.

Croton tigl.—Yellow, dirty green, or brown, watery stools, coming out like a shot; worse while eating or drinking; while nursing.

Iris vers.—Stool profuse, thin, watery, tinged with bile, corrosive. Great burning in anus after stool, as if on fire; vomiting of an extremely sour fluid, which excoriates the throat; also of sour milk in children.

Magnesia carb.—Stool green and frothy, like scum of a frog-pond; white masses, like lumps of tallow, floating on the green, watery stool; sour eructations, also sour vomiting.

Nux vomica.—Diarrhœa from high living; from abuse of alcoholic liquors; after drastic medicines or prolonged drugging; alternating with constipation. Stools dark-colored, brownish or greenish; frequent; small; corrosive; offensive; worse mornings. Constant ineffectual urging. After stool, sensation as if more remained but could not be evacuated.

Phosphorus.—Chronic and colliquative diarrhœas. Stools painless, watery, very debilitating; involuntary; gray, or whitish gray; watery, with lumps of white mucus, or little grains like tallow; copious, like water from a hydrant; purulent; undigested; oozing from the constantly open anus.

Rheum.—In children, during dentition. Very sour-smelling stools; child smells sour, even if washed or bathed; straining before stool, and colicky, constrictive cutting in the abdomen after; shivering during stool.

Secale corn.—Protracted diarrhœa in scrofulous children, during summer; putrid, fetid, colliquative. Sudden attacks of involuntary diarrhœa in aged persons. Stools brown; dark-colored; thin, olive-green. Aversion to heat or to being covered.

Sulphur.—Diarrhœa from suppressed eruptions; after taking cold; in children; scrofulous persons; during dentition; chronic diarrhœa. *Early morning diarrhœa, driving out of bed.* Stools watery; frothy, green, watery; fetid, slimy; pappy, greenish, yellow; excoriating; involuntary; sour; fetid; putrid. Offensive odor of the body, the smell of the stool follows him, as if he had soiled himself. Aversion to washing. Excessive prostration and rapid emaciation.

Veratrum alb.—Violent, painful, copious, with profuse, cold perspiration, especially on forehead. Greenish, watery stools, mixed with flakes; rice-water stools. Severe pinching colic before and during stool, with nausea, vomiting, weakness and shuddering; after stool, great sinking and empty feeling in stomach; hippocratic countenance; violent thirst for large quantities of very cold water or for acid drinks.

Also consult *Æsculus*, *Agaricus*, *Alum.*, *Antimonium crud.*, *Apis*, *Argentum nit.*, *Arnica*, *Asa fet.*, *Baptisia*, *Belladonna*, *Borax*, *Bovista*, *Bryonia*, *Calcareæ phos.*, *Camphor*, *Cantharides*, *Capsicum*, *Carbo veg.*, *Chelidonium*, *Cina*, *Colchicum*, *Conium*, *Dioscorea*, *Dulcamara*, *Ela-terium*, *Gelsemium*, *Graphites*, *Gratiola*, *Helleborus*, *Hepar*, *Hyoscy-amus*, *Iodum*, *Kali bichr.*, *Lachesis*, *Leptandra*, *Lycopodium*, *Natrum*

sulph., Nitric acid, Pulsatilla, Rhus, Rumex, Sepia, Silicea, Sulph. acid, Thuja, Zincum.

Also, compare treatment of enteritis.

CHOLERA MORBUS.

BY A. C. COWPERTHWAIT, M.D., PH.D.

Synonyms.—Sporadic cholera, Cholera biliosa, Cholera nostras, European cholera.

Definition.—An acute catarrh of the stomach and intestines, occurring in hot seasons, characterized by the suddenness of the attack, which consists in violent vomiting and purging, and is usually attended by cramp-like pains in the abdomen, spasms of the abdominal muscles, coldness, feeble pulse, and great prostration.

Ætiology.—Cholera morbus may be caused by exposure to sudden cool changes of temperature during the hot season, as, for instance, passing from a hot room into a cool cellar, or getting wet when overheated. So, also, large draughts of ice-water, taken when overheated, may produce the same result and in the same manner by arresting suddenly the functions of digestion. It is, however, usually considered that these causes, especially the former, are predisposing rather than exciting, and that the chief exciting cause lies in the ingestion of certain indigestible articles of food, such as unripe fruit and vegetables, decayed meat, etc., producing direct irritation or setting up a fermentative process in the stomach and intestines. Even as ancient a writer as Galen attributed cholera morbus to the presence of acrid humors generated by the corruption of food. It is thought by some that this affection involves a special cause, the nature and source of which are yet unknown.

Pathology.—Cholera morbus, being a functional disease, leaves few traces of its effects in the organism. These, if any, are similar, except in degree of severity, to those of true cholera.

There may be evidence of gastro-intestinal catarrh; hyperæmia of the mucous surface, desquamation of the epithelium, swelling of the glands, thickness and prune-juice color of the blood, etc. The phenomena of the disease may be explained on the ground that the offending substance causes irritation of the gastro-duodenal lining membrane, which excites a morbid transudation and produces the vomiting and purging. The irritation then extends to the liver, exciting in some cases the biliary secretion; and to the spinal cord, causing cramps in the muscles of the abdomen and legs; and, finally, to the sympathetic, producing, through the vaso-motor system, coldness of the skin and capillary torpor.

Symptomatology.—Attacks usually occur suddenly, but may be preceded for a few hours by weight and uneasiness in the epigastrium,

nausea, and some diarrhœa. The attacks occur most often in the night; the patient is awakened by colicky pains and some chilliness, and is almost immediately attacked with vomiting, first of the food last taken, with gastric mucus and a little bile, afterwards of bile and thin mucus alone. Almost simultaneously the purging sets in, first of offensive fœcal, diarrhœic stools, and later of mucus and bile. In severe cases the discharges partake more nearly of the "rice-water" character of true choleraic stools, being copious, thin, whitish, odorless, or having a faint, mouse-like odor, consisting of blood and serum, with mucus and casts of epithelium. The acts of purging are usually preceded by pain in the abdomen, which is temporarily relieved by the evacuation. These evacuations from the stomach and bowels are quite copious and occur very rapidly, soon reducing the patient in a remarkable manner, who is often so exhausted after one or two hours as to be unable to rise from the bed. The abdomen becomes contracted, and spasms of the abdominal muscles may occur; the body becomes shrunken, the face hippocratic, the surface cold and sometimes bathed in a clammy sweat; the pulse grows small and weak, the voice is husky and feeble, the tongue and breath cold; cramps may occur in the feet and legs, and there is a great thirst for cold drinks, which are usually ejected as soon as swallowed. The course of the disease is rapid, ending in prompt recovery, or a condition threatening a fatal collapse develops within twenty-four hours. Happily, however, the latter termination is extremely rare; usually, after a few hours the vomiting and purging become less severe, finally ceasing altogether, and the patient, though weak, is generally about on the following day, all the organs immediately resuming the normal exercise of their functions.

In the few fatal cases which occur, the choleraic symptoms become more marked and the patient dies in collapse within a few hours. In some cases the intense symptoms of the affection give way after a few hours to those of a subacute gastro-intestinal catarrh, and convalescence is somewhat tardy, occupying several days. Sometimes, in such cases, fever of a remittent type is developed, which may assume a dangerous typhoid form, or an acute attack of diarrhœa or dysentery may be established.

Diagnosis.—The symptoms of cholera morbus are so characteristic that an error in diagnosis is rarely made. The absence of an epidemic would exclude Asiatic cholera, and in the presence of the latter a technical diagnosis would be of little moment, as the diseases are essentially the same, differing only in degree.

It is sometimes important to distinguish between cholera morbus and cases of poisoning from acrid or corrosive substances. In the latter, there is burning in the throat and stomach before, as well as after, vomiting has commenced, and the vomiting precedes the purging,

whereas they are simultaneous, or nearly so, in cholera morbus, and the vomiting is out of all proportion to the diarrhoea. There is more gastric distress and tenderness and burning pain in the abdomen, neither of which are relieved by the evacuation of the bowels. The matter voided is apt to be bloody, and there are often bloody discharges from the bowels, neither of which occur in cholera morbus. Finally, poisoning may occur in any season of the year, while cholera morbus is limited to certain seasons, and the concomitant circumstances will serve to allay or excite suspicion so far as poisoning is concerned.

Prognosis.—The prognosis is almost uniformly favorable, but fatal cases occasionally occur, usually in persons already weak from some other disease. Death may occur within twelve, but oftener after twenty-four or forty-eight, hours. The indications for an unfavorable issue have already been noticed.

Treatment.—Cholera morbus seldom occurs in persons who during the heated term exercise prudence in the selection of their diet and are careful to avoid sudden changes of temperature; the wearing of flannel next the skin is one of the best safeguards against cholera and other bowel diseases occurring during the heated term. Persons not desiring to wear flannel over the entire body should at least wear a flannel bandage over the abdomen, especially if they are somewhat predisposed to acute disorders of the gastro-intestinal functions.

During the attack cold drinks should be limited; it is much safer to allow the patient occasional small pieces of ice to be dissolved in the mouth. If there is great prostration, a little brandy and water may be of service. Sometimes iced champagne will be retained when everything else is rejected. It is a good plan to give a little alcohol in arrow-root or scalded milk, but whatever is given by the mouth should be given in small quantities. During convalescence, and for a few days after, the diet should be guarded. Mutton-broth or chicken-broth, from which the fat has been removed, and light farinaceous foods, with toast, must precede a more substantial diet.

Veratrum album is the remedy most often indicated in this affection. There is violent vomiting and purging, the stools being light-colored, or resembling rice-water discharges. There is extreme exhaustion and copious perspiration, especially on the forehead; the body is cold; the face pale, cold and sunken; the pulse feeble, but rapid, and there are present violent, cutting, griping colicky pains about the umbilicus, as if the intestines were twisting in a knot, relieved by the stool.

Camphor is the remedy next in importance. It is indicated when cramps in the muscles of the abdomen and of the arms and legs predominate, the vomiting and purging being mild or entirely absent. There is great prostration, coldness, and tendency to collapse. I find Camphor most useful in those cases resulting from cold. It may be used by pouring a few drops of the tincture on some sugar, and dissolving this in a third of a glass of water, giving a teaspoonful of the solution at a dose. The Camphor cannot be given in water without the aid of sugar, which acts as a catalytic agent.

Podophyllum is an excellent remedy when the vomiting and pain are not

severe, or are entirely absent, and the stools are profuse, watery, yellow, and of an offensive odor.

Ipecacuanha is indicated in the milder class of cases when the discharges are green, and the vomiting and retching are very severe, being out of all proportion to the other symptoms.

Arsenicum album is not useful at the commencement of the disease, but when after several hours the pains in the stomach and bowels become very severe, burning or cutting in character, and are accompanied by intolerable anguish and extreme restlessness, this remedy is most valuable. In such cases there is usually extreme thirst, the smallest quantity of water aggravating all the symptoms; also embarrassed respiration, weak, almost imperceptible pulse, icy coldness of the skin, and clammy sweat, with subjective heat. It is especially indicated if the lips and tongue become dry, black, and cracked, and when the stools become dark-colored and offensive.

Aconite, Colocynthis, Cuprum, Dioscorea, Cinchona, Iris vers., Nux vomica, and *Phosphorus* may also be consulted.

Frequently, the use of hot fomentations over the abdomen will afford much relief, and the domestic plan of giving the patient a hot pack or bath, in order to produce a profuse warm perspiration over the entire body, often proves very serviceable.

CHOLERA INFANTUM.

BY A. C. COWPERTHWAITTE, M.D., PH.D.

Synonyms.—Summer complaint, Gastro-enteric catarrh, Summer cholera of infants.

Definition.—An acute gastro-intestinal catarrh, occurring in children during the hot season, and especially during dentition, and characterized by purging of a serous fluid, vomiting, high temperature, rapid prostration, emaciation, and collapse. Some writers see fit to include under this head that more frequent affection of infancy, entero-colitis, or enteritis folliculosa, which has been elsewhere described. While the latter disease presents many features in common with cholera infantum it is an essentially distinct affection, and is in no sense a choleraic disease. On this point Duncan* says, that "A distinction should be drawn between what ought to be called cholera infantum and that affection which is properly styled simple inflammatory diarrhoea or entero-colitis. Many physicians are in the habit of distinguishing the various intestinal disorders of children so frequent during the summer months under the common title of cholera infantum. It is certainly evident that a large majority of the deaths registered in our mortality-returns under this title are the result not of a true choleraic disease, but rather of entero-colitis, a disease of very frequent occurrence, almost solely during the summer months in young and, generally, teething children, who have been previously healthy, or subject for a long time to simple diarrhoea."

History.—Cholera infantum has been supposed by many to be a disease peculiar to America, but while it is probably particularly prevalent

* Diseases of Infants and Children, vol. i., p. 401.

in this country, it has been seen and described by many foreign authors. Even Sydenham speaks of a sort of "cholera morbus exceedingly fatal to infants;"* and later writers in France, Germany, Russia, and England, have given it a more or less full description, while Lumbard claims that Berlin surpasses American cities in the frequency of this disease.†

Ætiology.—Age is certainly a positive factor in the production of this disease, as it rarely occurs after the second year, and more often during the first eighteen months of life. At this age there is great functional activity and rapid development of the intestinal follicles, which is usually considered the predisposing cause for cholera infantum. Many are disposed to refer the prevalence of cholera infantum during infancy to the irritation of the first dentition. This, indeed, must be considered as an important predisposing cause, yet we should bear in mind that the process of teething is in itself a normal physiological process, and it is not at all likely that we should ever have occasion to enumerate the irritation of teething as a cause of this disease could other causative agents be removed. Teething, nevertheless, involves certain disturbances of the healthy equilibrium, holding the organism in a peculiar state of susceptibility to certain external impressions which render the system more particularly liable to be overcome by their pernicious influences. A continuously high temperature is one of the chief causes of cholera infantum.

In the city of New York, during a period of eleven years, out of 1245 deaths from cholera infantum, 1061 occurred in July, August, and September; statistics have since shown a still greater portion occurring at that time of the year. High temperature alone, however, is not responsible for this remarkable showing, for the disease is largely limited to cities and large towns, and is more prevalent in the northern and middle, than in the southern, states. It is therefore certain that anti-hygienic influences, bad air and improper food, in addition to a high temperature, are necessary to the production of cholera infantum. Badly ventilated and over-crowded, ill-kept houses, and air contaminated by animal and vegetable decomposition and emanations from cess-pools and sewers are potent causative factors. Aitkin‡ says: "The chief haunts of cholera infantum are the fever nests and cholera fields of large towns. Diphtheria, scarlet fever, putrid sore throat, typhus and Asiatic cholera herd together and fester in the slums, where the wretched and squallid dwellers are stowed away in ill-ventilated, ill-drained underground cellars and tenement houses, in the midst of every possible insanitary condition, breathing a septic atmosphere,

* Works of Thomas Sydenham, M.D., *Processus Integri*, ch. xxiv., vol. ii., p. 267, Syd. Soc. ed., London, 1850.

† *Traité de Climatologie Médicale*, vol. iv., p. 317, Paris, 1880.

‡ *Science and Practice of Medicine*, vol. i., p. 637.

poisoned without by the putrilage of slaughter houses, soap and glue factories, cesspools and sewers, and within by emanations from the body, filthy clothing and bedding, and often the excrements of man and beast."

High temperature, bad hygienic conditions, and the direct irritation resulting from the use of improper food are the trio of causes which combine to produce this scourge of infancy. Infants brought up by hand and those just weaned furnish a very large proportion of the victims; this is especially the case in cities where a supply of pure milk is not easily obtained, even if the importance of it is fully appreciated. On the other hand, ill health on the part of the mother affects her milk, and unfits it for the use of the child; if the mother suffers from devitalizing or septic influences, as she often does, the milk secreted by her is imperfectly elaborated and likely to prove quite as serious and exciting cause of intestinal disorder as an artificial diet. Parents are sometimes imprudent enough to give infants unripe fruit and vegetables, or allow them to eat from the table a variety of food scarcely fit for the use of an adult. Such habits impair the digestion of the child, and only too often excite cholera infantum or other disorders of digestion.

Pathology.—The pathological changes occurring in cholera infantum are by many described to be identical with those present in intestinal catarrh. This teaching arises from the fact that cholera infantum has been so long confounded with entero-colitis that pathologists have accepted the conditions which are characteristic of the latter as characteristic of cholera infantum. Frequently also, as stated, follicular inflammation is associated with, or follows, cholera infantum, and post-mortem examination will reveal the anatomo-pathological changes characteristic of the former condition. In true choleraic disease the mucous membrane of the small intestine is found congested, covered with mucus or a membranous exudation, and the follicles are enlarged, softened, and sometimes ulcerated. Even here are recognized the evidences of follicular inflammation. But in the choleraic condition there is underlying these manifestations a morbid condition of the blood, probably arising from defective nutrition, and a consequent derangement of the sympathetic nervous system which does not exist in a purely inflammatory affection.

Symptomatology.—Cholera infantum may be ushered in suddenly, or be preceded for an indefinite period by premonitory symptoms. In the first instance the symptoms closely resemble those of the sporadic cholera of adults. The child, when in full health, and without warning, is attacked with vomiting and purging which occur in frequent paroxysms of great violence; after the contents of the stomach and bowels are expelled, the abundant evacuations consist of secreted or transuded liquid of a greenish or yellowish color. These

symptoms may last but a few hours, and a recovery may speedily ensue under proper homœopathic treatment. If this is not the case, the vomiting and purging continue; there is great thirst, with inability to retain water; the child utters sharp cries as if in great pain, the surface becomes cold, the pulse rapid and weak, prostration ensues, and an early collapse follows, death occurring in from one to three days.

In other cases the choleraic symptoms may be preceded for several days or weeks by a diarrhœa, which is not of a character calculated to excite alarm. Suddenly the evacuations become frequent and watery, being so thin as to soak into the napkin, leaving a greenish or greenish-yellow stain, and having a peculiar, musty, offensive odor. They may also contain particles of undigested food, milk curds, and yellowish masses of mucus which turn green on exposure. At the same time vomiting of a sero-mucous fluid sets in, and everything taken into the stomach is rejected immediately, whether it be water or the nurse, the ejected matter frequently containing bile. There is excessive thirst; the tongue at first is moist and usually clean, or covered with a light fur; pulse is quite rapid, and at first full, but soon grows weak, running from 140-160 beats per minute. In the early stages the temperature of the body is natural, or very slightly raised at times, but the temperature at the surface soon becomes reduced. The stools are often painless, but usually the child whines and is restless before the evacuation occurs, as if it were in pain, and frequently the face shows a distressed expression by a line extending from the labial angle to the inside of the *alæ nasi*, and sometimes surrounding the orbicularis. Not unfrequently the abdomen is hot and more or less tympanic; at other times it is cool and retracted, and is usually tender upon pressure along the track of the colon.

The number of stools vary from four or five to twenty, or even more, in twenty-four hours. The severity of the case is not always dependent upon the frequency of the stools, the infrequency of their occurrence being often offset by excessive amounts, which drain the body of its fluids at a more rapid rate than more frequent evacuations of an ordinary quantity. The urine may become very scanty, and in severe cases it is sometimes entirely suppressed. Often an aphthous condition of the buccal cavity occurs, and an erythematous rash diffuses from the anus over the buttocks and genitals, causing so much tenderness that the contact of the irritating discharges excites pain. The emaciation is rapid and extreme. In a few days the body shrinks, the eyes are sunken and half-closed, the mouth remains partially open, the lips are dry, cracked, and bleeding, the cheeks hollow, and the face appears shrunken and pallid. The child now lies in a torpid condition, is insensible to external impressions, is only temporarily aroused by considerable effort, and apparently suffers only from the

distressing thirst which continues to the last. Even when indifferent to all else, and seemingly unconscious, when water is offered the child will raise its head, seize the cup, and drink with avidity. The body becomes cool and is covered with a clammy sweat, the eyes are bleared, and the pupils contracted. The pulse continues to increase in rapidity, and becomes more and more feeble; the respiration is accelerated and shallow from pulmonary congestion; carbonic acid poisoning ensues, producing a comatose condition which ends in death. Not unfrequently, before death, slight convulsions and other symptoms of cerebral disturbance supervene, which may result from uræmic poisoning or from that expression of cerebral anæmia which Marshall Hall describes under the term Hydrocephaloid, in contradistinction to acute hydrocephalus, an inflammatory disease which it simulates, and for which it is sometimes mistaken. In such cases the child grows restless, utters sharp, plaintive cries, rolls its head from side to side, gradually falling into a comatose state, which becomes more and more profound until death ensues.

If the termination is fatal, death usually occurs within three or four days. When recovery takes place, the duration of the disease is from two or three days to as many weeks, and sometimes inflammatory complications, usually enterocolitis, will prolong the difficulty indefinitely.

Diagnosis.—The symptoms of cholera infantum are so characteristic that the disease is easily recognized. The choleraic symptoms—profuse watery stools, severe vomiting, thirst, rapid sinking and emaciation, are sufficient to distinguish it from other forms of diarrhœa; and the seasons of the year at which it occurs, the age of the patient, and other surroundings, will serve to distinguish it from meningitis or any primary cerebral disorder. During the prevalence of Asiatic cholera it is often impossible to establish the identity of cholera infantum, but as the indications for treatment are similar, and do not depend upon the essential nature of the disease, the differential diagnosis is not of unusual importance in the treatment.

Prognosis.—The prognosis should always be guarded, and never unqualifiedly favorable. Even when the disease is apparently subdued, and the patient appears convalescing, the affection may continue as an enteritis, and ultimately prove fatal.

The hygienic conditions to which the child is subject have much to do with the result, and the nature and quality of its nourishment is an important item. Cholera infantum rarely occurs in a child nursing from a healthy breast, and when it so occurs the prognosis is much more favorable than in a bottle-fed child, or in one recently weaned. The disease must always be considered dangerous and the result doubtful, even though children seemingly hopelessly ill have made a good recovery.

According to Hartshorne,* the bad signs in cholera-infantum are extreme restlessness and jactitation, or, on the other hand, early apathy, stupor, or convulsions; incessant and uncontrollable vomiting; excessive frequency and copiousness of the discharges from the bowels; a pinched "Hippocratic" countenance, and coldness, with a blue and shrunken appearance of the extremities.

Encouraging symptoms are cessation of vomiting and diminution in the frequency and quantity of the discharges; quiet natural sleep; even temperature of the body and limbs; diminution of thirst, and a return of appetite and capacity for the digestion of food.

Treatment.—No disease offers better opportunities for, and greater encouragement in, the exercise of prophylactic measures. The child that is well fed, kept clean, removed from the ill effects of bad ventilation and sewer-gas, and not exposed to extreme heat, rarely has cholera infantum. When the mother's health allows, the child should not be weaned until after the second summer, as that is the most dangerous period of its life. If weaning before that time is unavoidable, it should always be accomplished before the heat of summer commences. The diet should then be pure fresh milk, kept perfectly sweet, judiciously accompanied by farinaceous foods. Meat, in any form, or fruit and vegetables should not be allowed until after the first year of age is passed, and even then they must be used sparingly, prepared with the utmost of care.

The child should be in the open air much of the time during the day, avoiding the early morning and late evening air as well as the intense heat of the noon hours. When the weather is at all cool or damp, flannel should be worn next the skin.

The first measure to be adopted after the invasion of the disease is the removal of the patient to some high, open, healthy locality, away from the influences which may have given origin to the trouble. The sea-shore or some mountain-resort is most desirable, or any moderately elevated locality in the neighborhood may answer, always keeping in view the necessity of a supply of pure water and of good fresh milk. Those who cannot afford such a change should take the more pains to keep the child in the open air and sunlight, with the restrictions above given. Frequent and long rides in the baby-carriage, or, still better, boat-riding are of much value to the patient. In some cities arrangements are such that children may be kept on a steam-ferry or excursion-boat most of the day, and the result is decidedly beneficial. When this is not to be had, the poor may make good use of the public parks by keeping their sick children in them for a good portion of the time.

Diet is next in importance; the quantity and quality of the food must be painstakingly watched. Mother's milk, if healthy, is unques-

* Reynolds's System of Medicine, vol. iii., page 255.

tionably the most desirable food ; in its absence, a healthy wet-nurse should be secured, if possible. Failing in this, fresh cow's milk may be used, which is to be properly diluted with boiling water, lightly salted, and sweetened with loaf or milk sugar. Cow's milk may also be diluted with barley-water and lime-water, the latter having a tendency to correct the acidity of the stomach usually present. When possible, it is best to use milk from only one cow, and a new cow is better than one that has been giving milk for a long time. When pure milk cannot be obtained, a reliable brand of condensed milk may be used. Especial care must be taken to insure the absolute cleanliness and sweetness of the vessel which contains the milk, and the bottle from which the child is fed should be thoroughly cleansed and scalded after it has been used. In cases in which milk does not agree, on account of the child's inability to digest the casein, barley-water may be used, to which a small quantity of sweet cream must be added. Sometimes a change to farinaceous food is desirable, though such a change involves a certain risk. Boiled or browned flour, Graham flour or oat-meal, thoroughly cooked and largely diluted with water, arrow-root, and gelatin often prove useful. Frequently the child craves an animal diet, and in children over a year old this craving should not be disregarded. Chicken-broth, from a fully-grown fowl, or mutton-broth, or a small piece of tender, broiled steak or mutton-chop may be allowed. I have personally witnessed the good effects obtained from the use of raw meat in this as well as other forms of intestinal disease. Tender beef is most desirable, but if the child prefers chicken or mutton, they may answer as well. Trousseau,* who recommends raw meat highly, suggests that it be finely hashed or, still better, reduced to a pulp in a mortar, and pressed through a fine sieve, so as to separate the vessels and areolar tissue. If the child manifests an aversion to it as thus prepared, the hashed meat or pulp may be rendered palatable by the addition of salt, sugar, or some kind of preserve, or it may be added to a broth made with sago or tapioca. The only objectionable feature in this diet is the danger of infection with tænia, but in severe cases this danger cannot be taken into consideration. The beef peptonoids manufactured by Reed and Carnrick may prove of excellent service. Water may be allowed frequently, though not in large quantities ; but it is much better to have the child suck small pieces of ice, which are very grateful and relieve the intense thirst without creating so much irritability of the stomach.

Stimulants are sometimes useful. A weak wine-whey, or white of egg beaten up with barley-water, to which a few drops of brandy or whiskey have been added, will often prove desirable. A few drops of pure brandy, given in a small quantity of ice-water, may check the vomiting and lessen the abdominal heat.

* Trousseau's Clinical Medicine, vol. ii.

Proper bathing is a matter of considerable importance, especially at the outset of the disease. Warm baths, as a rule, are more efficacious, but Ziemssen, and others, especially recommend a cool bath—from 65° to 85°. The child should be introduced into the water at the highest point named, and the temperature of the bath gradually reduced by the addition of cold water. The bath may continue for five or ten minutes, and be repeated two or three times a day, according to the height of the temperature. During convalescence an occasional salt bath is desirable; it must be cool enough to be grateful to the child without causing chilliness. Of course, sea-water bathing is preferable when available. In the later stages the child is too much exhausted to endure the fatigue and irritation of the bath, and only sponge-bathing should be had. In case there is coldness of the extremities and of the ears and nose, as is often the case, artificial heat must be applied. This can be done by wrapping the child in hot flannels, and by placing to the feet a hot brick or a bottle filled with hot water.

It is the opinion of the writer that the gums should never be lanced unless the membrane is so tense over the tooth as to leave the latter exposed after the lancing. I think the greatest irritation from dentition occurs before the teeth come within reach of the lancet, and to lance the gums under such circumstances is productive of no good, and possibly much harm.

Therapeutics.—**Veratrum album** is, in most instances, the first remedy to be used. It is indicated by the suddenness of the attack, the copious watery stools, the violent and excessive vomiting, the cold, clammy perspiration, especially on the forehead, and the great exhaustion following each attack of vomiting and purging. The thirst is great, but each drink excites vomiting; the tongue is cold, the pulse almost imperceptible, the face hippocratic.

Ipecac.—Nausea and vomiting predominate; stools green as grass, or fermented like yeast; face pale and puffed, or sunken; blue rings around the eyes.

Podophyllum.—Stools frequent, painless, watery, gushing, fetid or sour; yellow or green; often changing in their character, and usually worse in the morning. Especially during dentition, when the head is hot and is continually rolled from side to side.

Arsenicum.—Stools green, or dark, watery, offensive; violent and incessant vomiting of a brown substance, or of mucus and blood, excited by drinking; great thirst, but drinks only a little at a time; great restlessness and prostration; much emaciation; hippocratic face; cold extremities; distended and tympanitic abdomen. More useful in the later stages of the disease.

Camphor.—Choleraic symptoms; collapse threatening; skin cold, yet the child will not remain covered; little or no vomiting and purging, great prostration and coldness.

Cuprum.—Painful green stools; forcible vomiting or violent ineffectual efforts to vomit, relieved by drinking cold water. Especially when there is a tendency to convulsions from the beginning. Hydrocephaloid.

Iris versicolor is a valuable remedy. Stool thin, watery, copious, bilious; vomiting of a sour fluid, or of soured milk; much pain and burning distress in the epigastrium.

Consult also *Aconite*, *Æthusa*, *Belladonna*, *Borax*, *Calcarea*, *Chamomilla*, *Cinchona*, *Croton tigl.*, *Ferrum phos.*, *Kreosote*, *Magnesia carb.*, *Mercurius*, *Phosphorus*, *Silicea*, *Tartar emet.*, *Tabacum*, *Secale cor.* For the

hydrocephaloid condition which sometimes ensues, compare *Æthusa*, *Apis*, *Bryonia*, *Calcarea phos.*, *Cuprum*, *Ferrum phos.*, *Helleborus*, *Phosphorus*, *Podophyllum*, *Sulphur*, *Zincum*.

OBSTRUCTION OF THE BOWELS.

BY J. G. GILCHRIST, M.D.

By *obstruction of the bowels* is understood a more or less perfect closure of any portion of the intestinal canal, whether from traumatism or from morbid action in the intestines themselves, or in near parts. Systematic works on medicine and surgery usually give at considerable length a *résumé* of numerous morbid processes which may result in such a catastrophe, but it has seemed to me that much of it is in the nature of mere repetition, and a simpler treatment of the subject would be desirable. It is apparent that obstruction must occur from a few general classes of causes; as, for instance, plastic exudation from intestinal morbid states, compression from abnormal growths outside of the canal, the impaction of foreign material, or some accidental change in relation of one part of the canal with another. With such an arrangement, one that seems natural to me, I am of the opinion that a practical classification would be to consider such obstructions to lie in one of two classes as to causation and semeiology, *acute* and *chronic*, the former being further subdivided into *accidental* and *symptomatic*.

ACUTE INTESTINAL OBSTRUCTION.

An individual, previously in good health, occasionally, perhaps, with a history of more or less chronic intestinal irritation, is suddenly taken with a sharp pain in the abdomen, one that does not pass off speedily, but is persistent and progressive. There may be urging to empty the bowels, more or less effectual at first, but later nothing can be expelled. Enemas return almost or entirely unchanged, and yet the urging continues. On examining the abdominal surface by palpation, it will feel fuller than usual, painful at one spot, or in a limited area, with more or less sensitiveness over the whole surface, but not that peculiar painfulness indicative of peritonitis. The fulness gradually increases until there is tympanitis, soon becoming extreme, the pain increasing *pari passu* with the augmented swelling, and gradually becoming diffused, yet still with greater sensitiveness at one point, the focus from which the later symptoms develop. There will be much belching of wind, at first somewhat relieving the distension and pain; hiccough then comes on and vomiting, which towards the last becomes stercoraceous. The skin becomes dry, at first, later is clammy and cold, the sweat having an offensive fæcal odor. The breath is likewise

of fæcal odor; the face is pale, and the countenance denotes great distress and anxiety. The urine is often suppressed, although at times it is increased in quantity and micturition frequent. The mind becomes increasingly disordered, until profound apathy, in some cases even some delirium, is present. If the symptoms are not relieved and the case is progressing towards a fatal termination, the fæcal odor of the perspiration, exhalations and breath changes to a cadaverous or gangrenous one, and the apathy becomes a coma. In some cases recovery ensues even when the above grave symptoms come on, but as a rule, death is almost certain. In lighter cases, the symptoms being the same in kind but less in degree, recovery is slowly assured; but even in such instances the whole complexion of the case is one that causes the observer much concern.

A comparison of the above with the symptoms of hernia shows a remarkable similarity, and a study of the pathology does not lessen the resemblance. The conditions are almost, if not quite, identical, there being a constriction of the intestine in some way, all the more dangerous from the fact that the lesion is concealed, and can only be recognized as a variety of a class of accidents.

Acute obstruction being pronounced, some external signs sometimes appear. If the abdomen is too sensitive to be properly explored, an anæsthetic may be used, and almost invariably a "sausage-like" tumor can be felt, which should be considered diagnostic. After the tympanitis becomes considerable, it is manifestly impossible to detect the tumor through the walls of the abdomen. In such cases it may be felt through the rectum or vagina. There are some points of interest as to differential diagnosis, many of which, however, will need notice later. The sudden onset of the attack resembles renal colic or peritonitis, peri-typhlitis, or passage of gall-stone. The pain usually occurring in the right inguinal region, acute obstruction oftener being at the lower portion of the ileum, there are many reasons for mistaking the condition in the earlier stages. The tympanitis, localized pain, eructations of gas, fæcal odor of the exhalations and vomiting, particularly when stercoraceous, should serve to render a diagnosis reasonably clear, more especially when the symptoms occur in a child.

Pathology.—In my own practice I have seen eleven cases of acute intestinal obstruction, and my case-book shows that eight of these occurred in children under two years of age. One was in a woman of about seventy, one in a man of thirty, and the other in a man about twenty-five. The cases among children all recovered, without any operation in seven of them; the cases occurring among adults all proved fatal. This seems to be the usual experience of the profession, at least as to the question of age; in fact, I believe that cases occurring in infancy, also, are less fatal than when later in life. As to sex, among adults I have seen one woman and two men, the children

were all female. The experience of others in this respect, so far as I am able to conclude, is somewhat similar.

In the acute forms obstruction occurs from intussusception, volvulus (or twisting), internal hernia, or intestinal paralysis from traumatic lesions. Taking together all forms, acute and chronic, Pollock, according to Keetley (*Index of Surg.*, p. 148), tabulates 135 cases, from which it appears that "24 arose from intussusception, 36 from bands, diverticula and the like, 33 from intrinsic stricture, 8 from internal hernia, 7 from concretions, calculi and foreign bodies, 4 from volvulus of sigmoid flexure, 3 from fecal accumulations, 9 from peritoneal adhesions, tubercle, etc., and 8 were doubtful." It thus appears that 51 cases were acute in character, assuming the "8 doubtful" to be without apparent cause, and 84 chronic. This table might be quoted to argue the preponderance of cases in the adult periods of life, as chronic affections leading to stricture are more common among those who have passed the age of childhood. I am willing to allow it to thus stand, although my own experience and that of professional friends would lead to a different conclusion.

Intussusception is a condition in which one part of the intestine is drawn into a part below it, "telescoping," as it is otherwise called. This may occur at any part of the intestinal canal, oftener, however, at the lower portion of the ileum. The cause is usually a violent peristaltic action, whereby a portion is slipped into a lower part of its own body, so that at the point of invagination there are four thicknesses or layers of intestinal tissue. If the peristalsis is continued, the invagination may be increased until the ileum is drawn into the colon, which last may also become inverted from the irritation consequent upon its unwonted contents, until the ileo-cæcal opening may present at the anus. I have seen one such case, a patient of Dr. R. C. Olin, of Detroit, an infant a year, or so, of age. In this there was some sloughing of the constricted portions, and a perfect recovery; in fact, the child was better in health than it had been from its birth, a habitual constipation having disappeared. Intussusception may likewise occur from the traction of tumors growing in connection with the intestine, more particularly, as in the case of the rectum, when a polypus grows from the mucous surface. Accumulations of feces, or foreign bodies of various kinds, may likewise be causative. Under such circumstances invagination may occur at any point, but the chosen seat is at the lower end of the ileum, in these cases as well, from the nature of the part predisposing to the arrest of foreign material and the formation of tumors.

The natural history of intussusception shows that the tendency is to take on inflammatory action, contract adhesions, the constricted portion then sloughing off, to be discharged *per anum*. Cases are on record of large masses of intestine coming away in this manner; in

one case some feet of the ileum, together with the cæcum and five inches of the colon, came away in a stool, and the patient recovered. (*Trans. Califor. Hom. Med. Soc.*) Gant (*Science of Surgery*, p. 980) gives the results in "24 cases of intussusception, occurring at various periods of life, from two months and a half to fifty years of age," as follows: "13 of the patients died unrelieved, some as early as three days, some as late as forty days, from the commencement of the symptoms. But in the other 11 cases the invaginated pieces of intestine sloughed and were passed by stool. Of these cases, only 2 died soon after the passage of the slough; the remaining 9 entirely recovered. The patients who recovered were ill for periods varying from five to thirty days, and their ages ranged from six to fifty years." In my own cases the adults perished in from one to four days; in the cases among children sloughing occurred in seven, and one recovered without any appearance of a slough.

Volvulus, or twisting of the intestine, seems to occur next in frequency to intussusception. It is more commonly met with in the colon, particularly in the sigmoid flexure. This form of obstruction is produced in three ways: In the *first*, the bowel is twisted or rotated on its own axis, sometimes more than one turn being made. This form is peculiar to the colon, in fact, cannot well be produced in any other part of the canal. It is caused, in a majority of cases, by such injuries as being whirled around in machinery; it can scarcely occur from causes operating within the body, although it has been said to be the result of the traction of tumors, particularly when pendulous. In the *second* variety the mesentery becomes twisted, twisting loops of small intestines with it. This is likewise produced by accidents that violently rotate the body. The *third* method is when one portion of intestine is twisted around another. As far as results are concerned, they are about the same in these cases of *volvulus* as in intussusception. Inflammation occurs, adhesions are formed, the parts involved become strangulated, producing death or sloughing.

Internal hernia is a form of obstruction which is thought to be quite common. It is produced by forces causative of hernia generally, viz., a violent contraction of the abdominal walls, reducing the capacity of the cavity. The peritoneum or mesentery is ruptured, and a portion or knuckle of the intestines is forced through the opening, becoming strangulated. The rupture of the peritoneum is accompanied with great pain, and the resulting peritonitis, added to the intestinal obstruction, produces symptoms of the greatest urgency. This form of obstruction is more rapidly and surely fatal than either of the preceding; in fact, recovery is almost an impossibility. Strangulation to a degree which causes obstruction (and any constriction sufficient to retain the intestine in the opening in the peritoneum will cause this) must be followed by sloughing. Sloughing, under these circumstances,

almost inevitably destroys life, even if the patient survive long enough to give time for detachment of the dead tissue. A slough being thrown off is usually retained within the abdomen, external to the peritoneum, not only as a foreign body, but a decomposing one—thus adding vastly to the violence of the peritonitis. Furthermore, and perhaps of the first importance,—this separation of dead tissue does not restore the patency of the intestinal canal. The two extremities are either retained in the peritoneal opening, or, should they drop back after the detachment of the slough, the contents of the bowel are discharged into the peritoneum, rendering more dangerous a state that is already well-nigh hopeless.

Intestinal paralysis is spoken of by some authors as an occurrence somewhat frequently following certain spinal lesions, but the records are not sufficiently authentic to base upon them any theory. Paralysis might very easily permit volvulus, if the intestines were held in position by a contracting force, such as muscular effort. As a matter of fact, they are purely in a state of suspension, and paralysis could not, as far as I am able to see, have any result or influence in producing obstruction. From what I have read in some of the larger systematic works on surgery I am led to believe that those who thus speak of paralysis as a causative factor have misinterpreted their authorities. It seems evident to me that paralysis of the intestines is productive of retention of fæces, which causes obstruction by blocking them up, and should thus be classed in the chronic group. The loss of peristalsis can only, it would seem, cause obstruction in this way.

A glance at the various causes producing intestinal obstruction readily shows that, after traumatism, peristaltic action is oftener prominently concerned. There are many minor accidental factors, not mentioned in the above category. Thus, purgative medicine, severe diarrhœa or dysentery, and, under some circumstances, constipation would greatly increase the peristaltic action, and predispose to intussusception. An accumulation of hardened fæces, as in the sigmoid flexure, would favor the production of volvulus, and so on through a long list.

Foreign bodies in the intestinal canal may produce obstruction in two ways. Their bulk may constitute a perfect and complete obstruction. Their presence may excite a muscular irritability that results in a spasmodic stricture. Foreign material does not always, or necessarily, come from without the body; excrementitious material, produced within the body, if retained beyond a reasonable period in the canal, becomes foreign, to all intents and purposes. More than this, it may be, and is, the most dangerous of any form of purely mechanical occlusion, as, joined to the dangers associated with all kinds alike, we have an obstructing element here of putrefiable material, whereby septicæmia, or some other form of toxæmia, may be produced. Whilst

a foreign body, introduced from without the body, may be insoluble, and of a size to at once prevent the passage of the contents of the bowel, yet it has no toxic characters, and is, perhaps, more readily removed.

The termination of these latter forms of obstruction, impaction of foreign material, is often in ulceration and sloughing of the intestinal walls in relation with them and the passage of the offending body into the abdominal or pelvic cavity. In some cases adhesions have occurred between the intestine and the abdominal walls, and the foreign substance is cast out by suppuration. When it escapes into the abdominal or peritoneal cavity, inflammation and suppuration are necessarily the consequence.

Prognosis.—Gant's summary shows a mortality of 15 out of 24, a fact that leads me to infer that death resulted from conditions secondary upon the intestinal obstruction. He tells us that "13 of the patients died unrelieved," a little more than half. Two others died after the constricted intestine had been cast off. In my own list of 11 cases the recoveries were 8, almost reversing Mr. Gant's conclusions. It is perfectly natural to attribute this better showing to the aid furnished by homœopathic therapeutics; it is not impossible, however, that there were differences in the cases more than sufficient to account for the differences in results. I am the more inclined to believe this to be the case for two reasons: first, the records generally bear testimony to the exceedingly fatal character of the accident; and secondly, there is little for remedies to accomplish. At the same time, recovery sometimes occurs under circumstances that would forbid, apparently, any hope of a cure. It may be stated that when sloughing of the constricted portion occurs, and it is discharged from the body, the prognosis is usually good. When sloughing occurs and the dead tissue is left within the body, the prognosis is correspondingly bad. One case which I saw had inversion of the colon to an extent that permitted the ileo-cæcal opening to appear at the anus, and yet recovery was secured. No reason could be assigned for the favorable result, certainly there were no indications for remedies. The strangulated portion of the ileum sloughed, and even an improvement in the former health was observed.

Treatment.—Intestinal obstructions of all kinds, but particularly those of the acute variety, lie eminently within the domain of surgery. The only means of relief that are at all certain are formidable surgical operations, more particularly laparotomy and excision, or whatever may be required, of the obstructed bowel. In studying the natural history of the accident, more particularly its pathology, it must be at once apparent that remedies can have very little influence in the pronounced forms. With intussusception of a minor degree, coming on as a complication of diarrhœa or dysentery, it is possible, nay,

probable, that remedies, by moderating the violence of the unusual peristaltic excitement, may relieve the constriction. But when the constriction is severe, or a considerable portion of intestine is involved, the plastic adhesions induced by the inflammation forbid any hope of reposition unaided by mechanical means. The only hope of a continuance of life is in the early sloughing of the constricted portion or in its release by a surgical operation. I presume there is little question that many cases of a minor degree of constriction have been unwittingly cured. Probably many a case has been diagnosed as "bilious," or some other kind of, colic, and *Colocynth.*, *Stannum*, *Belladonna*, *Nux vomica*, or *Podophyllum*, have relieved all the symptoms. At an early stage it is difficult, if not absolutely impossible, to make a diagnosis, and remedies given on ordinary indications may have produced cures, curing a condition unrecognized by the prescriber. Later in the case, with the pathognomonic symptoms plainly pictured, I do not know how or in what manner remedies can possibly exert any influence. I have seen them employed, more than once, by the very best prescribers, and invariably without result. To illustrate, I made a post-mortem examination, in 1864, for Dr. H. N. Guernsey, a man who has a large reputation as a skilled prescriber. Even his exceptional skill was powerless to save the life or to relieve the sufferings of his patient, a young man, who had been in previous good health and vigor. I am forced to refer to works on surgery, therefore, for details of the treatment of acute intestinal obstruction, admitting, at the same time, that the minor degrees or recent cases may possibly be relieved, if not cured. The remedies that would seem to have the closest relation to the condition, in addition to those mentioned above, would be such as give violent peristaltic action, as drastic purgatives, particularly whose subjectivity includes violent and localized abdominal pains. These are, among others, *Aloes*, *Arsenicum*, *Croton tig.*, *Palladium*, *Plumbum*, *Platinum*, *Cuprum acet.*, *Veratrum album*, perhaps *Chamomilla*, and other remedies more exceptionally useful in colic. The generation of free gas in the intestines, what Dr. Danforth, of Milwaukee, calls the "soda fountain" treatment, has been successfully employed once or twice. While such treatment will probably be very successful in recent cases, where there are either no adhesions or the constricting force is feeble, in cases of a different sort, where adhesions are firm and many, and where the constriction is severe, there is danger of rupturing the intestines, and thus converting a case perhaps capable of recovery, into an utterly hopeless and irremediable one. Pumping air into the rectum has always enjoyed a reputation which appears undeserved; still, as compared to free gas, it is a perfectly harmless procedure, and might succeed in a mild case. Cases have been relieved by passing a long rubber tube up the rectum and through the colon, and injecting fluids or air through it when the point of stricture is reached. When air or

gas is used, success is announced by the rush of the gas out of the mouth, as well as the sudden subsidence of pain. The pain does not cease at once upon the removal of constriction, the bruised and inflamed parts remaining painful for some time, and sensitive to pressure still longer. Notwithstanding the negative results of remedies, at least as indicated in our most authentic records, the physician should not neglect their employment; they may possibly, I repeat, be of service in cases of a minor degree of severity. Reliance must never be had on them alone; such expedients as have been hinted at above must be employed. As soon, however, as it becomes very apparent that relief is not to be attained by any of these measures, the aid of the surgeon must be called. This aid must not be postponed too long. Remembering that the fatal cases are those in which surgical measures have been delayed until the patient was almost in *articulo mortis*, and that "nature's cure," sloughing, does not invariably avert death, the surgeon should see such cases *early*. If gastrotomy is to be performed, it is successful when made while constitutional disturbance is small and insignificant. Peritonitis, extensive gangrene, and the like, very greatly jeopardize the success of an operation.

The common indications of remedies which seem to have a relation to acute intestinal obstruction, are as follows:

Aloes.—In elderly people, with intense griping pains across the lower part of the abdomen, oftener on the right side; flatulent, watery stools.

Arsenicum.—Violent cutting, or spasmodic, drawing, tearing or gnawing pains, frequently attended with intolerable burning, or with feeling of coldness in the abdomen; thirst (for small quantities) and great weakness.

Belladonna.—Colic as if a spot in the abdomen were seized with the nails; griping; clutching, or clawing; pains come and go suddenly; tenderness to slight pressure, but relief from strong pressure.

Chamomilla.—Sensation as if the bowels were drawn up into a ball; griping, tearing colic in the umbilical region, and lower down on both sides, with pain in the small of the back as if it were broken. Hard pressure on the painful point relieves. (*Bell.*, relief from pressure over the abdomen generally, a *diffused* pressure.)

Colocynthis.—Violent cutting and tearing colic, as if cut with knives; pain intense, obliging one to bend double. The pain radiates from a central point, and is renewed or aggravated by every motion; relieved by hard, firm pressure on the centre of pain.

Croton tigli.—Colic, with sudden, profuse, and watery stools; "stools come out like a shot."

Cuprum acet.—Abdomen is drawn in, with violent cutting or drawing pains; unchanged by pressure; spasmodic contractions of the abdominal muscles.

Nux vomica.—Colic, with violent pains in the small of the back; soreness and lameness of the abdominal muscles on motion or on touching. Stercoraceous vomiting and singultus, signifying strangulated hernia, and commonly supposed to indicate this remedy.

Palladium.—Violent colic, more on the right side, growing worse under continuous eructations; can only endure the pain when lying on the left side; cramps in the extremities, and somewhat relieved from moist heat.

Podophyllum.—Cramping pain, with retraction of the abdominal muscles; stools profuse and very offensive, dark color.

Platina.—Continuous, severe, contracting pain, chiefly in umbilical region, extending through to the back.

Plumbum.—Severe, contracting pain, the muscles being drawn in; clawing and twisting pains about the umbilicus, radiating upwards and downwards.

Stannum.—Pinching colic, with tonic spasms of the muscles, obliging to bend double, or press the part against a hard substance, as a chair or corner of a table.

Veratrum alb.—Abdomen swollen, sensitive, cold sweat, and general coldness; cold feeling in the abdomen; cold breath; cramping, twisting or cutting pains.

CHRONIC INTESTINAL OBSTRUCTION.

Chronic obstructions of the intestines include morbid processes that are slow and progressive in their action, and while the later symptoms, those of complete occlusion, are the same as in the case of acute obstructions, yet the prodromal and earlier symptoms are very different. These early symptoms vary greatly, as a matter of course, having more relation to the morbid action, of which they are an expression, than to the condition of the intestines themselves. Some brief notice of these conditions will, therefore, be necessary. They may be grouped under the following heads: Strangulation by bands or diverticula, congenital or acquired; Strictures of various forms; Pressure or dragging from tumors; Impaction of fæces, or slowly accumulating foreign material.

Symptomatology.—The symptoms of various forms of morbid action which result in obstruction of the bowels, are those peculiar to the particular form of morbid action; it is very rarely the case that those of intestinal obstruction appear at the same time that other symptoms do. It is impossible, therefore, to treat of these prodromal symptoms, as they may be called, at this time, inasmuch as it would involve a more or less lengthy description of much that has already been considered in other portions of this work. When the morbid action has progressed sufficiently to affect the intestines injuriously, to diminish their calibre, and to alter their walls or tunics, other symptoms arise, generally obscure in their nature, and varying somewhat with the part of the canal implicated. Thus, with the morbid action operative in the duodenum or jejunum, or in the upper part of the ileum, there would be primarily diarrhœa, perhaps vomiting, or some other indication of gastric irritability. Should the vomiting occur after a time sufficient to allow the food to pass into the intestines, some idea of the locality of the lesion can be formed. When it occurs earlier, as is very often the case, there is much difficulty in determining whether the lesion is in the stomach or lower down, the presumptive evidence pointing to the stomach. The stools, when diarrhœa occurs, usually present some evidence of value. The appearance of mucus, pus, blood, or shreds of membrane, would indicate a lesion of the cæcum or colon. If examination excludes the colon, the lesion is located in the small intestine. Should there be cellular elements, pathognomonic in kind, the character of the lesion can be made out as well. When the constriction has become considerable, there will be very often an accumu-

lation of gas interior to the stricture, and quite frequently a lodgement of a portion of the contents of the bowels, which may gradually assume the form and other characters of a tumor. The constriction finally becoming pronounced, the difficulty with which the ingesta pass that point will quite often establish a diagnosis. The violence of the peristaltic action consequent upon this obstruction, the accumulation of gas and other material at the point of constriction, give rise to peculiar symptoms, the so-called "phantom-tumor," which ignorant people mistake very often for a live animal that has found its way into the body. I have seen one very ludicrous mistake of this nature, in which a physician was with the greatest difficulty restrained from opening the abdomen to secure this intruder, desiring to exhibit it as a curiosity in a museum. When obstruction becomes complete (if it should do so during the life of the sufferer), the accumulations interior to it, the absence of any fæcal substances in the discharges from the bowels, and the vomiting of stercoraceous matter, combine to render a diagnosis comparatively easy. In later stages of the disease there is much emaciation and prostration, suppression or diminution of the urinary excretion, and every indication of profound lowering of vital energy. With all this will be mixed up the symptoms of the form of morbid action responsible for the obstruction, and which does not now concern us.

The seat being in the colon, the symptoms are somewhat different. The changes in the stools here are in the direction of constipation, or, should there be diarrhœa, it is dysenteric. Later in the case, however, as far as proper fæcal matter is concerned, there is positive constipation, retention of stool. There may be much urging to stool, and a passage from the rectum of mucus more or less bloody or purulent, but there are no fæcal movements whatever. The colon becomes increasingly distended with the accumulated dejecta, and when emaciation is considerable, which soon becomes the case, it can be felt as a hard, sausage-like mass throughout its extent. The fulness will first be observed immediately interior to the point of obstruction, and extend from this point, in daily accessions of size from left to right, and, on the right side, from above downwards. The exhalations and breath then have an offensive fæcal odor, the tongue becomes furred, sordes may accumulate on the teeth, tongue and lips, the tongue becomes dry and parched-like, the eyes dull and lifeless, the mind impaired, and all the bodily functions become more and more disordered.

In chronic obstructions, whether in the large or small intestines, there is little pain arising from the condition of the bowels; what pain there is, is associated entirely with the causative morbid action. Even late in the case, when the bowel is completely occluded, pain is neither constant nor severe. This is accounted for, to some extent, from the gradual progress of the distension, the parts having opportunity to

accustom themselves to the new relation of things, and from the loss of sensitiveness due to distension. Even the natural feeling of fulness, which is often distressing, gives way, after a time, and as the fluid portions become absorbed, or otherwise disposed of, the distension is partly relieved. The pain which occurs is temporary and fugitive, caused by accumulations of gas.

Apart from the symptoms connected with morbid conditions at the bottom of the trouble, the case is of a character to baffle the skill of the most expert diagnostician. When the stools become deficient, day by day more and more scanty, attention is directed to the bowels; soon after, however, the distension of the parts interior to the constriction, and other symptoms noted above, become so marked and prominent that it is difficult to err.

Pathology.—As was the case with acute intestinal obstruction, a discussion of the pathology includes rather more ætiology than pathology pure and simple. This is not because the pathological states are not marked and characteristic, but because the lesions giving rise to the obstruction is the point of chief interest, and these have already been considered in their proper place. Taking the list of varieties already given as typically representative of the innumerable causes, I will very briefly allude to them in the order of their presumed frequency.

Bands or *diverticula* often cause obstruction. These may be accidental or acquired. They are accidental when plastic organization results from inflammation, either of the bowel or near parts. They also occur from injuries followed by cicatrization. They are congenital, usually in the form of diverticula, from malformation, or arrest of development. It is possible, as some have asserted, that injuries sustained *in utero* may produce obstruction. In the majority of congenital cases the obstruction seems to be either in an unusual flexure of some part of the intestinal tract or in a termination of the bowel in a cul-de-sac. In other cases there is no opening into the colon, the ileum terminating impervious.

Stricture is a very common cause of obstruction. Perhaps a purely spasmodic closure is rare, apart from the impaction of a foreign body, and yet there seems to be good evidence that it is possible. A foreign body remaining for some time impacted will be the cause of sufficient irritation to produce a sensible constriction from purely muscular contraction. To be sure, the swelling and engorgement of the mucous membrane will have the effect to make the stricture appear more pronounced. Should the constriction continue for any time, however, there will be exudation and more or less plastic organization, which may perpetuate the obstruction. More particularly is this the case should there be any erosion of the mucous surfaces or ulceration, or any kind of lesion that would be healed by cicatrization. It is thus

apparent that while a purely spasmodic stricture, if unassociated with a structural lesion, should not necessarily leave any organic constriction behind it, yet if from any cause there has been plastic exudation, a permanent impairment of structure will follow. Cicatrices from wounds or ulceration, from the well-known contracting properties of scars, are exceedingly liable to produce strictures of more or less tightness. This is eminently true of carcinomatous ulcerations. A slight stricture, non-malignant, may induce obstruction by what is called "*Pouching*" of the intestine. A stricture which extends deeper than the mucous coat, one which involves the submucous tissue or the muscular layers, must be a serious impediment to the passage of the contents of the bowel from the loss of peristaltic power. In such a case there is a danger of a portion of the substances passing through the bowel becoming arrested on the proximal side of the stricture, and forming the nucleus for a collection that may become enormous. The intestine at this point will gradually become distended, sacculated, and by traction expose the gut to danger of volvulus, or close it by the traction alone.

Tumors of all kinds, growing outside of the intestinal tract, may close the canal by pressure exerted directly thereon. If carcinomatous, they invade the tissues, as already described in another place. If attached to the internal surface, particularly if pendulous, they close the canal by their volume, or by traction produce intussusception. When growing from the subserous side, they predispose to volvulus, and also to closure of the tube by mere traction.

Impaction of feces or other slowly accumulating foreign material occurs, for the most part, at the sigmoid flexure, the ileo-cæcal opening, or at some part of the canal where a sharp turn is made, or some narrowing of the tube occurs. Even should the accumulation not be sufficient to fill the intestine, pouching may occur, and volvulus or obstruction by traction. When the foreign material is hard, or becomes so by the removal of the watery or fluid portions, there is additional danger of erosion of the mucous coat, ulceration, gangrene, or rupture of the intestine.

The above may be esteemed as a fairly typical classification of causation and pathology. As a matter of course, a minute classification would include many conditions not noted; and yet there can scarcely be a case of chronic obstruction of the bowels that will not fall naturally into one or the other of these classes.

Prognosis.—Prognosis is uniformly bad, more particularly when the cause lies in some kind of morbid action. When accumulations of feces or other foreign material can be made out early in a case, life may be preserved; so also with constriction from cicatricial contraction. Unfortunately, however, an early diagnosis is next to an impossibility, save in very exceptional instances. This fact alone would

make the prognosis very unfavorable, but even with the facts reversed, the condition would be very little changed for the better.

Treatment.—If acute intestinal obstruction falls within the domain of surgery, of which there can be no question, certainly it is eminently true of the chronic form. No matter what the lesion may be which antedates the stricture or obstruction, once produced, it is a case for the surgeon alone. If a cure can be secured at all, it must be through an operation of some kind, often one of the most formidable character. The only instance in which medicine may be supposed to have any value would be a cicatricial stricture resulting from ulceration or injury. Here *Silicea*, given on general principles, may exert a beneficial influence from its property to loosen up cicatricial adhesions and to metamorphose scar-tissue. Given on these indications, immediately after the cure of an ulceration, it is possible to avert subsequent contraction. Later in the case, when the stricture has been developed, and there is considerable dilatation of the gut interior thereto, *Silicea* must be counted out of the problem.

As far as the physician is concerned, his indications are plain, but, alas! not as easily fulfilled. Thus, if there is foreign material impacted at any point, it must be removed. If morbid action is the cause, it must be attacked. The morbid action being carcinoma, the case may be considered hopeless. When the obstruction has become pronounced, and assumes the first place in the case, the surgeon must be employed. Laparotomy must be made, the constriction found, and if possible removed. The means to be employed for this purpose are outside of our present inquiry, and the reader must go to the works on surgery.

HERNIA INTESTINALIS.

BY J. G. GILCHRIST, M.D.

The term *hernia* is used to indicate a protrusion of viscera from any of the great cavities of the body, whether through natural outlets, as the canals for the passage of vessels, or accidental openings. By common consent, in modern times the term, unqualified by some prefix, refers particularly to protrusions of abdominal viscera, more especially the intestines or omentum. In the present place, in view of the fact that the condition is almost entirely of surgical interest, it will not be attempted to present an exhaustive treatise on either pathology or therapeutics, more particularly the latter, inasmuch as the vast majority of cases demand mechanical or operative treatment, whether for cure or palliation. The subject is one that has always engaged the interest of medical practitioners, and the literature is exceedingly voluminous. Much of this literature is burdened with obsolete and

barbarous terms, terms that are only used to-day in systematic treatises, it appears, more for the purpose of showing the writer's familiarity with this literature than for any useful purpose. Simplicity, as to classification at least, will, therefore, be sought in the present instance, and many of these time-honored terms will be ignored.

Abdominal or intestinal hernia may be described as a tumor suddenly appearing at some part of the abdominal parietes, or near neighborhood, or one existing from birth, soft and more or less compressible, globular or pyriform in shape.

In studying these protrusions it is essential, both as a matter of diagnosis and for therapeutical purposes, that some rational form of classification should be adopted. *Herniæ*, accordingly, are classified first with reference to location; second, to contents of the tumor; third, to duration; and fourth, as to reducibility.

Location.—A hernia protruding through the inguinal ring is known as *inguinal hernia*, and may be *direct*, *oblique*, or *straight*. It is *oblique* when the viscera enter the internal abdominal ring, pass along the inguinal canal, in company with the spermatic cord in men (or the round ligament in women), and emerges through the external ring. It may descend in the one case into the scrotum, being then known as *scrotal hernia*, or, in the other case, into the labia majora, then called *puddental hernia*.

Inguinal hernia is *direct* when the protrusion occurs through the external abdominal ring at any point internal to the epigastric artery; in other words, when the intervening tissues are pushed before the viscera, and do not enter at the internal ring, thus not occupying the inguinal canal.

Straight inguinal hernia exists when from long standing of the malady the internal ring is dragged down opposite the external, thus obliterating the canal and forming a direct opening into the abdominal cavity.

The significance of these varying conditions lies in the following: Indirect or oblique hernia is likely to be of recent or non-traumatic origin, or the result of some congenital or hereditary defect. It is, therefore, more likely to yield to mild methods of treatment. When it is *direct*, on the other hand, it is nearly always traumatic, and implies such a change in the relation of the parts involved that some radical surgical measures are likely to be demanded for its relief. A *straight* hernia is always an old one, and represents a condition of the mesentery which forbids all hope of a retention of the mass within the abdomen, and the indications for treatment are, therefore, largely for palliation.

Should the tumor appear below Poupart's ligament, it is in relation with the femoral or crural canal, and is known as *femoral hernia*. When through the ischiatic notch, it becomes *ischiatic hernia*. At the

umbilicus it is *umbilical hernia*. And when it appears directly through the abdominal walls, not through a natural or existing outlet, it is spoken of as *ventral*.

The same significance attaches to this classification as in the case of the inguinal varieties. Thus an *umbilical hernia* is usually congenital, and represents a structural defect in the parts involved. A *femoral hernia* is practically of the same character as the oblique inguinal, being oftener found in women, however, as the inguinal canal is less likely to remain patent with women than men. *Ischiatic hernia* is to be considered of the same class, as there is a natural opening. *Ventral hernia*, on the contrary, is always a result of traumatism.

Contents.—The second classification refers to the contents of the hernial protrusion, and is particularly useful as furnishing data for prognosis as well as therapeutics. Should the contents be entirely intestines, it is called an *enterocele*; if omentum, *epiplocele*; should both intestine and omentum be present, the term *entero-epiplocele* is used. As to *prognosis*, life is less immediately threatened in cases of epiplocele than when the intestines are involved. As to curative measures it may, in exceptional cases, be proper to remove an obstinate epiplocele, a procedure that could rarely be justified in cases of enterocele. As to the differential diagnosis, it may be noted in passing that when a hernia can be reduced, if the act is accomplished with a gurgling sound, it is likely to be enterocele; if with a sucking sound, epiplocele. The sounds in cases of entero-epiplocele are rarely diagnostic.

Duration.—Thirdly, hernia is classified with reference to its duration. When recently produced, it is called *recent* or *acute*, and represents often a condition of traumatism, with good promise of curability. When of long standing, it is known as *ancient* or *chronic*, and represents a condition of the parts in which long traction, or other causes, has more or less permanently placed the condition beyond the hope of curability. Furthermore, an ancient hernia is either *congenital* or *acquired*. In the former case we may expect to find a structural deficiency that may prove irremediable; in the latter, the parts may be altered by the long standing of the hernia, but not necessarily of a kind or degree of alteration that forbids more or less perfect restoration.

Reducibility.—Lastly, hernia is classified with reference to the ease with which it may be reduced, or its practicability. When the mass is readily returned within the abdomen, it is spoken of as *reducible*. When such reduction is impossible or difficult, it is called *irreducible*, or partly so. Irreducibility may be due to the existence of adhesions and may be absolute, when the term *incarcerated* is to be preferred. It may, again, be of an acute character, either from inflation of the prolapsed bowel with air, or distension from fæces, or the

contraction of the tissues surrounding it, when the term *strangulated* is used.

This classification may be arranged schematically as follows :

- | | | | | |
|---|---|--|---|--------------------------------|
| 1. Location. —Inguinal | { | Direct.
Oblique
Straight. | { | Scrotal.
Pudendal. |
| | | Femoral.
Ischiatic.
Umbilical.
Ventral. | | |
| 2. Contents. —Epiplocele.
Enterocele.
Entero-epiplocele. | | | | |
| 3. Duration. —Recent, or acute.
Ancient, or chronic | | | | |
| | | | { | Congenital.
Acquired. |
| 4. Reducibility. —Reducible.
Irreducible | | | | |
| | | | { | Incarcerated.
Strangulated. |

Semeiology.—Before studying the pathology of hernia, it is necessary that the symptoms should be described. It will be a natural arrangement to consider incarceration or strangulation the usual termination of a hernia, as is to some extent the case. For convenience of description, also, I shall consider the symptoms under two heads, the reducible and irreducible forms.

Reducible Hernia.—It must be laid down as a truism that, under all circumstances, the existence of a hernia is a constant menace to the life of the individual. Even an old hernia, readily reducible, may easily become strangulated, and the sufferer be placed in imminent danger of death. So plainly is this indicated that applicants for enlistment in either the army or the navy are rejected at once if they are subjects of the smallest hernia, reducible or otherwise. Hence the student must not fail to realize the exceeding gravity of this accident, and the practitioner is bound to use his best efforts to secure a repair of the injury. While certain symptoms are common to all forms of hernia, yet it is not impossible to be led into a diagnostic error, under favorable circumstances. In recent cases, perhaps, there is little danger of this if the history of the case is carefully scanned; but in chronic cases, particularly when incarcerated, it often requires very careful study to arrive at a proper understanding of the case. I shall, therefore, subdivide our subject and consider the acute and chronic varieties separately.

(a) *Acute reducible hernia* usually presents the following history :

An individual presents himself with a more or less painful tumor in the groin or elsewhere, that has come on suddenly after some sudden or unusual muscular effort. There was no swelling in the region antecedent to the accident, and no history of inflammation or other morbid action. The tumor is usually quite regular in form, more or less globular, quite elastic, and is in a locality that would suggest hernia, as the supra-pubic or crural triangle. On lying down and maintaining the recumbent posture, the tumor will diminish in size, perhaps disappear. On resuming the erect posture it will reappear, or become larger. On straining, as at stool, the size will often become greatly augmented. Grasping the tumor with the hand, and directing the patient to cough, will, in the case of enterocele, communicate an impulse to the hand of the examiner. Finally, on making pressure on the tumor, in the direction of the canal with which it is in apparent relation, should it disappear, and evidently through the canal, a diagnosis may be considered as established. In the case of men, particularly young men, the scrotum should be examined for the testicle on that side. In one case I found a truss worn to keep up a testicle that had been delayed in its descent, under the supposition that it was a hernia. In acute cases there is usually increasing pain as long as the hernia remains unreduced, with a feeling of tension or dragging. All these symptoms should disappear in reduction of the hernia. It is dangerous, also, to permit a hernia to remain long unreduced, as the protruded intestine may become distended until it cannot be returned, and strangulation or incarceration result.

(b) *Chronic reducible hernia* will usually give somewhat different symptoms, and the history will sometimes be necessary to make out a perfectly satisfactory diagnosis. In the large majority of cases, however, the symptoms are unique and pronounced. Patients suffering with chronic reducible hernia usually protect themselves by a truss, and it is only occasionally and by accident that protrusion occurs. Subjectively, there is a feeling of weakness or insecurity about the parts, about the inguinal or femoral ring, as the case may be, and the individual is often prompted to wear a truss as a precautionary measure. When, from any reason, protrusion occurs, the symptoms are similar to those of acute or recent cases, with the exception of pain; as a rule, such people are sufficiently familiar with the accident to reduce it themselves. It is, consequently, an unfrequent occurrence that a surgeon is called in on such occasions. But should the truss become ineffective, medical advice is sought to produce a radical cure, if possible. So, also, in cases of strangulation. When one testicle is absent, there is a coexistent hydrocele, or varicocele, or some other morbid or abnormal condition of the parts, and a diagnosis may be difficult; in fact, it can often only be reached by a prolonged examination under an anæsthetic, and a careful study of the history. Thus a his-

tory of former hernia which was supposed to give place to some other morbid condition, would lead to a suspicion of its continuance, more particularly should the inguinal or femoral opening be unusually large or patent, and should there be a noticeable increase in the protrusion while standing, and a diminution while lying. The long-continued use of a truss very considerably alters the appearance of the parts; usually the integument becomes thickened and somewhat discolored; the interference with the venous circulation, particularly in cases of inguinal hernia, causes stasis, and varicocele is a common result. Other local changes may occur which, in progress of time, assume such prominence that it may become anything but an easy matter to settle the question of hernia. As a rule, however, the variations in size and the feasibility of reduction, particularly the reduction occurring in the direction or axis of one of the common hernial canals, remove much of the difficulty.

Sarcocele, hydrocele, hæmatocele, and varicocele may be mistaken for hernia, or, existing in connection therewith, may complicate a diagnosis. I will endeavor to give the differential diagnosis in a comparative table:

HYDROCELE.	VARICOCELE.	SARCOCELE.	HEMATOCELE.	HERNIA.
<p>Pyiform shape. Constant size.</p>	<p>Ovoid shape. Constant size, or growing.</p>	<p>Ovoid or globular. Constant size, or diminishing.</p>	<p>Pyiform or irregular. Larger on feet, smaller on lying down.</p>	<p>Pyiform or irregular. Larger on feet, smaller on lying down.</p>
<p>Transmitted light shows nature.</p>	<p>Opaque.</p>	<p>Opaque.</p>	<p>Opaque.</p>	<p>Opaque.</p>
<p>Narrow neck, or ceasing before reaching the ring.</p>	<p>No pedicle, but cord may be thickened.</p>	<p>No pedicle.</p>	<p>Thick pedicle at ring.</p>	<p>Thick pedicle at ring.</p>
<p>No "cough impulse."</p>	<p>No "cough impulse."</p>	<p>No "cough impulse."</p>	<p>No "cough impulse."</p>	<p>"Cough impulse."</p>
<p>Tumor is light in weight.</p>	<p>Heavier.</p>	<p>Heavy.</p>	<p>Heavy.</p>	<p>Light, but heavier than hydrocele.</p>
<p>Bowels natural.</p>	<p>Bowels as usual.</p>	<p>Bowels natural.</p>	<p>Bowels natural.</p>	<p>Bowels constipated?</p>
<p>Elastic or fluctuating feel.</p>	<p>Doughy compressible, may be partly reduced in size.</p>	<p>Firm feel, solid.</p>	<p>Fluctuates on surface, deep pressure resisting, or boggy.</p>	<p>Elastic feel.</p>
<p>Gradual development, from bottom upwards.</p>	<p>Slow development, from bottom upwards.</p>	<p>Slow growth, all parts simultaneously.</p>	<p>Sudden appearance, traumatic history.</p>	<p>Rapid development.</p>
<p>Compression does not disperse the tumor.</p>	<p>Compression may slowly diminish size.</p>	<p>Compression has no result.</p>	<p>Compression has no result, or may break up clot.</p>	<p>Compression reduces tumor through a hernial canal.</p>

Irreducible Hernia.—Irreducible hernia, under some circumstances, presents one of the most difficult of diagnostic problems, particularly when chronic. As in the case of the reducible forms, I shall give the semeiology under two heads, as acute and chronic.

(a) *Acute irreducible hernia* represents a condition in which a recent or ancient hernia becomes incapable of reduction by ordinary means, and produces symptoms of such severity that surgical aid is at once sought. An old hernia, hitherto perfectly reducible, may protrude to such an extent, from the slipping of a truss or other accident, that its bulk alone forbids an easy reposition. At other times, a small knuckle of intestine may become distended with gas or the contents of the bowel, and be too large to pass through the opening. In either case, symptoms of urgency do not generally come on at once, but after a time the parts become sensitive, inflammation, more or less acute, is set up, and symptoms become rapidly worse, from this point common to all varieties of acute strangulation. In many cases, the irreducibility is characteristic of the first appearance of hernia.

An unaccustomed or unusually violent muscular effort is made, one that has a tendency to make tense the abdominal walls, whereby the capacity of the abdomen is much diminished, and the crowded viscera seek release from the pressure by protruding through a convenient outlet. The violence with which this act is accomplished probably ruptures some of the fibres of tissues forming the canal; the peritoneum is exposed to more or less injury, and the same force has a tendency to distend the portion of intestine prolapsed. There is a sudden production of a tumor at the point of exit, with great pain, rapidly increasing constitutional disturbance, with nausea, vomiting, and fruitless attempts at defecation; these latter symptoms have the effect to still further increase the distension of the hernia. The pain gradually increases until strangulation becomes complete, when it ceases in the tumor, but continues in the tissues surrounding it. The vomiting, late in the case, becomes stercoraceous, and hiccough is annoying. Unrelieved, the constricted portion of intestine becomes gangrenous, when the tumor assumes a livid or bluish-black hue, and there is a crepitating sound on palpation, occasionally a cadaverous odor about the patient. The skin becomes moist and clammy, the temperature falls, the mind is more or less disordered, and death commonly ensues. These last symptoms are modified somewhat, depending upon the character of the hernia, whether enterocele or epiplocele, the former being naturally the most serious malady. In a few cases, very exceptional, adhesions may occur between the prolapsed viscera and the walls or margins of the canal, and life be preserved, with a permanently irreducible hernia. In other cases, still more exceptional, the strangulated tissue will slough off, the two extremities of the intestine become united, and the continuity of the canal will thus be reestablished. It

has even occurred that a fistula has formed, opening on the surface, and life continued, although at considerable expense of comfort. As a rule, however, the result is in death, if relief is not obtained.

(b) *Chronic irreducible hernia* is one in which a hernia has remained unreduced after all acute symptoms have passed away, usually from plastic adhesions. Such herniæ are chiefly troublesome from their size, interfering with some bodily functions or movements, but are not as innocent affairs as is popularly supposed. The existence of adhesions, whilst usually a promise of immunity from later and additional protrusions, is no promise that dangerous symptoms may not be set up. An accumulation of fecal matter, or the entrance of some indigestible substances, may set up inflammation, suppuration, or gangrene, the fact that there is incarceration adding largely to the danger. The symptoms of chronic irreducible or incarcerated hernia, as long as acute inflammatory conditions do not appear, are often very obscure. They are largely objective, and from the fact that hydrocele and varicocele may easily become secondary and caused by the hernia, sometimes even overshadowing the original malady, a diagnosis becomes very embarrassing. A careful study of the history of such cases, bearing in mind that a hernia is often complicated by these diseases, will usually enable the physician to reach a satisfactory conclusion.

Ætiology.—The causes of hernia naturally fall under two heads; many serious mistakes in treatment have occurred from a failure to recognize this fact.

(a) **Exciting causes.**—With a predisposition to hernia, either congenital or acquired, the most common and, indeed, the sole existing cause for its appearance is a sudden, violent and usually involuntary diminished capacity of the abdominal cavity. Thus, severe straining efforts, as in lifting heavy weights, are often found to be the cause. When a severe muscular effort is made voluntarily, as a rule the parts chiefly concerned are gradually placed in the best position to avoid injury, and the effort is voluntarily relaxed before damage is done. But in involuntary acts, where some sudden and unforeseen effort is required, there is no such preparation to avoid injury. Thus, the abdomen being suddenly compressed and its walls rendered unyielding, the capacity being correspondingly diminished, the viscera being compressed beyond their capacity for such compression, if an outlet can be found, some weak and unguarded portion of their environment, they will make their escape thereby. All things being equal, therefore, the inguinal canal in men and the femoral in women offer the desired release, and through one or the other the hernia occurs. The variety of forces that result in this compression are numerous, and a short treatise, like the present, does not demand their full consideration. The general fact being stated, special forms are readily suggested to all practitioners.

(b) **Predisposing causes.**—The predisposing or maintaining causes of hernia are very numerous, partly as they affect all mankind, and partly as relating to portions or families of the human race. Under the first head, there are common anatomical arrangements; under the second, age, sex, occupation, race, and individual, congenital peculiarities. I will consider each of them very briefly.

Anatomical peculiarities are the existence of a number of apparently insufficiently guarded openings or outlets, or openings usually competent to resist protrusion, but accidentally rendered vulnerable. Prominently, these are the inguinal and femoral, although a classification given earlier shows that there are others. These openings exist in all, and thus our very structure and plan of organization predisposes man to hernia. But Velpeau has shown that ventral hernia has occurred through the small openings provided for the passage of muscular branches of arteries. Thus, portions of fat have become insinuated into these openings, have grown there, distended them to a size sufficient to a portion of intestine, which is drawn in very frequently by the peritoneum in relation to the fatty prolongation, being drawn in with its increasing growth. Such causes for hernia are extremely rare, but they do occur. The occurrence of ventral hernia is oftener due to injury. Thus a wound dividing a muscle heals with considerable retraction or dispartition of the two extremities of the muscle. The gap is filled up by an inelastic tissue, cicatricial, which really alters the action of the muscle. Thus the rectus exerts its force from the sternum and cartilages above to the pubis below. If divided, the upper fragment terminates in the cicatrix in place of the pubis, and the lower originates at the scar, and not at the sternum. Now its action is that of two muscles pulling in different directions, and exerting traction on the inelastic scar-tissue, it becomes thinned and distended, offering such a feeble barrier to the protrusion of the viscera that a hernia is readily produced. Taken together, these three anatomical peculiarities may be considered representative of their class of causative factors; the particular point of emergence of a hernia, therefore, depends upon accidental agencies, as one opening is better protected than another, or some peculiar character of the force applied.

Age has always been considered an important element in ætiology. If we take the age, not when the hernia is seen by the surgeon, but when it was first observed by the patient, the younger periods of life seem to furnish more cases than the later. This is what would naturally be expected when we remember the frequency with which the descent of the testes is delayed.

Sex has not been found to exercise a marked influence in this direction, so far as hernia itself is concerned, although it does as to kind. Thus there are more cases of femoral hernia among women than among men; when the differences in occupation are considered, it

would appear that under the same conditions or circumstances there is no reason why women should be exempt.

Occupation is supposed by many authors to play a highly important part in causation, and rightly so, but in a slightly different manner, so far as my own experience goes, than is popularly supposed. Thus it is generally stated that laborious occupations furnish more cases than others. Mr. Kingdon (*London Truss Societies' Reports*) has made very careful inquiry in this direction, and finds that the number of herniæ in each class of any occupation is determined solely by the number in each class, and not the kind of labor. A moment's reflection, it seems, would show that the greater the muscularity, other things being equal, the greater the protection. We would find hernia, therefore, less often among those who are inured to laborious occupations; and such has been my experience. I have found more cases among bookkeepers, clerks and men of some leisure than among laboring men.

Race, so far as our records go, would seem to negative the foregoing, as among Arabs, Egyptians, and people of equatorial climates there does not seem any disposition to hernia, at least not greater, in spite of their indolent habits, than among other people. We will remember, however, that the lower orders are frequently hard working and industrious, with proverbially muscular, although spare, figures. The higher classes have little, if any, provocation to physical exertion, and hence are not exposed to those agencies that produce hernia.

The *vaginal process* of the peritoneum must be considered as a peculiar provocative of hernia, owing to a somewhat common abnormality. As the testes descend into the scrotum they push before them a portion of the peritoneum which becomes the tunica vaginalis, the portion in relation with the cord and the inguinal canal becomes obliterated and converted into a cord, under normal conditions. Occasionally it remains open, and a portion of intestine, finding its way into this funnel-shaped opening, gradually distends it until it has passed out of the abdominal ring, when it becomes a hernia. This patency of the vaginal process, therefore, must be considered a predisposing cause of the first magnitude, and it is so esteemed among careful students to-day.

Elongation of the mesentery must be considered as closely related to the former. Even with a failure to close the vaginal process, if the capacity of the abdomen is sufficient for its contents, a hernia may never occur. But if from congenital defect the mesentery is abnormally long, the contents are practically increased in bulk, and on proper provocation a hernia occurs. The mesentery being abnormally long, with the vaginal process closed, a hernia is more probable than were this not the case.

It can be at once credited, it would seem, that hernia may easily be

hereditary. A parent with an old hernia has necessarily a long mesentery. The probabilities (or possibilities) are that his offspring will have a similar defect, and thus, with weakness about the inguinal canal, or late closure of the vaginal process, a hernia is very easily produced. I certainly place these last two conditions in the first class of predisposing causes.

Prognosis.—The prognosis of hernia is to be based entirely upon its reducibility. As long as a hernia is reducible, and can be retained with a suitable and properly constructed truss, so long is the prognosis good as to continuance of life. Should it be retainable with difficulty, either from faulty truss or unusual size of the openings through which it protrudes, there is constant danger of strangulation, and the prognosis becomes bad. If incarceration occurs, death is imminent, and if it is escaped it can be attributed often to lucky accidents. Under all circumstances, however, a hernia of any kind, reducible or otherwise, is a menace to life, and in proportion to its reducibility is the menace lessened.

Treatment.—There can be no question that the treatment of hernia is largely a question of surgical interest, and must, therefore, be passed over very briefly in this place. Nevertheless, there are items in the treatment that have a relation to purely medical practice, and to such I shall largely confine myself.

The first consideration, in a recent case, is to secure perfect reduction, and then to procure retention with a suitable truss. Should the subject be young and the disposition to return of the hernia marked, there is a strong presumption that there is both an elongation of the mesentery and patency of the vaginal process. The effect of retention in such a case can only be considered palliative, as, the contents of the abdomen being too voluminous for its capacity, should a descent of the viscera be prevented at one point, it will likely occur at another. Should the case, on the other hand, be an acute traumatic one, particularly in an adult, reduction and perfect retention should prove curative, inasmuch as the very fact of traumatism promises a solid repair if taken in hand sufficiently early. Under all circumstances, therefore, complete reduction is the first indication, as perfect retention is the second, and the disposal of any predisposing conditions that may be accessible the third. In ancient cases, or those in young subjects, congenital in character, any attempt to close the outlet by medicines must fail; nothing but a surgical operation can do this, and the case must be referred to a competent practitioner. The mesentery being shortened, one leading, perhaps controlling, element in causation is disposed of, and this can often be attained by medical treatment. Not unfrequently the recession of the protruded viscera produced by this shortening of the mesentery is followed by a closure of the peritoneal process, and an additional barrier thereby interposed against

reproduction. *Lycopodium* and *Calcarea carb.* have been extensively used for this purpose, and the results are sufficiently voluminous to give assurance of reliability. The indications for the remedies are entirely general in character, and need not be noted at length. There are very many cases reported of a remedy having been used for a difficulty unconnected with hernia, apparently, with no intention of affecting the latter condition, in which the hernia has likewise disappeared. *Argentum* and *Sulphur* are both credited with such cures.

In cases of irreducible hernia different considerations obtain. While remedies are of value, yet it is my opinion that lives have been lost by relying upon them to the exclusion of the operation. Statistics are abundant, proving beyond a doubt that deaths from herniotomy are comparatively rare; perhaps almost uniformly a cure is secured if an operation is made early. On the contrary, when it has been delayed, or the parts subjected to rough usage, bruised and inflamed from long-continued efforts at reduction, death is a common occurrence. In the one case, we return an intestine to the abdomen only slightly irritated from the constriction; in the other, one partially devitalized, and perhaps beyond the possibility of recovery. Furthermore, success with taxis, or other means for reduction, leaves the parts concerned in a suitable state for a reproduction of the accident; in other words, the result is palliation, postponing the final result. An operation often, and nearly always, results in a radical cure. There are additional reasons why radical operative measures should be preferred to timid, uncertain and blind medication. Accidents are not uncommon, under taxis or other methods of reduction, accidents that often put the patient immediately beyond the hope of recovery, and render even an operation useless. For instance, the hernial pouch may be ruptured, and the contents poured out into the peritoneum; the peritoneum may be torn, and the knuckles of intestine strangulated in the rent, so that reduction of the tumor may not release from constriction. Finally, the use of remedies and taxis may be continued for so long a time that gangrene occurs, and while an operation may even then be successful, yet it is a somewhat problematical, and at all events a very formidable undertaking. For these and other equally cogent reasons, I am decidedly opposed to temporizing treatment, and counsel early operation in cases of strangulated hernia, both as a means for present relief and permanent cure. I will simply mention the fact that *Nux vomica*, *Opium*, and *Plumbum* have long enjoyed a reputation for reducing strangulated hernia. They may be used if the case is very recent, and in connection with them slight or rather very briefly continued taxis, or application of cold. If the physician is wise, and correctly reads the lessons furnished by the records of the past, he will refrain from all such palliative, uncertain and dangerous practices, and perform herniotomy, or call in competent surgical skill to perform

it for him. Should reduction be readily effected, a truss or some suitable retentive dressing must be applied and worn until all danger of a return seems to be averted. Incarcerated hernia is a purely surgical subject, and foreign to our present inquiry.

ULCERATION OF THE BOWELS.

BY J. G. GILCHRIST, M.D.

Ulceration of the bowels, in which term are included both the small and large intestines, may be symptomatic or idiopathic; very often, perhaps in the larger number of cases, it is the former. In this connection the term *symptomatic* is used to express an ulceration which constitutes a symptom, either characteristic or accidental, of some recognized morbid condition or accident. Thus, in medicine we have a familiar example in typhoid fever, and in surgery in cuticular burns or scalds. *Idiopathic* ulceration, on the contrary, represents something unconnected with other *recognized* morbid states, either from traumatism or from intestinal diseases more or less obscured by the ulceration. As far as the pathology of either form of ulcer is concerned, there exists much unnecessary confusion, the conditions resulting in ulcer being the same, no matter what tissue is the seat. *Prognosis*, however, is interested in intestinal ulceration, and more especially in the symptomatic group.

Pathology.—Ulceration, under all circumstances, and this is the case in all tissues, can never have any different origin than inflammation. Next to suppuration this process is the commonest termination of inflammation. The particular question of interest, therefore, in the present instance will be the causes for the inflammation, particularly when the ulceration is associated with a morbid condition existing or starting outside of, and at a distance from, the intestinal tract. Ulceration may always be expected and predicted when the inflammation is intense, localized, stasis marked, and effusion defective. It represents a condition of exaggerated molecular waste or loss, a granular disintegration of the tissues under observation. It does not so frequently complete devitalization as when the circulation is entirely cut off, for then we have death of the part in masses, gangrene, and sloughing. Should it result from traumatism, it represents a defect in repair, a *minus* as to organization, while production is not necessarily deficient. It argues local or general adynamia. Hence, any cause for inflammation is a legitimate cause for ulceration, as well as any local and circumscribed removal of vascular tissue, under circumstances that might interfere with repair. It appears that Erichsen (*Science and Art of Surgery*) has most happily classified the conditions favorable to

ulceration, and while his scheme applies more particularly to cuticular ulcers, as the form oftener presented to the surgeon, yet it applies equally well to the present form. Thus, one of three conditions of local mal-nutrition must obtain. 1st. Deposition is normal, and absorption excessive; 2d. Absorption is normal, and deposition is defective; 3d. There may be a simple throwing off of dead, spoiled matter. It requires no commentary on the above to show its suitability as an explanation of all forms of ulceration. In the case of the intestines, particularly organs engaged at once in nutrition and elimination to a greater degree than almost any other organs in the body, the conditions for ulceration are most abundantly supplied. This vulnerability is largely increased by the compensatory function of emunctories generally. Thus it is stated that the defecation of the body is little, if any, less important to its well-being than its nutrition.

The amount of effete material, gaseous, fluid, and solid, that is thrown off in a single day, through the lungs, the kidneys, the bowels, and the skin, is actually enormous. Should this elimination be suppressed at one point, other emunctories must have an increased amount of work thrown upon them, or the arrested excretion remains in the body, producing more or less disastrous effects, depending upon its kind. In many instances, either through double organs, as the kidneys, or associated organs, as the lungs and skin, a suppression at one point may be compensated at another. Should this increased effort of a duplicate or alternate organ be unduly continued, serious consequences must ensue. Prominently the hyperæmia that normally attends vital effort may, and does very easily, pass over into inflammation if the function is too energetically performed. Inflammation, being always destructive and pathological, induces lesions that still further complicate matters, and a common lesion is ulceration or a molecular waste, which corresponds to that condition. We may now be prepared to understand how it is that ulceration of the bowels may be concomitant of morbid action that would not, at first sight, appear to have any relation to the intestinal tract.

In view of the fact that an ulcer of the intestines presents the same pathological features attending ulceration of other tissues, it is necessary to consider ætiology and pathology simultaneously. For convenience of description it has been the custom to classify ulcerations of the bowels under two heads, viz., those originating from without the intestine, and those from within. The most objectionable feature in this classification is that the first group only includes morbid action developed in parts contiguous to the intestinal ulcer, while, as a matter of fact, as we shall see later, the causative morbid action may be very far removed. I subdivide the first group, therefore, into local causes and those operating at a distance. My scheme may be thus tabulated:

Inter-intestinal	}	Traumatic. Idiopathic.	
Extra-intestinal	}	Contiguous lesion Remote morbid action	} Traumatic or Symptomatic.

(a) Ulcers arising from morbid action or traumatism within the proper tissues of the intestinal canal, furnish by far the largest number of cases. There is no portion of the canal exempt from ulceration, and yet the duodenum, the last portion of the ileum, the cæcum, the sigmoid flexure of the colon, and the rectum seem to be favorite seats. There is some significance in this, more particularly, however, in relation to extra-intestinal cases. In the present instance, the circumstances governing selection of site seem to be some alteration in the direction of the canal, furnishing more or less obstruction to the motion of the contents of the bowels, and at the same time acting, in some sense, as a separator. Thus the beginning and end of each section of the intestines, the one admitting the food acted upon by the secretions of the stomach, nutritious and innutritious alike, and the other thrusting out, as it were, that which has been rejected as unsuited to the purposes of the body, supply conditions that may well be considered eminently favorable to ulceration. The duodenal portion of the canal is largely interested in digestion, supplies a secretion of its own, and receives that from the common duct, arguing considerable vital activity, predisposing to inflammation. Any fragment in the mass received from the stomach of a consistency or other character that has resisted its disintegrating action, or that is specifically irritant, may well be causative of inflammation. At the termination of the small intestine there is a constriction of the canal, and the ileo-cæcal valve which, to some extent, perhaps greater than is ordinarily supposed, predisposes to the arrest of particles of the ingesta, thus retaining putrefiable material within the body, which alone would be a source of danger and an eminently competent cause for ulceration. In the same manner indigestible foreign material may thus be arrested, and cause either suppuration resulting in an ulcer, or ulceration from absorption. The cæcum is occasionally a point of arrest for fecal matter, its location and general characters making it somewhat a source of wonder that such accidents are not of more frequent occurrence. At the sigmoid flexure the same natural and anatomical predisposition is found. The same remarks apply to the rectum, where we have a narrowing of the calibre at both ends, and an almost constant accumulation of dejecta in many, if not all, individuals. It is thus very apparent that the anatomy of the intestinal canal, as well as its function, predisposes to the essential conditions of ulceration. Should sharp or hard and irregular foreign material, such as pieces of bone, or other insoluble substances, be admitted into the intestines, a lacera-

tion of the mucous coat may readily occur, and a wound once inflicted, an ulcer is very easily produced.

There is another occasional cause of ulceration, one that should, it would seem, be often operative. This is the lodgement of particles from the ingesta behind the mucous folds of the intestine, the *valvulæ conniventes*. Their function, it is supposed, being largely to retard the passage of the intestinal contents, and thus give greater opportunity for the absorption of the nutrient portions, it would necessarily be an easy matter for particles to lodge, and give rise to inflammation and consequent ulceration.

Thus far we have had to do with ulceration arising from causes operating from within the intestinal canal, primarily upon the mucous coat. There are other methods and causes, however, possibly equally important. Morbid action may commence in the muscular coats, or the subserous, and thus reach the mucous surface. These are nearly traumatic in character, something in the nature of a contusion, whereby ecchymosis is produced, or capillary extravasation is secured. Such ecchymosed spots must necessarily favor ulceration, if the parts are otherwise so disposed.

(b) Ulceration arising from conditions operating or originating at a distance from the intestinal tract, those *extra-intestinal* in character, is not difficult to comprehend or account for. The first step in the process of ulceration must be an arrest of excretion somewhere. In some forms of fever there is suppression of cutaneous excretion, a diminution in that from the kidneys, the bowels are sluggish and inactive, and even the breath is hot and dry. In such a condition, if life is to be continued, the remaining emunctory, the intestines, must be actively engaged. The portions of intestine particularly of interest in this condition are naturally those in which the largest number of glands and follicles are found. These portions are the duodenum, the first part of the jejunum, and the last part of the ileum. It is at these points that ulceration usually occurs, and on any sufficient provocation. The increased activity of these glands, to compensate for the loss of function in the other eliminators, induces a necessary hyperæmia. From the general condition of the body, the changes in the blood (increased fibrin) consequent upon the fever, and abnormal functional activity of the parts, inflammation readily succeeds the hyperæmia. The arrested nutrition of the body and the augmented molecular waste combine to make this inflammation one of considerable intensity, with unusual disposition to stasis. Ulceration at these points is an almost inevitable consequence. The ulcers secondary upon remote or general lesions are, therefore, oftener duodenal, from the glands of Brûner, or lower down from breaking down of Peyer's patches.

Ulceration, extra-intestinal in character, but from contiguous morbid action, occurs from such lesions as inflammation of other viscera, re-

sulting in suppuration, a connection being established between the abscess and the intestine. Such occurrences are not by any manner of means rare, but the ulcer is usually of short duration, healing as the morbid action back of it disappears. Should it remain open for any time, however, particularly if the abscess with which it is in relation should become chronic, it cannot properly continue to be called an ulcer; it is then more correctly a fistula or sinus, being of secondary importance to the lesion with which it is associated.

The colon seems to be affected by a peculiar form of inflammation, commonly spoken of as "croupous," in which there is a fibrinous exudation, somewhat friable in texture, which dips down between and into the follicles, accompanied by much thickening and "congestion," as some call it, of the deeper parts. Upon the detachment of this adventitious membrane the parts are excoriated and raw, a condition which is much aggravated by the constant irritation to which the sensitive surface is exposed by the passage of the feces over it. In fact, a similar exudation on a surface not exposed to such an irritation might, and usually does, remain as a protective to the deeper parts, until it has matured, and then desquamates or exfoliates, leaving a sound surface. It is very likely, therefore, that in croupous inflammation of the colon the passage of the feces, which are supposed to move steadily along the canal, loosens and detaches the membrane prematurely, and then follows up this mischief by converting what might have been considered an abrasion into an ulcer.

Although many of the systematic works on practice and special pathology devote much space to this subject of non-specific ulceration, I prefer to treat it as purely supplemental to the pathology of ulceration in general; ulcers in all parts of the body, as already remarked, are produced in much the same way, the variety of causes being actually repetitions of each other, with often merely insignificant modifications growing out of differences of location. If this is true of the non-specific ulcers, it is certainly equally so of the specific. Tubercular, strumous, carcinomatous, and syphilitic ulcerations have been already described in other chapters of this work, and need no additional mention at this time.

Semiology.—The symptoms of ulceration of the bowels, apart from conditions with which they may be associated, are not at all pronounced; they depend for the most part on the portion of the canal involved. While this is true of many cases, yet there are instances in which the symptoms are marked and severe, the ulceration being, as it were, the most significant feature of the case. As might be inferred, the condition originating in an inflammation, the earlier symptoms are febrile in character, and more or less pronounced as the inflammation is intense or otherwise. The tongue shows the characteristic signs of gastric or intestinal irritation, and there may be more or less

well-defined pain or sensitiveness at some point in the abdomen, particularly on pressure. Such pain or sensitiveness as there may be is localized, not at all diffused, so that the lesion may often be definitely placed. These symptoms are in the nature of prodroma, although they rarely appear until the ulceration is accomplished, or, if they do so, they are insignificant, and do not attract much attention from either the patient or the physician. Later, and very soon after the above indications become prominent, others, depending upon location, become quite pathognomonic. Under all circumstances, the *bowels*, to use a common expression, become disturbed. In the majority of cases diarrhoea, more or less approaching dysentery, is the form of disturbance, but in some cases it is constipation. Probably, judging from the imperfect records in this particular, the higher in the intestinal canal the ulceration occurs, the greater the probability that constipation will be the result. Consequently, something can be attempted in the way of localizing the ulcer by observing the character of the stool. The stools being diarrhœic, they should be inspected with a view to determine the presence of blood, mucous shreds, or other evidences of ulceration. When the ulcer is in the ileum, the blood, if there be any present, is in a more or less coagulated form, but has been observed fluid. It may not be amiss, in view of the fact that I have witnessed some very ludicrous misapprehensions on this point, to state that blood from the small intestines very rarely appears in the stool in the ordinary characters of that fluid. It is usually black, may be tarry or fluid, in short, the stool of *Leptandrin*, as given in our *Symptomatologies*, describes it exactly. It may not be in large amounts, often a mere streak or speck, and yet in other cases be poured out in considerable quantities from an opening of a vein, or even an artery of size. There are cases in which the hæmorrhage has been sufficiently profuse to destroy life, but ordinarily it is as given above.

Ulceration of the colon, particularly of the lower portion, gives symptoms very frequently observed in dysentery. This disease forms the subject for a separate treatise in this work, and need not detain us here. Suffice it to say that the bloody stools, the small amount of fæcal matter therein, and the shreds of tissue from the bowels form very characteristic features of ulceration. In this case, however, we find a symptom peculiar to the region, namely: tenesmus from the irritability of the sphincters.

Therapeutics.—Considering the treatment of intestinal ulceration to be essentially for the ulcer, and with no reference to associated conditions, all reference to typhoid fever and dysentery, except of a very general character, must be omitted. The reader is referred to the appropriate chapters for details in these particulars. The treatment is almost, if not entirely, by means of remedies given on characteristic indications. Of course, if the cause of the ulceration is apparent, and

it should be of a character to threaten a return or continuance of the trouble, it must be removed, or as far as possible guarded against. No instruction can possibly be given on this point; in this particular each case must be considered by itself. Being entirely dependent upon subjective indications, the objective symptoms of the stool being common to all forms of ulceration, the list of remedies is necessarily much shorter than is the case in cuticular ulcers. And yet, an exhaustive presentation of therapeutics would include all the remedies useful in diarrhœa and dysentery. Those which would seem to have particular relation to ulceration are here given, reference being had for additional remedies to the chapters on diarrhœa and dysentery for further particulars.

Argentum nitr.—Diarrhœa as soon as he drinks. Stool green; flaky, like spinach, mucous, bloody, with tenesmus.

Arnica mon.—Involuntary stools during sleep; brown, fermented stools, with fetid breath and loathing of food; offensive, papæsent, involuntary stools.

Arsenicum alb.—Black, acrid, putrid stools; rapid emaciation; dryness of skin; thirst for small quantities, cold drinks excite vomiting.

Baptisia.—Dark, brown, mucous, and bloody stools, with typhoid tendency; stools very offensive.

Capsicum.—Stools frequent, small, mixed with black blood and tenacious mucus.

Carbo veg.—Stools frequent, involuntary, putrid, cadaverous-smelling; stools bloody, sometimes causing fainting.

Elaterium.—Dark green, mucous stool, mixed with white mucus streaked with blood.

Leptandra virg.—Before stool, loud rumbling and gurgling in abdomen as of water, seeming to start from the stomach; profuse, black, papæsent, tar-like, very fetid stools, followed by severe cutting pains in the small intestines; after stool, faint, weak, and hungry.

Mercurius corros.—Cold face and hands, with small and feeble pulse; the limbs feel bruised, and tremble. Stools small, frequent, bloody, mucous, with great tenesmus, before, during, and after stool; stools largely mucous.

Phosphorus.—Watery diarrhœa, sometimes pouring away from the bowels like water from a hydrant, suddenly becoming bloody; almost pure blood, with great weakness and prostration.

Sepla.—Chronic, debilitating diarrhœa; frequent, not profuse, jelly-like, green or bloody stools, with nausea and colic before, prolapsus ani during, and exhaustion after stool.

Silicea.—Frequent desire for stool, with chilliness and nausea; stools of bloody mucus, or brown fluid and bloody, smelling offensively.

Sulphuric acid.—A sensation of trembling in the body, without visible trembling; bloody stools, with empty, exhausted feeling in the abdomen afterwards.

For other remedies, probably not as often indicated, see under *Diarrhœa* or *Dysentery*, the following: *China*, *Dulcamara*, *Ipecacuanha*, *Nux vom.*, *Pulsatilla*, *Rhus tox.*, *Sulphur*, or *Asar. europ.*, *Bryonia*, *Calcarea carb.*, *Chamomilla*, *Dioscorea*, *Ferrum*, *Hepar*, *Kreasotum*, *Lycopodium*, *Nitric acid*.

CARCINOMA OF THE INTESTINES.

BY J. G. GILCHRIST, M.D.

With the exception of the stomach and rectum, the bowels are not very frequently the seat of carcinoma *ab initio*: when so affected, it is nearly always as an extension from cancer of contiguous parts. It is difficult to understand why this immunity should exist, the tissues not being at all different from others which are very frequently the subjects of cancer. Inasmuch as carcinoma of the stomach and rectum receive attention in their proper place, the present subject must of necessity be very briefly presented.

The chief point of interest is in the results of cancer in this region, and apart from some considerations growing out of function even they are very similar to the effects observed on all tubular organs. The pathology, ætiology and semeiology, with similar exceptions as above, are the same as in carcinoma occurring elsewhere, and need no particular mention. Scirrhus, encephaloid, colloid and melanosis occur in about the same order of frequency as elsewhere; the two former are likewise oftener primary, and the latter secondary or recurrent.

Scirrhus perhaps oftener appears as a primary disease, and in very much the same manner as in the peritoneum, already noticed; that is, there is a deposit of granules or small masses, gradually becoming aggregated and forming either a tumor or patches. I am of the opinion that scirrhus is oftener deposited in a stratified form, following, for a time, the line of separation of the different tunics of the bowel, but soon exerting its characteristic action on the parts with which it is in relation. The first effect will be to stiffen the walls of the intestine which very materially interfere with its function. Next, the glands and follicles are destroyed, the various parts are agglutinated, fused together, and the calibre of the tube diminished by the contracting power of the scirrhus tissue. Whether the deposit occurs on the sub-serous, the mucous, or in the middle coats, the result is the same; the whole thickness of the part becomes implicated, the peritoneum becomes adherent and takes part in the morbid action, and neighboring viscera are likewise brought under its influence. From the peculiar anatomy of the intestines, dispersion of germinal elements very speedily occurs; hence there are usually early secondary deposits and a rapid establishment of cachexia. Perhaps when the deposit is first made on the fibrous or subserous side, these later symptoms may be sometimes delayed, but the whole course of the disease, I have thought, is much more rapid than when other tissues are affected.

Finally, the intestine becomes constricted or narrowed until a stricture is formed, the passage of its contents is more and more difficult, until, at last, there is total occlusion and speedy death. The occurrence

of occlusion is never sudden; there is always increasing urgency in the symptoms of stricture, until there is evident total obstruction, with accumulation of gas and ingesta, so that a mistake in diagnosis is very rare indeed. This is particularly true from the fact that cachexia is generally well established before obstruction occurs, and there are also probably other cancerous formations or deposits, secondary in character, which forbid any mistake in the majority of instances.

Encephaloma, as well as *colloid*, differs in some particulars from scirrhus. Thus neither is liable to occur in a stratified form, but assumes tumor-characters from the first. Occurring on the mucous surface, they grow rapidly, and while not exhibiting any tendency to contract the parts, or to draw other parts into them, they produce all the symptoms of constriction or obstruction by the growing mass filling the lumen of the organ. When the canal is filled with the tumor, it speedily contracts intimate adhesions to all sides, and near parts of all characters become partakers in the morbid action. As was found to be the case in colloid of the stomach and peritoneum, contraction and fusion of near-lying parts often occurs. This is rarely the case, however, with encephaloid; the tendency here being to amplification, tumor forms.

Melanosis is rarely found as an independent growth or deposit. When occurring at all (and it is among the most unfrequent of carcinoma), it is associated with encephaloid or colloid, sometimes with scirrhus. When with the former, it appears as an infiltration, or in small tumor-like masses. When in connection with scirrhus, it is oftener punctiform.

The *symptoms* of carcinoma of the bowels are very obscure in the commencement, very closely resembling ulceration. Diarrhœa is present in nearly all cases, constipation being more common, perhaps, when the disease is high up. The evident malignant character of the symptoms, their persistence and steady increase in intensity, the rapidly increasing cachexia, and the occurrence of severe and exhausting hæmorrhages are of a character to leave little room to mistake the indications. As to hæmorrhage, my opinion has been that carcinomatous ulcers more frequently open large vessels than any other form of ulceration. This is particularly true of the arteries, whose coats seem to be singularly resistant to morbid action. When hæmorrhage is abundant, therefore, particularly if arterial, more especially should it be frequently repeated, there is good ground for supposing that the condition giving rise to it is carcinoma.

Prognosis, as in all cases of cancerous diseases, is bad. Cancer of the bowels, more particularly scirrhus, is almost uniformly fatal. There are a very few cases on record, infinitesimal as to the whole number of cases of cancer, in which a tumor has been cast off by ulcerative action, the ulcer which remained promptly disappearing,

leaving no trace of the specific disease. These few and isolated cases must not encourage the medical attendant to give a hopeful prognosis, for the conditions upon which such terminations are based are so exceptional that nothing can be founded upon them. The rule is that death will occur, and more speedily than is the case when the cuticular surfaces are chiefly affected.

Treatment is purely palliative. It is possible that cases have been cured in the incipient stages, but data are then wanting on which to base a diagnosis. Carcinoma being fairly established, it is more than questionable if a cure is possible by any means or methods now known to us. At least, we have no authentic records of such cases; if any are found scattered through our periodical literature, the symptoms and conditions on which a diagnosis was made are so carelessly given that no reliance can be placed upon them. If remedies are used, they would be given on indications furnished by the symptoms of the stool, and hence reference must be had to the articles on Diarrhœa, Dysentery, Constipation and Ulceration of the Bowels.

DISEASES OF THE RECTUM AND ANUS.

BY J. G. GILCHRIST, M.D.

CONGENITAL IMPERFECTIONS.

Whilst congenital malformations, or arrest of development, may always be considered as only remediable by the resources of surgical art, yet a brief review of the subject forms a proper introduction to that which is to follow.

Imperforate anus seems to be by far the most common of these structural and congenital malformations. So frequent is this occurrence, in one form or another, that thorough obstetricians always carefully inspect the anus of newborn children, to receive early information of any defect that may imperil the life or future happiness of the child. An imperforate state may exist with or without corresponding imperfection in the rectum. Thus the rectum may be perfect and the anus closed, the rectum may be deficient, or the rectum may be wholly wanting. The commoner form is that in which the rectum is perfect and there is an absence of an anal opening. This condition may be due to adhesions from various causes, in which case there will be some external mark of a previously patent anus; or there may never have been such an opening, in which case the perinæum gives no appearances that would point to the position of the end of the rectum. Either of these forms may be considered as constituting a decidedly minor degree of imperfection, inasmuch as a comparatively simple operation may put the parts in a normal condition, at least as to a satisfactory establishment of their function. Should any doubt exist

concerning the condition of the rectum, a delay of a few hours, by permitting an accumulation of the meconium, will usually furnish a suggestive fulness in the perinæum, marking, at the same time, the location of the anus.

A form of imperfection having more relation to the rectum than to the anus is where the latter *terminates in a cul-de-sac*, at a varying distance from the anal border. This may be due to a septum, adhesion of opposing rectal surfaces, or to a deficiency in the rectum itself. Under the two former conditions the accumulation of meconium will cause the termination of the *cul-de-sac* to bulge outwards, and thus give evidence of the patency of the rectum. The failure of such bulging would be presumptive evidence of the absence of a rectum, although, should the obstruction be due to adhesions, a long adhesion might prevent any such descent of the deeper portions of the tube. Other abnormalities connected with imperforate anus are numerous, chiefly relating to deficiencies or abnormalities of the rectum. Thus there may be :

Opening of the rectum into the bladder in either sex. The absence of the anus, and no signs of distress in the infant, with the appearance of meconial or fæcal matter in the urine, would at once indicate the nature of the anomaly. Life may not be at all prejudiced by this unfortunate arrangement, and during childhood, at least, no serious inconvenience will result. Later, however, the abnormality would be a constant and prominent mortification to the sufferer, and surgical counsel should be sought.

The opening may be into the *vagina*, and present indications that would seem to be unmistakable. For similar reasons to those above given, the condition may be considered of comparatively trifling moment in infancy and childhood, but becomes an exceedingly embarrassing one after maturity.

There may be an opening of the rectum in the *inguinal region* or in some other parts of the abdominal walls, constituting an "artificial anus."

With the rectum deficient, in part or wholly, there may be a considerable deficiency of other portions of the colon. The variety of such abnormalities is very large, almost everything conceivable having been observed, in some cases the smallest portion of the colon, little more than the cæcum, being found; in some rare instances the defecation occurred through an opening from the ileum. Many of these defects, it is self-evident, are naturally and radically irremediable.

Narrowness of the anus is the last on our list of the commoner forms of congenital imperfections, and the characteristics are sufficiently indicated in the name.

It is evident that some of these abnormalities are the result of an arrest of development, others of malformation, and still others of

morbid action occurring during the uterine life. The latter, when the condition can be made out, may be curable by electrolysis, by Silicea, or other remedies, in case of cicatricial constriction or adhesion; yet a proper surgical operation is to be preferred in even these cases. As a matter of fact, however, the exact diagnosis is rarely attainable. Even a *cul-de-sac* may represent a termination of the bowel, the remaining portion terminating in like manner above the brim of the pelvis. Such cases must, therefore, always be viewed with solicitude, and no steps taken, particularly surgical in character, without such counsel as can be obtained.

HÆMORRHOIDS.

Piles, as they are otherwise called, are tumors growing from, or in connection with, the mucous surface of the rectum, composed of dilated and enlarged veins, in the commencement, but later materially changed in structure by exudation and extravasation. It has long been the custom to classify hæmorrhoids with reference to their location into *internal* and *external*, the former occurring inside, and the latter outside, of the sphincters. The arrangement is a perfectly natural one, and quite as much so from the fact that the structures of the two kinds are different as from the mere consideration of location.

External hæmorrhoids are small tumors at the verge of the anus, often more than one, in the first stage composed of dilated vessels, with some swelling and inflammation of the overlying mucous membrane. After a time, usually a day or two, the swelling will subside, either from a rupture of the vessel or a sort of partial resolution from coagulation of the blood, and only a slight fulness remains to mark the seat of the trouble. Some local irritation may subsequently occur, and the tumors again become distinct, enlarged and inflamed, a less perfect resolution succeeding. In process of time, the integument in the region becomes thickened, the cellular tissue infiltrated, and the veins permanently enlarged. The swelling thus goes on increasing in size and hardness, not always productive of pain, but quite generally sensitive. At times they will become inflamed, very painful, and then all symptoms will disappear for a time. The pain, during an attack of inflammation of hæmorrhoidal tumors, is most intense; the tumors themselves are turgid and hot, the skin in the neighborhood is red and inflamed, the cellular tissue is additionally infiltrated; there is a distressing fulness in the anus, producing tenesmus, and yet the pain caused by even the passage of flatus is so great that every effort is made to repress it. Finally there is an escape of blood, either externally or into the cellular tissue, with a somewhat rapid subsidence of the acute symptoms or a more gradual and imperfect resolution,

requiring some days. Under either circumstance, however, it results in increase of the size of the tumors and of provocation to subsequent attacks of inflammation.

It is a popular belief that constipation is almost a necessary factor in causation. This is only partly true. Diarrhœa is not less important in this respect. There are two governing conditions, as a matter of fact, somewhat different in character, and yet not different in some important particulars. These are causes operating to produce venous engorgement and stasis, and those which induce atony of the parts concerned. Errors in diet may operate through either class. Walking, excessive venery, sedentary pursuits or habits, constipation, pregnancy, and, in short, anything which may determine an increased amount of blood in the part, and impede its exit, may be considered predisposing causes. There seems to be little question that hereditary influences play an important part in ætiology. It is very common to find such a predisposition running through an entire family.

A hæmorrhoidal tumor, once formed, rarely disappears entirely unaided by art. The occurrence is the precursor of many subsequent attacks, and at last they may become so numerous and so large that they are a constant annoyance and a source of much discomfort. As to size, there is very great variation; the tumors vary from the size of a pea to that of a walnut. The same variation exists as to numbers; in some cases two or three tumors may be found, while in others the anus may be completely surrounded by them.

When the hæmorrhoidal affection becomes chronic and the number of tumors is considerable, the appearances very closely resemble condyloma; observing, however, that there are periodical attacks of acute inflammation during which the tumors are increased in size, and that these attacks are followed by an augmentation of size, with a more or less abundant hæmorrhage at the close of the attack, there can be no question as to the nature of the malady. Furthermore, the repeated attacks of inflammation are not at all characteristic of condyloma. It must not be understood that there is absolute painlessness and freedom from discomfort during the periods of quiescence. The parts involved are always sensitive, and the encroachment of the tumors on the anus, together with the infiltration and thickening of the integument and subcutaneous cellular tissue, cause a constant feeling of fulness in the rectum, with urging to stool, which act, from the distension of the sensitive tissues, is always more or less painful.

Treatment.—The treatment of external hæmorrhoids must be determined by the stage of the disease. Acute cases can usually be cured quite promptly and satisfactorily by remedies alone, or aided by some soothing local application. When the tumors are large, I am of the opinion that much benefit can be derived from opening them and turning out the clot. The blood will be found coagulated, and

hence there will be little, if any, hæmorrhage. To many who, like myself, have been reared in the strictest observance of the canons of homœopathic practice, this may seem objectionable teaching; but the result of over twenty years' experience has been to lead me to very much question the wisdom of allowing such cases to pass over into a chronic state when a simple expedient will have the effect to prevent such a catastrophe. A hæmorrhoidal tumor has a natural tendency to rupture and subcutaneous extravasation of blood. The parts in its neighborhood thereby become thickened and infiltrated, with a predisposition to acute inflammatory action on slight provocation. Now, if such a tumor is laid open early, there is a probability that the vein will be obliterated, and thus a future tumor will become almost impossible in that locality. Furthermore, should the case be taken in hand sufficiently early, there will be no exudation into the cellular tissue, and thus another prominent predisponent to future trouble will be avoided. To say nothing of the speedy, almost immediate, subsidence of pain, it seems to me that humanity, and a correct knowledge of the natural history of the affection, would prompt the intelligent practitioner to such a course. Even late in the case, the effect of removing the coagulum, whether in the vein or cellular tissue, can have no other effect than to place the patient in the best position to escape future attacks. On the other hand, such treatment may have the effect to produce a scar that may prove very troublesome. Therefore, when an incision seems to be demanded, it must be made in the natural fold of the part.

Occasionally, remedies conjoined with warm and moist applications will so quickly subdue pain and inflammation that other treatment is not required. Undoubtedly, such a method is to be preferred, yet even then a coagulum will remain and continue as a menace to future comfort. The rule should be, therefore, to give remedies if the case is seen early, before there is much, if any, infiltration into the surrounding parts, and to apply hot cloths or other soothing and emollient dressings. Should relief be speedily attained, well and good. If, however, the progress of the case is not arrested, or should the attack be a second or a third, or again, should it be seen only after considerable exudation or extravasation have occurred, then by all means lay open the tumor or tumors, turn out the coagula, and apply soft compresses wet with warm water into which a few drops of *Hypericum* have been dropped. Should inflammation continue in the wound—which the remedy indicated above usually prevents—*Aconite*, *Belladonna* or *Rhus* may be given according to indications.

In the chronic forms, where the tumors are large, cause much discomfort, and are subject to frequent acute inflammations, I do not believe remedies are of the least value. The tumors should be removed with sharp scissors, including as much of the thickened integu-

ment as can be spared, keeping in view the danger of troublesome contracting scars.

Internal hæmorrhoids, from every point of view, are far more serious, and constitute the form more frequently seen by the surgeon. They are tumors, venous or arterial in character, sometimes both kinds of vessels being present, formed above the sphincters, appearing externally when very large or when brought down by straining at stool. The symptoms produced are as follows: In the early stages there is some increased frequency in calls for stool, which is somewhat unsatisfactory from a feeling of incompleteness. Later, there are more or less frequent hæmorrhages, sometimes occurring in connection with the stool, and sometimes without. At times the hæmorrhage is quite profuse, largely of venous blood; again, not very large in amount and evidently arterial. When the hæmorrhages are frequent and severe, there are constitutional signs of such loss in the blanched face, weak and tremulous pulse, irritable heart, debility, and the ordinary symptoms of traumatic anæmia. There will also be more or less pain in the loins, sometimes extending down the thighs, and in the case of women, as H. Smith (*Holmes' Surgery*) says, who very often suffer acutely, their sufferings are not unfrequently "referred to that prolific storehouse of morbid phenomena, the womb." There will usually be some considerable irritability of the bladder, often strangury or retention of urine, and symptoms of disordered digestion are frequent and pronounced. But these, while sufficiently severe and ominous, are not at all the consequences of internal hæmorrhoids. As they increase in size they often protrude at the anus, sometimes from walking or after standing for an unusual time, almost always at stool. They excite spasmodic contraction of the sphincter, which causes intense pain. At first they are easily replaced; after a time, however, either from their increased size, the length of the pedicle which is increased by the traction, or a partial inversion of the rectum from the same cause, reposition becomes increasingly difficult, and retention a matter requiring constant care. They become strangulated for longer periods, and as the constriction only becomes released by a hæmorrhage, the effects on the patient soon become very serious indeed. The symptoms I have given above represent the worst forms of the disease, a form which many sufferers undoubtedly escape to some extent. The differences, however, are in degree rather than in kind.

A patient applying for relief from these symptoms presents signs of rectal tumor, ulceration, or fissure, and it is manifestly essential to arrive at a complete understanding of the case. This can only be had by a thorough physical examination by means of a speculum. A speculum should be used in all cases, even when pile tumors are readily found at the anal orifice, for it has been shown by Mr. Smith

(l. c.) that it is not an uncommon occurrence to find two or three rows of tumors, at distances varying from an inch to two inches from each other, the upper rows not presenting sufficiently low down to be seen without a speculum. Placing the patient in a recumbent posture, on one side, with the knees well drawn up, the nates are separated, and he is directed to strain slightly, as at stool. Usually, the tumors, or at least the lower row, will protrude and appear sometimes as smooth, shining, bluish masses, often like a bunch of grapes, or as red, single tumors. On examination the blue masses are found to be composed of dilated venous pouches, the mucous membrane covering them being thickened and perhaps excoriated; the red tumors are found to be largely composed of enlarged arterial twigs, sometimes the size being considerable, varying from that of a cherry to a walnut, perhaps even larger. The structure of the tumors is similar (if not identical) to that of varix generally, even to the enlarged stigmata through which the blood exudes. In other cases, the arterial, they resemble the varicose aneurism.

On laying open a tumor, in the case of a vein, it will be found to be partly filled with a coagulum and fibrous organization, its walls somewhat thickened, and the cellular tissue in the neighborhood infiltrated with fibrous material. Coagula are also found in the arterial form, but the bleeding is more active, and there is less surrounding infiltration.

There is still a third form of pile tumor, not pedunculated, as the two former usually are, but sessile, sometimes scarcely presenting characters of a tumor. These are villous or papillomatous growths, not much elevated, bleeding very readily on touching or irritating them, and usually constituting the upper rows when more than one row is found. I have thought it possible that these villous tumors might become pendulous and pedunculated, were time given them for full development, as it has been surmised by some observers that the pendulous masses, when arterial, originated in this form, and become pedunculated by detachment at the base and elongation of the feeding vessel from traction.

As symptoms associated with piles of the internal variety, we find the integuments about the anus relaxed, sometimes disposed in pendulous folds, and bathed in an offensive mucous discharge, sometimes quite distinctly purulent. There is often much *pruritus ani*, in some cases associated with an eczematous eruption which, joined to the irritation from the discharge and the blood drying on the clothing, produces great distress from the resulting excoriation. The dragging of the hæmorrhoidal tumors, their frequent protrusion and strangulation, and the atony of the rectal muscular fibres frequently induce more or less prolapse of the rectum, the sufferings being thereby much increased.

Like external piles, those of the internal variety have periods of ex-

acerbation and amelioration. Some dietetic excess or error, an attack of diarrhœa, or a constipation; an unusually long walk or other violent exercise; excessive coitus, or anything which would have the effect to increase the amount of blood in the pelvic vessels, or to excite unusual irritation, may result in inflammation and an acute attack. Patients, however, soon learn to avoid that which brings them suffering, but not seldom ignorant people, professional as well as lay, lead them to promote bleeding as a means of relief. It is true that many urgent symptoms are relieved by the hæmorrhage, but the ultimate results are disastrous in the extreme. Not only do the symptoms of a general character become greatly aggravated by the hæmorrhage, but the atonic condition is also rendered worse, so that the transient relief is very dearly purchased at the expense of much future suffering.

Treatment.—I am strongly of the opinion that the best results in the treatment of this variety are obtained from remedies. Operative measures of all kinds, ligature, excision, cautery and injections are to be held in reserve for a very last resort. The objection to operative measures whereby the tumors are removed, is the danger of cicatricial contraction, with a possible stricture as a result, predisposing to some form of intestinal obstruction. The objection to the injection of medicinal substances into the tumors is the danger of embolism, under the most favorable circumstances forming a thrombus which, in the majority of cases, simply postpones a more formidable operation. Nevertheless, there are cases in which injections of carbolic acid, or some other agent of similar properties, will produce a firm clot that subsequently becomes absorbed. In a considerable number of cases, some writers assert a majority, the clot will remain unchanged, and furnish the occasion for an acute inflammatory attack at a later date. The tumors being of large size, the cause of much suffering, or the patient being much reduced in vigor, an operation of some kind seems to be called for. Under other circumstances and conditions milder measures must be preferred. It does not enter into the plan of this work to discuss these operations, nor their indications, at least not in detail. It must be borne in mind that the ligature, or the removal of the tumor with scissors or other cutting instruments, is not to be used indiscriminately; each method has more or less exact indications, for which the reader is referred to works on surgery.

The remedies which are found useful in hæmorrhoidal affections are as follows: *Æsculus hip.*, *Aloes*, *Arsenic*, *Belladonna*, *Calcarea carb.*, *Carbo veg.*, *Dioscorea*, *Erigeron*, *Hamamelis*, *Lachesis*, *Muriatic acid*, *Nitric acid*, *Nux vom.*, *Phosphorus*, *Podophyllum*, and *Sulphur*. In connection with the indicated remedy, in acute cases, hot or cold applications (as may be most comfortable to the patient) must not be neglected; the patient must be kept as quiet as possible, and some attention paid to the diet. In chronic cases, attention must be paid to keeping irritants

at a distance, and to avoid all acts which experience has taught the patient may be productive of an acute attack.

Esculus hip.—Mucous membrane of rectum very dry, producing a feeling as if sticks were in it; constipation, with feeling as though a fold of mucous membrane were obstructing the passage; fearful of straining, from sensation as though it would cause prolapsus; aching, lameness, or shooting in back.

Aloes.—This is one of the most useful remedies; at least in my hands it has produced many excellent results. The piles protrude like a bunch of grapes, with constant bearing down in the rectum, and stools of a jelly-like substance; there may be no active hæmorrhage, but at times it is severe. Diarrhœic stools, with much flatulence, so that the patient is in doubt whether it is stool or flatus that passes.

Arsenicum.—Piles with stitching pain when walking or sitting; not when at stool; with burning pain; pains better from heat. Watery, excoriating diarrhœa, with restlessness and great debility.

Belladonna.—Bleeding from piles, profuse, arterial; contraction of sphincters, with puffiness and congestion of mucous membrane; great sensitiveness to touch, so that the patient lies with the nates separated. Pain in the back as though it would break.

Calcarea carb.—Protruding piles, painful when walking, better when sitting; painful at stool. Irritability of anus causes all stools, hard or soft, to be painful. Much milky mucus; offensive discharge.

Carbo veg.—Large bluish varices, bleeding freely; much flatulence and eructations of gas; colicky pains from incarcerated flatulence, relieved by eructation; much offensive moisture, and viscid mucus about the perinæum and anus. Burning and soreness of the anus.

Dioscorea.—Piles, like grapes, around the anus, not bleeding; slimy mucus involuntarily discharged from the anus; hæmorrhoidal tumors of livid color, prolapsed, with great pain.

Erigeron can.—Hæmorrhoids with great and frequent passive hæmorrhage; burning around the anus, which feels torn.

Hamamelis.—Bleeding from piles, producing great exhaustion; out of proportion to the amount of blood lost; particularly useful in large blue hæmorrhoids, where the blood does not tend to coagulate, or does so very imperfectly.

Lachesis.—On coughing, a stitching pain upwards in the pile tumors; beating, as if from little hammers in the anus. Blood dark, fluid, coagulates slowly or imperfectly.

Muriatic acid.—Sudden hæmorrhoidal attacks, particularly in children, with protrusion of bluish piles, very sore, and so sensitive to contact that even a sheet is uncomfortable. Prolapsus recti, or protrusion of piles when urinating.

Nitric acid.—Bright red, uncoagulated blood from the piles; particularly worse in warm weather; the bleeding so profuse that the least motion causes faintness. Tearing pain in the rectum at each stool; feeling as if the anus were full of splinters or sharp pieces of glass.

Nux vom.—This remedy has long enjoyed a reputation for the cure of piles, and is oftener given empirically than any other. It is particularly useful when the rectum feels spasmodically closed, with habitual constipation, especially if it alternates with diarrhœa. Bruised pain in the small of the back, making it difficult to rise quickly from a sitting position.

Phosphorus.—Free hæmorrhage from the rectum, flowing in a small steady stream. Difficult passage of long, narrow, tough fœces.

Podophyllum.—Piles in connection with chronic diarrhœa, occurring mostly in the early morning, preceded by pinching pains; stools light-colored and very offensive. Prolapsus of rectum at almost every stool.

Sulphur.—This remedy divides the honors with *Nux vomica* among routine prescribers. It is chiefly suitable for old chronic cases in which the piles are rarely painful. There is usually a chronic diarrhœa, sudden urgency early in the morning. Considerable blood passes with the stool, usually dark-colored, and there is some soreness of the anus and bruised lameness of the back.

PROLAPSUS RECTI.

Prolapsus of the rectum occurs in two forms, that of the mucous membrane alone, and that in which the whole rectum, or rather all its tissues, are found in the protruded portion. This latter form I prefer to call *procidencia*. *Prolapsus*, to adopt the above classification, is perhaps equally common at all periods of life, possibly, however, it may be observed oftener among children. It is a protrusion of the mucous folds lying nearest to the anus, transient or permanent. A normal evacuation of the bowels is always accompanied by some protrusion of the rectum, which, however, is withdrawn again on the completion of the act. The loose connection between the muscular and mucous layers of the rectum permits considerable mobility of the latter upon deeper parts, and if from any cause the mucous tissue becomes thickened and infiltrated, this already loose connection may become still more slight. Under these circumstances the protrusion, if frequently repeated, gradually includes more and more of the loose tissue, at the same time adding to the already existing congestion, until an amount is finally prolapsed which can again be returned within the anus only with great difficulty. The first protrusion is usually reduced without difficulty, but is often very painful; when the accident is repeated, reduction becomes more and more difficult, the irritable sphincter constricting it firmly, and producing much pain. On examining such a protrusion, it is seen to be a conical projection, red and smooth, covered with mucus, and with a sulcus or fissure around its base, as would be the case in intussusception of the rectum. The opening of the cavity of the rectum is seen at the apex of the protrusion. In cases in which the accident has been frequently repeated, the mucous membrane is found thickened and hardened, somewhat leathery, more or less eroded, and when the protrusion is reduced, some of the folds are found to remain without the anus and to have assumed the character of integument. As time goes on, unless a cure is effected, the portions habitually without the sphincter become larger and lose all the characters of mucous tissue.

Procidencia recti is almost entirely, I believe, an accident of adult life, possibly more common among those past middle life. It has been observed, however, at all ages. It seems to be more common among women. Probably, could the early history of such cases be secured, it would be found that they commenced as a simple prolapse of the mucous tissue; but, when they come to the surgeon as *procidencia*, the protrusion is found to be composed of all the layers, mucous, muscular and fibrous. In many cases the protrusion is not constant, but in the majority more or less of the bowel is habitually without the anus. We find the mucous membrane thickened, hard and leathery, either dry (which is the customary state), or covered with mucus more or less purulent. It may be so voluminous that it becomes an abso-

lute impediment to locomotion. The proximity of the bladder, urethra, and prostate gland in men, and the sexual apparatus in women, entails usually some associated disturbance in these organs. Particularly do we find vesical irritation, strangury, retention of urine, or enuresis.

The *causes* of prolapsus and procidentia are similar, in fact the same, if we esteem the latter to be an advanced stage of the former, of which there can be very little question. The first cause must be something productive of atony, either operating through local causes or generally. Thus, any condition that induces general muscular atony must have some causative influence on the production of prolapsus recti, at least predispose to it. Violent diarrhœa or dysentery has the effect to induce atony of the intestinal muscular elements, and the straining and tenesmus associated with these disorders may cause prolapse. Thus, enlarged prostate, urethral stricture, or stone in the bladder, from the straining required to empty the bladder, are often prominent exciting causes. Hæmorrhoids play a very important part in this particular, both from the traction exerted on the mucous coat, the hæmorrhages, and the frequent straining at stool. So also tumors of the rectum may by traction produce an inversion or invagination. The peculiar laxity of the mucous coat is always to be considered among the common predisposing causes; when we have muscular atony, and some morbid condition, near or remote, that excites frequent contraction of the abdominal walls, as at stool or urination, a chain of causes can easily be made out.

Treatment.—In the severer forms of procidentia recti, where the mucous coat and, indeed, all the tissues are extensively and permanently altered, and where the portion habitually without the sphincters is of large size, I do not think remedies can be of the least avail. In the minor degrees, more particularly when the condition is still acute or recent, remedies have produced many remarkable cures. In fact, it is doubtful whether any other measures are ever called for in such cases. A complete symptomatology of the remedies that might be indicated would take up too much space, the condition being associated so closely with diarrhœa, dysentery and hæmorrhoids.

The remedies oftener employed are not many in number, and a selection should not be a matter of much difficulty in ordinary cases. Still, reliance must not be placed on them alone to the exclusion of certain mechanical measures which are of the very first importance.

Reduction or reposition of the protruded gut is the first indication, if it is strangulated. The protrusion is to be well lubricated with fresh lard or some other bland and unctuous material; joining the tips of the fingers of the right hand together, press firmly on the centre of the projection, at the same time separating the nates as much as possible with the other hand. It is very rarely that there will be a

failure to replace the intestine. In the case of procidentia, particularly when the protrusion is large and the tissues have undergone much change, such treatment is useless; the altered tissues would constitute a foreign body in the rectum, and could not be retained.

Having reduced the prolapsus, the next step is its retention within the pelvis. In aggravated cases bandages, or some form of mechanical support, may be needed, but in most instances the bowel will remain in place until some unusual exertion, some effort at defecation or micturition, reproduces the prolapsus. Hence, the patient must be cautioned in these particulars, and we must see that he thoroughly understands the necessities of the case.

In an acute case, one that has occurred for the first time, and with some strangulation, *Arnica* should be given, or applied locally, or both, for some hours. By attention to the bowels, correcting any diarrhoea, or the like, that may be present, it is not often that the accident will be repeated. In cases in which the accident is of somewhat frequent occurrence, the chief indication, so far as mechanical measures are concerned, is to secure retention, if possible, and to avoid, as far as practicable, any occasion that may reproduce the displacement.

The remedies oftener useful are as follows:

Belladonna.—Where there is constriction of the prolapsed rectum, the parts being hot, red, and swollen, particularly if the sphincter is strongly contracted and the parts are intolerant of the lightest touch.

Hamamelis.—When the prolapsus occurs in connection with varices of the rectum, from which there is copious hæmorrhage of fluid dark blood, with little tendency to coagulation.

Ignatia.—This remedy is useful for children when prolapsus occurs with every stool, hard or soft, with or without straining. Stitches up the rectum, and an itching as from ascarides in the anus.

Mercurius cor.—Prolapsus, with dysentery, in which there is almost constant tenesmus during and for some time after stool. The stools are frequent, small, bloody and mucous.

Muriatic acid.—When urinating, discharge of thin, watery stool, with prolapsus recti. Prolapsus, with (or from) hæmorrhoidal tumors.

Nux vom.—Diarrhoea, alternating with constipation, in which there is prolapsus with the stool, although between the stools the anus seems spasmodically contracted.

Podophyllum.—Prolapsus with almost every stool; particularly when the stools are light-colored, very offensive, preceded by pinching, colicky pains, and mostly early in the morning.

Sulphur.—Habitual constipation, with frequent urging to stool; ineffectual, during which the rectum becomes prolapsed. Prolapsus occurs under reverse circumstances, with the characteristic morning diarrhoea.

The treatment of procidentia is purely surgical. Many cases require excision of the rectum or some equally formidable operation, and the reader is, therefore, referred to works on general surgery.

ULCER AND FISSURE OF THE RECTUM AND ANUS.

The lower portion of the rectum, just within the sphincters, is disposed in folds which peculiarly dispose it to retain portions of *feces*

or foreign material contained in the stool, although these folds are smoothed out during the passage of the stool. A portion becoming lodged, usually close down to the sphincter, is firmly held in the crease or fold, and soon sets up an inflammation, sometimes a preceding abrasion which forms a superficial ulcer. On partially opening the anus, this has the appearance of a slit or fissure, but on introducing a speculum, whereby the parts are put upon the stretch, it is seen to be a shallow ulcer, round or oval in form, about $\frac{1}{4}$ or $\frac{1}{2}$ of an inch in diameter. On the opposite side of the rectum will often be found a papillomatous projection, which seems to fit into the ulcer and assists in keeping up the irritation. My opinion is that the papillomatous growth is often a cause of the ulcer, and not secondary upon it. However formed, these sores are not disposed to heal spontaneously, and are productive of the most exquisite suffering.

The pain is rarely experienced during the stool; it usually comes on immediately afterwards, sometimes even after an hour. It is then exceedingly acute, completely prostrating the sufferer. So severe are the pains that patients often postpone defecation to the longest possible intervals, sometimes even denying themselves food in the vain hope to avoid a movement of the bowels. Cases are even reported where chloroform was taken to the closet whenever a motion of the bowels could be no longer delayed. The sphincter soon becomes exceedingly irritable, so that it will not tolerate contact of any kind, feeling like a hard, solid ring under the integument. The bladder becomes also sympathetically affected, as does the vaginal sphincter, resulting, in the latter case, in vaginismus. It is this extreme sensitiveness which causes the frequent error of diagnosing a fissure, as dilatation of the anus is impossible, and the shape of the ulcer cannot be made out.

These irritable ulcers occur for the most part about the period of middle life, and oftener among women. When fully formed, or chronic, the irritability is so extreme that a satisfactory examination cannot be made without anæsthesia. The contraction of the sphincter being so violent, there is a constant danger of foreign material being retained from the fæces, and the distension to which the parts are subjected at each act of defecation keeps the sensitive sore from healing. From perfectly natural causes, therefore, such an ulcer must prove very intractable.

Treatment.—The conditions of the part are such, anatomically considered, that it would seem almost impossible to produce a cure without, in some way, placing the parts in a different relation. This is to be done by paralyzing the sphincter, and thus removing one of the chief obstacles to a cure. As a matter of fact, an effectual paralysis of the sphincter often produces a cure without any other treatment whatever. The most convenient method is that of Pattison, as fol-

lows : First anæsthetize the patient, and then, lubricating both thumbs, introduce them into the anus, back to back, until the muscle is felt to be included within their grasp. Now separate the thumbs, with a sudden force, drawing the margins of the anus outwards until they reach the tuber ischii on each side. This usually, to some extent, lacerates the floor of the ulcer. If it fails to do so, it is best to incise it in the direction of the rectal fold, not carrying the knife deeply, only sufficient to cut through the mucous layer. In very many, probably a large majority, of cases, ulcers so treated will heal very quickly, all symptoms disappearing by the time the irritability of the sphincter is destroyed. I think the success of the operation depends upon a rupture or laceration of the floor of the ulcer ; simple paralysis of the sphincter will not prove sufficient. Separate the thumbs, therefore, with a *sudden* force, and if laceration does not occur, incise the floor of the ulcer, with the lancet.

Remedies should be used, however, to hasten healing, *Calendula* taking the first rank. Should the ulcer fail to close from this treatment, it should be repeated, and some remedy given that would be indicated by the symptoms of the ulcer as they occurred prior to the stretching of the sphincter. Probably *Arsenicum*, *Belladonna*, *Pæonia*, *Lycopodium*, *Mercurius*, *Nitric acid*, *Rhus*, *Silicea* or *Sulphur*, one or the other, would be found curative.

IRRITABLE SPHINCTER.

In hysterical persons, or in those unusually sensitive to pain, there is sometimes found a condition of irritability of the sphincter ani which very closely resembles ulcer as described above. There is great pain on the passage of stool, but it is *during* the passage, as well as afterwards, thus differing from ulcer. Moreover, it is more of an aching or constricting feeling, somewhat as though the parts had been contused. On attempting a physical examination, the sphincter will violently contract, as occurs in the case of ulcer, but there is not that extreme sensitiveness which occurs in the former complaint. The finger having passed the sphincter, the muscle is felt like a tight cord and, in old cases, much hypertrophied. There is no sensitiveness in the lower portions of the rectum, the pain being entirely in the sphincter muscle. On attempting to evacuate the bowels, the sphincter becomes spasmodically contracted, the anus being drawn inwards, and after the act is accomplished there is a feeling of incompleteness of the evacuation from the continued muscular spasms. The bowels are usually constipated, which condition adds to the painfulness of the act, and near parts soon become sympathetically affected. The aching which persists after a movement of the bowels is very severe, and for some time prevents sitting, or even walking, with any comfort.

Treatment.—Remedies suggested by the general condition must

be given the first place in these affections, although in aggravated chronic cases a division, partial or complete, of the sphincter may be needed. The remedy oftener called for is *Belladonna*, although *Cuprum*, *Platina*, and *Plumbum* are prominently indicated. The affection being for the most part a concomitant of constipation, special indications for these, and other remedies, may be found in the article on that subject.

TUMORS OF THE RECTUM.

Tumors of various kinds occur in the rectum, and yet remembering the frequent irritation to which the functional activity of the part gives rise, it is remarkable that they are not observed oftener and in greater variety. The usual form is the polypoid, either follicular or fibrous, and a villous tumor which, to all intents and purposes, may be considered a pile. The symptoms, ætiology, and pathology are not at all different from tumors of the same kind in other situations, at least so far as the growth itself is concerned; other symptoms peculiar to the region, on the other hand, have no special significance as indicating a tumor. There is a feeling of fulness in the rectum, more or less urging, and unsatisfactory defecation, but the same symptoms are produced by enlarged prostate or hæmorrhoids. There may be violent bleeding or pain from a villous tumor, but hæmorrhoids, ulceration, or irritable sphincter furnish similar indications. Sometimes, when the tumors are pedunculated, the morbid growth may appear at the anus. Even then it may be mistaken for a hæmorrhoidal protrusion. As a matter of fact, to all intents and purposes the growth may be considered hæmorrhoidal, and treated as such. This similarity in symptoms of many different morbid conditions adds emphasis to what was said in an earlier paragraph, viz., that an examination must be thorough, and not held to be complete until a speculum has been used, and the tumor brought into actual view.

The pathology and histology of these tumors being identical with the same growths in other regions of the body, the treatment is likewise to be the same. They should be removed as soon as detected, and care had to include enough of the base to reduce the chances of recurrence, without leaving a wound likely to be followed by serious cicatricial constriction.

FISTULA IN ANO.

Anal or rectal fistulæ, like fistulæ generally, are the result of abscess. An abscess forms outside of the rectal tissues, and burrowing through the loose connective tissue and between the muscles, points in the perinæum or near the anus; from some cause the track does not close, but remains as a *blind external* fistula. In another case, a foreign particle lodges in one of the rectal folds of mucous membrane, sets up acute inflammation, with ulcerative perforation and abscess, as in the

former instance, leaving a track communicating with the interior of the intestine at one end and the integument at the other, forming a *complete fistula*. There is still a third form, in which the process commences as in the last variety, but is not continued to the tegumentary surface, thus leaving but one opening, that into (or from) the rectum. This is called a *blind internal fistula*, and is probably more common than is generally supposed.

The commoner site of the rectal opening is just within the sphincters, where the suddenly narrowed canal affords favorable lodgement for foreign material, and the longitudinal folds of mucous membrane afford convenient receptacles for retention. The anal or perineal opening is usually within some of the folds of integument surrounding the anus, or the mucous folds within it. Short as the distance, in a direct line, is between these two openings, the fistulous track may be quite long, owing to numerous curves and flexures in its course as it is directed between the various bundles of muscular fibres, as the general course in the direction of least resistance. The fistula once formed, it is kept open by the passage of gas, fæcal matter, and the various motions to which the parts are subjected, and soon it becomes lined with a firm pyogenic membrane, which, in time, becomes organized and permanent.

The symptoms at first are not very striking after the abscess has ceased to be active, and for a long time may escape the attention of the sufferer. After a time, there is noticed an involuntary escape of flatus, occurring at inopportune moments, and the clothing is found soiled with fæcal matter and pus, notwithstanding the utmost care and cleanliness. Medical advice is then sought, and examination will at once reveal the source and nature of the trouble. Should the opening be on the integument, it will appear as a little florid pimple-like elevation, similar to what is observed in necrosis, which is found to constitute a flap-like covering for the fistula. If the opening is within the mucous or cutaneous folds of the anus, the part must be exposed to a good light, and, passing the finger into the anus, we must make pressure at different parts of it, pressing outwards at the same time, by which means a drop of pus, mucus, or some particle from the bowel will be forced out, thus enabling us to locate the orifice. Having found the opening, with the forefinger of one hand within the sphincters, pass a delicate flexible metal probe into the external opening, rotating it between the thumb and finger, and gently pass it along the fistula. Should the fistula be complete, the end of the probe can be felt by the finger in the rectum; if not complete, it can be felt impinging on the mucous membrane. In the latter case the probe should be withdrawn a little, and passed onward in various directions, to be sure that what had been thought the bottom of a blind fistula is not an angle of a complete one. Should it appear, after faithful

effort, that the probe will go no further, a blind fistula may be diagnosed.

The consequences of anal fistula are not of light moment. To be sure, the constant mortification to which the sufferer is subjected renders the condition one of gravity; but it is productive of serious physical consequences as well. Apart from the irritation of the parts so constantly bathed in the secretions from the fistula, and the discomfort in walking and sitting, whether as cause, effect, or only coincidence, there certainly seems to be a close relationship between pulmonary tuberculosis and this condition. Such relationship is denied by many good authorities, but my own experience would go to prove the fact of such relationship. In looking over my case-book I can find few records of anal fistula in which some reference to tuberculosis does not appear. As the mass of authority seems to be arrayed against this assertion, my cases may be considered mere coincidences.

Treatment.—The treatment of fistulæ is based entirely upon the stage and the kind. Thus, an old fistula, with a firmly organized pyogenic membrane, may be considered entirely incurable so far as remedies administered internally are concerned. A blind internal fistula, one with no cutaneous opening, is incurable by any means until it is converted into a complete one. In all forms there are two cardinal indications: the sphincters must be paralyzed during the continuance of treatment, or through a considerable portion of this period, and some effort must be made to prevent the passage of the contents of the bowel into the canal. The paralysis of the sphincter can be secured by stretching it by Pattison's method, given in a preceding paragraph; the prevention of the entrance of foreign material may be secured by a rectal plug or obturator of hard rubber or even wood.

The pyogenic membrane must be destroyed as a preliminary to any treatment. If it is a recent case, and the lining membrane is loosely organized, it may be possible to secure cicatrization by simply paralyzing the sphincter and closing the rectal orifice. Under other circumstances the membrane must be destroyed, either by caustic applications, scarification, or, in short and straight tracks, by dissecting it out. In old cases, where the pyogenic lining becomes almost cartilaginous, it may become of embarrassment as to its effectual disposition. Such cases are purely surgical.

Assuming a case to be of a sub-acute character, with a loosely-organized lining membrane, laceration with the probe may be sufficient treatment; the sphincter is then stretched, the track washed out by means of a small syringe, and the obturator or plug inserted. Daily for a time, say for three or four days, the probe is to be passed, injections used, and the sphincter stretched, if need be. Ordinarily, there will be immediate improvement, particularly if *Calendula* is used in the water thrown up from the syringe. Perhaps *Causticum*, or some

other remedy indicated by the general condition of the patient, may be employed, but the chief reliance is to be placed on keeping the parts quiet by paralyzing the sphincter, and upon the closure of the rectal orifice. Should failure result, after an interval of a week or longer, repeat the treatment, but insert a soft rubber tube, or any soft material which the track will accommodate, and thus promote healing from the bottom. Should the case still remain uncured, proceed as in the case of the chronic form.

Chronic cases, with a dense, firm lining membrane, can rarely be cured without converting the fistula into an open wound. There are two methods, chiefly, by which this may be accomplished. The most efficacious, least painful, and altogether most satisfactory way is to divide the tissues with the knife, on a director, provided the tissues included are not of a character that such division would produce serious consequences. Thus vessels of size, or important muscles, should not be divided; the sphincter itself, if it can be avoided, should not be completely divided. If circumstances forbid the use of the knife, a ligature may be employed, passing it through by means of a blunt needle, and tying it tightly. Silk or the elastic ligature of Dittel may be used, the former being preferred. I prefer the silk, as it causes less pain than the elastic ligature and is equally efficacious. Ligature generally, however, is a painful mode of treatment, and not to be preferred to the knife unless circumstances forbid the latter.

I do not mention remedies in this connection, for two reasons. The first is that there does not seem to be any field for them, the continuance of the fistula being entirely dependent upon mechanical causes; and secondly, if the fistula is a part of a general or systemic morbid action, the remedy that would be indicated might rationally be supposed to include the fistula.

STRICTURE OF THE RECTUM.

Strictures of the rectum, of which the physical characters are sufficiently described by the term, proceed from the same class of causes which produce stricture in other parts of the intestinal canal. Perhaps the function of the rectum peculiarly predisposes it to injuries which may result in this way, but the fact remains that from some cause strictures oftener occur in this portion of the intestinal canal than in any other. The location of the stricture is usually at the lower portion, about an inch or an inch and a half from the anus; sometimes it is found higher up, even at the commencement of the rectum. Thus Curling (*Reynolds's Practice of Medicine*, iii., p. 269) says: "In twenty-eight cases I found the stricture at 'one inch and a half or two inches from the anus' in twenty-one; in two it was nearer the anus; and in five at a greater distance. In three of the latter the

stricture was at the point where the sigmoid flexure terminates in the rectum. In two instances I have met with a double stricture."

The causes of stricture are either inflammatory changes, usually of a chronic form, or traumatism. Occurring, when non-traumatic, in those who are of constipated habit, the constant irritation resulting from hard stools and from long retention of hardened fæces sufficiently accounts for the thickened and chronically inflamed state of the mucous membrane. Some narrowing having thus been produced, lodgement of portions of fæcal matter occurs, ulceration or fistula frequently resulting, intensifying the original inflammation and increasing the stricture at the same time. The increasing stricture predisposes to pouching or sacculation of the intestine, and when it occurs sufficiently high up, invagination, volvulus, or other forms of obstruction may occur.

Should there be ulceration without a preceding inflammation, that is, without a stricture, the cicatrization of the ulcer may result in constriction, one that is progressive from the contracting property of all forms of scars, but which in this region is more rapidly productive of a major degree of the trouble from the inflammation due to the lodgement of foreign material. The same consequences follow traumatism. Traumatic lesions are common, inflicted in many ways. The frequent or habitual use of enemas or suppositories are the commoner forms; the passage of hard, angular, or sharp foreign material through the intestine may lacerate the mucous coat or become lodged in some of the folds or rugæ; or injury may be received from without, as gunshot or stab wounds. Stricture may arise from other causes, however, but so exceptionally that they have rarely received any attention from writers or teachers. Thus, tumors may cause compression from encroaching on the bowel from without; tumors growing within the rectum may have the same effect; prolapsus, from the redundancy of the mucous membrane causing, or caused by, this condition; and many other forms of morbid action that have the effect to thicken the mucous lining or make traction upon the bowel or any of its coats.

However produced, the symptoms are very obscure and rarely recognized until the affection becomes serious. Occurring in persons of constipated habit, the gradual increase of constipation does not at first attract attention. Later, however, there is much pain, usually of a burning character, coming on after defecation, not as severe as occurs in ulceration, yet sufficiently so to cause a suspicion of that condition. If examination is now made, the true state of affairs may be discovered, unless the constriction is so high up that it cannot be easily reached with the finger. Later, there is a constant discharge of brown sero-mucus, staining the linen, and causing an unpleasant fæcal odor about the person; there are occasional attacks, of increasing frequency, of dysenteric diarrhœa, largely of the explosive type, alternating with

obstinate constipation. The stools, late in the case, become bloody, more or less purulent, and small in amount; there is almost constant urging to evacuate the bowels, the straining incident thereto increasing the stricture and precipitating many of the late graver symptoms. Late in the case, from the irritated and inflamed condition of the surfaces, the stools are very painful, the sensation often being likened to that of boiling hot water. Abscesses, fistula, excoriation of the anus and perinæum, together with hæmorrhoids or villous tumors, frequently complicate the case and render the sufferings of a very serious character.

Treatment.—The treatment of stricture is based upon three indications: to correct the constipated habit; to reduce the inflammation and its attendant induration; and to remove the stricture, at least to an extent sufficient to permit the passage of an ordinarily soft stool. To meet the first indication, remedies must be used as already laid down in its proper place—*constipation*. It must not be forgotten, however, that the diet must be of a character to favor soft stool, and every precaution must be taken to avoid the accumulation of fæces in the rectum. These measures have already received attention in a previous chapter. The inflammation and its consequent induration will usually disappear together with the constipation. At this time, therefore, we have chiefly to do with the stricture and the means for its disposal. In fact, it will rarely occur that the constipation can be relieved, at least materially, until the stricture is improved, as this condition acts as a mechanical obstruction to the passage of the fæces. Furthermore, if treatment is undertaken late in the case, it will be remembered that diarrhœa is a more prominent symptom.

The stricture having been located, we have a choice of methods for its relief. In examining a case of suspected stricture, if the obstruction occurs low down and can be felt by the finger, no embarrassment will ordinarily exist. If, on the contrary, the obstruction is high up, there may be some difficulty. For purposes of diagnosis the most convenient instrument is the hand. Under an anæsthetic the hand can be passed up the rectum as far as the colon; but this should not be attempted if the hand is large, or there is much acute inflammation or ulceration about the anus. If for any of these reasons it is unadvisable to use the hand, and a single finger cannot reach the obstruction, the rectal sounds, olive pointed, made on the principle of Otis's bougies *a boullé*, should be used.

The stricture being located, divulsion, incision, dilatation, or electrolysis may be practiced. These operations are all of the major class, and reference is to be had to works on surgery for details, but the general principles, at least as relating to selection of the method, may be given at this time.

In general terms, when a stricture is of large calibre but firm, divul-

sion may be practiced. When cicatricial and of some degree of tightness, incision. When very small, tight, and cicatricial, electrolysis. Under all circumstances dilatation with graduated bougies must follow either of these operations, particularly when the structure is cicatricial, and it must be persisted in until there is no disposition to a return of the trouble. *Silicea* must also be used, I think not lower than the 30th attenuation, from its well-known effects on scar tissue. Incision or divulsion must not be hastily undertaken nor performed without due precaution, as rupture of the intestine may easily occur, an accident that might give rise to the most dangerous symptoms.

CANCER OF THE RECTUM.

Carcinoma of the rectum presents no symptoms that differ in any respect from cancer elsewhere. Probably the three principal forms of the disease occur in the same order of frequency—viz., scirrhus, encephaloid, and colloid—in which they occur in other regions. From the fact that the anus is an orifice partly composed of mucous tissue and partly cutaneous, as well as a part which is very frequently exposed to injury, both from forces operating from without and from hard stools from within, carcinoma is quite a common occurrence. The early symptoms of cancer are not at all pathognomonic; they are common to many anal and rectal diseases, spasm of the sphincter, ulceration and fissure, piles, stricture, etc., and may not attract the attention of either surgeon or patient sufficiently early to permit prompt treatment at a time and in a stage when there may be some reasonable hope of relief or even cure. The case generally falls under medical notice when far advanced, and when the only treatment available is purely palliative.

The disease usually commences just within the sphincters, at the point where most rectal diseases originate, extending as a rule upwards and downwards simultaneously. From the loose texture of the tissues of the part, particularly the loose connection between the mucous membrane and the muscular coat, the absence of resistance in almost every direction, and the constant irritation of the part from the performance of its function, the development of the disease is unusually rapid. The passage becomes rapidly contracted, sometimes so much so that even a small probe cannot be passed, and from the tendency of scirrhus to draw into itself near-lying parts, the passage often becomes impervious, thus adding the sufferings attendant upon retention of stool to those of the cancerous disease. Should the form of disease be encephaloid or colloid, this tendency to contraction does not always appear; on the contrary, there may be sloughing of large masses, or the texture may be so friable and loose that no resistance to stool exists. Furthermore, sloughing may establish large vaginal, vesical, or perinæal fistula. Whether there is contraction or slough-

ing, one thing is quite noticeable and of almost constant occurrence: the sphincters are soon rendered powerless, either from inclusion in the cancerous disease or from the destruction of the nerves, so that the retentive power of the anus is early lost. This causes incontinence of feces and involuntary stools, and later in the case, when the disease is well advanced, the discharges flow out over the clothing or person precisely as though through a metal tube.

The disease, as is the case with carcinoma generally, is peculiar to the middle periods of life, and is often observed among women. It has been seen in children or young people, but not frequently. Occasionally it has occurred as a secondary deposit, either from a primary disease higher up in the intestinal canal or even in other parts outside of the digestive track. As is the rule in cancer, scirrhus is generally primary, while colloid and encephaloid are as commonly secondary.

In the early stages, as already noted, a diagnosis is not easily made; the symptoms so closely resemble other non-malignant rectal diseases that unless cancer exists in some other parts of the body no suspicion of the true state of affairs would be excited by the symptoms. When the constipation becomes an almost complete retention of stool, and the anus or perinæum becomes full and tumefied, above all when the lancinating pains of carcinoma appear, the patient may apply for relief. An examination in a comparatively early stage may find no external symptoms. On passing the finger into the rectum, if the disease is situated low down, the cartilaginous constriction, feeling as hard and unyielding as gristle, will give a hint as to the condition. Later there will be an equally cartilaginous feeling of the walls of the rectum generally, which also become nodular; the nodules later project from the anus, are hard, sometimes elastic, and have a tendency, particularly in encephaloid, to bleed on being handled. The patient soon becomes cachectic when this stage is reached, and there can be little question of the nature of the case.

The *prognosis* is, of course, unfavorable in all stages and under almost all circumstances. The disease having made sufficient progress to attract the attention of the surgeon, it is nearly always so far advanced that even an operation can rarely, if ever, either save or prolong life. Carcinoma generally may always be considered an eminently dangerous and fatal disease, and in no other part of the body, unless it be the pharynx and œsophagus, is it as rapidly fatal or certainly irremediable as in the rectum.

Treatment.—In very early stages, or even later, should the disease be primary and the lymphatics not extensively implicated, excision of the rectum may cure. The conditions favorable to success, however, very rarely appear, and yet early incision may not only prolong life, but render it more endurable. Other treatment is valueless;

I cannot find a well authenticated report of a cure by other means. The treatment, therefore, as might be supposed, is purely palliative, this being one of the cases in which humanity demands the employment of opiates to allay pain. Certain effects from remedies are nevertheless obtainable as a mitigation of some of the sufferings; possibly, as is strenuously held by some, a cure *may* be secured in exceptional instances. I have never been able to secure such results, and am, therefore, naturally skeptical. The following medicines are credited with having cured cancer: *Arsenicum*, *Aurum met.*, *Carbo anim.*, *Conium*, *Condurango*, *Hydrastis*, *Kreasotum*, *Lapis alb.*, and *Mezereum*.

ANAL TUMORS.

Tumors about the anus, in sufficiently close relation with the part to be classified as above, are exceedingly common. With the exception of carcinoma, which usually extends to the anus from the rectum, these tumors are nearly all tegumentary. Condyloma, warts, and similar growths are quite common and present no peculiar features, nor do they differ in any particular from similar growths elsewhere. They are often found in persons of dirty habits, and not seldom are connected with some form of venereal disease. When close to the verge of the anus, they may be mistaken for hæmorrhoids, but the absence of attacks of acute inflammation and the history of their development will usually prevent any such mistake. Fibrous tumors have occasionally been observed, not of large size ordinarily, and usually become pedunculated. I have seen two or three cases of fatty tumor, also pedunculated. The common forms, however, are tegumentary growths.

Treatment.—The treatment of these tumors is the same as for tumors in general, *i. e.*, prompt removal. Warts and condylomata may be cured with *Thuja*, *Nitric acid*, *Calcarea*, or *Sulphur*, but failure will likely result unless particular attention to cleanliness is secured.

PRURIGO ANI.

Pruritis of the anus is an itching of the anus and perinæum, sometimes extending to the insides of the thighs and near parts, a very common accompaniment of many morbid affections. It may be associated with hæmorrhoids, or other rectal diseases, or with diseases of the uterus, bladder, or vagina; it may be caused by ascarides, or other intestinal parasites, or arise without any recognizable cause, being a purely unaccountable local hyperæsthesia. From whatever cause, it may become a truly distressing complaint, robbing the sufferer of sleep, and even rendering his days a torment. In the milder forms it appears only at night, after going to bed, when sleep is prevented for an hour or two. Rubbing or scratching will only afford momen-

tary relief, in the end greatly aggravating the sufferings. The itching is so distressing that it is only by a strong effort of the will that scratching can be avoided, and very often those who can restrain the impulse while awake, yield to it during sleep. The parts then become excoriated, dry, and leathery, forming cracks or even ulcers by breaking of the thin, brittle epithelium. Sometimes there is an herpetic eruption developed, when the itching and irritation are constant day and night, sometimes so severe that the patient has no comfort sleeping or waking. The scrotum, or the fold between the labia and thigh, becomes sore and excoriated, often exuding an unpleasant moisture.

The condition must usually be looked upon as a pure neurosis, but there are often some habits of the individual which seem to hold some causative relation. In the absence of any recognizable near lesion, inquire into the habits of living. Some have observed that when actively engaged in absorbing occupations they cease to be annoyed; others, that tobacco or alcoholic stimulants aggravate the sufferings; others, that particular articles of food or drink increase the severity of the symptoms. While little or nothing as to exact causation may be learned in this way, useful hints may be obtained as to management.

Treatment.—The removal of any cause that may be discoverable is a common sense procedure. It has appeared, however, that such causes are not at all times discoverable. Cleanliness must be enjoined, and as cold water sometimes aggravates the trouble, warm ablu-tions will be prescribed; should warm water cause aggravation, cold must be preferred. The temperature of the water must depend entirely upon the comfort of the patient. The bowels and bladder must be looked to, and every care taken to secure a proper performance of all the bodily functions. Proper medication is of the first importance. The list from which the selection is to be made is very long, and sometimes, from the similarity of the local symptoms, the general condition and minute constitutional peculiarities must be considered. For this reason it is exceedingly difficult to give indications for all the remedies which may be useful; my own rule has been to rely very largely upon the periods and conditions of aggravation and amelioration. The list from which I have oftener made a selection is as follows: *Alumina*, *Ammon. carb.*, *Calcarea*, *Carbo veg.*, *Causticum*, *Ignatia*, *Lycopodium*, *Nitric acid*, *Petroleum*, *Sepia*, *Sulphur*. As an empirical prescription some physicians seem to have had remarkable success with the local application of *Belladonna*, mostly the cerate. Some others find some oleaginous application helpful, as *Vaseline*, not omitting the appropriate remedy. The special indications for the remedies mentioned are as follows:

Alumina.—Feeling of constriction of anus and rectum, with albuminous, stringy discharge; difficult evacuation of bowels, whether stools are hard or soft. Worse on alternate days, in the afternoon; when talking.

Ammonium carb.—Hard, knotty stools; worse in the open air, from cold, from talking or hearing others. Better from warmth and in dry weather.

Calcarea carb.—Stools either hard or loose, white, and milky; fermented stools. Sensation of dryness and coldness about the part. Worse from cold and damp air; from cold water, after mental exertion, and on awaking.

Carbo veg.—Burning at the anus, with soreness of the perinæum, and oozing of moisture. Worse in the open air, when warm in bed, from poultices, and from pressure (or contact?).

Causticum.—Pulsation in the anus and rectum; itching after dinner. Worse at night and in the open air. Better from heat.

Ignatia.—Itching and creeping in the anus, with stitches running up the rectum. Constriction of the anus after stool. Worse when heated, in the open air, after dinner, and in the morning as soon as waking. Better from scratching, if the skin is not broken.

Lycopodium.—Itching and tension of anus, which is painful to the touch. Painful spasmodic stricture of the anus; bruised feeling in the perinæum. Itching returns in daytime when becoming warm; humid herpetic eruptions, with rhagades and crusts. Worse from 4 to 8 P.M.

Nitric acid.—Itching, burning, and stinging, with humid moisture; feeling of sharp foreign particles in the anus; itching felt during sleep. Worse on awaking or touching the parts.

Petroleum.—Herpetic eruption on perinæum and near parts; intense biting itching, inducing scratching until the parts become raw.

Septia.—Pain in the rectum as if from contraction, with itching, burning, and stinging, and discharge of mucus. Worse from mental exertion, washing, or after eating.

Sulphur.—Itching and formication of the parts, with moist herpetic eruptions, very greatly aggravated from cold water, or from water of any temperature.

Other remedies may be needed, as *Conium*, *Graphites*, *Pulsatilla*, *Rhus*, or remedies mentioned under *Prurigo* in general.

PROCTITIS—PERIPROCTITIS.

BY A. C. COWPERTHWAIT, M.D., PH.D.

Definition.—Inflammation of the mucous lining of the rectum. Catarrh of the rectum. In its mild form proctitis constitutes simply dysentery. Periproctitis signifies an inflammation of the connective tissues about the rectum.

Ætiology.—Proctitis may be caused by taking cold, especially from sitting on the ground, or on some cold damp object while perspiring. It frequently arises from the habitual use of medicated injections which cause excessive local irritation, and from purgative medicines, especially such as contain aloes. It often results from the accumulation of masses of hardened fæces in the rectum, and thus it may be said that constipation is the chief cause of proctitis. It may occur secondarily from inflammation in neighboring organs, or from diseases of the liver, vena porta, heart, or lungs which are caused by an obstruction of the abdominal veins.

Periproctitis usually follows an extension of inflammation in the rectum, and corresponding affections of the prostate gland, bladder, or

uterus, or it may arise from caries of the vertebræ and pelvic bones. Primarily it is occasionally caused by external violence.

Pathology.—The pathological changes correspond in a marked degree to those of other catarrhal inflammations. Leube* briefly enumerates the pathology of proctitis as follows: marked swelling of the mucous membrane, blenorrhœa, branny diphtheritic deposits, ulceration, polypoid proliferations, and finally hypertrophy of the submucosa and musculosa. This hypertrophy is at times so considerable as to convert the rectum into a "thick indurated tube," and is firmly bound by the proliferated tissue in its vicinity. At the same time the intestine above the inflamed part is dilated and impacted with fæces, while the rectal veins, particularly those of the anus, are engorged (hæmorrhoids). The venous engorgement is due partly to the incessant irritation of the mucous membrane, and partly to purely mechanical causes, such as the impediment presented by the conditions above mentioned to the return of blood from the hæmorrhoidal plexus.

Periproctitis, when dependent upon intestinal inflammation, may terminate in two ways, either in an absorption of the inflammatory products, followed by induration of the tissue, or the pus formed may be discharged either externally or into the intestine. In the latter case, collections of pus, fæces and necrosed shreds of tissue are formed, which communicate by fistulous openings with the affected part of the intestine (the so-called internal rectal fistulæ in proctitis). These secondary collections, in their turn, may rupture in other directions; the periproctitic abscesses externally in the anal region with the establishment of a complete rectal fistula, or into neighboring cavities, such as the bladder. In the external rupture the final event is generally preceded by a burrowing of the pus along the connective tissue which surrounds the cæcum, ascending colon, and extends directly to the rectum, kidneys, and superficial fascia of the upper part of the thigh.

Symptomatology.—In the milder form of proctitis the patient experiences dysenteric symptoms, tenesmus being the most prominent, and the stools consisting of mucus mixed with blood. In severe cases these symptoms become greatly intensified, the pain being of a burning character, sometimes tearing and throbbing, often sticking as if something sharp were irritating the rectum and must be forced out. The straining is violent, often causing prolapsus ani, the mucous membrane appearing at its orifice like a dark red cushion, and the stools contain considerable blood. Neighboring organs become irritated, and, as a consequence, we have strangury, painful urination, erection of the penis, metrorrhagia, and leucorrhœa. The symptoms may, after from four to ten days, begin to subside. A free evacuation of

* Ziemssen, vol. vii., page 361.

partially normal fæces may occur, and the patient soon recovers without further trouble. More often, however, either the inflammation extends to the peritoneum or the adjacent connective tissue (periproctitis), or, assuming a chronic form, ulceration and sloughing may ensue, rendering the stools purulent or muco-purulent, and very offensive. In the latter case the pains grow less severe and more heavy and dragging in their character, a continuous discharge of offensive pus takes place from the anus, the patient slowly becomes weak and emaciated, and may finally die from extensive ulceration and sloughing, even if perforation has not sooner excited a fatal peritonitis. In case the inflammation extends to the connective tissue about the rectum, we obtain the usual symptoms of an abscess, which may become absorbed, but more often discharges either externally or internally, or into the rectum, vagina, or bladder, thus forming different varieties of fistulæ. Sometimes dangerous complications arise, such as pyæmia, or thrombosis of the hæmorrhoidal veins may occur, resulting in the formation of an hepatic abscess by deposit of emboli.

If peritonitis is established we obtain the usual history of that affection, influenced by the extent and character of the local disease.

Diagnosis.—The symptoms of proctitis are so characteristic that there is little trouble in establishing a diagnosis, though it is sometimes more difficult to ascertain whether the condition is a simple catarrhal inflammation, or whether it be secondary to some serious fundamental disease, such as carcinoma, ulcers, or hæmorrhoids. In such case the use of the speculum will usually determine. In case there is reason to suspect that the inflammation is due to irritation from a displaced uterus, a vaginal examination may be required. From severe dysentery proctitis is usually distinguished by the absence of the flatulent stools and of the general constitutional disturbance so characteristic of the former.

Prognosis.—The prognosis is usually favorable; it is unfavorable only when the existing cause can not be removed. This is especially the case when proctitis results from some dyscrasia, as in tuberculous or cancerous conditions. Also in obstructive disease of the liver, heart, or lungs, more especially when abscesses of the liver have followed thrombosis of the hæmorrhoidal veins, as before mentioned.

Sometimes, when the disease is due to the presence of foreign bodies, fæcal masses, etc., which have been allowed to remain until extensive and deep ulceration has taken place, or periproctitis has supervened, the prognosis is not favorable, especially in weak or tuberculous patients. In cases of perforation resulting in peritonitis the prognosis is extremely unfavorable, and hardly less so when peritonitis has resulted from an extension of the inflammation by the contiguity of tissue.

Treatment.—When proctitis arises from local irritation, as after

the use of medicated injections or purgative medicines, it is often necessary to employ an enema as a soothing and healing application. For this purpose a simple injection of warm water is all that is required, though a flax-seed emulsion is usually most desirable. Sometimes an injection of equal parts of Glycerine and Calendula tincture will answer even better. In case the inflammation arises from an accumulation of fæces it is of the utmost importance that these be removed at once by a copious enema of hot water, which should be occasionally repeated in order to prevent a recurrence of the accumulation. At the same time the diet should be carefully regulated with the same object in view, the patient being restricted to the use of milk, corn starch, mutton broths, and such food as leaves little fæcal residuum. The medicinal treatment is precisely the same as in dysentery, the chief remedies being *Nux vomica*, *Mercurius corr.*, *Cantharides*, *Arsenicum*, *Nitric acid*, and *Rhus tox.*, for the indications of which the reader is referred to the article on dysentery.

INTESTINAL WORMS.

BY A. C. COWPERTHWAIT, M.D., PH.D.

Synonyms.—Intestinal parasites, Entozoa, Enthelminthes, Helminthiasis.

History.—That some sort of a parasite at times infests the intestinal canal of man has been known since the earliest times, but almost absolute ignorance prevailed in regard to their respective forms and characters. The Greeks went so far as to distinguish by their form three varieties,—the tape-worm, the round worm, and the thread-worm, which are described by both Hippocrates and Aristotle. Amongst the Romans, Galen also distinguished these three forms, but Celsus and Pliny only described two species, the broad and the round worm, embracing the thread-worm in the latter variety; at a still later day, the Arabians held that aside from the round worm the tape-worm is the only distinct species. This view was generally entertained until the seventeenth century. In 1691, the independent nature of the "hydatid Cyst" was established by Tyson.* As late as 1766, it was stated by Pallas that all the cystic worms were forms of tape-worms belonging to one species—namely, the cystic or hydatid tape-worm, and he first taught that entozoa, like other animals, spring from similar parents, and are propagated by means of eggs which are transmitted from one host to another, though he was not able to demonstrate how this is accomplished; at that time the doctrine of spontaneous generation was generally accepted.

In 1808, Rudolphi published his systematic treatise on Entozoa,†

* Phil. Trans., cxiii., page 506.

† Entozoor. Hist. Natur.

and in 1819 Bremser's work* was issued. Both these authors assumed the theory of spontaneous generation, the correctness of which was soon destined to be overthrown by the investigations of von Siebold (1835) and Eschricht (1837), who held that the entozoa during the reproduction generally undergo a metamorphosis and a migration. These views were subsequently confirmed by Steenstrup,† in 1842, who discovered that amongst a certain class of minute *Cercariæ* (worms of a microscopic size found in stagnant water), their generation was carried on through a series of broods produced from one parent, each brood differing from the parent and from each other. This discovery he described under the "alternation of generation," and from it deduced the conclusion, afterward verified by von Siebold (1848) and Van Beneden (1850), that the hydatid cysts would be proved to be undeveloped tape-worms, each cyst capable of producing a tape-worm after its kind. It now only remained for Kückenmeister, in 1852,‡ to establish a series of experiments to conclusively prove the correctness of Steenstrup's views. This he accomplished by feeding carnivora on flesh containing *cysticerci* and producing tape-worms, and, on the other hand, by feeding herbivora with the ova of *tæniæ* and producing *cysticerci*. These results have subsequently been confirmed by several distinguished investigators, so that it is now generally held that the ova or embryos are admitted from without, and conveyed into the intestinal canal by articles of food and drink.

Varieties.—It has only been a few years since accurate information has been had as to the great number of species of entozoa which exist, and even now new observations constantly increase their list. At present it is supposed that there are about fifty animal parasites which infest the human body; of these, twenty-one inhabit the intestinal canal, though of this number only eight are peculiar to man, and to them our remarks will be limited. Of these latter, three belong to the order of Cestoda, or tape-worms, and five to the order of Nematoda, or round worms.

Cestoda	{	<i>Tænia solium.</i>
		<i>Tænia saginata.</i>
		<i>Bothriocephalus latus.</i>
Nematoda	{	<i>Ascaris lumbricoidis.</i>
		<i>Oxyuris vermicularis.</i>
		<i>Trichocephalus dispar.</i>
		<i>Trichina spiralis.</i>
		<i>Anchylostomum duodenale.</i>

Ordinarily, but one of these varieties infests the human intestine at the same time, though many cases are reported where two have been

* Ueber lebende Würmer in lebenden Menschen.

† Ueber den Generationswechsel.

‡ Prager Vierteljahrschrift.

found, and Rosen* reports the case of a child, four years of age, in whose intestines were found ten lumbricoid worms, an innumerable quantity of oxyures, and four tæniæ. Heller † holds that different species are frequently found in the same intestines. He says this is especially true of the three common round worms, the *Ascaris*, *Oxyuris* and *Trichocephalus*, which are very often found in company. In like manner we may meet with these in company with tape-worms, and even the different varieties of tape-worms may take up their abode, side by side, in the same intestine. Heller also holds that the *Ascaris* and *Oxyuris*, or, as the vernacular has it, the round worm and the thread-worm, are, like tape-worms, found oftener in adults than in children, which is quite contrary to the views usually held by authors.

Natural order Cestoda.—Ransom ‡ describes the varieties of cestoda as parenchymatous worms, “without mouth or alimentary canal, with a so-called water-vascular system. They develop by budding from a pear-shaped larval form to a long, jointed, tape-shaped colony of individuals. In their reproduction they suffer an alternation of generations. The individual members of the colony (proglottides), or sexually ripe animals, increase in size and complexity of structure, although otherwise resembling each other, the further they are removed from the head, near to which a continuous formation of new joints takes place by budding. The head, which is the same in the adult as in the larval form, is furnished with two or four suckers, and commonly also with a coronet of hooklets, which serves for attachment. They infest, in their adult state, the alimentary canal of vertebrate animals only,” their habitat being the small intestines, though, when very long, the worm may reach into the large intestine.

Ætiology.—The origin of entozoa has already been briefly intimated, and in considering the general causes which operate for their production it is best to more fully explain the manner of their development. In the first place, in considering the ætiology of intestinal worms, it must be remembered that the theory of spontaneous generation from deranged intestinal conditions is now a thing of the past. The eggs or embryos must be introduced into the system from without, nor will an intestinal worm develop in the bowel directly from an ovum deposited there by a previous tenant, but it must first be discharged and undergo metamorphosis, being afterwards conveyed by some means through the mouth into the alimentary canal in a certain stage of development; when the parasite thus reaches its peculiar habitat, it grows into the adult animal.

Accurate observation and experiments have established the fact that the Cestodæ are cystic entozoa, known as *cysticerci*, in a state of ma-

* “Traité des Entozoaires et des mal. Verm.,” par C. Davaine, Paris, 1879.

† Ziemssen's Cyclopædia, vol. vii., p. 675.

‡ Reynolds's System of Medicine, vol. iii., p. 277.

turity. Different varieties of cysticerci are found in the solid parts of different animals, and each variety, received into the alimentary canal of another animal and there finding favorable conditions, becomes a perfect *tænia*, each kind of cysticercus becoming a particular kind of *tænia*. A cysticercus, on the other hand, is the product of the ovum of a *tænia*. The last links of the *tænia*, known as proglottides, which contain the ripe eggs, occasionally drop off and are evacuated.

In order to develop further, the embryos from the eggs must enter some other animal. If they are swallowed by some animal, they pass from the intestines into the tissues of the body, till they find a suitable place; then they throw off the little hooks, and a neck and head (scolex), resembling those of the tape-worm, grow from their wall. At first the scolex is inclosed within the embryo; it subsequently becomes free, and the swollen body of the embryo hangs to it like a bladder. This constitutes, at this stage, the cysticercus, or bladder-worm, such as is seen in the muscles, liver, brain, and other organs and tissues of different animals, and sometimes in human beings. The most common variety of cysticercus is that found in the swine, called the *cysticercus cellulosus*, which constitutes the scolex of the *tænia solium*. The scolex of the *tænia saginata* is found in beef, and is usually termed the *cysticercus medio-canellata*. The scolex of the *bothriocephalus latus*, or *tænia lata*, has more effectually eluded investigation, but is supposed to exist in fish or mollusks. If one of these scolices enters the intestines of a human being it becomes attached by the head to the wall, drops the bladder-like tail, and then a succession of segments form, constituting the tape-worm. They are generally introduced by eating the raw or imperfectly cooked flesh of the animals which they infest. Thus the *tænia solium* results from eating pork, while the *tænia saginata* is acquired by eating beef, and it is supposed the *tænia lata* from eating fish or from drinking water into which the larvæ have been deposited. Occasionally, the cysticerci may be introduced with other articles of food which have been in contact with the infected meat, and to which the embryos have adhered, or which have been cut with a knife that has been previously used for cutting infected meat. Tape-worm is far more frequent in those countries where much pork is eaten, and persons who do not eat pork, as the Jews, are particularly exempt from the disease. *Tænia saginata* is the variety mostly found in England and America, as might be expected from the large amount of beef consumed, though the *tænia solium* is of not unfrequent occurrence. The *tænia saginata* is most prevalent in Africa and Asia. It is said that the Abyssinians, almost without exception, are infested with this variety, and it is well known that the use of the raw, still quivering cow's flesh is looked upon by them as the greatest delicacy. The *bothriocephalus* is prevalent in Eastern Europe as far as the Vistula, especially along seacoasts and rivers, and in Switzerland. The

habit of feeding children and invalids with raw beef has been known to produce tape-worm. Cysticerci cannot withstand boiling, roasting, and smoking, and infested meat thus treated in a thorough manner never produces tape-worms.

Pathology.—The disorders generally caused by *tæniæ* are simply functional, and such as result from the irritation to the mucous surface by the movement of the tape-worm. Leuckart* has shown by observations on the dog that local congestions of the mucous membrane, separation of the epithelium, and even minute superficial sores may occur, and we have reason to infer that similar changes take place in man, though as yet they have not been demonstrated.

Symptomatology.—The symptomatology of tape-worm is quite indefinite, and often exceedingly obscure. Probably, in a majority of cases, there occur no symptoms whatever until fragments of the worm are passed at stool. There are, however, functional disturbances, already mentioned. Frequently, patients will complain of a severe twisting pain in the abdomen, like colic, and will bend double, or press the abdomen against some hard substance, suffering from nausea and, sometimes, vomiting. They may also have more or less itching about the nose and anus, disturbed sleep, anorexia, or a voracious appetite, frequently followed by fainting if not satisfied, and diarrhœa alternating with constipation, headache, ringing in the ears; the disposition is fretful, and the mind greatly depressed. As a rule, all these symptoms are worse when fasting, and are at once mitigated by eating.

In addition, there exist sympathetic disturbances which sometimes assume a grave character, hæmorrhages, menstrual irregularities, hysterical fits, chorea, convulsions, and even epileptic and maniacal attacks.

These, however, are so liable to occur from other causes coincident with the tape-worm that they should be received with much caution, and frequently they do not disappear long after a *tænia* has been discovered and dislodged.

Diagnosis.—It is not only quite important to recognize the actual presence of a tape-worm, but it is also important to distinguish the variety, in order to anticipate the amount of resistance to measures of relief, a fact often overlooked by the average physician. From a diagnostic point of view, the symptoms already described are of but little importance, as they are by no means characteristic of worms, so that we are unable to positively predict their existence until it is known that the proglottidis has been expelled. Segments of the *tænia saginata* are usually expelled spontaneously, but this is seldom, or never, the case with the *tænia solium*, it often being necessary and justifiable, in strongly suspected cases, to administer a purgative in order

* Die Menschlichen Parasiten, etc., 1862-1868.

to secure the segments for examination and diagnosis. The segments of the *tænia solium* are much thinner, softer and more transparent, and the lateral branches going off from the uterus are only from nine to twelve in number, while the *tænia saginata* has from fifteen to twenty. The segments of the *bothriocephalus* are seldom expelled singly, but usually several joined together, and in each may be seen a brown spot formed by the uterus, which is not shown in the other varieties.

Prognosis.—The prognosis is always favorable, there being no reason why the worms should not be dislodged if properly treated. It is necessary to insure the discharge of the head, else a further growth will probably take place. Tape-worms may infest the bowels for many years, yet no serious consequences ensue, as a parasite seldom destroys the life of the animal from which it derives its own subsistence. Sometimes, by their migrations, or by causing obstruction of the bowels, worms may become dangerous, and death may occur in children from reflex convulsions excited by their agency.

Description.—The *tænia solium*, or solitary *tænia*, was so called because it was supposed to always exist singly, but it is now known that two, or more, occasionally exist in the same intestine. The worm varies in length from seven to thirty feet, and in exceptional cases is very much longer. The head is very small, somewhat globular or bulbous, with a slightly prominent conical snout in front, surrounded by a double row of hooks, about twelve in each row, and four projecting suckers. The neck is extremely slender, like a thread, about an inch long, and transversely marked. The segments in their earliest form are very small, much broader than long, gradually becoming more flattened and altered in the relation of their diameters, so as to be first square, and afterwards oblong, being much longer than broad, with the ends narrowed, especially the anterior extremity. Mature links are about one-half of an inch long and one-fourth of an inch broad. The male and female sexual organs open by a common aperture, which is situated near the centre in a little projection, now on one side and then on the other, but not regularly alternating.

The *tænia saginata* has been confounded with the *tænia solium*. Its links are very similar, but are somewhat broader and thinner and are more numerous, the entire *tænia* commonly attaining a greater length. The unripe segments are broader than long, and those ripe are longer than broad. The head is larger, and has neither snout nor hooks, being flattened in front, but is furnished with four very powerful and prominent suckers, and, according to Leuckart, a fifth smaller one between them. The common sexual orifice is situated alternately near either posterior border, and the organs are more fully developed and divided. This is the largest tape-worm known to infest man. The *bothriocephalus latus* resembles the *tænia*, but may be readily distin-

guished from it. The head is obtuse or club-shaped, and, instead of the snout, hooks and suckers, we find only two longitudinal slits or grooved suckers on each side. The neck is so short, it can hardly be seen. The segments are very numerous, their breadth being much greater than their length, and they have a slightly brownish color. The sexual orifices are not at the side, but in the middle of the links, and are distinct, that of the male apparatus being anterior.

A tænia, called the *bothriocephalus cordatus*, distinguished by the form of the head, is common in dogs and has been found in man, but its importance is not such as to merit consideration here.

Treatment.—From our present knowledge of the causes which give rise to tape-worm, it is quite evident that the only preventive measures consist in an abstinence from the use of raw or imperfectly cooked meat. As has been stated, the cysticeri cannot withstand boiling, roasting, or smoking, and meat so treated cannot produce tape-worm. In countries where the *bothriocephalus latus* is found, it is necessary to avoid the use of impure drinking water, especially that coming from sources where fish abound. The first step in treatment is to rid the system of the invader, after which the symptoms which have resulted from its presence, or which may have been produced in the efforts made to dislodge it, are to be removed by the use of the indicated homœopathic remedy, together with such a diet as the individual case seems to demand.

Before administering the tænicide, the patient should be placed on a low diet for a few days, avoiding such articles of food as are digested in the small intestines, and only eating beef-tea, chicken-soup, milk, toast, or some light food which leaves little residuum. German physicians put their patients on a diet of onions, garlic, and salt-herring, for the reason that these articles are known to be obnoxious to the worm. The medicine may then be administered, and after a few hours an active purgative given to expel the dead parasite. In case the head is not discharged there is no certainty of the success of the treatment, but further means for its removal should not be employed until fragments of the worm are again discharged.

Male fern or *filix mas* is the oldest and probably most popular tænicide. It is best administered in capsules containing one half to one drachm of the ethereal extract. The oil may also be given in drachm doses, in mucilage with milk.

The bark of the *pomegranate root* (*Punica granatum*) is an excellent tænicide. The fresh bark only should be used. About two and one-half ounces should be boiled in a pint and a half of water until the quantity is reduced one-half, this amount being taken in three doses within an hour.

Kückenmeister strongly advises the addition of twenty or thirty grains of the ethereal extract of male fern. The tannate and sulphate

of pelleterine, the active principle of the pomegranate, have both been successfully used to remove the tape-worm.

Kouso, the flowers and tops of the *Brayera anthelmintica*, a tree of Abyssinia, a country where the tape-worm abounds, is considered an effective tænicide and is much used for the species there prevalent. It has also been used with success in Europe and America. It may be given in doses of one-half ounce of the powder. Heller prefers to give it in compressed balls or disks coated with gelatine. He considers five drachms necessary for the *tænia solium*, and seven and a half drachms for the *tænia saginata*. The balls or disks should be placed on the back part of the tongue and swallowed alone, or by the aid of some coffee. After this, the tendency to vomiting should be resisted, with the assistance of lemon-juice, mustard applied to the epigastrium, bits of ice swallowed, and by maintaining the recumbent position. He advises an ounce, or two, of castor-oil two hours later, to expel the worm speedily and entire. Koussin, an alcoholic extract, is now used by some in thirty-grain doses instead of the crude drug.

Kameela, the glandular powder and hairs from the capsules of the *Rottlera tinctoria*, is an efficient and not unpleasant tænicide. It may be given in doses of from one to three drachms, prepared in a gum-arabic emulsion, and repeated every three hours if necessary. No purgative is required to follow. If two or three doses do not prove effectual add about one drachm of the oil of male fern, and repeat.

Pepo semen, an emulsion of pumpkin-seeds, is ranked in this country as one of the best tænicides. It possesses the advantage of producing no unpleasant, injurious effects. The emulsion is prepared by rubbing up about two ounces of the fresh seeds in a mortar with a pint of water, and straining through a cloth. To this a drachm of sulphuric ether should be added, and the whole quantity taken at one dose in the morning on an empty stomach. If the first dose is not effectual, it may be repeated each morning for several days.

Turpentine is an efficient tænicide, but its unpleasant taste and the ill effects following its use have prevented its general employment, save in cases which have resisted other methods of treatment. It may be given in half-ounce doses every half hour until two ounces are taken. Bartholow advises uniting with it an equal amount of castor-oil. It is probable that any of the medicines before mentioned are equally effectual and less injurious to the system.

Order Nematoda.—Ransom* describes this order as “elongated, slender, often thread-like worms, not distinctly jointed, or provided with appendages; with a separate alimentary canal, a terminal mouth, an anus near the caudal extremity, opening on the ventral aspect. The integument is marked by two longitudinal bands, and often by a

* Reynolds's System of Medicine, vol. iii., p. 284.

dorsal and ventral one; in the former are imbedded the nerves with their ganglia and the excretory tubes, which open in the surface about the level of the pharynx."

"The female aperture is placed about the central region of the body, that of the male near the anus, and conjoined with it; it is furnished with retractile spiculæ, usually two or more. The male is smaller than the female. The development is direct, and the metamorphosis inconspicuous, so that the embryo has the general aspect of the nematode worm. The order is rich in species, and furnishes as many parasites as all the other Helminthoids put together. They infest invertebrata as well as vertebrata, and no organs escape their invasion."

The *ascaris lumbricoidis*, or round worm, is the most common of all intestinal worms, and exists most often in children between three and ten years of age. It is elongated, cylindrical, and tapering at both ends, from six to twelve inches long, and from two to three lines thick. The body is of a whitish or yellowish color, and almost transparent, firm, and elastic. The head is separated from the body by a circular depression, and has three small elevations, between which lie the teeth. The male is smaller than the female, and curved at the tail-end, where the sexual organs are placed. The female is about one third larger and is straighter and thicker at the tail-end, and has the sexual opening near the end of the upper third. It has been estimated that a female *ascaris lumbricoides* contains sixty-four million eggs.

The round worm inhabits the small intestine, but frequently passes into the large intestine, and out through the anus. It not unfrequently migrates into the stomach, œsophagus, and has also been known to find its way into the nares, Eustachian tube, frontal sinus, larynx, pancreatic and biliary ducts, and gall-bladder. Flint* cites a case in a subject dead with lumbar abscess, connected with caries of the vertebræ, in which a great number of these worms were found within the hepatic ducts, some extending along the ducts and others coiled up. It is not probable that they can perforate the intestine, but if the intestine be perforated by any disease, we not unfrequently find round worms in the cavity of the abdomen. They often occur in great numbers. Cruveilhier cites a case in which over a thousand were found after death.

The *oxyuris vermicularis*, or common seat-worm, also known as the thread, pin, or maw worm. This worm varies in length from one to five lines, resembles in appearance and size a piece of fine sewing-cotton, the female being about twice as large as the male. They are whitish, semi-transparent, their surface presenting fine transverse striæ. "The head is furnished with three inconspicuous lips around a terminal mouth, and an elongated vesicular expansion on the dorsal and ven-

* Clinical Medicine, p. 512.

tral aspects." The male is rolled up posteriorly, where the sexual organs are placed. The female is but slightly bent, and its vulva is situated at about the junction of the anterior and middle thirds. This worm inhabits the large intestine, chiefly the rectum, rarely passing into the small intestine. They often crawl out of the anus and enter the vagina or urethra, or get under the prepuce. They occur chiefly in young children, but no age is exempt from their presence. They frequently exist in great numbers, hundreds and thousands lining the intestines, and sometimes passing off during stool in large masses or balls, agglomerated by mucus.

The *trichocephalus dispar*, the hair-headed or whip worm, is about an inch and a half or two inches long; the posterior part is quite thick, the anterior hair-like, ending in a simple terminal mouth. In the male, which is the smaller, the posterior part is wound into a spiral, and has at its end the hook-shaped penis, surrounded by a bell. The female is larger and thicker, and only slightly curved, and its posterior end contains an immense number of eggs. They inhabit the cæcum especially, but are sometimes found in the colon, and, very rarely, in the small intestines. They do not occur in as great numbers as do the other varieties of nematodes already mentioned.

The *anchylostomum duodenale* is a small cylindrical worm, five to eight lines in length, the female being twice as long as the male. The terminal mouth is surrounded by a thin capsular expansion, which is directed obliquely backwards. The upper side is furnished with four small teeth, and the opposite side with four larger teeth. The vulva of the female is placed a little back of the centre. This parasite inhabits the duodenum or jejunum, where it is present in very large numbers.

The nematodæ vary so in their individual characteristics and in the morbid phenomena which they produce that they will require separate consideration.

ASCARIS LUMBRICOIDIS.

Ætiology.—The ascaris lumbricoidis is propagated by ova, and probably without the aid of an intermediate bearer, though this point is not yet established. The eggs being expelled with the fæces, and often in countless numbers, gradually develop an embryo in damp earth or water. Both the eggs and the embryo seem indestructible, either by freezing or desiccation, and retain their propagating power for years. Davaine maintains that the ova, with their contained embryos, are swallowed with impure water, and develop directly into the adult form if received into the intestine of a suitable bearer. Others hold that this is not the case, but that it is far more probable that the ova are not transferred directly into the intestine of the ultimate bearer, but are taken up in some manner by an invertebrate intermediate bearer, possibly a worm, or the larva of an insect, thus passing

through the necessary stages of metamorphosis, and then being discharged are received into the stomach of the future host through the medium of food or drink. It is especially conceded that they are first introduced into the system through drinking water; thus it follows that in the country, and in other places where excreta easily gain access to water, and people are careless in their habits, the ova are rapidly disseminated through the water drank. They may be propagated also in the same manner through certain foods, such as fruit, vegetables, salad, and other articles which are eaten in the raw state. It is necessary, however, that the ova or embryos find a congenial soil for their development. This condition results chiefly from uncleanness, and thus the ascaris thrives among the least cultivated nations, and, as a rule, among the lower class of people. Those who live in almost total disregard of sanitary requirements are especially liable to worms, their food being inferior in quality and poorly prepared, and their streets and surroundings being filthy and insalubrious. Continued indigestion, accompanied by irritation or inflammation of the mucous coat of the intestines, with excessive mucous secretion, especially in children, seems to predispose to the generation or development of worms. It has been frequently noted that children in the last stages of typhoid fever often pass lumbrici in the evacuations, but this may only be a coincidence.

Symptomatology.—Probably in a majority of instances there are no symptoms of any kind present, it being nothing unusual to have lumbrici pass from the stomach or bowels of persons who had experienced no inconvenience or disorder of system whatever. Occurring in large numbers, and especially so in delicate persons, they may produce a variety of phenomena, mostly indicating disorder of digestion, nutrition, or of the nervous system, with constant reflex manifestations. The most common symptoms are: itching of the nose, colic-like pains around the navel, boring and tearing pains in the abdomen, inflation of the region of the stomach, changeable appetite, and diarrhoea, with the expulsion of masses of mucus, occasionally tinged with blood. There is often also some swelling of the face, darkening of the eyelids, unequal dilatation of the pupils, foul breath and general emaciation. Nervous symptoms, such as irregular pulse, unpleasant dreams, grinding the teeth during sleep, and starting out of it in a fright, are symptoms which, in children especially, are usually attributed to worms. These symptoms, however, have no diagnostic value, as they may be present with other varieties of worms, and even when no worms are present. Choreic conditions and epileptiform convulsions may result from worms and cease on their removal, and death has been known to result from convulsions so caused. Obstruction of the bowels, with its consequent phenomena, may result from a bundle of worms, either in the bowel or in a hernial protrusion, and

when these worms migrate into other organs and passages, as they sometimes do, serious consequences may arise, the symptoms varying with the part visited. Especially do we find lumbrici in the larynx, producing symptoms of suffocation, and in the common duct, which they obstruct, causing jaundice, and ultimately serious derangements of the liver. Abscesses may also result from the local irritation.

Diagnosis.—All the ordinary symptoms of worms are quite insufficient for diagnostic purposes. Only when worms pass from time to time, or when a microscopical examination of the fæces has revealed the presence of ova, can we determine positively that the symptoms result from their presence in the system.

Treatment.—At the present day, since the theory of the spontaneous generation of intestinal parasites has been exploded, and it has been demonstrated beyond question that they are propagated by means of ova being received into the system through the channels of food and drink, it is unwise to longer advocate the principles of treatment as set forth by Hahnemann and his immediate followers. These were established upon the then prevalent theory that the worms were generated by morbid conditions of the intestine, resulting from a depraved systemic state, and were entirely in accordance with that doctrine. Hahnemann held that intestinal worms could only be successfully treated by removing by the indicated homœopathic remedy that morbid condition of the system which caused their generation, and that worms could not exist in a previously healthy intestine. It now appears that these morbid conditions of system are the result rather than the cause, and while many of the symptoms so arising may be mitigated or, perhaps, entirely removed by the aid of the indicated remedy, which may not be a vermicide, it also follows that to render a cure complete it is necessary first to administer an agent which will destroy the worm, and afterwards to treat the remaining morbid conditions by the use of the indicated remedy. It must be admitted that intestinal worms thrive best in persons of unclean habits, and in those who are troubled with indigestion and intestinal derangements. It therefore follows that the preventive measures to be adopted are cleanliness, regularity in habits, the use of properly prepared food, and, more especially, the use of pure drinking water, carefully avoiding water from shallow wells, near residences, barns, or privies, or water obtained from small streams. It is most desirable to use only well-filtered water. The diet should be plain, easily digested, and regular, no food being taken between the usual meals. Cakes, pastry, and sweetmeats must be forbidden. *Salt* as a condiment should be freely used.

Santonine, the active principle of *Cina*, or *Artemisia contra*, is our most efficient vermicide. It is usually given in the evening, and in doses of from two to four grains in powder in the form of troches, followed in the morning by castor-oil or some other laxative. I have

found this plan unnecessary, only giving the first or second decimal trituration four times a day for three or four days. In this manner, while usually destroying the worms, we fail to obtain the objectionable symptoms of disturbed vision, red urine, etc., which so frequently follow the administration of large doses of Santonine. If the worms are numerous, it is often necessary to persist in the treatment for some length of time.

Spigelia is also an excellent vermicide, and may be given in doses of one or two drachms of the fluid extract. It is mostly used in an officinal preparation, combined with senna.

Cina is more often indicated in the treatment of vermicular affections than any other remedy; it is often homœopathic to the existing morbid condition, and at the same time acts as a vermicide. The special indications for its use, and for the use of other remedies which control the conditions arising from the presence of worms, will be given at the close of this chapter.

OXYURIS VERMICULARIS.

It is generally considered that the oxyuris vermicularis spends its whole existence, from the egg to maturity, in the intestinal tract of the same individual, which theory receives the support of Kückenmeister, Vix, Zenker, Heller,* and many others. Ransom,† however, considers that this view is out of accord with the general law of development in parasitic animals, and does not suffice to explain the known facts. Leuckart "insists that the emigration of the embryo is a necessary condition of its future development, and has indeed almost proved the correctness of this view." He claims "that the ova deposited with the feces are abundantly and widely scattered in the dry state by winds and other agencies, and then are taken into our stomachs upon uncooked fruits and vegetables, and in various other conceivable modes; there, exposed to the digestive fluids, the embryo escapes, is carried down into the colon, and attains the adult form probably in about two weeks. A sort of self-infection may take place also; in persons already infested, it is easy to see how the ova upon the skin and hairs near the anus may be conveyed to the mouth by the fingers, after scratching to allay the violent irritation which these small pests produce; there are various modes in which the eggs may find their way into the stomach from the soiled bed-clothes or personal linen. These views explain some long-known facts which are not otherwise easily understood, for instance, the great length of time for which some persons suffer from seat-worms, and the liability to relapse in spite of repeated treatment, the frequency with which these worms are found inhabiting many members of one family or household, the greater

* Vide Ziemssen, vol. viii., page 754.

† Reynolda's System of Med., vol. iii., page 284.

liability of children, of dirty or insane people, and of persons who often eat uncooked fruits and vegetables, as well as the immunity of infants at the breast."

Symptomatology.—Only when the worms are located in the rectum do they give rise to inconvenience. Here they cause pain, tenesmus, and especially a violent itching and tickling in the anus and its neighborhood, which is intolerable, and occurs in paroxysms, mostly at night. Excitation of the sexual organs is apt to occur with seminal emissions, and it is stated that the habit of masturbation in either sex may originate from this source. In females, the worms frequently wander into the vagina, and by their excessive irritation cause pruritus and leucorrhœa.

Diagnosis.—The diagnosis is easily made. Inspection of the fresh stools will usually reveal worms in active motion, and they may frequently be seen about the anus. If this is not the case, a small injection of cold water will cause those in the rectum to be expelled. A microscopic examination will reveal the ova—a certain diagnostic mark.

Treatment.—From what has already been said concerning the development and habits of this parasite, it is evident that scrupulous cleanliness is one of the most important prophylactic measures. Close personal contact, especially occupying the same bed, with infested persons should be avoided. Only pure water should be drunk, and the food should be well cooked.

In addition to the indicated remedy required for the correction of the general health, and the mitigation of the annoying symptoms usually associated with the presence of thread-worms, it is quite essential to destroy and remove the parasites. This is usually accomplished by the use of injections. Sometimes only cold water is required, though salt and water is more efficient. Sweet oil, lime-water, quassia, or turpentine and castor-oil, decoctions of onions or garlic, are sometimes employed in the enema. The folds and crevices about the anus and perinæum and external genitals should be thoroughly sponged out with a one per cent. solution of carbolic acid, and afterwards anointed with lard or carbolated oil or vaseline.

TRICHOCEPHALUS DISPAR.

Ætiology.—This worm is propagated by ova, without the intervention of any intermediate host. The eggs, being expelled with the fæces, are after a time developed into an embryo. In damp earth or water, and in warm weather, this development takes place much more rapidly than in cold or dry weather. The ova or embryos, or both, find their way into the stomach in some manner, probably upon raw food, especially fruits and vegetables, and become sexually mature in from four to five weeks, when they propagate with remarkable rapidity,

it being estimated that the female uterus contains 58,000 eggs, and that the annual production is about 400,000. The farther and special ætiology of this worm has not been established.

Diagnosis.—The trichocephalus dispar offers no symptoms that are at all reliable, and a diagnosis is only established by finding the worm in the fæces, or by examining the fæces microscopically for the characteristic ova.

No treatment has as yet proved available to dislodge them, but it is a satisfaction to know that they are probably short-lived, and that their further development may be avoided by proper hygienic measures, especially by the exclusive use of well-cooked food and pure water.

ANCHYLOSTOMUM DUODENALE.

Nothing is positively known in regard to the manner of propagation of this parasite; but it is supposed to be swallowed in embryo, with dirty, slimy water. It occurs only in tropical countries, and as far north as Italy. It affords no special symptoms, but is supposed, on account of its blood-sucking qualities, to be the cause of a very fatal disease known as tropical chlorosis, or Egyptian chlorosis, a peculiar anæmic condition which is said to follow intestinal hæmorrhage due to this parasite. Griesinger recommends turpentine as the remedy.

TRICHINA SPIRALIS.

The trichina belongs to the *Nematoda*, and while, in one sense, it pertains to a class of general diseases, and is treated of by some authors as an infectious disease, it nevertheless attains its state of sexual maturity in the intestinal tract, where its species is propagated, and from which locality it migrates to its habitat in the voluntary muscles, so that it is not inappropriate to consider it in this connection.

History.—The trichina was discovered in 1828 by Peacock. Tiedmann's claim to having discovered it in 1822 is disputed on very reasonable grounds. In 1835 Owen described it accurately, classified it, and gave it the name it has since borne. From that time until 1860 it received the attention of many distinguished pathologists whose investigation and experiments were considered of great scientific interest, though it was little thought up to that time that this seemingly insignificant and harmless intruder was in reality a most dangerous foe to the health and life of man. In 1860 Prof. Zenker, of Dresden, aroused the world to the great importance of the subject by publishing his famous case, which at once revealed the morbid effects of this parasite, and established a conclusive theory as to its nature and source. In a young girl who died after an illness of several weeks' duration, characterized by debility, fever, sleeplessness, abdominal tenderness, great pain in the muscles, and œdema of the lower extremi-

ties, numerous trichinæ were found in the voluntary muscles and in the mucus from the small intestines. The origin of the disease was traced to eating ham and sausages, which, upon microscopic examination, were found to contain trichinæ in abundance. At the time of this occurrence Virchow and Leuckart were engaged, independently of each other, in investigations on trichina. The efforts of these three observers and, later, of Prof. Dalton, establish the following:

1. Man becomes infected with trichinæ by the use of trichinous pork (Zenker).

2. The muscle-trichinæ in the stomachs of mice become freed from the capsules (Leuckart) and develop in the intestines of dogs and cats (Virchow), as also in that of man (Zenker), to mature sexual worms—intestinal trichinæ—which

3. Attain their full growth in about seven days, and give birth to living young (Leuckart).

4. These young trichinæ migrate directly from the intestine in which they are situated into the muscles of the same person or animal (Zenker, Virchow). Since,

5. During their migration, they are found in the mesenteric glands, abdominal cavities, and pericardium (Virchow).

6. They penetrate into the muscular fibres (Virchow), and cause the destruction of the contractile substance (Virchow, Zenker).

7. Within the muscles they grow to perfect muscular trichinæ (Zenker, Virchow, Leuckart).

8. These migratory processes bring about in man a severe febrile disease, trichinosis (Zenker), which

9. May result in death, both in man (Zenker) and in animals (Virchow).

10. Cases of capsulated trichinæ are to be considered as healed cases of trichinosis (Zenker).

Description.—When expelled from the cyst in its mature state the male is about one-eighteenth of an inch long, and the female twice this length. They have the appearance of an extremely fine, round, thread-like, slightly coiled worm. So long as they remain in the muscular tissue they are sexually immature and are in a quiescent state. The sexual system is fully developed in the intestinal canal of its host, and in the female consists of an ovary, a uterus, and a vagina. It is viviparous and discharges from the vaginal outlet about one hundred embryos a week, and the birth of the embryos begins in about a week after the female enters the intestine. As more females than males are borne, and as the successive formation of embryos from the eggs may take place, the number developed becomes enormous.* The viable embryos are in lively motion, and at once

* Conheim, "Zur pathologischen Anatomie der Trichinenkrankheit," Virchow's Archiv., Band xxxvi., p. 163.

begin a process of migration, finding their way through the blood (Heller), or the intestinal walls and connective tissue, which is the route generally accepted by investigators, until they reach the muscles where they force themselves into the primitive fasciculi, coil into a spiral form, and become surrounded by a calcareous cyst, which has an ovoid shape and is visible to the naked eye as a whitish or gray speck. As intestinal trichinæ the parasites rarely live longer than from five to eight weeks, but as muscle trichinæ their vitality is almost unlimited, and frequently ends only after the death of the person affected. Cases are reported showing conclusively that patients have been affected many years. It is equally certain that the flesh of animals which have been infected with the parasite ever afterwards may contain living trichinæ, and could not be eaten with safety. The flesh of a single trichinous animal may produce trichinosis in a large number of persons, and thus the disease resembles an epidemic in its prevalence. Man, the hog, and the rat seem to be the principal hosts of the trichina, but it has been found in the cat and other animals, as the rabbit, guinea pig, and dog, though in the latter never developing farther than the intestinal form. It is found wherever man and swine exist, being especially prevalent in those sections where pork is largely used as an article of diet.

Symptomatology.—Some authors attempt to divide the symptoms of trichinosis into two or three stages, corresponding to the stage of intestinal development, migration, and encapsulation of the parasite. This, however, cannot be done with any degree of certainty, as the symptoms are not uniform in their appearance and duration. Symptoms of gastro-enteric irritation first make their appearance. The patient experiences a general feeling of discomfort and fulness in the epigastrium, the appetite is impaired, emaciation and nausea appear, and then vomiting occurs, which may end with the first ejection of the contents of the stomach, or may last with much retching and anguish for several days. The mouth feels pasty, and the patient complains of a loathsome, putrid odor being continually present. There is almost always diarrhœa, the passages being at first brownish, subsequently yellow, thin, and accompanied by more or less severe colicky pains. The diarrhœa usually lasts for some time, may indeed continue for weeks and greatly exhaust the patient, but the other symptoms generally disappear in about one week, giving place to those which are dependent upon the condition of the muscles. Occasionally there is an absence of intestinal symptoms in the first stage, and the patient only experiences a feeling of lassitude and depression, with wandering pains and stiffness of the limbs. This stage is supposed to correspond to the introduction of the trichinæ into the intestinal canal and the commencement of their migration toward the muscles.

Flint remarks* that it is not difficult to understand that the aggregated puncture of the mucous membrane by these parasites should occasion notable disturbance, when it is considered that the trichinæ which have been found to be contained in a half pound of meat may be sufficient to give birth in a few days to a brood numbering thirty millions.

Before the primary symptoms disappear, fever supervenes, which is probably coincident with the birth of the embryos and the beginning of migration. The fever is remittent in its character, with morning remissions, and usually is quite similar to that of an ordinary case of typhoid.† The temperature runs from 101° to 106°, and the pulse from 90 to 140, and is usually small and weak. There is an abundant clammy perspiration, which is not critical and does not relieve the fever; intense thirst, dry tongue and lips, red swollen face and occasionally sudamina appear. During the existence of the fever, and some time before its onset, the muscles of the body appear flabby and are sore to the touch, but Heller remarks that this state must not be confounded with that condition of the muscles caused by the entrance of the parasites into them.

The symptoms of invasion of the muscular system supervene about the tenth day, and vary in severity with the number of parasites entering the muscles, sometimes only amounting to a soreness, but most often the muscles are hard, swollen, and very tender. The muscles of the extremities are most affected; those of the trunk to a less extent. The pains are of a rheumatic character, and may be very violent. There is great rigidity of the muscles in the neck, back, arms, and legs, movement being greatly impaired, and the joints in a fixed state of more or less flexion, any attempt to extend them causing great distress. From implication of various muscles there may result attacks of severe dyspnoea, aphonia, difficult mastication, dysphagia, partial deafness, impaired movement of the tongue, and double or distorted vision. Œdema soon appears in the eyelids and face, which subsequently extends to the lower extremities, and sometimes anasarca occurs. The patients are usually sleepless, though their mind is ordinarily in a state of apathy and indifference. In children, however, sleeplessness is not present, a somnolent condition characterizing the attack throughout. In cases tending towards a fatal issue, low typhoid symptoms set in, and frequently, about the end of the fourth week, bronchitis, pleurisy or pneumonia may arise to complicate the case. The course of the disease may vary from a few hours to several weeks, according to the number of parasites introduced. Very light cases recover in about three weeks, often not having been confined to the bed, but in more severe cases, even though of comparatively mild type,

* Clinical Medicine, p. 524.

† Fieckler, Archiv d. Heilkunde, vi., p. 503. 1865.

convalescence does not begin until the fifth or sixth week, while in fatal cases this is the time of the greatest mortality. Should recovery ensue, as it may even in severe cases, from encapsulation and the consequent quiescence of the parasites, the muscular symptoms subside, the fever abates, but more or less œdema and anæmia remain, and the exhausted patients gain strength very slowly, often three or four months elapsing before entire recovery has taken place. In fatal cases death may occur from pneumonic complications, from impairment of the respiratory muscles, from the presence of the parasites in them, or from the prolonged suffering and exhaustion. According to Heller, cases of death after the seventh week are rare.

Diagnosis.—The diagnosis is often difficult in isolated cases, but a diarrhoea, soon followed by the characteristic muscular pains and lameness, is sufficient to excite suspicions of trichinosis and lead to investigation, and, if possible, to microscopic examination of the meat eaten. If there is still doubt, a small piece of affected muscle may be excised and examined microscopically. Ordinarily, the muscular symptoms are sufficient to distinguish trichinosis from cholera, typhoid fever, and other affections for which it might be mistaken. From rheumatism it may be distinguished by the gastro-intestinal symptoms, and by the profuse perspiration, apathy, and great exhaustion. After migration has taken place, the symptoms are so characteristic that the diagnosis can scarcely remain in doubt.

Prognosis.—The prognosis is always a matter of doubt, and can not be positively made. The issue depends upon many direct circumstances, but especially upon the number of trichinæ introduced, which may be fairly conjectured by the number in the meat used and the comparative rawness of the flesh when eaten. Those cases commencing soon after eating, and those ushered in violently, are usually the most severe. Even the severest cases, however, may recover by encapsulation of the parasites. Cases in children seldom prove fatal.

The mortality ranges from twenty to fifty per cent.

Treatment.—The results of treatment thus far have proved quite unsatisfactory. In fact, it is doubtful if there is any remedy, at least after the parasite has migrated to the muscles.

For the destruction of the trichinæ in the intestinal canal carbolic acid has been used with apparent success; so, also, has glycerin, which seems to cause a shrivelling and death of the parasite. After the parasite has migrated from the intestine, we can only rely on the indicated homœopathic remedy to control the symptoms that may arise. Hot baths, friction, with salt and massage, are said to be important auxiliary measures. The patient should be sustained by the use of milk, beef-tea, egg-nog, etc.

The only preventive measure is to abstain from the use of all pork, ham, or sausage that is not thoroughly cooked.

General Therapeutic Indications for Intestinal Worms.—

In addition to the methods suggested for the destruction and removal of intestinal worms, our *Materia Medica* affords a number of remedies which have been proved valuable for the relief of symptoms associated with the presence of these parasites or which remain after their removal.

Cina is our most important remedy. It not only covers the range of symptoms most often found in connection with the presence of round or thread worms, but containing Santonine as its active principle, it is practically a vermicide, and frequently the only remedy required for the removal of the parasites and the symptoms they may have produced. Its chief indications are: child irritable and cross; has dark rings around the eyes, and a sickly expression; white and bluish around the mouth; tossing about in sleep, with sudden cries; boring in the nose with the finger; grinding the teeth at night; great hunger, or loathing of food; nausea and vomiting; abdomen hard and distended; twisting, colicky pains; itching of the anus; turbid urine; dry, hacking cough, which causes gagging; twitching of the muscles, and convulsive motion of the head and limbs; fever, usually intermittent or remittent in its character.

Ignatia.—Especially in mild, nervous children. Itching and crawling at the anus and in rectum, as from thread-worms; prolapsus ani; epileptiform convulsions.

Mercurius.—Excessive hunger; salivation; fetid odor from the mouth; abdomen hard, distended, and painful; glandular swellings; will sometimes cause discharge of ascarides or of lumbrici without other aid.

Aconite.—Worm-fever. Excessive restlessness, face red and pale alternately; loathing of food; intolerable nightly tingling and itching at the anus as from thread-worms.

Spigelia.—Nausea every morning, better after eating; squinting; sensation of a worm rising in the throat, better after eating; itching and tingling in anus and rectum.

Sulphur.—Especially after other remedies have failed; excessive, ravenous hunger, though the stomach feels full and distended after eating but little; nausea before meals, and gone, faint feeling about 11 A.M.; abdomen distended; itching and crawling in rectum and anus; turbid urine; emaciation and debility.

Calcareo ostrearum.—In leuco-phlegmatic children, especially when there seems to be a hereditary predisposition to worms; abdomen hard and much distended; children of a scrofulous habit.

Consult also *Terebinthina*, *Stannum*, *Cinchona*, *Ferrum*, *Sabadilla*, *Urtica urens*, *Teucrium* (thread-worm), *Antimonium crud.*

E. DISEASES OF THE PERITONEUM.

PERITONITIS.

BY A. C. COWPERTHWAIT, M.D., PH.D.

Definition.—An inflammation of the peritoneum. It may be either acute or chronic, or partial, being limited to only a portion of the membrane, or general, involving the whole peritoneal sac.

History.—Owing to the tendency of the abdominal viscera to partake of any disturbance occurring in the peritoneum, and the symptoms of the former being so much better understood than those of the latter, it was generally supposed, until a comparatively recent date, that the peritoneum was not the subject of primary inflammation, but

that it was necessarily, from contiguity of tissue, involved secondarily in the diseased processes occurring in the viscera themselves.

It was only in the latter part of the last century that an effort was made to establish serous inflammation as an independent disease, anatomically distinct from inflammation of the abdominal viscera. Even at this day some authors hold that peritonitis cannot occur as an idiopathic affection, but modern anatomical and histological researches, together with the results of careful clinical observations, seem to establish beyond question the independent character of this affection. True, in most instances the abdominal viscera become involved in the inflammatory action, but this may be secondary, due to an extension of the disease from the peritoneum.

In idiopathic peritonitis resulting from cold or unknown atmospheric influences, the inflammation is considered rheumatic in its character.

Peritonitis occurs as a secondary affection by the extension of the morbid process from adjacent organs or tissues, and this is usually evident by the exciting symptoms of visceral disease obtaining prior to the appearance of the symptoms indicating peritoneal inflammation.

Peritonitis occurs in all ages and conditions of life, from infancy to old age, and in the robust and healthy as well as in the feeble and constitutionally diseased.

It may occur sporadically or prevail as an epidemic, in which latter class is included that form of peritonitis which is incident to the puerperal state. Owing to the intimate anatomical relations of the peritoneum with the female generative organs, and its sympathy in the disorders peculiar to those organs, peritonitis is of much more frequent occurrence in the female than in the male.

Ætiology.—Idiopathic peritonitis is of rare occurrence, but may result from exposure to intense cold or to sudden changes when overheated, from unknown atmospheric influences, or from severe and protracted counter-irritation by blisters; it has also been attributed to over-eating and over-drinking, blows on the abdomen, and other injuries, the ætiological relations of which to peritonitis have probably been much exaggerated.

Peritonitis most often occurs from an extension of some lesion of the abdominal viscera, an occurrence likely to take place since the connective tissue stroma of these organs and the serous membrane form one continuous whole.* Thus the various pathological processes set up in these organs may give rise to a local inflammation of the contiguous peritoneal investment, which may either remain circumscribed and constitute what is termed partial peritonitis, or may extend and become general; of this nature is the peritonitis accompanying gastritis, hepatitis, splenitis, or dysentery, or which results from

* Bauer (Ziemssen), page 224, vol. viii.

typhlitis, strangulated hernia, internal strangulations, or intussusceptions of the intestines, or pelvic peritonitis, by the extension of local inflammation in the uterus and its associate organs.

Probably the most frequent cause of peritonitis is perforation of the stomach or intestines, more often of the latter, the gaseous, and other, contents of the alimentary canal escaping into the peritoneal cavity and exciting inflammation. This may occur in connection with gastric or duodenal ulcer, or result from the intestinal ulceration incident to typhoid fever or tuberculosis, and not unfrequently from ulceration of the vermiform process.

Perforation, leading to peritonitis, may also result from mechanical violence. Foreign bodies, such as intestinal calculi or parasites, finding their way into the peritoneal sac, either with or without previous ulceration, may excite peritonitis.

Peritonitis may result from menstrual congestion, or the habitual suppression of the menses, or suppressed lochia, and may follow the injection of cold water or irritating fluids into the cavity of the uterus. It may arise from septic influences; this is frequently observed in Bright's disease and in connection with the puerperal state. The condition known as puerperal fever usually, but not necessarily, involves an inflammation of the peritoneum. This may be a simple inflammation proceeding from the uterus and its appendages, such as may take place independent of the puerperal state, or, more often, it may be the result of pyæmic or septicæmic influences, and thus may be conveyed by contagion, becoming epidemic, especially in lying-in hospitals. That this condition is not dependent upon the puerperal state, *per se*, but rather upon the blood-poisoning, is evident from the fact that the same conditions may arise after surgical operations upon the organs. The prevalence of epidemic erysipelas during an epidemic of puerperal fever, and the apparent production of the latter by the *contagium* of the former, would seem to establish an intimate ætiological and pathological relationship between the two.

Peritonitis may also occur as an intercurrent malady during the course of erysipelas and other blood diseases, such as pyæmia, small-pox, glanders, rheumatism, etc. Sometimes it is the result of metastasis in rheumatism, erysipelas, and the exanthematous fevers, in the latter accompanied by retrocession of the exanthem. During infancy, and even in the later months of fetal life, peritonitis may occur from other causes, chief of which is the puerperal infection consequent upon the presence of an epidemic of puerperal fever, especially in lying-in institutions, and gangrene and inflammation of the umbilical vessels, and umbilical hernia; usually, however, ante-natal peritonitis is supposed to be due to the presence of a syphilitic taint in the mother.

Pelvic peritonitis is a form of partial peritonitis, but it is, to a great extent, ætiologically distinct from other varieties, and is of far more

frequent occurrence. When occurring after parturition or abortion, it may assume the features and course of puerperal peritonitis. It may also occur from an extension of cellular inflammation in the pelvic cavity; from an extension of gonorrhœal inflammation, or ovaritis, endometritis, or salpingitis; or from the escape of fluids through the Fallopian tubes into the peritoneum after intra-uterine injections. A case of this kind recently came under the writer's observation, when a prostitute, suffering from a slight gonorrhœal endometritis, fell into the hands of a reckless and ignorant physician who injected a strong solution of chromic acid, producing at once a violent metroperitonitis, from which the woman barely recovered. A few weeks after recovery, the original trouble not having disappeared, the same physician resorted to the same injection, again resulting in a similar, but not so violent, attack of inflammation. After this, occasional attacks of inflammation occurred, until death finally resulted about two years after the first attack. Pelvic peritonitis most often arises from disorders of menstruation, the result of imprudence during the presence of the menstrual flow. It may be caused by bad uterine displacements, or result from traumatic influences. In the latter list may be placed the use of the uterine sound or sponge tent, which frequently gives rise to pelvic inflammation. Dr. Barnes says he has seen fatal peritonitis follow the simple application of nitrate of silver to the cervix uteri.

Pathology.—The pathological character of peritonitis does not differ essentially from that of the serous inflammations. The morbid appearances are first an occurrence of hyperæmia, the capillaries being distended, even to such an extent as to cause extravasations of blood at various points. Subsequently, the redness consequent upon this condition disappears, and the surface soon becomes cloudy from loss of its epithelium, and presents a velvety appearance, due to a proliferation of the connective tissue composing the peritoneum. The normal secretion is arrested and an abnormal dryness occurs, which, however, is soon followed by the exudation so characteristic of peritonitis, and which never fails to appear, though it may vary greatly in character and amount. First, an effusion takes place which forms a thin, transparent covering upon the peritoneum, of a grayish-yellow color, readily detached, and which loosely connects the various organs. In other cases the deposit is a thicker, less transparent, yellow, croup-like membrane, and, in the dependent parts of the abdomen, there is a moderate amount of cloudy, flocculent serum.

Again, there may exist a great quantity of exudation. When the abdomen is opened, an immense amount of turbid, flocculent fluid escapes, while still more remains in the abdominal cavity. Besides the membranous deposits covering the peritoneum, we find numerous yellow clumps of coagulated fibrin which partly swim in the fluid, partly sink, and collect in the dependent portions of the abdomen

(*Niemeyer*). Bauer* endeavors to explain the varieties of effusion which take place according to their physical and histological characters, with wide limits as regards quantity, which, he says, may vary from a small amount in the true pelvis or in the spaces between the intestines, to a quantity which is sufficient to press up the abdominal viscera far into the thorax, displacing the heart, and compressing the lungs into an entirely airless condition, thus producing death.

He speaks especially of three forms of effusion.

(1) The fibrinous effusion, with an exceedingly slight quantity of fluid, hence, dry or adhesive peritonitis. This forms a continuous false membrane which invests the abdominal viscera, or sometimes, instead of being continuous, occurs only in patches. This further results in the formation of adhesive connective tissue which binds the various organs and tissues together, producing permanent displacements, fixing organs, and causing constrictions in organs which happen to be included in the firm retraction of the new formation. It may also produce a whole series of disturbances in function, or, later, give rise to incarceration, twistings, constrictions and a fresh inflammation of the peritoneum. These layers of false membranes often include fluid; frequently they are pigmented, and occasionally concretions occur imbedded in thick connective tissue, the result of calcification of the effusion.

According to Niemeyer,† this form of exudation is chiefly found in peritonitis due to injuries or to the propagation of inflammation from neighboring organs.

(2) Bauer next mentions the *serous and sero-fibrinous effusion*, where it approaches in its characters pure ascitic fluid; it is yellowish-green or milky-white, turbid, and flakes and separate pieces of false membrane are suspended in it. The quantity may be enormous, especially in terminal peritonitis supervening on ascites, but in other cases it is much less. After the fluid has become absorbed, all further alterations proceed as with the fibrinous variety. Niemeyer holds that this form of exudation is more frequent in peritonitis from perforation, or dependent on infection, particularly puerperal, and lastly in the so-called rheumatic peritonitis.

(3) *Purulent effusion*. This may be either a thickly fluid pus, or a very mobile, purulently turbid fluid, and is found in the most dependent parts, unless sustained by matting and adhesions. This form may be associated with suppuration of the peritoneum consequent upon ulceration of the same, or as a result of long contact with masses of pus, or from perforations and escape of purulent or decomposing matters into the peritoneal sac. It thus constitutes the most frequent variety of exudation met with. By admixture with gastro-intestinal

* Ziemssen, vol. viii., page 235.

† Niemeyer's Practical Medicine, vol. ii., page 640.

contents the pus may present a foul, discolored appearance, and feculent smell, and gases may be found occupying the free abdominal cavity. There is also more or less admixture of blood, as is, indeed, the case with all varieties.

In cases of recovery, absorption of the fluid takes place rapidly, and suspended particles, flakes, coagula, or pus, undergo fatty metamorphosis, become fluid, and are absorbed; but partial thickenings and adhesions of the peritoneum always remain. In partial peritonitis the changes are similar, only limited to the part involved. If the exudation be of the fibrinous variety, the process often results in adhesion of the inflamed parts. If the exudation be serous or sero-fibrinous, portions may become capsulated and run the usual course.

The changes of chronic peritonitis are similar to those of the acute form, being usually the result of a protracted course of the same. There is often little or no fluid exudation, and when present, it is not abundant, and has a purulent or semi-purulent form. The chief characteristic is the formation of a false membrane, which may be general or only exist in local bands. The intestines usually adhere in globular or shapeless masses, and between the various convolutions there are cavities filled with serous, purulent, or bloody fluid, the purulent often being converted into a cheesy mass. Occasionally a part of the false membrane undergoes a calcareous transformation; or it may become soft, friable and granular, preparatory to absorption, or may be converted into connective tissue.

In puerperal peritonitis, according to Lee,* the appearances of inflammation are sometimes confined to the uterus, but they are much more generally extended to other organs. The lymph is mostly thrown out in thicker masses upon the uterus than in any other situation, and this viscus seems to suffer in the greatest degree. In the sub-serous cellular tissue, serum and pus are often deposited. The cellular tissue surrounding the vessels of the uterus where they enter or depart from the organ, and that connecting the muscular fibres, is often surcharged with serous and purulent fluid. The peritoneum becomes thick and vascular, more especially where it invests the uterus and pelvic viscera, and sometimes, where the malady is intense, the serum is mixed with blood, and pus is found in the pelvis. When death has rapidly followed, the lymphatic exudate is semi-fluid, or the surfaces which have become agglutinated are readily torn asunder. The Fallopian tubes and ovaries are sometimes filled with pus or blood (*Wardell*).

In pelvic peritonitis, the changes are not essentially different from those in general peritoneal inflammation. The most characteristic feature is the deposition of lymph and serous or purulent fluid into the cellular tissue about the uterus, which, in the second stage, imparts to the sense of touch a feeling as if hot lead had been poured

* More Important Diseases of Women, page 24.

into the tissues and allowed to cool, rendering the roof of the pelvis hard and unyielding. The uterus is usually displaced, and its appendages seem solidly fixed, being held immovable by the surrounding elements. The subsequent processes of absorption or purulent degeneration and the formation of adhesions do not differ from the same in other varieties of peritoneal inflammation.

Symptomatology.—In idiopathic peritonitis the attack is usually abrupt, being ushered in by a chill, followed by intense fever and very severe local pain and tenderness. The pain is of a burning or lancinating character, and may, from the start, be distributed over the entire abdomen, or, at first, be circumscribed, and extend gradually. The slightest touch, deep inspirations, and the acts of coughing or sneezing cause intense exacerbation; at times the pain assumes the character of spasm or colic. Usually the patient lies on his back, if the peritonitis is general, with the thighs flexed on the pelvis, and the shoulders elevated, in order to prevent pressure of the muscles on the tender peritoneum, though this decubitus is by no means constant. The respiration becomes superficial and rapid, to avoid motion of the diaphragm; in other words, the breathing is costal. Every cough and every full respiratory movement is most anxiously avoided, and every motion of the body causes severe pain. The aspect of the countenance soon becomes altered in a remarkable manner; the eyeballs are sunken and are surrounded by a bluish-black ring; the face assumes a hollow, withered expression, the nose becomes pinched, the cheeks fall in, the lips become thin and bluish, the skin is cold and covered with a cold sweat, the voice is husky, and the expression of pain and anxiety is vividly depicted. These symptoms of collapse, according to Bauer, are generally connected with the quantity of the effusion and the severity of the vomiting, which is rarely absent. This usually sets in early, the articles vomited being first food and gastric mucus, and then biliary matters from the duodenum, and, later, feculent matter, owing to occlusion of the intestines. The acts of vomiting occasion great pain. In the latter part of the course of the disease the contents of the stomach are apt to be ejected by regurgitation rather than by vomiting. The abdomen soon becomes distended and tense, generally in a great degree, and remains so during the course of the disease. This distension is first due to the presence of gas in the intestines, the subsequent extreme tympanitis being supposed to result from a paresis of the muscular fibre of the bowel, allowing an expansion of the contained gases, and at the same time retarding their escape. The tympanic percussion-sound is obtained most over the course of the colon, and over the abdomen in general, except in the most dependent parts where the collection of fluid gives rise to dulness varying with the changes of position of the patient. The distension of the abdomen presses upwards, encroaching upon the diaphragm, and compresses

the lungs, giving rise to most distressing symptoms of dyspnoea and rapid respiration, while the disturbance of the circulation thus caused may give rise to cyanotic symptoms.

Obstinate constipation is usually present, arising from paralysis of the muscular coat of the intestines. At the same time, paralysis of the sphincter is sometimes present, allowing the escape of fæcal matters by mere pressure upon the abdomen. This has been particularly observed in puerperal peritonitis, where a serous diarrhoea often occurs from transudation, which may also exist where there is present some coincident intestinal disease, tuberculosis, or any form of septicæmia, whether connected with the puerperal state, or not.

Painful urination is present; the desire to urinate is frequent, and the quantity of urine passed is very small. Complete retention may occur. In many cases there is a distressing hiccough, the tongue is generally coated, and there is a complete loss of appetite, and great thirst. The pulse is quick, small, and wiry, ranging from 120 to 140 per minute; the temperature from 103° to 105° F., or even higher. On approaching collapse, the pulse rises to from 160 to 200, but the temperature falls below normal.

The expression of the countenance is that of extreme anxiety and distress. Sometimes the upper lip is elevated and drawn tight over the teeth, as is seen in no other disease. The intellect generally remains clear, but finally becomes clouded, the patient growing apathetic and delirious towards the close of the disease.

The course of peritonitis is rapid, and the mortality very great. If, as sometimes occurs, the malady takes a favorable course, the pain, tympanitis, and fever generally subside, the respiration becomes freer, and the patient may recover rapidly, though often adhesions remain which may produce habitual constipation for life. If peritonitis arises from perforation, death may be expected within two or three days. In idiopathic peritonitis death occurs usually in the course of five or six days, but may be delayed until the middle of the second week. In case death does not occur within this time, nor improvement set in, the disease usually assumes a chronic form, all the symptoms moderate, the pain, fever, and tympanitis partially subside, but the effusion persists, dulness on percussion becomes more distinct, and an increasing resistance is observed over the dull spots. Sacculations are formed with dense membranes, which cause considerable opposition to the absorption of the inclosed effusion, and which act as incentives to new inflammation in the intervening spaces. Thus we may have present at the same time the symptoms of existing effusion and its metamorphosis, and those of pus-inflammation. These sacculations appear like irregular tumors, and give the abdomen a nodular and unsymmetrical appearance. Sometimes the capsulated exudation becomes purulent and gives rise to symptoms of abscess, together with

chills, fever, sweat, and other indications of septic poisoning. Usually, in the chronic form, an obstinate constipation alternates with a profuse diarrhoea, which greatly exhausts the patient. The urine is passed in small quantities, which slowly increase if absorption of the fluid takes place. The patient gradually emaciates, the muscles become soft and flabby, the skin dry and scaly. Œdema of the lower extremities sets in, and death from exhaustion occurs in the fifth or sixth week. Sometimes ulceration and perforation of the peritoneum occur, which is marked by a sudden increase of the temperature and pulse, and symptoms of an abscess pointing externally soon appear, or, in more fortunate cases, the abscesses perforate the intestine, and their contents are discharged per rectum. Such patients either make a very slow convalescence, or finally die from exhaustion. If reabsorption of the exudation takes place in chronic peritonitis, the convalescence is always very slow, and remaining adhesions leave various contractions and distortions of the pelvic viscera, which are usually the sources of lifelong and severe suffering.

In partial peritonitis the symptoms of a primary disease from which the former extends may precede the peritoneal symptoms, though often the primary disease remains latent until the peritoneal inflammation is developed. The symptoms are first those of general peritonitis, but they rapidly become localized. The pain and the degree of tenderness often depend largely on the extent and rapidity of the inflammation, which is oftener subacute than acute in its character. Some of the symptoms of general peritonitis may be entirely absent, as is notably the case with the vomiting and tympanitis, which, if present at all, are only so in a comparatively mild degree. In mild cases the symptoms may rapidly disappear and the patient entirely recover. More often, however, the local symptoms, though apparently subsiding, remain, and percussion over the spot gradually becomes duller, the resistance of the abdominal walls more decided, and a more or less defined tumor makes its appearance, which suppurates, and may discharge externally or follow the course of a capsulated abscess in general peritonitis. This condition more often follows the partial peritonitis consequent upon an inflammation and ulceration of the cæcum and vermiform process.

Pelvic peritonitis presents some symptoms peculiar to itself. An attack may be preceded for several days by pelvic uneasiness and weight, but quite as often it is ushered in with the chill, fever, and pain characteristic of the other varieties. The pulse and temperature are variable, sometimes being nearly normal and at other times very high, and sometimes fluctuating between the two conditions. The symptoms of local tenderness, tympanitis, vesical irritation, nausea, etc., do not essentially differ from those occurring in other varieties of partial tympanitis.

The subacute and chronic forms are often quite barren of symptoms, and frequently pass unrecognized. The patient may only complain of local discomfort and weight, aggravated at the menstrual period, with more or less difficulty of locomotion, and a general feeling of weariness, which symptoms are often attributed to other causes. Physical examination in the first stage only reveals the usual tenderness, and a sensitiveness upon pressure in the vaginal cul-de-sac, and upon attempting to push up the uterus. This is sometimes the extent of the physical signs, but if the disease progresses either fluctuation or a tumefaction may soon be observed at the side of the uterus or in the posterior cul-de-sac, the part being extremely sensitive to touch. Should pus form, it will be discharged and the tumefaction disappear, but more often the effused lymph becomes organized and leaves a hard, resisting tumor which causes displacement of the uterus, and disappears slowly. The disease may run its course in a few weeks, and then disappears entirely. At other times it assumes a chronic character, the patient suffering from acute symptoms only at the menstrual periods. Frequently the uterus is permanently displaced by the remaining adhesions.

Infantile peritonitis rarely occurs idiopathically, and when it does, or when it follows exanthematous diseases, or occurs during an epidemic of puerperal fever, it presents but few features essentially different from peritonitis in adults. The skin usually presents a dirty-yellow color, and in the last stage becomes cyanotic and icteric. Vomiting occurs with less uniformity than in adults, but the child refuses the nurse from the beginning, as the act of sucking increases the pain in the abdomen. A watery diarrhoea is present instead of the constipation which is found in adults. The disease may run a very rapid course and terminate fatally in 24 or 48 hours, though in older children it may continue for several days, and occasionally, though seldom, assume a rather chronic course.

In ante-natal peritonitis the symptoms are too indefinite to be reliable, especially if death occurs before birth. Sometimes the child is born with an intensely distended and painful abdomen, with œdema of the lower limbs, and with jaundice, thus suggesting at once a diseased peritoneum. Such cases nearly always die within a few hours or, at most, days.

Puerperal peritonitis offers some peculiarities distinct from those varieties which occur independent of the puerperal state. The symptoms usually appear within five days after confinement, though in exceptional cases the interval may be much longer. The patient first complains of pain, and experiences a chilliness which soon gives place to hot skin, quick pulse, and rapid respiration. The pain is characteristic, and resembles the pain of general peritonitis, but neither pain nor tenderness is uniformly present. The abdomen enlarges and

becomes tympanitic much more rapidly than in general peritonitis, probably on account of the recent and prolonged distension of the uterus and abdominal walls, and their present relaxed condition. The lochia are diminished in quantity, or entirely suppressed. The secretion of milk does not take place, or if it has already done so, it is suppressed, and the mammæ become small and flaccid. Otherwise the symptoms and course of this form do not vary essentially from those of general peritonitis.

Varieties.—Peritonitis may occur in either an acute or chronic form, and be either general or partial, as previously defined. The term *perforative peritonitis* has been given to that variety in which there has been a positive solution of continuity of the membrane, a rupture of the peritoneum having taken place either from suppuration, ulceration, or from mechanical violence.

Erysipelatous peritonitis occurs as a sequel or complication of the exanthem in adynamic fevers and in puerperal peritonitis, and is supposed to originate in a general blood change, holding a close relationship to that present in pyæmia. In such cases the inflammation is very extensive, intense, and rapid in its progress, the products being remarkably non-plastic, consisting chiefly of a purulent-looking fluid which may occur in great abundance. The symptoms are very severe and of a low type. *Adynamic peritonitis* includes all forms in which there is a rapid tendency towards a typhoid condition, the tongue being dry and brown, the teeth covered with sordes, and low nervous symptoms predominating. *Puerperal peritonitis* includes all cases which occur during the puerperal state. It must, however, be borne in mind that here reference is not made to puerperal fever in general, for this does not necessarily include a peritoneal inflammation, but only to that form of puerperal fever which is characterized by peritonitis with or without pyæmia. The latter is the form which most often occurs sporadically, but there exists such doubt as to the nature of possible contagion that great caution should be entertained even in these cases. *Traumatic peritonitis* results from mechanical injury. *Infantile peritonitis* occurs during infancy and childhood, and even during intra-uterine life. This variety has usually been made to include *tuberculous peritonitis*, the consideration of which will be found in the chapter on tubercles of the peritoneum. *Partial* or *circumscribed peritonitis* is often designated according to the locality affected, the name indicating the viscus whose peritoneal investment is involved, as *perihepatitis*, *perisplenitis*, *perimetritis*, *perityphlitis*, etc. *Pelvic peritonitis* denotes an inflammation limited to the peritoneal covering of the female pelvic viscera, and is of a very common occurrence; its presence is often overlooked, its symptoms being referred to other causes.

Diagnosis.—It is sometimes very difficult to establish the diagnosis of acute peritonitis. However, the mode of onset, the great pain

and excessive tenderness on pressure, together with the tympanitis, the posture of the patient, and, often, the symptoms of pyæmia, will usually serve to differentiate it from other inflammatory or hysterical affections.

Enteritis is less intense in all its manifestations. *Colic* lacks the continuous pain, tympanitis, high temperature and pulse, and muscular rigidity of peritonitis. In *rheumatism* of the abdominal muscles there will usually be evidence of rheumatism in some other part of the system; the pain is limited to the muscles, deep pressure does not increase it, and the constitutional symptoms do not indicate a severe disease. *Neuralgic* conditions of the abdomen, occurring in hysterical women, and complicated with hyperæsthesia of the skin, often simulate peritonitis. Frequently, in such cases, there is more or less tympanitis, and the patient may assume the dorsal decubitus with the thighs and knees flexed; but there is usually present the ordinary hysterical history, an absence of fever and of muscular rigidity, and firm, deep pressure is well borne, and may even afford relief, while light pressure is unbearable. In the *passage of gall-stones* there is usually great sensitiveness in the right hypochondrium, but the pain is paroxysmal, and there is an absence of tympanitis and of the constitutional symptoms of peritonitis, and, moreover, *all* trouble ceases as soon as the stone has passed. In cases of peritonitis dependent upon perforation, in cases in which the conditions leading to perforation have never been recognized, it is often a difficult matter to establish a correct diagnosis. Under all circumstances, a correct idea of the primary disease which has given rise to the peritonitis makes the diagnosis a comparatively easy matter. In the puerperal state, severe after-pains are sometimes mistaken for peritonitis.

It will be observed, however, that after-pains always occur with a firmly contracted uterus, while in peritonitis the uterus is relaxed; after-pains come on immediately after delivery, and wear away gradually, while peritonitis comes on later, and the pain becomes more and more intense, and we have fever and other constitutional symptoms which are seldom present with after-pains. Subacute and chronic peritonitis are often difficult of recognition, especially when not preceded by the acute form. They are most likely to be confounded with symptoms resulting from stasis of the portal vein, especially ascites, cirrhosis of the liver being the disease which it is most often necessary to exclude. In the latter, the jaundice, enlarged spleen, clay-like stools, dark-colored urine, and normal temperature and pulse, together with the diagnostic symptoms of ascites, will be sufficient to establish its presence. Simple chronic peritonitis cannot always be distinguished from the tuberculous form, especially when it occurs, as it sometimes does, in patients suffering with tubercular diseases in other organs. The aspirator or the exploring needle in the tubercular form will show

more or less hæmorrhagic admixture in the effusion. Partial peritonitis, being generally connected with an affection of the parts covered by the inflamed portion of the membrane, is usually readily distinguished. If the inflammation is situated over the liver or spleen we may hear a friction sound, the presence of lymph causing roughness of the opposing surfaces. In such cases we usually get the costal respiration, so characteristic of general peritonitis. Pelvic peritonitis may be confounded with pelvic cellulitis. It must be remembered that the latter will probably only occur after parturition, abortion, or an operation on the pelvic viscera, while peritonitis results from an entirely different class of causes. If the inflammation results from the extension of gonorrhœal disease it is safe to locate it in the cellular tissue rather than in the peritoneum. Pelvic hæmatocele is more sudden in its onset, and is chiefly characterized by the symptoms of great loss of blood with which there are no inflammatory signs. The tumor rapidly assumes a larger size than any enlargement connected with peritonitis, and is at first soft, gradually becoming hard. Hæmatocele may excite peritoneal inflammation, after which a diagnosis is more difficult. Thomas* holds that fœcal impaction is a frequent complication of pelvic peritonitis, and, often remaining after the inflammation has passed away, gives rise to the belief that the latter is still present. I am confident, however, that this is seldom the case when opium has not been freely used to relieve the pain consequent upon the peritonitis.

Prognosis.—Acute general peritonitis is at best a grave malady, and the prognosis should always be guarded. Cases which arise from the extension of simple inflammation of the abdominal and pelvic viscera by contiguity of tissue, or cases of traumatic origin, offer the most favorable prognosis, while, on the other hand, the gravest cases are those which are associated with pyæmia and other forms of blood-poisoning, including puerperal peritonitis. The next gravest in character is perforative peritonitis, and I question if it should not be ranked as the most uniformly fatal, though recovery is not impossible, provided the opening be small and closure be quickly effected by the exudation of lymph and the formation of adhesions around it.

Death in fatal cases usually occurs in five or six days. Unfavorable symptoms are: rapid, weak, and intermittent pulse, increasing prostration, hurried and more shallow respiration, hiccough, cool and clammy surface, and cold legs and feet. On the other hand, favorable symptoms are: a remission of the pain and tenderness, diminution of the tympanitis and muscular rigidity, with a gradual return to the normal of the pulse, respiration, and temperature. At best, convalescence is slow, often extremely so, considerable tenderness remain-

* A Practical Treatise on the Diseases of Women, by T. Gaillard Thomas, M.D., page 477.

ing, and paroxysms of colicky pains occurring frequently for some time. The prognosis of chronic non-tubercular peritonitis is considered unfavorable, though it may require months, and even years, to bring about a fatal issue. According to Galvagni the prognosis is more favorable when the effusion is serous, especially in children; less favorable in the fibrinous forms, and least favorable in the purulent.

The results of homœopathic treatment have shown a considerable reduction in the mortality of both the acute and chronic forms of peritonitis, and it is considered by many that the fibrinous bands and adhesions which are so apt to remain after peritonitis, often causing the patient lifelong misery, may be removed by the potent influence of homœopathic remedies.

The prognosis in partial peritonitis is so entirely dependent upon the nature and extent of the disease with which it is associated, that while generally we may expect a favorable issue, this is not by any means an invariable rule. Of course, when there is a purulent collection which does not discharge externally, bad results may be anticipated.

Treatment.—The prevention of peritonitis may only be accomplished by the avoidance of the agents by which it is propagated. It is, however, only in the treatment of the puerperal variety that the physician has opportunities to adopt preventive measures. During the prevalence of an epidemic, either in or out of lying-in institutions, it is of much importance that the room be light and airy, the temperature kept at about 60° F., and the most scrupulous cleanliness be observed. A physician having one or more cases of erysipelatous disease should under no circumstances consent to attend a fresh accouchment.

Patients suffering with acute peritonitis, whether puerperal or not, should be kept in a well-ventilated apartment, with a uniform temperature of 60° F. They should lie on a soft mattress, feather-beds being entirely proscribed. The coverings should be light, and frequently it may be found necessary to keep the covers from coming in contact with the abdomen by means of barrel-hoops or some other suitable contrivance. For the violent thirst, small draughts or sips of fresh water may be allowed, but it will be found that small lumps of ice placed in the mouth will answer equally well, and not excite vomiting as readily as the water does.

When convalescence begins, the diet should be of mild unstimulating character, solid food being avoided on account of the bulky fecal residuum. Soups, especially beef broth, are desirable; also arrow-root, tapioca, and other farinaceous articles, which, unless there is much exhaustion, should precede the animal broths. After a time lean meat may be allowed, but it should be used cautiously, as should

also fruits and vegetables, which tend to produce flatulence. If at any time the patient shows signs of rapid exhaustion, resort should be had at once to the use of stimulants, small quantities of good wine or of brandy and water being most desirable. In chronic varieties, gentle exercise, either by carriage or boat-riding, is often beneficial, though it must not be carried to the point of fatigue. When the patient can endure the removal, it is sometimes wise to give a change of air and scenery by sending them to the seaside or some summer resort, or even, if desired by the patient, by allowing an ocean voyage. In the acute varieties, the habit of blood-letting and the use of opium and cathartics, which are the chief features of treatment by the old school, should be persistently avoided as unjustifiable and positively injurious. The application of the appropriate homœopathic remedies will prove far more effectual. Indeed they could not well prove otherwise, as the mortality statistics of peritonitis under old-school treatment show an average fatality of about seventy-five per cent., while the remaining twenty-five per cent. suffer more or less for years, and sometimes through life, from the sequelæ.

Therapeutics.—**Aconite** is most often indicated in the first stage of acute attacks, especially when resulting from cold or from drinking cold water when overheated. The skin is hot and dry, the temperature high, the pulse hard, full, and frequent, and the respiration short and quick. The patient is extremely anxious and restless. The abdomen is swollen, burning hot, and sensitive to the touch. There is great thirst, much vomiting, the urine is scanty, scalding hot, and red or dark colored; after confinement the lochia and milk are suppressed, and there are sharp cutting pains, worse from pressure, or when lying on the right side.

Belladonna ranks next in importance. It is frequently indicated from the first, especially in the puerperal variety. The pulse is full and strong; there is much throbbing of the carotid arteries; the face is flushed, and the eyes brilliant and protruding, and there may be delirium. The abdomen is painfully distended, with much heat and burning; cutting, colicky pains, worse from the slightest motion or contact. This remedy is often indicated when there are complications with metritis or perityphilitis. After confinement, when the lochia are hot and offensive or suppressed, and violent after-pains occur, Belladonna is the chief remedy, often preventing peritoneal inflammation.

Bryonia follows Aconite or Belladonna after the fever has relaxed and effusion has taken place; it promotes absorption. It is indicated by the stitching, lancinating pains in the bowels, worse from the slightest motion. There is great thirst for large quantities of water; the mouth, lips, and tongue are very dry; the tongue is thickly coated white; there is considerable nausea from motion, and obstinate constipation. It is especially useful when the diaphragm is involved in the inflammatory action.

Veratrum album is indicated when there is much vomiting and diarrhoea; violent colicky pains; coldness of the skin; cold sweat, especially on forehead; sunken features; small and weak pulse, and great restlessness, anxiety, and exhaustion.

Mercurius corrosivus.—Purulent exudations; creeping chills, surface cold, and covered with perspiration, which affords no relief; foul odor from the mouth; distended and painfully sensitive abdomen; mucous stools, with persistent tenesmus and violent burning and cutting pains; œdematous swelling of the feet; great weakness and emaciation. Is especially useful in the various forms of partial peritonitis, with a tendency to the formation of abscesses.

Sulphur, like Bryonia, promotes absorption of the exudation, and often follows that remedy well. Sulphur is preferable to Bryonia in chronic cases and in scrofulous subjects. There is great weakness and deficient reaction. When carefully selected remedies have failed to do any good, or have only brought the case to a certain point, at which it persistently remains, Sulphur should be selected.

Arsenicum album is of great value in cases of the asthenic type, or in which the exuded fluid is copious and persistent. There is a sudden sinking of strength; great restlessness and anxiety; hippocratic countenance, violent burning and cutting pains in the abdomen; constant thirst, drinking often, but little at a time; vomiting, and sometimes diarrhoea. All symptoms are worse after midnight.

Calcareo ostryearum is a remedy of much importance in tubercular peritonitis, and in the simple chronic variety, when occurring in scrofulous persons, especially in children of a leucophlegmatic temperament. In such the abdomen is hard and much distended, and the mesenteric glands are hard and swollen.

Opium is an efficient remedy for the paralytic condition of the bowels which remains after the disappearance of the exudation, producing obstinate constipation.

Nux vomica.—May be needed to complete the cure of the constipation, and to remove irregularities of digestive functions which may remain.

The following remedies may be consulted, as possibly useful: *Apis*, *Calcareo phos.*, *Calcareo iod.*, *Cantharides*, *Carbo veg.*, *Cinchona*, *Colocynthis*, *Lachesis*, *Nitric acid*, *Phosphorus*, *Rhus tox.*, *Sulphuric acid*.

The most valuable of the auxiliary measures is the application of hot fomentations over the abdomen, or of hot poultices, made from corn or linseed meal. The latter will retain the heat for a long time, but must be made very thin, and should be covered with cotton. Many physicians contend that in the first stage ice or ice-cold applications should be used, warm applications being useful only after the fourth or fifth day. It is claimed that the cold not only tends to reduce the inflammation by withdrawing heat, but that it also excites peristalsis and allays pain.

It is further asserted that by the local reduction of temperature the gas in the intestines is condensed. The fact, however, that excessive reaction so often follows the use of cold applications, seems to retard their employment and to render the hot applications more desirable.

Probably it is safest to allow the patient's subjective condition to be the guide, using hot or cold applications as most agreeable to the patient. Often, in the first stages, as in other inflammations, the wet pack is of great benefit, but such a measure should not be adopted unless it can be conducted by an experienced nurse, an important item in the application of all auxiliary treatment. As a rule, it is unwise to evacuate the serous or sero-purulent effusion which may occur, unless it becomes so excessive as to threaten life, in which case it may be withdrawn by the aspirator or by a small trocar and canula.

TUBERCLES OF THE PERITONEUM.

BY A. C. COWPERTHWAIT, M.D., PH.D.

The frequency of tubercular depositions in the peritoneum is only second to that of the same in the pulmonary structures and in the mesenteric glands. If only existing locally, in connection with tubercular ulceration of the intestines, occupying a space on the serous membrane corresponding to the diseased portion of the bowel, they

may give rise to very little disturbance, and not be recognized during life. When, however, tubercles are developed on the serous surface without local cause, and from the condition of system which gives rise to similar deposits in other organs, they induce characteristic and important symptoms which are of the utmost clinical interest.

This condition is often described as tubercular peritonitis, owing to the local inflammation induced by the presence of the tubercles, and was formerly considered a variety of peritoneal inflammation.

Tuberculosis of the peritoneum may occur in all ages, but is decidedly more frequent in children over five years of age, and is almost invariably associated with tubercular deposits in other organs, to which it appears to be secondary.

Pathology.—As has been observed, tubercles of the peritoneum rarely exist alone, but are associated with a general tubercular condition, the lungs being usually involved in the same process, as may be the intestines, mesenteric glands, pleuræ, kidneys, liver, spleen, and even the brain, uterus, and other organs and glandular tissues. The most frequent seat of the tubercles is upon the attached surface of the peritoneum where they are formed from the connective tissue, which proliferates to a remarkable extent, giving an extensive fibrous growth in which the tubercles are abundantly deposited; at the same time, an adhesive exudation takes place, giving rise to false membranes, which again become the seat of the tubercular deposits. Every portion of the peritoneum is liable to the disease, whether visceral, parietal or omental, but it is rare that tuberculization of all these surfaces occurs in the same case. The individual character of the tubercles may vary, as it does in other organs and portions of the body. They are spherical or lenticular in shape, and are usually very small, sometimes so minute as to be scarcely visible, but may be as large as a poppy-seed; they present an opaque white, or grayish, or yellowish appearance, according to their age. Sometimes, as they advance in age, they assume the form of globular masses which are of a cheesy consistency, and present a yellowish color. Frequently these tubercular masses, together with the inflammatory products which invest them, are so large that they can be felt through the abdominal walls. The formation of the deposit does not always occur simultaneously on different portions of the membrane, but generally it may be found in all stages of development, the new and old tubercles existing in close proximity, the one just forming, while the other is undergoing its retrograde metamorphosis. This process may continue uninterruptedly, or periods of repose may occur wherein no new development takes place. An effusion of serum generally occurs into the peritoneal cavity, which is of a greenish-yellow color, and turbid in its appearance. Often this is mixed with the coloring matter of the blood, which has been more or less decomposed, and which gives it a brownish or brownish-red color. When periods

of cessation from tubercular development occur, this effusion becomes absorbed, only to reappear with the fresh outbreak of new formations. The local appearances of inflammation occur in greater or less degree, and are usually in proportion to the amount of the serous effusion, the quantity of which depends upon the extent of the inflammation. Sometimes, owing to the adhesive connections which are established with the intestines and the consequent distortions of the bowels, ulceration of the mucous membrane may be established, resulting in hæmorrhage into the peritoneal cavity, and even perforation of the bowel from without.

Symptomatology.—The characteristic symptoms of peritoneal tubercles are mainly attributable to the inflammatory condition. These are modified and often overshadowed by the symptoms of constitutional tuberculosis, affecting different portions of the body, some of these local lesions preceding the tubercular manifestation in the peritoneum. Thus it occurs that the symptoms and course of tubercular disease of the peritoneum vary greatly in individual cases, it being almost impossible to establish any definite aspect by which the local character of the affection may be readily recognized. Kaulich* describes three varieties, which, however, are necessarily indistinct, often passing from one into the other. The first variety represents the acute cases in which the symptoms often simulate the ordinary remittent fever or enteric fever. The patient experiences febrile symptoms, pain in the limbs, and malaise. The abdomen, either at a circumscribed spot, or over a larger area, becomes hard, tumefied and tender, and the patient complains of pain in it. With this, there is usually more or less vomiting, constipation and meteorism, with the usual indications of a partial peritonitis. After a short time these symptoms may disappear, save the circumscribed abdominal tumefaction and hardness which remain. The same process is soon after repeated, another portion of the abdomen being attacked; these attacks continue, with longer or shorter intermissions, until, finally, almost the entire abdomen becomes involved. The parietes are drawn in, hard lumps or knuckles are felt over the abdominal walls, and between these fine, cord-like, fibrous thickenings, but no fluid effusion. The patient soon emaciates, the functions of nutrition become impaired, vomiting and constipation continue, but no acute symptoms occur. Sometimes symptoms of a typhoid character supervene, and the patient gradually succumbs; but generally, death results from the occurrence of tuberculosis in other organs. It cannot be said that this is the constant character of the acute variety, for frequently the disease commences with more decidedly acute symptoms, rapidly followed by fluid effusions, and general constitutional disturbance, the disease gradually assuming a chronic form.

* Klinische Beiträge zur Lehre von der Perit. Tuberkulose. Prag. Viertelj., ii., 36.

Kaulich's second variety comprises the disease in its various chronic manifestations, either where it follows the acute stage or where, as is more often the case, it creeps on insidiously, the patient for a long time only recognizing weakness and the progressive distension of the abdomen. There is little, if any, pain in the abdomen, the principal complaint being a sensation of fulness and tension. The symptoms, as a rule, are almost identical with those of ordinary chronic peritonitis. After a time ascites become the most prominent feature, causing great abdominal distension, although the latter is often partially due to the coexisting meteorism. Frequently, tumors formed by the coils of the distended intestines are seen projecting in the upper part of the abdomen. The usual pressure of the ascitic fluid upon adjacent organs occurs, and produces dyspnoea and disturbance of the functions of the liver and other organs involved. At this stage, tuberculosis of the lungs and other organs becomes manifest, if, indeed, it has not constituted the primary disease. The symptoms of general tubercular disease may be so associated with the local manifestations as to greatly aid in the diagnosis, or, again, may so preponderate as to entirely overshadow the latter, and render the diagnosis obscure. Sometimes, in these cases, an effusion of blood takes place into the peritoneal cavity, which is indicated by symptoms of collapse; or tubercular perforation of the intestine may occur, and then death rapidly follows. These are the two varieties which particularly claim attention, but Kaulich designates a third, which really comprises the same class of cases, only characterized by a temporary subsidence of the general symptoms with decrease of the effusion and an improvement of the general health, lasting for an indefinite time, to be followed by another attack similar in its symptoms and course.

As has been stated, the course and character of the disease are quite indefinite, no two cases commencing precisely alike or retaining the same peculiarities throughout. The symptoms of fever, pain, and tenderness are not uniform in their character, and the effusion may vary greatly both in quantity and quality, as well as in its external manifestations. Many cases, entirely anomalous, have occurred, the character of the disease only having been recognized after death. Sometimes death results in a few weeks, but more often the disease lasts for months and even years.

Diagnosis.—Enough has already been said to indicate the difficulty in diagnosis which may arise from the complication of other organs in the tubercular disease. If it is possible to exclude the presence of the tuberculosis of the lungs, heart, or kidneys, we may then not be certain as to the presence of cirrhosis of the liver, which, in many respects, is quite identical in its symptomatology with tubercles of the peritoneum. This latter disease, however, usually occurs in persons who have been addicted to strong drink, the tubercular dyscrasia is

also absent, the abdomen is less painful and less sensitive to pressure, the spleen may be enlarged, the pulse and temperature not affected, at least not continuously, there is less vomiting, emaciation is not so marked, and there is often a collateral dilatation of the veins, which does not occur with peritoneal tubercles. From carcinoma of the peritoneum, or of other organs, we may usually distinguish tubercles of the peritoneum by the absence of the cancerous cachexia and by the local manifestations of a cancerous growth ordinarily present in such cases. The differential diagnosis from chronic peritonitis usually depends upon the presence of the constitutional symptoms of tuberculosis, but since simple chronic peritonitis may occur in tubercular individuals* it lessens the certainty of the diagnosis. In tubercular peritonitis, the aspirator or exploring needle will show more or less hæmorrhagic admixture in the effusion, a symptom not obtained in the simple variety.

Prognosis.—The prognosis is unfavorable in the degree in which it is unfavorable in other tubercular diseases, largely depending upon the extent of the constitutional dyscrasia and upon existing complications. Bauer regards the prognosis as “absolutely fatal.”

Treatment.—A nourishing diet of easily digested food, calculated to sustain the strength of the patient as far as possible, is very important. The patient should be much in the open air, and take such gentle exercise as his condition will permit, which is usually confined to carriage and boat riding. Altogether, such dietetic and hygienic rules should be observed as have been found useful in the treatment of other forms of tubercular disease.

Therapeutics.—**Calcarea ostrearum** is the most important remedy. It is indicated in leucophlegmatic persons, especially in children who have a distended abdomen, and whose mesenteric glands are hard and swollen.

Calcarea phos. is indicated when the nutrition is especially defective. The child is emaciated and constantly hungry; eating does not satisfy, but always produces more or less distress in the stomach. Frequently the osseous system is characteristically affected. There is a tardy closing of the fontanelles; the skull bones are soft and thin, there is a great muscular weakness, with inability to walk or hold the head up, and curvature of the spine.

Silicea.—Especially useful in imperfectly nourished children with large abdomen, weak ankles, and profuse sweat about the head, the rest of the body being dry. The fontanelles remain open; the head is large, and the body emaciated; the abdomen swollen and hot. The child is very weak, and always cold. Diarrhœa is usually present, the stools being very offensive.

Sulphur.—In scrofulous children, and especially when resulting from a suppressed eruption. There is extreme emaciation, and great weakness, with deficient reactive power.

Phosphorus.—When there is complication with pulmonary tuberculosis. There is considerable tympanitis, with sensation of weakness and emptiness in the abdomen; painless debilitating diarrhœa of undigested food, and hectic fever.

Also consult *Arsenic*, *Calcarea iod.*, *Carbo veg.*, *Iodine*.

* Aran, De la Perit. chron. simple et tuberc, etc., L'Union Méd., 93, 1858.

CARCINOMA OF THE PERITONEUM.

BY J. G. GILCHRIST, M.D.

Carcinoma of the peritoneum is probably of as frequent occurrence as cancer of other tissues or parts, but various circumstances naturally combine to render an early diagnosis very difficult, if not practically impossible. In late stages of the disease neighboring and contiguous parts become implicated, and it is impossible to determine in which tissue the disease had its origin. Owing to facts such as these, it was long a matter of doubt whether cancer ever originates in the peritoneum, and many were disposed to attribute all cases in which this tissue was found affected to an extension of the morbid action from some associated viscera. Later investigations, particularly by John Syer Bristowe, M.D., from the records of St. Thomas's Hospital, London, would seem to settle the question in favor of the peritoneal origin of cancer. The number of cases of carcinoma of the abdominal viscera, particularly the primary forms of the disease, is not large, and a comparatively small proportion of these cases showed evidences of peritoneal origin. Assuming, as my theory of ætiology of carcinoma does, that inflammation, or rather a modification of that process, is the more frequent, if not the only cause of cancer, it would follow that a tissue or organ is liable to cancerous disease in proportion to its vascularity. This would certainly tend to prove, if proof were needed, that the peritoneum may be the seat of primary carcinoma.

It goes without saying that even in cases of unquestioned primary cancer of the peritoneum it is only a question of time when related parts partake in the morbid action. There are few, if any, morbid processes of which the peritoneum is the seat that do not extend with great rapidity, owing to its peculiarly favorable anatomy, and carcinoma is no exception to the rule. As is true of cancer elsewhere, it rarely occurs in the peritoneum in young people, being to a considerable extent a disease of middle or advanced life. There does not seem any predisposition of one sex over the other, but the natural history of the disease in general would go to show that women should present the greater number of cases. Of 22 cases cited by Bristowe (*Reynolds's System of Medicine*, iii., p. 323), none occurred under twenty years of age: "three occurred between twenty and thirty, four between thirty and forty, five between forty and fifty, five between fifty and sixty, five between sixty and seventy." Thus fifteen, approaching two-thirds of the whole number (22), occurred after forty years of age, showing the usual history of cancer in this respect. As to sex, no quotations are made bearing on that point.

As to the varieties or forms of cancer developed in the peritoneum, all four seem to occur with about the same frequency as in other tis-

sues. Thus the order of frequency may be stated as scirrhus, encephaloid, colloid, and melanosis, the latter either alone or as a complication of encephaloid. The first two, scirrhus and encephaloid, as is usual, are more frequently primary, the latter oftener appearing as a recurrent or secondary affection.

Scirrhus commences as a rule in the formation of exceedingly firm and hard spots, quite circular in outline, but of the "split pea" form, very small in the subserous tissue. They rarely exceed a line, or at most two, in diameter, and are scattered irregularly through the substance of the part. Later they become aggravated, forming larger or smaller patches, until considerable portions of the membrane are involved. At first the peritoneum seems thicker, but the nodules which the cancerous deposits have now become do not project much, if any, on the face surfaces, extending largely into the subserous tissues, and exhibit the general character of scirrhus elsewhere, viz., to contract and draw movable parts into its substance. This characteristic property has the effect to convert naturally pendulous folds or duplicatures of peritoneum into dense cord-like masses, often very strikingly illustrated in the omentum. Such processes as the meso-colon, the mesentery, or the appendices epiploica, are thus formed into hard tumors or narrow and extremely indurated bands. Notwithstanding this is the usual character of scirrhus, viz., contraction, yet there are instances when the deposit has been in a circumscribed territory, when a distinct tumor has formed, with all the characters of scirrhus elsewhere. There is the same tendency, also, to ulceration of scirrhus that is commonly observed. Perhaps the tendency to contraction is nowhere more pronounced, nor productive of such discomfort and danger. Thus tubular organs, as intestines, bloodvessels, or various ducts, are drawn into the growing mass, and either completely occluded or constricted to a degree that very seriously impairs their efficiency.

Encephaloid commences, as cancer generally does, in the substance of the part, in the subserous tissue, usually very early, or even from the commencement, assuming distinct tumor characters. Not having the same disposition to contraction, the masses project beyond the surface of the peritoneum, forming either solitary tumors or masses of small tumors, like bunches of grapes or currants. In place of the indurated contraction of scirrhus we find the volume of the affected tissues greatly increased. The tumors, being small, are often found aggregated in patches of greater or lesser size, but when larger they are usually solitary. They are much softer than scirrhus, and have been found polypoid or pedunculated. The usual size rarely exceeds a walnut, but cases have been observed where the size of a child's head has been attained.

Melanosis, while sometimes appearing as a distinct tumor in other tissues, has never, according to Bristowe (*loc. cit.*), been observed in the

peritoneum. It occurs with some frequency, however, as a complication of encephaloid.

Colloid cancer, according to Bristowe (*loc. cit.*), has many distinctive characters, which he puts as follows: In its early stage the disease "appears for the most part in the form of groups of vesicles which vary in fineness, and have a close *prima facie* resemblance to patches of eczema or herpes, or (if the fibroid element be abundant), in the form of slightly granular or delicately reticulated patches. Later on, the vesicle-like bodies are often as large as a millet-seed or tare. The patches often become more or less elevated above the level of the surrounding surface, and spread sometimes in tortuous and anastomosing lines as though taking the course of the lymphatic vessels, sometimes by forming scattered, isolated, somewhat pedunculated growths. This disease, like scirrhus and encephaloid, tends in various degrees both to involve, and to diffuse itself over, the peritoneal surface." When fully developed, the colloid disease presents no peculiar characters. It has, perhaps, rather less disposition to form outgrowing tumors, the development being largely interstitial, thickening the peritoneum without much induration, forming nodular projections, here and there, and when the disease extends to near parts preferring to implant itself in muscular or serous tissue to glandular structures. There are cases, particularly when the stomach is affected, in which the omentum presents the appearance of scirrhus, being contracted, thickened, and indurated.

The above abbreviated account of what is a pure disease, rare, at least, as to early detection, has purposely ignored much of the general pathology of carcinoma. It is manifestly impossible for a cancerous disease affecting the peritoneum to long remain solely related to that tissue. It is equally impossible that such a serious tissue-change can occur in a part as sensitive to morbid influences as the peritoneum, without the establishment of other abnormalities, having the effect to greatly enhance the danger. Thus peritonitis, with lymphatic, serous, or purulent effusions, or obstructions of intestines, bloodvessels, or the lymphatic duct, may each and all occur, and very seriously complicate an already sufficiently grave case.

Semiology.—The symptoms of peritoneal carcinoma are naturally divisible into three groups, viz., those of the formative stage, of the mature stage, and the stage of decline or degeneration.

(a) The *growing or formative stage* of cancer furnishes symptoms of extreme ambiguity, and which, it would seem, can only occasionally be correctly interpreted. There are pains probably referable to the peritoneum, but not recognizable as indicative of cancer. There may also be various disturbances of digestion, of which the usual symptoms of the tongue and bowels will be observed. There is often diarrhoea, at first, but later the bowels become constipated, increasingly so

if constriction occurs. From the implication of the liver, which it is found is frequently implicated (more so than any other viscus, after the intestines), there will be jaundice. In fact, there may be a long array of symptoms, perhaps distinctly referable to certain organs, or sets of organs, but there is rarely any clue to the actual cause. In cases of secondary or recurrent cancer, after the removal or development of a cancer on the surface of the body, or of the viscera, when a diagnosis can be made—the appearance of symptoms such as these may be suggestive of invasion of the peritoneum; even then, unfortunately, it is not possible to determine whether the disease originated in the peritoneum, or extended to it from near parts.

(b) The *mature stage* will usually give symptoms which are pathognomonic. It is very rarely that this stage is reached without there being a degree of emaciation that will enable the physician to detect something suggestive, at least, of the state of affairs. The abdomen will often be somewhat full, and yet quite resisting to pressure. There will be discovered more or less clearly defined tumors, but which may easily be mistaken for enlarged mesenteric glands. The peculiarly lancinating pain, the feeling of immobility of the tumors, will suggest carcinoma. Even with such prominence in the indications of carcinoma, there is little to enable the physician to determine whether it is of the peritoneum or mesentery. So far as indications for treatment are concerned, perhaps it makes little difference whether a diagnosis is made or not.

(c) In the *degenerative stage* carcinoma is generally easily made out. If other symptoms have been lacking hitherto, the establishment of cachexia would set the matter at rest. When the omentum is the seat of colloid or scirrhus disease, it can usually be felt as a hard ridge or band running across the abdomen, and is really more diagnostic than the tumors that may also exist.

Under all conditions, it must be conceded, and in all stages of the disease, a diagnosis can rarely, if ever, be satisfactorily reached when the disease is primary in the peritoneum. Even when secondary or recurrent, it is at best a more or less well-founded *suspicion*.

Prognosis.—As with carcinoma generally, a prognosis is almost invariably bad. If it is assumed that the disease is curable in the early stages, the fact that it is rarely recognized until it has become developed forbids any hope of a cure. The prognosis is additionally unfavorable, if such a thing be possible, when the disease occurs secondarily.

Treatment.—As may be inferred from the above, little, if any, hope of a cure can be held out. The records of homœopathic practice do not give instances of a cure; in fact, so far as my reading goes, I do not find the condition referred to at all. Considering it as cancer in general, epithelioma and colloid might be considered some-

what amenable to treatment, either to arrest or retard development, even if no hope of a cure exists. But these forms of cancer have been cured when early recognized. The difficulty in the present instance is an early recognition; without it, I do not believe a cure possible. Based upon the records attainable, if the case is recognized, *Sanguinaria*, *Crocus sat.*, *Phosphorus*, *Arsenicum*, or *Hydrastis*, might be used as the general indications in the case would suggest. Should the case be one of scirrhus, *Carbo an.*, *Lapis alb.*, *Carbolic acid*, *Arsenicum*, or *Hydrastis* may be used, but I do not believe that the slightest beneficial effect will result. The office of the physician, in these unfortunate cases, is reduced to the simple function of affording relief from suffering by any means at his command, a purely palliative function. Knowing, as it would seem all *must* know, that the disease is practically incurable, he will feel compelled to devote his energies to make the patient as comfortable as may lie in his power.

ASCITES.

BY E. U. JONES, M.D.

From the Greek, *Askites*.

Synonyms.—Hydrops abdominis, Hydrops peritonei, Hydroperitoneum, Hydrops saccatum, Abdominal dropsy.

Situation.—Entirely within the peritoneal sac.

History.—There is no time when this disease was not known. It was early diagnosticated by the ancients, and separated by them from general dropsy. The treatment, however, was the same, and the causes were not separated from those considered as causing any collection of water within the body.

Ætiology.—Ascites is nearly always symptomatic, so nearly so that it may usually be considered as depending upon the presence of some other preëxisting disease, and having a strict relation to the character of that disease. Speaking generally, it will be found to depend upon some form of obstruction of the circulatory system, by which serous portions of the blood are allowed, or rather forced, to escape into the peritoneal cavity. This obstruction exists most commonly in the capillaries alone, but a similar state of the larger vessels may also exist, though producing other symptoms to indicate its presence. It may be general or sacculated, existing either in the open abdominal cavity, or in that cavity divided by adhesions into several sacs. Encysted abdominal dropsy is not, properly speaking, ascites, and is not usually amenable to the ordinary treatment of ascites. There is a possible primary peritoneal dropsy depending upon cold, affecting either the orifices of the lymphatic ducts, or increasing the functional activity of the epithelial cells, but secondary causes, arising from diseases of the

organs situated within the abdominal walls, are by far the most common. The most general action of these secondary causes is by constriction, pressure, or other modes of obstruction of the circulation through the several organs, by means of aneurisms, tumors external to the organs themselves, inflammation of the peritoneum or any portion thereof, or by degenerative action within, or connected with, the organs. Sometimes there is an extension of disease from one organ, in which the disease would not tend to produce ascites, to another organ, resulting in an obstinate and incurable dropsy. This dropsy may be accompanied in the last stages of its causative disease by œdema pedum, or even by general anasarca, but in every instance of true ascites these extensions of the effusion are caused by the pressure of the original ascites upon the larger vessels of the trunk, preventing the return of the blood from the extremities. The removal of the ascites is their cure, and, so far as this study is concerned, they will not be considered.

An intimate causative connection exists between ascites and obstruction of the portal circulation; hence, one of its common causes will be found in some form of hepatic disease.

Adhesive inflammation of the liver is one of the most frequent of these diseases, especially as it presents itself as cirrhosis. Ascites is a sure accompaniment, commencing after the atrophy succeeding the enlargement is fully established, and therefore being one of the last symptoms of the causative disease. If the diagnosis of that disease has been satisfactorily made previous to the presence of the ascites, the coming of the effusion may be assured and in a measure guarded against. The premonitory symptoms of any of the diseases ending in atrophy of the liver, whether such atrophy may be due to compression from without, to confirmed alcoholism, to constitutional syphilis, or to pressure from within, are but seldom referred to the true cause, are slight, and but little notice is taken of them at the first. They are more usually considered as a form of dyspepsia, with a loss of true appetite, furred tongue, languor, a dull pain in the right hypochondre, with commonly but little disturbance of the bowels.—in fact, the usual train of the so-called "biliousness." Close examination will detect a slight enlargement of the liver, but the patient is not ordinarily prevented from his usual occupation, and a few domestic remedies, or a little patent "medicine," satisfy him. Too often he knows that his habits are such as will condemn him, and he thinks the trouble will soon pass away. It is impossible to assign the length of this prodromal stage of the ascites, as it may have been coming on for months, or even years. The deposition of lymph is very slow, the fibrinous contraction still slower, and it is not unfrequent that attention is not called to the trouble until ascites has shown itself. The difficulty of finding the usual hepatic dulness on percussion, and the rough, dry skin, may call

the attention of the physician to the real condition. In hospital practice this stage may be more accurately noted; in private practice less so. The acute form of effusive hepatitis, however, demands treatment, and the attention of the physician is at once called to the disease by the fever, tenderness on pressure, the jaundiced hue, and the highly colored urine. The supervention of ascites upon this form is almost wholly under control, but the patient should never be left for "nature to complete the cure." True cirrhosis of the liver is seldom seen under thirty years of age, and one of its common accompaniments is hæm-atemesis, the occurrence of which, the other symptomatic indications agreeing, may be taken as a diagnostic symptom of this disease. The pathological cause is the contraction or the complete obliteration of the smaller branches of the portal vein, preventing the full circulation of the blood in the liver.

The more common cause of cirrhosis, and therefore of ascites, is alcohol. The trouble is not usually found with those who drink the lighter liquors, but with chronic, reckless drinkers, who take all their liquors without diluting them, giving the alcohol free action. In this class of patients the diagnosis will be easy, the prognosis plain, and the predetermining disease undoubted. In many of these cases syphilis is a complication and, when present, cannot be ignored, and in the palliative treatment must be taken account of.

Cancer of the liver also produces ascites. This it does by mechanical and uneven pressure upon the capillaries of the portal vein, generally obstructing its circulation to a less degree than in cirrhosis, the ascites consequently being less severe. The objective symptoms are very nearly the same, and it is often difficult to distinguish the cancerous complexion from that sallow hue accompanying yellow atrophy. Symptomatic differences are: a moist, rather than a dry, skin; often sweating, with hectic; an enlargement, often irregular, of the liver instead of atrophy; may occur at any age; and is not necessarily connected with alcoholism.

Cancer of the omentum is also a cause of ascites, though very rare, and will require an unusually careful diagnosis. It may be probalized by the degree of fever, the absence of direct hepatic disease, the greater and more rapid emaciation, the moist skin, and the more diffused pain.

Chronic enlargement of the spleen probably sometimes causes ascites, but it is a question whether it does so from mechanical pressure merely or from some accompanying disease of the liver. The organ may be easily detected in the left hypochondrium; the skin is moist; and the ascites frequently disappears, apparently of its own will. This cause may most commonly be found in malarial regions.

Chronic inflammation of the peritoneum frequently results in ascites, and among the temperate classes is, perhaps, the most common cause.

Its own exciting causes may be very many,—chill, in all of the various forms which so frequently give rise to inflammations of other membranes; tubercular deposit; injuries of the abdomen; metastatic causes; sequelæ or accompaniments of other fevers, as the exanthemata, intermittents, erysipelatic, rheumatic; and, perhaps, a depraved condition of the blood, arising from faulty secretion or innutrition, and then developed by some slight local cause. Its diagnosis is comparatively easy. There is a certain amount of hectic fever, with general abdominal tenderness, varying in degree, however; the effusion is not so great as in the hepatic causes, and, except when the ascites becomes immense, is not accompanied by any anasarca; the emaciation is slow; the skin is not harsh, and its color is not changed; and absorption of the fluid frequently takes place spontaneously.

Diagnosis.—Ascites is the presence within the abdominal cavity, and properly nowhere else, of a peculiar serous fluid, usually light yellow in color,—though sometimes, in cirrhosis, of a brown hue from the presence of blood or bile-pigment—rich in albumen and commonly containing fibrinogen. It is not an idiopathic disease, but always symptomatic, and is classed as a disease only as it becomes the most persistent, annoying and visible evidence of disease, the sufferer from which demands its removal. Different from anasarca, its fluid is confined within a limited and specific region, its causes being as limited and specific. When the preëxisting disease has been slow and insidious, the attention is first called to a certain embonpoint, without a corresponding apparent increase of flesh in other portions of the body. There is a dyspnœa, accompanied by easily increased rapidity of the pulse, and the patient becomes sensible that he has a heart, and supposes that he has some disease thereof. In the cases of drunkards this conclusion is quickly and naturally reached. The urine may not be sensibly reduced in quantity at first, though it is usually high colored. In cases of hepatic disease the complexion becomes sallow, and the skin dry and rough, but in ascites from other causes there may be no apparent change in the complexion, and the skin may be moist and even easily sweating. Dyspeptic symptoms are almost universally complained of, and in some cases there have been found on autopsy organic changes in the gastric membranes. The appearance of the abdomen differs with the position of the body. If the distension is not very great, and the position is upright, its lower portion will be the more dependent, and the upper portion drawn downward. By placing the patient upon the back, the abdomen flattens at the umbilicus, but increases at the sides, and the dyspnœa increases. In any position, fluctuation may be detected by placing the hand lightly upon one side of the abdomen and percussing with the fingers of the other hand. In cases in which the effusion is small, this fluctuation can be perceived by bringing the hands very near together, and percussing very lightly,

but it is best always to supplement this examination with other marked symptoms before a sure diagnosis is given. An examination of the urine may not show any difference peculiar to the ascitic situation, but it may be more scanty than usual and higher colored, with a higher specific gravity. In true ascites there is seldom any effusion apparent in other parts of the body, but in its advanced stages it may, by its own pressure, retard the return of the blood from the extremities, and thus produce cedema of the feet. Ascites may be a part of general anasarca; its diagnosis has then been made before its appearance.

Differential Diagnosis.—There are but few pathological states with which ascites could well be confounded. One of these is encysted effusions, either unilocular or multilocular, especially when the result of ovarian disease. This form is not generally amenable to the treatment of ordinary dropsies, and has no direct relation to ascites. If the woman be placed upon her back, the abdomen will preserve its protuberance, not flattening out as in ascites; percussion will continue its dull sound over the same regions as in the erect posture, while in ascites the floating of the bowels to the upper portion of the abdomen, in whatever position the patient may be placed, will cause a change in the location of the resonance; ascites is uniform in its enlargement of the abdomen, except when confined by adhesive inflammation, while ovarian dropsy is more unilateral in its manifestation. The history of the case will often decide the diagnosis, especially if a preëxisting peritonitis be established, and the presence or absence of the habit of spirit-drinking. There are cases of enormous distension of the bladder which may simulate ascites, but, if there be any doubt upon the point, the introduction of the catheter will decide it. It would seem almost impossible that the gravid uterus should be mistaken for ascites, but the mistake has been made many times. The history of the case should always be carefully had, and the probabilities estimated. The general health of the woman; the absence of the menses, except in those abnormal cases in which they continue during the whole pregnancy; the absence of fluctuation; the movement of the womb on ballottement; and the dulness on percussion in all positions, will make the diagnosis positive. There are certain cases of chronic tympanitis which possibly may be thought to be ascites, a condition more commonly to be found among those whose diet is not of the best and is largely vegetable. The resonance on percussion is, however, very strongly marked, and it is with difficulty that dulness can be found anywhere in the abdomen. This will be the diagnostic point, for the accompanying gastric difficulties are also found in diseases of the liver. It is possible that tubercular peritonitis may simulate ascites, but the tenderness on pressure, sometimes scarcely bearing the necessary examination, the discovery of the enlarged and lobed omentum, the

absence of marked fluctuation, and the tuberculous dyscrasia, will aid the decision.

Prognosis.—In the majority of cases the prognosis is doubtful, for these cases occur among the poorer classes and among those least well nourished. It is with these that organic changes of the liver are the most frequent, and the ascites is but the evidence of their existence and of the hopelessness of their recovery. In cirrhosis of the liver, after the deposition of lymph in the course of the ramification of the portal vein, and when the organized exudate has exerted its contractile power, there is no possible hope of recovery. The ascites remains persistent, and powerfully aids in shortening life. The same is true of the changes caused by all malignant hepatic growths. In the ascites charged to diseases of the spleen, there being no organic diseases of the liver preëxisting, and in that caused by peritoneal inflammation, the prognosis is better. Spontaneous absorption of the effusion which was in supposed connection with each of these causes has occurred, and they are both amenable to medicine. After the inflammatory condition on which the ascites had depended has been cured, or has ceased to continue in active process, the effusion may remain, and seems easily controllable by the appropriate remedy.

Treatment.—From the ætiology it will be seen that all cases of ascites are not amenable to curative treatment; much may be done, however, to palliate and to retard the fatal issue. It will be well to determine the remediability or the irremediability of a case as early in its progress as possible, and not to waste time in fruitless endeavors. The medicinal treatment for relief should not be directed to the removal of the dropsy alone, but rather to the whole condition of the patient, increasing his powers of resistance, seeking to enable the assimilation of food,—thereby checking the progressive emaciation, and giving a new vitality to the effluent nervous forces. It is not with every one of these cases that the same diet can be given, but it will oftenest be found that the more concentrated forms of animal food, with the diluent water, coffee, etc., given at a time other than when the food is taken, will be well borne for one or two of the daily meals, the others, for a while, being composed of the cereals, varied in their selection, with milk or malt. In very many of these cases the dyspeptic symptoms are those most complained of, and even their partial relief takes away something from the misery of living. Markedly is this the case before hæmorrhages have begun, and while a certain portion of moral activity still remains. For in many of the cases having their remote causes in alcoholism, the anæmic brain can but slowly respond to mental or moral stimulus, and a dreary hopelessness affords but little ground for work.

The remedies to be selected for this purpose are those which affect profoundly the organic nervous system, each in their several methods.

Arsenicum.—But few autopsies of chronic arsenical poisoning, sufficiently chronic to have developed all of the organic changes of which this medicament is capable, have been had; nor has diffuse interstitial hepatitis been found among its consequences. Yet it cannot be doubted that it is a remedy of much power over the functions of the liver. In primary acute inflammation of this organ, with feeling of fullness and burning pain, venous engorgement tending to hæmorrhage, utter prostration, and restlessness, melanic vomiting or stools; or in secondary inflammation during other organic changes, with the same marked symptoms, Arsenic is potent. In the dyspepsia caused by the sub-acute gastritis of drunkards, with burning pain, tenderness over the region of the stomach, constant thirst, which cold water allays the best of anything for the time, but which cannot be retained long, with pale face and functional starvation, this remedy is needed. When there is a sense of constant pressure and weight, unrelieved by eating, sallow complexion, gnawing, corroding pains, with a history indicating a cancerous diathesis; or when, with a like history, there are sharp lancinating pains in the right hypochondre, hardness of the liver to the touch, obstinate constipation, or yellowish, greenish, or black diarrhœa, Arsenic may be given with good effect.

Hydrastis can.—The sphere of Hydrastis covers that of the whole nutritive system, and primarily governs the mucous surfaces. It has considerable reputation in general cancerous affections, and, while by no means a specific, has afforded great relief in many of this class of diseases. In debility from the loss of animal fluids (like china), in empty abdominal feeling, as if the abdomen were hollowed (and it may be actually so), in the "goneness" of the stomach without relief from eating, hydrastis indicates its sphere. There is some reason to suppose that it will cause enlargement of the liver, becoming chronic; and intestinal hæmorrhages by no means contra-indicate it.

Hydrocotyle asiatica.—"Cirrhosis of the liver, hypertrophy and induration of connective tissue; obstruction in the whole hepatic region; slight pain in the upper portion of the liver; crampy pains in the stomach without nausea." I have had no experience in these diseases with this remedy, but its symptomatic indications are a perfect analogue of chronic alcoholism.

Lachesis.—In these affections Lachesis ranks with Hydrastis and Lycopodium, and in the failure of either of these remedies may be expected to work well. Its organic action, perhaps through the cerebro-spinal nervous system, is deep and persistent. It is more indicated in that anomalous class of cases which ignore nosological arrangement, and as an intercurrent with other remedies. Muscular tremors, cardiac weakness, nervous asthma, grayish complexion and extreme irritability, and left-sidedness, are general conditions for which it may be chosen.

Lycopodium.—A strict impression of the ganglionic nervous system, spending its force principally upon the liver and the digestive tract. The patient is usually cachectic; muscles loose and flabby; and suffers from chronicity in all his ailments. He is commonly hypochondriacal; blustering perhaps, but timid; chronic hepatitis, with the region very sensitive to the touch or to motion; feeling of tension, as from a hoop around the hypochondria; excessive flatulence, as if in the left transverse colon; lithic acid diathesis, with red sand in the urine. Of great value in true ascites.

Nitric acid is a remedy not to be forgotten in this disease, to be changed sometimes for the combination Nitro-hydrochloric, especially for those who have been under mercurial treatment or have suffered from syphilis. Excessive emaciation, particularly of the upper arms and thighs, with enlargement and torpor of the liver; stitching pains in the liver; jaundice with clay-colored stools; frequent epistaxis; pressure and burning pain in the stomach as if he would vomit blood; glandular swellings.

Nux vomica.—A decided cerebro-spinal irritant. When ascites has alcoholism for its primary cause there is no remedy which will be more often called for than this; and when hepatic enlargement and induration have occurred from long-continued "high living" it cannot be omitted. Excessive sensitiveness of the peripheral nerves; attacks of tetanic rigidity; constipation; thirst; vertigo; loss of appetite, and cadaveric appearance demand it.

Phosphorus.—The great reconstructor of weakened nerve force. It has a specific and profound influence upon the liver and intestinal tract, though there is no organ in the body which does not feel its influence. Pathologically it produces fatty degeneration of the liver, diffuse interstitial inflammation, and "genuine alcohol cirrhosis." The atrophy succeeds the previous hypertrophy; and the jaundice is dark, malignant; the urine scanty, albuminous. The stomach has oppression and burning,

with great thirst and extreme sensitiveness; vomiting soon after drinking, or vomiting of blood, or of coffee-colored masses. Stool dry and scanty, or persistent diarrhoea. Rapid emaciation.

Other remedies are: Aurum, Bryonia, China, Iodine, Mercurius, Ptelea trifoliata, Sulphur.

The curable forms of ascites are those arising from certain diseases of the spleen and peritoneum. These forms are not necessarily fatal, and when not so, are limited in their progress and tend to retrogression. Hence the ascitic effusion is sometimes spontaneously absorbed, and a complete cure results. But it is still a mooted question whether inflammation of these organs ever produces dropsy *per se*, or whether collateral inflammatory disease of some other organ does not produce stasis in the abdominal vessels, and thereby gives rise to the effusion. This the more as ascites is by no means a necessary adjunct of either of these inflammations, and is often absent in severe and chronic cases. Be this as it may, we have to deal here with the fact of the effusion and its remedies, leaving a wider discussion of its mode of causation to the papers upon the diseases of those organs.

The spleen shows its greatest susceptibility to disease in the middle adult age, and then manifests its close connection with diseases of the stomach and liver. The same causes which result in enlargement of the liver may also produce inflammation and enlargement of the spleen, perhaps through the connection of the splenic vein with the portal vein. A similar condition of the mesenteric glands is by no means an unusual complication. Splenic anæmia is common, and, secondarily affecting other organs, may conduce to the formation of ascites. The weakened bloodvessels easily allow their contents to escape, hence the violent epistaxis so common in chronic splenic inflammations. Malarial conditions, particularly if they have become chronic; badly treated intermittents; typhoid fevers; puerperal fever; chronic peritonitis; and diseases affecting the portal circulation, are causes of those engorgements of the spleen which may result in ascites. To these may be added infectious diseases and syphilis.

In connection with diseases of the peritoneum ascites is not uncommon. The amount effused may be so small that it cannot be ascertained by palpation, or it may be so great as to cause, by its own pressure upon the abdominal vessels, a general anasarca. Whether ascites is ever engendered idiopathically from the peritoneal membrane is an open question, but many cases of this disease seem to admit of no other solution. Acute idiopathic peritonitis itself is denied, but deemed secondary to diseases of those organs invested by it. Or it may be excited by cold, rheumatic or general morbid causes; chronic forms of renal troubles; diseases of the female sexual organs; pregnancy, in all of which it may seem to be idiopathic. It may be secondary to any disease of the stomach or intestines by which they

are occluded, or by which stasis is caused in their bloodvessels; to ulcerations, with or without perforation, as in typhoid fever or dysentery; to typhlitis; to various abdominal glandular inflammations; and to different forms of abdominal phlebitis. The chronic form may be due to many of the causes which induce the acute, but may also follow an acute peritonitis, or may be the sequel of peritoneal or mesenteric tuberculosis, or be traumatic. (For diagnosis of these various causes see, among others, article on "Diseases of the Peritoneum.")

In the beginning of ascites from primary or secondary inflammation of the peritoneum, the urine, at first, may be normal in amount, or but little lessened. It soon, however, becomes scanty and high-colored, with a copious deposit of urates. This may be due to various causes, as the fact of the effusion itself, low arterial pressure, and, later, the pressure exerted upon the renal arteries.

Treatment.—The indications are to cure, if possible, the morbid conditions on which the ascites depends, and to promote the absorption and elimination of the fluid by the kidneys and the skin, or, in some cases, by the bowels. Hence the remedy must always be one having a specific relation to the cause, to be followed, or alternated, with one of the following:

Apis mel.*—All of its pains are stinging-burning; palpitation of the heart, as if one had been running; oedema of the eyelids; urine scanty, dark colored; great soreness of abdominal walls. It produces dropsical inflammations of all serous membranes.

Apocynum cann.—Acting less forcibly on the serous membranes, and more so upon the glandular system. Stomach exceedingly irritable, rejecting everything; ascites with bruised sensation of the abdomen; sinking feeling at stomach; urine excessively scanty, thick, yellow and turbid; looseness of the skin of the eyelids. "Whenever it acts beneficially, the skin becomes moist before the secretion of urine becomes abundant."

Arsenicum.—Pale, earthy or sallow countenance; great debility, with faintness on the slightest motion; great thirst, but drinks but little; sensation of burning heat all through the body, while the skin is cool; all pains burning; urine scanty, high-colored.

China.—Splenic ascites, and from functional disturbance of the liver; anæmia. In ascites in malarial regions it, or its alkaloid, may become absolutely necessary.

Lycopodium.—When as a cause, or in connection with the cause, of ascites there has been large indulgence in alcoholic drinks; urine scanty, with deposition of urates; emaciation of the upper body: one foot cold, the other hot; the pain is increased by incarcerated flatulence.

Other remedies: Aurum, Bryonia, Fluoric acid, Helleborus, Lep-tandra, Senecio, Copaiva, Elaterium.

Adjuvants.—*Compression.*—Great assistance in the resorption has often been found in the judicious use of compression, compelling moisture of the skin and increased action of the mucous membranes. A remarkable illustration of its value is reported in the *North American*

* This remedy is often unreliable, seeming to deteriorate. I have found success with fresh preparations.

Journal of Homœopathy, vol. xvi., p. 523, by B. F. Cornell, M.D. It had been of six years' duration, and arose from repercussion of rubeola. The whole body was enlarged; there was no waist, the expansion commencing at the clavicle in front, and the axilla on the sides; the back was broad, the false ribs and the lower portion of the sternum were much distended, making the distension uniform from the throat to the lower portion of the bowels. Her general health was not very materially impaired. Paracentesis was decided upon. "I prepared a bandage about three inches wide and many yards in length; the trocar was introduced in the linea alba, and as the fluid escaped I commenced applying the bandage around the body, commencing at the axilla with as much tension as she could bear; this prevented faintness or exhaustion. The fluid was fifty-five minutes in discharging, measured 12½ gallons, and weighed 100 pounds and 12 ounces. The day before the operation she weighed 202 pounds, the day after, 98 pounds. The fluid was of a straw color; she sat up during the entire discharge. After she had rested some four hours I removed the bandage, and the following condition was presented. The integuments at the navel could be carried around like a blanket 5 inches beyond the spine. The ribs spread outward, and the diaphragm was so much distended that a large loaf of bread could be passed up under the ribs on either side to above the false ribs. I had a corset prepared, and, after bathing the body with dilute alcohol, and rubbing it vigorously with the hand for several minutes, the corset was put on, and laced with as much force as could be endured; then applied the bandage as before. I had these removed every day, and, after bathing and friction with the hand, applied again. I pursued this course for some thirty days, when I left it off at night; some two weeks after, abandoned it entirely, substituting one broad bandage pinned tightly around the abdomen. The corset was continued till the ribs compressed into the natural form; the integuments gradually contracted, and in the course of a year the shape had become nearly natural. The only remedies used internally were diuretics, tincture of iron, and an alkali made by burning grape-vine, the ashes put into water, and taken after eating. No accumulation of fluid followed the operation. I attribute the cure to compression."

Paracentesis.—This operation may be necessary in advanced stages of the disease, especially in hopeless cases or while awaiting the action of the appropriate remedies; but it is at best only palliative. Cases are on record in which there seemed to be no return of the dropsy after the operation, but in every instance some medicines were exhibited which appeared best suited to the general condition of the patient. These medicines must have played a part in the cure, though it is not impossible that a dropsy once established may perpetuate itself, after the removal of the primary cause, by the pressure

it exerts on the renal vessels. For the mode of operation consult the works on surgery.

Hot water is a grand aid in relieving the pains which sometimes accompany ascites. It is best applied over the whole abdomen, through many thicknesses of cloth covered with an overlapping flannel bandage.

Position has much to do with the relief of these cases. When the effusion is large, and the diaphragm pressed strongly upward, the heart and lungs are obliged to fulfil their duties in a lessened space, and, in consequence, dyspnœa and faintness are not unusual symptoms. Rest in the usual position of health is impossible, but the head and shoulders must be placed high, and the patient be posed partly upon his right side.

F. DISEASES OF THE LIVER.

BY W. H. DICKINSON, M.D.

CONGESTION OF THE LIVER.

Definition.—Congestion of the liver denotes a condition of that organ in which there is found an abnormal accumulation of blood in its substance, with the consequent symmetrical enlargement which this hyperæmia necessarily implies. Whether this congestion shall presently subside with the passing away of the cause which gave rise to it, and so be classed as acute, or become chronic, is a matter determined by the circumstances or habits of the individual. There is no essential difference of character between acute and chronic congestion; it is merely a question of duration.

Ætiology.—The causes lying back of this affection differ widely, and may be divided into two general classes. First, we have the mechanical causes. Anything which retards the egress of blood from the liver must, of necessity, tend to pile it up in the meshes of this great sponge. What condition implies this retardation? Embarrassment of the thoracic circulation. So it comes about that valvular disorder of the heart, such as mitral insufficiency, by making the transit of the blood through the chest difficult, becomes responsible for congestion of the liver. Even diseases of the respiratory apparatus which impede the passage of blood through the lungs, or compression of the vena cava by tumors, may have the same undesirable effect upon the hepatic circulation. Given any condition which makes the return of the blood from the liver to the heart slow and laborious, we are justified in looking for congestion of the liver as a result. These congestions are purely mechanical, are known as passive congestion, are due to morbid conditions existing elsewhere, and their removal

being dependent upon remedial measures addressed to other organs, no further notice will be taken of them in this connection.

Those causes which make up the list of the second series, are immediately concerned with the functional life of the gland. Prominent among them is that peculiar cachexia induced by malarial poisoning, so familiar to every physician. Another cause is found in excesses of the table. Overeating, especially of rich and stimulating foods, and the use of liquor of any sort, are powerful agents for the production of a congested state of the liver. Nor need we wonder that such is the case, for when it is remembered that, by means of its portal vein, the liver runs away with the greater part of a man's dinner, the first of all tissues and organs, save only the stomach, to make its requisition and do its work, it is not surprising that it should early feel those influences which make for abdominal plethora. In tropical climates, active exertion is often followed by a congestion of the liver which is marked by a hypersecretion of bile and an intestinal disturbance taking the form of dysentery. Such attacks may be very acute, while the more chronic class of tropical congestions seem to result from the mere influence of prolonged residence. Finally, an overloaded liver may accompany uterine ill-health, and, also, according to Jousset, leucocythemia. These causes of the second class are followed by *active* congestions, in contradistinction to the *passive* congestions which result from the obstructions of the circulation. In recognition of this difference, some authorities specify two varieties of the disorder in hand, the active and the passive.

Pathology.—At the post-mortem examination, the swelling of the liver is found to be proportionate to the degree of congestion existing; the increase in the size of the organ is more marked in its thickness than in its length. If the swelling is great, the coats of the liver assume a smooth, shining appearance.

In recent cases blood flows freely on section, but later the blood is thicker, and the cut surfaces appear dark or spotted. According to Niemeyer,* this is particularly apt to occur when there has been congestion for a long time; dark spots, corresponding to the dilated *venæ centrales*, the commencement of the hepatic veins, and varying in shape with the direction of the cut, alternate with brighter colored spots which do not contain so much blood, and which represent the termination of the portal vessels. The spotted appearance which has given rise to the much misused name of *nutmeg liver* becomes still more marked when the more bloodless spots in the vicinity of the dilated central veins appear decidedly yellow from obstruction of the bile-ducts. The latter may be partly due to catarrh of the gall-ducts, induced by the hyperæmia of their mucous membrane, partly to the pressure of the enlarged vessels obstructing the free escape of bile from the small bile-

* Niemeyer's Practical Medicine, vol. i., page 659.

ducts; and to gastro-duodenal catarrh, induced by the same causes which excite the hyperæmia of the liver.

After the hyperæmia has existed for a length of time, a slow atrophic degeneration of the organ takes place, the pathology of which is not altogether established. Bartholow* says this condition consists in a wasting and disappearance of those cells lying in contact with the dilated central vein, their places being supplied by connective tissue having a granular appearance. The disappearance of these cells and the contraction of the newly-formed connective tissue cause a diminution in the size of the liver, and an increase of its density, so that this state is often confounded with cirrhosis; but the substance of the organ has not the density, nor are there present the prominences which give the nodular aspect to the latter. These conditions are usually present when the congestion results from obstruction in the heart or lungs, this being the most frequent cause of hepatic congestion. Frerichs† explains the *modus operandi* by which these changes are wrought by saying that when valvular diseases of the heart are present, especially constriction of the left auriculo-ventricular opening, incompetence of the mitral, and still more of the bicuspid valves, and further in affections of the lungs, which greatly impede the circulation through the pulmonary artery, as in emphysema, the liver becomes a powerful agency in the circulation of the blood. "The suction power exercised during inspiration is either more or less powerful than it ought to be; either the blood in the vena cava and hepatic veins is subjected to a higher degree of pressure, which interferes with the evacuation of the capillaries of the portal vein, or the current of blood regurgitates with each systole of the heart into the hepatic veins. When this is the case, the branches of the hepatic vein in the liver continue permanently distended, and gradually enlarge, while their walls become hypertrophied; the stagnation is propagated to the portal vein and to the organs in which this vessel takes its origin, and there results a series of derangements in the functions and nutrition of the liver, and of the organs comprised in the portal system." Thus we obtain the pathological changes in the liver, as before described, and may also find the vessels of the mucous membrane of the stomach and intestine, of the spleen, pancreas, etc., distended with venous blood, sometimes giving rise to a deposit of black pigment, and sometimes to erosions and ulcerations. The spleen, at first increased in volume, is usually found normal in size, but solid and firm. There is generally found an excessive mucous and serous effusion, the latter having given rise to ascites with or without anasarca. Sometimes, old extravasations of blood are found between the folds of the mesentery, the mesenteric glands being of a

* Bartholow's Practice of Medicine, page 142.

† A Clinical Treatise on Diseases of the Liver, Wm. Wood & Co., New York, 1879, vol. ii., page 35.

livid tinge, with congestive swelling and serous infiltration of the pancreas.

Where the congestion has resulted from long-continued excesses in diet, or from the use of alcoholic liquors, or from malarial poisoning, we may obtain various modifications of the changes before described. Often, under such circumstances, the congestion is more intense in its character and, while not resulting in the peculiar character of changes as we have described, may induce serious structural lesions, hæmorrhages, softening of the parenchyma, abscesses, hypertrophica, fatty degeneration, or induration, and occasionally cirrhotic degeneration with atrophy.

Symptomatology.—The local symptoms of congestion of the liver are uniform enlargement of the gland, with the consequent increase in the area of dulness as defined by percussion, and sensations of weight, fulness and constriction in the right hypochondriac region, with a dull, annoying pain which reaches out posteriorly to a point beneath the shoulder-blade of the same side, and is aggravated when the patient is lying down, by change of position from the right side, on which he instinctively lies, to the left.

The general symptoms show themselves in a complexion which becomes muddy or dusky, in the yellowish tinge of the conjunctiva, in the constipation with stools which are "off color" (in rare cases and in hot countries, diarrhœa), in the scanty and high-colored urine, in the nausea, the coated tongue and the bitter, mawkish taste which takes possession of the mouth, in the aching and dizzy head, the pains in loins and limbs, and not unfrequently in that mental depression which bespeaks a mind not less jaundiced than the body.

Diagnosis.—The symptoms above enumerated form a group sufficiently suggestive and not easily mistaken. The patient will be sure, and will assure the physician, that he has dyspepsia or is "bilious." If, in his mind, it be the former, perhaps the word has a significance wide enough to include the actual state of affairs; while the physician is guided to a correct conclusion as to the precise pathological condition, not merely by the sensations which are referred to the right side, but by the absence as well, notwithstanding the nausea and furred tongue, of a distinctly gastric set of symptoms.

If the patient thinks himself "bilious," the word represents to his mind a dim conception of an encumbered liver which is really not very far from the truth; and though "bilious" patients are most tenacious of their own diagnosis, and are inclined to insist that the physician accept it without asking for particulars, yet a little patience and skill will soon be successful in drawing out the details necessary to settle the diagnosis. In very many cases a physical examination may be considered a needless procedure; but in those instances in which the subjective symptoms, *plus* the ochre skin and the blanketed tongue,

leave the diagnosis still a matter of doubt, percussion and palpation will definitely decide the question. The patient should be placed upon the back, the knees drawn up to secure the greatest possible relaxation of the abdominal muscles, and the region in question thoroughly exposed. Palpation will determine the lower margin of the liver to be decidedly below the border line of the ribs, whereas it normally oversteps that line very little, if at all. It will be felt as a smooth body of firm consistence, following the respiratory movement of the diaphragm. Percussion will also give its reliable testimony as to the increased size of the organ. It will often show an extension of the liver clear across the epigastrium and into the left hypochondrium. It should be borne in mind, in employing this method of examination, that, at the lower border of the liver, deception is possible through the resonance of a gas-distended transverse colon, and that at the upper border there is not the same clear definition of the margin, because the convex surface of the liver fits into the concave base of the lung, thus causing the characteristic percussion sounds of the two organs to shade off into each other. It has been remarked, also, that in both percussion and palpation there is a possibility of mistake in those cases where the liver has been forced downward, as, for instance, in pleuritic effusion, the lower margin of the liver being thus found below its normal position, although in fact there exists no enlargement. It might be urged in answer that, by defining the entire gland, it would appear still unchanged in its actual size, the depression above corresponding to the extension below, and so the error would be excluded. But it certainly is not going too far to assert that any changes within the thorax sufficient to produce a displacement of the liver will be attended by symptoms of their own, pronounced and grave enough to render a diagnosis of congestion of the liver an almost inconceivable blunder.

Prognosis.—Omitting those cases, already ruled out, dependent upon obstructions of the chest circulation, the prognosis is favorable, with a single exception. This exception applies to the cases which are due to the use of liquors, continued in spite of the physician's protest. The logical outcome of persistence in the habit is steady progress toward cirrhosis and incurable degeneration; and the patient should be led to anticipate this reasonably-to-be-expected result. But if he be ready to relinquish his habit, the disorder not yet having passed beyond congestion, the prognosis becomes as favorable as in those cases consequent upon other causes.

Treatment.—Treatment is almost purely medicinal. Aside from the avoidance of dietary excesses, and the observance of those ordinary rules of health which include a reasonable amount of physical exercise, no accessory measures are employed. The proper medicinal agents are reliable and efficient, their thorough work affording a striking contrast with the questionable results obtained from the crude make-shifts

of purgatives, from the citrate of magnesia to blue mass, or of leeches applied to the anus.

The leading remedies are *Nux vomica* and *Cinchona*.

The symptoms calling for *Nux vomica* are: liver swollen, indurated and sensitive, with pressure, slight jaundice, nausea, constipation, fullness in the head; complaint induced by high living.

Cinchona is especially valuable when the congestion occurs during, or after, an attack of intermittent fever (arsenic); pain and swelling in the region of the liver, sensitiveness to touch, yellowness of the skin, nausea, and loss of appetite.

Hughes has good words for *Iris vers.* and for *Sulphur*. Ludlam praises *Ammonium mur.* Jousset records a brilliant instance of permanent cure, the disorder having existed for eight years, with *Lachesis*, which is evidently a favorite remedy with him.

Sepia and *Magnesia mur.* are especially applicable to the congestion dependent upon uterine conditions. The writer has used *Euonymin* in some cases, with decidedly pleasing results. Other remedies which may be consulted are: *Bryonia*, *Chamomilla*, *Chelidonium*, *Hepar sulph.*, *Leptandra*, *Lycopodium*, *Mercurius*, and *Podophyllum*.

ICTERUS OR JAUNDICE.

Definition.—Icterus or jaundice is the diffusion of a peculiar coloring matter through various tissues, secretions, and excretions, in consequence of hepatic derangement. The precise hue of the stain so resulting is subject to wide variation, passing through all the intermediate shades between a light yellow and a brown so dark as to almost suggest an admixture of black. Yellowish or brownish discoloration may show itself over limited areas of the skin when no jaundice is present, as in the tingeing of forehead and cheeks which marks chlorasma, or the patches on the chest which appear in chromophytosis. So it becomes necessary to specify, in defining jaundice, an exhibition of coloring matter due to some disturbance of the liver, although with certain fluids and tissues, as for instance the conjunctiva, no change in color is known except the icteroid. An exact definition of this disorder cannot be one of close limitations, for it may be the expression of numerous and widely differing hepatic conditions, and is, at best, but a symptom. Still, it is a most prominent symptom, and is fairly entitled to its place in the nomenclature of disease. Biliary discoloration occurs in the course of such profound diseases of the liver as acute hepatitis, cirrhosis, and cancer, but is not the chief symptom. In these cases it stands in the same relation to the disease in which sore throat does to scarlatina. Because of the coexistence of the two latter, no one thinks of denying the entity of pharyngitis.

Ætiology.—Ligate the ductus communis choledochus in the living animal, and in twenty-four hours jaundice is developed. Therefore, jaundice may be caused by mechanical obstruction of the biliary passages; and clinical experience has shown obstruction to be the cause in the majority of cases of this disease. But it is not the only cause, for mental emotions, when their current was turbulent, have been known to start this same process of yellow staining. Let us consider for a few moments these two classes of causes which lie behind this malady,—the obstructive and the non-obstructive.

I. That obstruction of the bile-ducts should be followed by distension of so much of the biliary channels and receptacles as lie behind the impediment, that this in its turn should favor the reabsorption or dialysis of the bile through the coats of the vessels and back into the blood-current, and that by aid of the circulation the bile should be carried as a stain to all parts of the body, is not hard to understand. Given the obstruction, and we should naturally anticipate just the result which experience shows to be the sequence in fact. So there is left only the query: How do such obstructions occur? They are the possible results of quite a variety of conditions. In the typical jaundice, all inflammation and swelling of the mucous membrane lining the ducts encroaches upon the normal calibre of the passages, and an increased production of mucus suffices to plug the narrowed canal altogether. A calculus formed in the gall-bladder may, in travelling outward, block up the common duct; or these concretions may be formed at the site of the obstruction. The same occlusion may occur from the presence of hydatids and of lumbricoid worms. The exudation of coagulable lymph may end in its organization and a consequent stricture. External pressure, proceeding from an accumulation of the contents of the colon or from the gravid uterus, may embarrass the biliary duct. This pressure may even be exerted by enlarged lymphatics of this region, occurring as an incident of depraved or malignant cachexia. Or cicatricial tissue, the result of ulcerative processes within the duodenum, may involve the opening through which the products of the liver find their way into the intestine, and thus cause retention. Those diseases of the liver involving the organ in profound tissue changes not unfrequently set up an obstructive jaundice. It is even asserted that tumors of the ovaries, of the kidneys, of the pancreas, and of the pylorus, may exercise sufficient pressure upon the channels through which the bile should flow, to send it back into the circulation.

II. Coming now to the second class of causes, those in which there is supposed to be no mechanical obstruction to the discharge of the bile, yet which are sufficient to bring about the characteristic yellow staining, we find the utmost confusion and divergence of opinion prevailing. Where is the bile pigment originally formed? Is it manu-

factured by the liver? Or does it preëxist in the blood, being merely filtered out by the liver? Does the liver fail to strain it out of the blood, or fail to manufacture it? Does the blood normally receive a certain amount of bile from the liver or intestines to be immediately oxidized, and does a depraved condition of the blood allow it to circulate unchanged? Might a decrease of tension in the portal vein by the laws of hydraulics cause the bile to flow backward in its channels toward the hæmatic capillaries, and so induce reabsorption? Does the hæmatin of the blood ever undergo a metamorphosis into a yellow pigment resembling, or identical with, the coloring matter of the bile, thus giving rise to a jaundice which is a blood disease? These are some of the questions which are, as yet, undetermined, and which serve to make the second class of causes uncertain and hypothetical.

Virchow has been the champion of the theory that morbid alteration of the hæmatin of the blood is a cause of non-obstructive jaundice. The familiar exhibitions of color in the extravasation of blood attending a bruise, the yellow surface of the newly-born, with whom the fulness of the peripheral capillaries results in the deposit of a certain amount of hæmatin, even the yellow sputa seen at times in pneumonia, have all been brought forward in support of this notion. Were this view to meet with common acceptance, the jaundice resulting from the serpent poisons, from phosphorus poisoning, and from pyæmia, would probably be referred to this blood alteration for their explanation. But even Virchow has retreated somewhat from his original position, being now inclined to credit to catarrh of the biliary ducts (that is, to an obstructive cause) many of the cases he would formerly have assigned to changes in the composition of the blood.

The opinion that in the healthy organism more or less bile finds its way into the blood, there to be consumed, and that jaundice may result from failure to properly dispose of the bile received, is supported by Frerichs. He also favors the theory that changes in the equilibrium of pressure among the circulation of the liver may send the bile into the blood-current instead of into its proper receptacle. The supposition that bile, or at least its pigment, finds its origin in the blood, and is only eliminated by the liver, is too violent an assault upon the commonly received notions concerning the hepatic functions to deserve to stand in the face of the fact that extirpation of the liver is not followed by accumulation of pigment in the system. Yet there are not wanting those who maintain this hypothesis in explanation of non-obstructive pigmentation.

It is hardly worth while to enter into the discussion as to the bile acids, where they are formed, and whether, or not, they appear in the urine during jaundice. For the real question does not refer to these acids, but is concerned with the coloring matter; and up to the present time evidence has not been obtained adequate to settle the vexed

questions in regard to its normal and abnormal presence in the blood current. Enough has been said to indicate the problems which are presented by non-obstructive jaundice, together with the various theories which have grown up around them in attempted solution. With these speculations before us we may easily divine what was in the minds of those who have, from time to time, suggested probable causes and possible explanations of their *modus operandi*. The list of causes receiving common acceptance, as being the more probable and reasonable, includes absorption of bile from the intestines, as a result of violent mental emotion or of habitual constipation; absorption from the liver, in consequence of derangement of the hepatic circulation; absorption from either liver and intestines, or from both, of a part of the product of a liver secreting an excessive amount of bile; failure of the liver to manufacture the bile; failure to strain it out from the blood where it pre-exists; failure of the blood to carry on the metamorphosis of bile normally present in its current, and the toxic conditions consequent upon the presence in the system of serpent poisons, malaria, phosphorus, and the existence of pyæmia.

Of course, these poison-states are supposed to result in jaundice by bringing about some one of the conditions above enumerated. Under certain circumstances, the causes, or some of them, tending to produce this disease, may act with sufficient uniformity to produce a prevalence of the disorder which raises it to the dignity of an epidemic. The official reports of the Rebellion show that 10,929 cases occurred during one year in those portions of the Northern army which were stationed in miasmatic localities.

Pathology.—It has been seen, then, that jaundice arises from mechanical obstruction to the passage of bile into the intestines, and the consequent reabsorption of the detained fluid into the blood; or from the suppression of the biliary secretion arising from some morbid condition of the liver itself, whereby biliary ingredients accumulate in the circulation.

Some of these ingredients or constituents of bile are generated in the liver itself, as the bile acids, while others, as the green bile pigment, or *biliverdine*, and the *cholesterine* exist preformed in the blood. In obstructive jaundice there may be a congenital deficiency of bile-ducts or an accidental obstruction; non-obstructive jaundice may result from innervation, disordered hepatic circulation, or an absence of secreting structure.*

Non-obstructive jaundice is characterized by the rapid accumulation of green bile pigment in the blood, until the serum, the tissue, and the urine are saturated with pigment.

Over this secretion the mental state seems to exercise a remarkable influence, so much so that mental emotion favoring congestion of the

* Harley on Jaundice, p. 20.

organ favors the stoppage of the secretion. Obstructive jaundice is also characterized by the accumulation of pigment in the blood, whence it stains the tissues, the urine and the serum. The bile, in these cases, is absorbed from the distended ducts and gall-bladder; and the biliary products, manufactured in the liver, equally with those formed in the blood, find their way back into the circulation, to be eliminated by the excretions. Hence, the bile acids, which are absent in non-obstructive jaundice, are present in this form, from reabsorption, as well as the bile pigment (*Harley*).

The anatomico-pathological changes found are in the liver itself and in distant tissues and organs.

The size of the liver is usually increased, but its form is not altered, and the bile-ducts are more or less dilated and distended with bile in the obstructive variety.

In the non-obstructive form, the liver is not so large and the ducts are collapsed, and they and the excretory passages are quite pervious. The color of the liver in the obstructive form is deep yellow and, in the highest grades, olive green, usually presenting a mottled appearance; the hepatic cells grouped round the intra-lobular veins, tinged or clotted with bile pigment; the nucleus is sometimes dyed yellow; the peripheral cells of the lobules are pale or scarcely tinged.

After obstruction has lasted for some time, the liver cells contain firm collections of pigment in the form of yellow, reddish-brown, or green rods, spheres or angular fragments, which lie in the minute network of the capillary ducts, and sometimes form casts of the capillary network. In old cases the liver becomes atrophied and acquires a dark green or even black color, and loses its consistence, becoming soft and disintegrated from breaking-up of the hepatic cells. This condition is not present in non-obstructive jaundice.

Bile pigment is found in nearly all the organs and fluids. Besides the characteristic color of the skin, conjunctiva and urine, as soon as the body is opened we notice the lemon color of the fat in the subcutaneous pericardium and elsewhere. The fibrinous coagula in the heart and bloodvessels, the fluid in the pericardium, and any pathological transudations or exudations of the pericardium, pleura and peritoneum have a distinctly jaundiced appearance. The less red the normal color of the different tissues is, the more marked is the pathological yellow color; hence, it is more evident in the serous and fibrous membranes, the walls of the vessels, the bones, cartilages, etc., than in the muscles, spleen, etc.* The skin is most affected, the pigment being deposited in the deeper layer of the epidermis, giving rise to all grades of color, from a slight yellow tinge to an intense saffron color, and, in malignant jaundice, to a greenish or even mahogany

* Niemeyer's Practical Medicine, vol. i., p. 107.

color. The brain and nerves show little color, and the mucous membrane scarcely any.

The color of the urine becomes changed at an early period, from the admixture of cholepyrrhin. "It becomes saffron-yellow, reddish-brown, dark brown, greenish-brown, or brownish-black, according to the quantity and quality of the pigment which enters into it."* In the earlier stages the kidneys are often enlarged and congested, and the secreting cells loaded with bile. In old and intense cases the kidneys are of an olive-green color, and some of the uriniferous tubules are filled with a brown or black deposit. Upon close inspection the pale uriniferous tubules are found to be of a green or brown color, and their epithelial lining, which is seldom entire, is of a deep-brown tinge, which is particularly marked in the nuclei; the dark uriniferous tubules are distended with a coal-black, hard, brittle mass, which may or may not be soluble in caustic potash. In addition, there may be noticed cylindrical masses, consisting of an amorphous material, brown in the centre, but becoming gradually paler towards the periphery.† Next to the kidneys the sweat-glands are most involved, the sweat often coloring the linen distinctly yellow.

Symptomatology.—The one symptom which outranks all others in prominence and which gives the malady its name, is the familiar yellow coloring of various tissues and secretions. There is hardly a fluid or a tissue which may not be tinged with this pigment, though the mucous membranes are by some held to be exempt, and certainly are not a favorite place for this deposit. The skin offers the largest opportunity for its display. Here its slightest touch is a light yellow, which may progress into a darker yellow, and then pass through the various shades of greenish-yellow into the browns, and almost up to the boundary line of black. A large amount of the bile pigment passes through the kidneys, the urine being the first to show the presence of free coloring-matter in the system, and here the changes of color are rung principally upon the browns.

The prevailing saffron hue early invades the conjunctiva, which, in common with the urine, receives the stain in advance of the skin. The sweat-glands carry off the pigment in such appreciable quantity that the linen is perceptibly stained, especially in the region of the axillæ.

In rare and severe cases yellow milk, yellow tears, and even yellow vision have been observed.

Naturally enough, the scattering of the bile pigment over the entire organism leaves little or none for the fæces. When the diversion of biliary matters from their proper channels is but partial, the stools show only a lessened color. But in the cases in which this diversion is more nearly complete, the alvine evacuations assume a color which

* Frerichs, *Disease of the Liver*, William Wood & Co., 1879, p. 70.

† Frerichs, *op. cit.*, page 72.

has been compared with that of slate, of lead, of clay, and of ashes, and which may, at times, almost approach a white. The usual tendency is toward a moderate degree of constipation, though occasional cases tend toward diarrhœa.

Although there is little febrile motion accompanying this disorder, the pulse does not by any means hold on its undeviating way, unaffected by the disturbance below the diaphragm. The influence exerted upon the circulation by the presence of bile in the blood current is not a little remarkable. The sedative effect is unmistakable, the frequency of the pulse dropping decidedly below the normal rate, in some cases going as low as forty beats per minute, and even lower. Whether, or not, this is due to depression of the heart, as has been supposed, is uncertain. At any rate, no special danger is indicated by this symptom, for the prognosis of jaundice is, in the main, good.

Pruritus is often present, the itching extending over large areas of the skin, and at times rising to a height which becomes intolerable. The lesser symptoms are: loss of appetite, coated tongue, bitter taste, nausea, headache, vertigo, drowsiness, and the malaise which ushers in and accompanies the attack.

In severe and fatal cases dysenteric symptoms and hæmorrhages from the stomach or intestines are sometimes met; while in others the nervous system bears witness to the heavy incubus under which it labors by sopor, delirium, and coma. If the disease be sufficiently protracted, the disturbance of the digestive function is plainly written in the pinched and haggard features.

Varieties.—In considering the causes of jaundice it became necessary to advert to conditions which might, with equal propriety, be canvassed under the head of varieties; for the simplest and most natural, and therefore best, classification includes but two varieties, the obstructive and the non-obstructive. Perhaps a third class might be added to cover the jaundice of the newly-born, which is the result of a deposit of hæmatin. The division into jaundice from reabsorption and jaundice from suppression is not nearly so good, as it begs the whole pathological question involved.

Many writers speak of "malignant jaundice." This will be considered under its appropriate heading of acute yellow atrophy. Though there has been some confusion regarding the two, the best opinion makes them identical; and under this ruling there is properly no such variety of jaundice as the "malignant." Varieties have also been created based upon the amount of coloring-matter at large in the system. This classification is usually made to embrace three forms, the yellow, the green, and the black. Some authors also mention the "epidemic" form; but all these refinements are fanciful rather than practical, and tend not to increase but rather to obscure understanding.

Diagnosis.—There is almost nothing in the entire field of diagnosis

easier than the recognition of jaundice. Spreading, as it does, its most important symptom over the entire surface of the body, it is hardly possible that it pass unsuspected, as, for instance, might be the case with an hepatic abscess, hidden away in the body of an interior organ. The yellowness *will* be seen, it *cannot* be overlooked. On the other hand it is so far characteristic that, when seen, it can scarcely be confounded with the signal of any other disease; so that in both directions the liability is at the minimum.

Chlorosis, and the cancerous dyscrasia, may spread a light-yellow tint over the skin, but they leave the conjunctiva intact. And beyond these two there is nothing which even a lively imagination can suggest as offering a possibility of mistake. When, however, jaundice is recognized, the work of diagnosis is not necessarily at an end. The question is: Is this symptom *the* symptom and the disease, or is it *a* symptom of some other disorder, and nothing but a symptom? If it be the result of the impediment offered by a gall-stone, or of the pathological conditions obtained in acute yellow atrophy, it is not the disease, but a symptom. It would be out of place to here detail the diagnosis of these, and other, hepatic disorders; they will be found in their proper place. Whether the trouble be less than, or altogether different from, jaundice is germane to the present purpose, and is easily decided. Whether it be jaundice, but at the same time much more than jaundice, involves the whole subject of hepatic diseases, and cannot be included here.

It must be understood that, though the diagnosis may be easy, jaundice is after all but the name of an inaccuracy, for it must cover pathological conditions differing widely, conditions of whose precise existence we cannot be exactly informed, and about which we can do little more than group plausible theories.

Prognosis.—It is not often that jaundice has a fatal termination, and little fear need be felt for the patient's life. But caution must be observed in giving an opinion as to the probable duration of the attack. Ordinary cases may be comprised within a period of from one to four weeks, while not unfrequently the disease is prolonged over a period of time measured by as many months, and has been known to persist for years. When it results from the more occult causes, being due to some ill-understood loss of balance among the forces of the system, it is quickly at an end. When it is of the obstructive or semi-obstructive variety, as, for instance, partial occlusion of the bile-ducts from catarrh of their mucous lining, the tendency is toward a longer duration. As must obviously be the case, when a favorable termination is approached, the stools resume their normal color before the skin loses its stain, the bleaching of the cutaneous surface being a matter not of abrupt, but of gradual change. In those rare and exceptional cases in which the kidneys seem to take

on a form of congestion, and we have the grave nervous symptoms passing into delirium, convulsions, and sopor, it goes without saying that the prognosis is bad, and the end death. But in general the prognosis is decidedly favorable.

Treatment.—This is accomplished exclusively by the internal administration of the appropriate medicines. There is no auxiliary or adjuvant treatment, partly because internal remedies are the only available agents, partly because the jaundice which really constitutes a disease is often confounded with the jaundice which is but a symptom of a much deeper disorder, and last, because the less accurate the knowledge of any malady the greater the number of remedies which are brought forward as infallibly curative.

Sifting out the remedies which have best stood the test of actual employment, and taking them up in the order of their importance, the following can be warmly recommended.

China.—Its symptoms are nausea, with canine hunger, aversion to meat, oppression of the stomach, bitter taste, dryness and roughness of the skin, clay-colored feces. It is especially indicated if the disease occurs in the course of, or after, malarial fevers, or when it follows excessive loss of the fluids of the body.

Nux vomica is more particularly adapted to jaundice caused by catarrhal inflammation of the lining membranes of the hepatic ducts. The liver is swollen, and there is some constipation of the bowels with the characteristic clay-colored stools; dyspeptic symptoms are prominent.

Mercurius is appropriate to jaundice with fever. The stools are more liquid and of a darker color than is usual in the disease. There is also more catarrhal inflammation, with loss of appetite and thickly furred tongue. In jaundice of young children mercury is especially useful.

Phosphorus and **Phosphoric acid.**—The evacuations are diarrhœic.

These are the remedies which have been tried and found useful in England, Germany, France, and this country. Many others have warm advocates. E. M. Hale thinks eighteen of his new remedies appropriate here. Jahr would commence with Aconite whenever the slightest excuse can be found for so doing; and Jousset thinks he has known of some cases of cure of malignant jaundice (if the term be allowed) through the use of this drug in the tincture. Hempel lays special stress upon Podophyllum and Digitalis. In England, Hughes is not satisfied until he has included Chamomilla, Chelidonium, Hydrastis, Podophyllin, Leptandra, Myrica cerifera, and Crotalus. He also speaks of two striking cases of cure by Iodum. Any one of these, and other, remedies may be indicated by the totality of symptoms, but it is impossible to follow the list further than the few whose value is beyond dispute.

To attempt to do more than this would open the way for a flood of drugs, the indications for which could be little more than a repetition of familiar landmarks of *materia medica*, in no wise specially related to the disease we have been considering.

BILIARY CALCULI.

Synonyms.—Cholelithiasis, Gall-stones.

Definition.—Biliary calculi are concretions formed in the gall-bladder and bile-ducts, resulting from the precipitation of certain substances held in solution in the bile. They differ in number, size, form, color, and in chemical composition.

The *number* of calculi found in the gall-bladder is very variable, ranging from one to several hundred. In some instances the number is enormous.

Frerichs found 1950 in a woman sixty-one years old; Dunlop, 2011 in a woman ninety-four years old; Morgagni, 3000; Hoffman, 3646; Otto, 7082 in one gall-bladder.

When a large number are found in one bladder, they are alike in size, shape, and chemical composition.

As a rule, from four to eight are found together; the single stone is the exception. When but one is found, it is usually of large size, sometimes completely filling the bladder.

The *size* depends upon the number. When numerous, they are quite small, varying in size from a mustard-seed to a small pea.

The *fewer* the number the larger the size, and conversely, the greater the number the smaller the size. The larger stones are generally found in the gall-bladder. Very large stones are rarely seen. Frerichs mentions having seen several from two to two and a half inches long, and one inch in thickness. Another is described as three inches in length, and one and one-half inches in diameter. The largest one ever recorded measured six inches in length, and two and one-half inches in diameter.

When gall-stones are very minute in size and very numerous, they are called gall-gravel. Von Schueppel remarks that it occurs in connection with larger concretions, though also often found alone. Sometimes it is crystallized and granular, sometimes pulpy, consisting of mere inspissated bile. Cruveilhier once found the biliary passages from the ductus choledochus to the finest bile-ducts enormously distended and filled with such gravelly masses through which the bile flowed as through a sand filter.

The *shape* of gall-stones varies as much as the size. The solitary stones are generally round or oval. When numerous, they are rounded or many-sided, with facets produced by attrition with each other. Square, pyramidal, and wedge-shaped stones are also often found. In the bile-ducts the stones sometimes assume a cylindrical shape, or branch out like coral formations.

The *color* of gall-stones varies from grayish or pearly white to black, presenting in mixture many gradations of color *between*. The majority

of them are brown or yellowish-brown. The color depends upon their chemical constituents, but the coloring matter of the bile forms the basis of each tint. Generally they are opaque, except those composed of cholesterine, which, when fresh, are sometimes transparent.

The surface is generally smooth, but occasionally rough, wrinkled, or nodulated. To the touch they are sometimes soft and slightly greasy, at other times hard and rough.

The consistency is usually slight. They may easily be cut or broken down with a slight pressure. They are readily broken down by attrition with each other. In rare instances they are firm and hard, offering considerable resistance to attempts to crush them. The specific gravity is greater than water when they are in a fresh state, but usually less when dried. Some varieties which contain a considerable proportion of salts of lime have a specific gravity nearly twice that of water.

Structure.—Von Schueppel classes gall-stones under two varieties, namely, first, simple homogeneous stones, and second, compound nucleated stones. The homogeneous stones are of comparatively rare occurrence. They are of uniform structure, and on fracture show a crystalline, earthy, or soap-like formation. The stones having a crystalline structure are composed almost wholly of cholesterine. Those with an earthy or soap-like fracture are composed of cholesterine, biliary fats, earths, and salts of lime.

Compound nucleated stones.—These, as the name implies, are composed of different chemical compounds arranged in layers or mixed together. They generally consist of three parts, namely, a nucleus, a body, and a crust or cortical portion. The nucleus is usually of a brown or black color, of small size, of varying degrees of consistency, and is composed of a small quantity of biliary coloring matter and lime compound, bound together by mucus. Occasionally it is formed of cholesterine crystals or, more rarely, of some foreign body which has found its way into the bile-ducts, as a grape-seed, a minute clot of blood, or an intestinal parasite. In some instances the stone has more than one nucleus. Stones having several nuclei are probably formed by the agglutination of several small ones. Cases are recorded in which the nucleus consisted of a needle, a globule of mercury, and a plum-stone respectively.

The body lies between the nucleus and crust, but is not unfrequently wanting. It generally presents a striped and radiated appearance. It is sometimes arranged in concentric layers, and sometimes appears to be homogeneous and of an earthy or watery consistency. The body is of a lighter color than the nucleus, particularly when composed of cholesterine which, when present, gives it a glistening crystalline appearance.

The crust or cortical portion differs from the body in color, hardness, and structure. It consists of successive layers, the number of layers

being more numerous in stones which have existed for some time. The hardness and color vary in different stones according to their chemical composition. If the crust is composed of cholesterine, it is arranged in smooth layers of a pearly lustrous appearance, and varies in color from almost white to a greenish-gray. Biliary coloring matter and lime-compound forms a very hard, smooth crust of a greenish-black hue. When carbonate of lime constitutes the bulk of the crust, it forms a thick brown coating, either smooth or uneven and warty looking.

In many cases, however, the crust shows no regularity of form or structure, the several substances composing the stones being intermingled in all varieties of form and appearance.

Chemical Composition.—The principal chemical constituents found in the gall-stones are, in the order of their frequency and proportion, as follows: cholesterine, biliary coloring matters, biliary acids and salts, lime, and carbonic acid. Other substances more rarely found are fatty acids, soda, magnesia, iron, manganese, and copper. Mucus and epithelium also constitute a small part.

Cholesterine is the principal constituent of most gall-stones, many being formed almost entirely of it, and nearly all containing some proportion of this substance. Cholesterine stones are of a pearly, translucent appearance, of a white or yellowish color, crystalline in fracture, and of a radiated structure. They are of light specific gravity, soapy to the touch, and often of large size. In many cases cholesterine is combined with more or less of biliary coloring matter, or with lime and magnesia. In these combinations they are darker in color and of greater specific gravity. The bile pigment is sometimes distributed irregularly in the cholesterine, giving the stone a striped or mottled appearance, or of alternate layers of light and dark color.

Biliary coloring matters are the next most common ingredients, and are found in variable quantities in nearly all gall-stones. Biliary acids and salts, and the fatty acids, are found in small quantities. They are more frequently present in combination with lime than in any other form.

Lime is the chief inorganic element which enters into the composition of gall-stones. It is usually in combination with other elements, but particularly with carbonic acid.

The different combinations and proportions of all these substances account for the great variety of stones and their different physical conditions.

Classification.—The classification found in Ziemssen, vol. ix., page 698, is the simplest, and at the same time the most comprehensive. It arranges them according to their chemical composition.

A. Concretions containing cholesterine. These are again divided into

1. Pure, simple, cholesterine stones.

These are generally single, or there are but few together, and on the whole they are not very frequent. They are rounded, of the size of a pea to a large cherry, of a glossy transparency, colorless, or of a faint grass-green; their surface is smooth, or granulated, or nodular; their fracture shows radiated crystalline plates, and is therefore glistening. They are of light specific gravity, not hard, and easily cut.

2. Mixed cholesterine and pigment stones (with a slight admixture of salts, etc.).

This is the commonest form, several or even many being found together, of all sizes and shapes. They are often faceted, are externally of a brown or green color, or are covered with a pearly, shining, smooth coating of cholesterine. Their fracture shows concentric layers of changing color and different degrees of lustre. They often possess a crust of lime and pigment (hard, dark green, smooth), or of carbonate of lime (white), which sometimes forms a uniform smooth cover, sometimes appears in coarser crystalline clusters, rough and jagged masses. Aside from this lime crust, these stones are of light specific gravity, and quite soft.

B. Concretions destitute of cholesterine. Of these there are two varieties, viz.:

1. Pure, simple pigment-stones.

These are not especially frequent. They are very small, often gravelly, generally occurring in large numbers. The larger ones are mulberry-shaped, blackish-green, shining like tar; their fracture is likewise so, and they are homogeneous. They are not very firm, and their specific gravity is light. They are notable for the amount of copper they contain.

2. Simple lime-stones (carbonate of lime).

These are very rare, are single, of heavy specific gravity, very hard, and of a whitish-gray color. Their surface is rough or even slightly warty.

Origin of Gall-stones.—It is evident that all the constituents of gall-stones must exist in the bile, and that these constituents are in a soluble state.

By some process of precipitation they are thrown down and aggregate into the mass constituting a gall-stone. There seem to be three conditions requisite to the formation of biliary calculi.

1. An excess of certain elements of bile so great that they cannot be held in solution, and are consequently precipitated.

2. The natural solvents, such as soda, may exist in insufficient quantities to hold other elements in solution.

3. An interruption or retardation of the flow of bile, thereby favoring a precipitation and agglomeration of the constituents which enter into the formation of stones.

It is doubtful if concentration or inspissation of the bile conduces to the formation of gall-stones, for this does not diminish the capacity of the bile to hold in solution the substances constituting gall-stones.

Ætiology.—The chemical changes which lead to the formation of gall-stones have already been briefly detailed, but other conditions affecting the individual may be regarded as predisposing and exciting causes of their formation.

Chief among these may be mentioned age, sex, habits of life, climate, and affections of the liver and bile-ducts.

Gall-stones are much more frequent in middle and advanced life than in youth and childhood. They are of comparatively rare occurrence prior to the age of twenty-five; they are exceedingly rare in infancy and childhood. Of 395 cases, only three were persons under twenty years of age.

The liability to them increases with advancing years. In old age there is a greater proportion of cholesterine in the bile, less activity of the biliary secretion, and retardation of the flow. These conditions combined may be considered predisposing causes.

Women are more subject to gall-stones than men, the proportion being as three to two. There seems to be no reason for it in any sexual peculiarity, and the most plausible explanation of their more frequent occurrence in women lies in the fact that women live much more sedentary lives than men.

Corpulent and sedentary people are thought to be more liable to cholelithiasis than those of active habits, because inactivity promotes stasis of the bile, and consequently the precipitation of the substances composing biliary concretions.

The effect of climate cannot with any certainty be determined. In hot climates, when excessive heat predisposes to excessive secretion and active flow of bile, it would be expected that the formation of gall-stones would be of less frequent occurrence, but no accurate statistics have corroborated the supposition.

Catarrh of the gall-bladder and biliary ducts, anatomical changes in the liver hindering the excretion of bile, hereditary predisposition, constitutional tendencies, luxurious habits of living, and, finally, too long abstinence from food, have, by different observers, been regarded as ætiological factors in the production of biliary calculi.

According to Dr. Goodeve, the consequences and effects of biliary calculi may be arranged under the following heads:

1. They may remain stationary in the ducts or gall-bladder without causing much inconvenience. It is rare, however, that they do not cause some disturbance, though it may not have attracted notice.

2. They may pass from the branches of the ducts or gall-bladder by the common duct into the duodenum, causing in their passage slight or severe disturbances of the system.

3. They may be arrested in their passage and act as plugs, completely or partly obstructing the channel in which they are stopped, sometimes causing obstructive jaundice or even permanent closure of the duct, with the usual symptoms and consequences.

4. They may become encysted or, at any period of their existence, give rise to degeneration of neighboring tissues, inflammation, suppuration, softening, ulceration, pyæmia, or even rupture or perforation of the structure in which they lie, leading to extravasation of the contents, or giving rise to fistulous passages by which the calculus may escape.

5. Arrived within the intestinal canal, they may be ejected with the evacuations, or they may be arrested in some part of the canal causing obstruction with the pneumonia, or other mischief resulting therefrom.

Symptomatology.—The symptomatology of gall-stones may be considered under two heads—the symptoms which arise from the presence of gall-stones in the gall-bladder and ducts, and the symptoms which are produced by their extrusion from the gall-bladder and biliary ducts.

Gall-stones in considerable numbers may remain in the gall-bladder for an indefinite period without causing much inconvenience. The patient may be even unconscious of their presence. This is particularly the case with persons of advanced years, on account of the great tolerance to their presence which is shown by the parts in old age. If, however, they are present in large numbers they frequently cause a feeling of discomfort and uneasiness together with a sensation of fullness and distension in the region of the gall-bladder. The patient is more liable to be thus affected after active exertion, or when the stomach is distended by a full meal. If the gall-bladder is much distended with calculi, it sometimes forms a tumor which may be felt through the abdominal walls. The pressure of such a tumor upon the pyloric orifice of the stomach may also produce irritation of the nerves of the stomach, giving rise to various symptoms expressive of gastric disturbance. In other cases the irritation caused by their presence in the gall-bladder and biliary ducts may lead to inflammation, and subsequently to ulceration.

The inflammation may be of a mild form, causing no great amount of pain, and end in the stone becoming encysted. In still other cases the inflammation may eventuate in suppuration within the gall-bladder and consequent distension of that viscus with purulent fluid. If inflammation occurs in the hepatic ducts, abscesses may form in neighboring parts of the liver. In some instances, ulceration and softening of the adjacent tissues take place, and the stone may escape from its bed into neighboring parts. Occasionally a stone makes its way by an ulcerative process into the stomach, duodenum, or through the ab-

dominal walls. In one instance a calculus escaped into the cavity of the thorax.

At a recent meeting of the Cambridge Medical Society a case was related of gall-stones discharged through an abscess in the right groin. It occurred in a woman, who had an obscure swelling in the right inguinal region. An exploratory puncture discovered pus too thick to flow through the canula, but a free incision let out thick pus and over a hundred gall-stones. The finger passed into the wound in the direction of the gall-bladder; a large drainage-tube was then tied in the opening, through which gall-stones still pass. There was no bile and no fæcal odor. The patient had a remarkable history. She was for several years subject to attacks like ague. One year before, she first noticed in the right side of the abdomen a swelling which enlarged painlessly until it could not be spanned by her hand; her bowels were regular, and she had no jaundice. Two months later the swelling appeared, from her description, to burst inside her, and she was immediately seized with violent cramp-like pains in the right lumbar and iliac regions. The swelling diminished, and she had now attacks of vomiting of dark fluid every five minutes for five days, and during this time she ate nothing. When the vomiting ceased, however, she had a ravenous appetite, and was able to walk about. Altogether, she had five similar attacks of vomiting, lasting from three to five days each, followed by several weeks of health. The narrator also mentioned a case of three fistulæ of the gall-bladder which led respectively to the duodenum, colon, and skin.

In general, however, gall-stones remain quiescent in the place of their formation, and induce but little, if any, disorder of the system unless the number is large. It is when they are set in motion, and advance from the gall-bladder or the place of their formation in the bile-ducts to the intestinal canal that they give rise to severe constitutional disturbance.

The passage of a gall-stone from the gall-bladder or bile-duct into the duodenum occasions a series of symptoms which is designated biliary or hepatic colic. If the stone is situated in the gall-bladder, it is carried into the cystic duct, passes along the cystic into the ductus choledochus, and finally, if not arrested in its course, makes its exit into the duodenum. It is not clearly determined what are the forces which set the stone in motion. It is probably a combination of agencies, any one of which may be insufficient, but all of which, accidentally combined, are effective. An unusual flow of bile conjoined with a favorable position of the body, a sudden contraction of the abdominal muscles, as in the act of defecation, or a violent fit of coughing, carries the stone into the entrance of the cystic duct. It is more easy to understand the causes which set in motion stones lying in the hepatic ducts. Unless they lie in pouches in the ducts, there is no

special hindrance to motion, except great size or adhesion to the walls of the ducts. An unusual flow of bile or a sudden shock is sufficient. After the stone has been set in motion, it is forced onward by the pressure of bile behind it, and possibly by some contraction of the ducts.

The passage of a gall-stone through the ducts is not always attended with an attack of hepatic colic. The smaller concretions are frequently expelled without any sense of discomfort. After the ducts have been dilated by the passage of several stones, others may subsequently pass unobserved, owing to the greater diameter of the ducts. Von Schueppel observes that stones of considerable size may, in the case of aged and sluggish individuals, pass wholly unnoticed. It is therefore when the canal is smaller than the calculus, and sensitive to dilatation, that the symptoms characteristic of hepatic colic occur.

The attack may come on suddenly or be preceded for several hours by slight nausea and feelings of uneasiness and distension of the abdomen.

Quite suddenly, or after a period of uneasy sensations referable to the epigastrium and right hypochondrium, the patient is seized with acute pain. The pain is referred to a spot to the right of the epigastrium and lower part of the chest, and radiates from thence to the right hypochondrium, the right shoulder-blade, the spine, and even to the right arm. It comes in paroxysms of great severity, increasing in intensity with each recurrence, with intervals of abatement of suffering.

The pain is described as most agonizing. It is of a burning, tearing, boring, cutting character. The patient clutches at the epigastrium, doubles himself up, contorts himself into all positions in the vain hope of finding relief. Between the torturing paroxysms the pain is of a dull, steady, burning character.

The expression of the patient is one of acute suffering. The countenance is pale and distorted, the pulse feeble, the skin bathed in cold perspiration. In women of a delicate nervous temperament an attack of hepatic colic sometimes causes hysterical or epileptiform convulsions, syncope, or delirium.

In some instances repeated and severe attacks are followed by collapse and death. In such cases the countenance is ghastly pale, the pulse weak and thready, and the body covered with cold clammy sweat.

Hepatic colic is usually accompanied by repeated attacks of vomiting. In a majority of cases the paroxysm of pain commences two or three hours after eating. The contents of the stomach are first ejected, succeeded by vomiting of a ropy, acid, colorless fluid. In mild cases there may be only retching and vomiting.

The act of vomiting is usually followed by a remission of pain. If

bile is present in the matter ejected, it is indicative of non-closure of the common duct.

Fever is not, as a rule, observed in hepatic colic. The temperature is not raised nor the pulse increased in frequency. On the contrary, in the majority of cases the pulse is retarded, especially when the stone is delayed in its progress for any considerable period, causing obstruction of the hepatic or common duct. Wolff observed that even in cases in which there is no jaundice the pulse is often from five to ten beats slower than normal.

In the cases in which fever is present, it is generally caused by inflammation resulting from laceration of the bile-ducts.

Jaundice is present in a certain proportion of cases. Should the attack last less than twenty-four hours, jaundice is not likely to occur. Neither will there be jaundice if the calculus is arrested and delayed in the cystic duct, or even in the common duct, if the stone is irregular in outline and permits the bile to escape by its sides. But if the stone is retarded in the common duct for a longer period than twenty-four hours, and is of such a shape and size as to completely occlude the duct, jaundice generally appears, the conjunctiva first showing a yellow hue, which rapidly extends over the whole body. The color is more or less pronounced in proportion to the extent and duration of the obstruction to the flow of bile. The duration of the jaundice is usually limited, being from two to six days, according to the number and size of the stones.

Permanent occlusion of the duct, and consequent chronic icterus, is of very rare occurrence.

The duration of an attack of hepatic colic is variable, depending largely upon the size of the stones. An attack usually passes off in three or four hours, although it may be prolonged to several days. The pain sometimes ceases in consequence of the calculus falling back into the gall-bladder after having passed into the opening of the cystic duct. Occasionally, after passing from the cystic into the common duct, the severity of the pain is sensibly lessened. As the stone finally reaches the duodenal orifice, which is somewhat narrower than the main canal, the pain becomes more intense, which increase quickly subsides as the stone finally escapes into the duodenum, the patient experiencing at once a feeling of marked relief. After the attack is over, there is often for several days much soreness and tenderness.

As a rule, there is a succession of paroxysms of hepatic colic occurring at variable intervals. They have been known to occur daily for several weeks, but usually at intervals of weeks or months. In exceptional cases only a single attack has occurred, either because there has been but a solitary calculus, or because on account of the dilatation of the ducts by the passage of the first stone, the escape of the remainder has been rendered easy and painless.

Successive attacks are accounted for by the fact that the stones escape, one by one, at greater or less intervals of time, or by the subsequent formation of fresh calculi.

For several days after an attack of hepatic colic the *fæces* should be carefully examined in order to ascertain if the stone has escaped from the intestinal canal. If the stones are found in the *fæces*, their presence confirms the diagnosis, and also establishes the fact that they have not slipped back from the cystic duct into the gall-bladder.

Not unfrequently several stones are found together in the stools, and occasionally a large number of small ones.

Calculi usually escape from the intestinal canal without causing any irritation or pain, unless they are unusually large, in which case they may cause some flatulence and colicky pains, or a certain degree of tenesmus as they emerge from the anus.

Diagnosis.—It is no easy matter to determine the presence of gall-stones in the gall-bladder or biliary ducts. Calculi may remain for an indefinite period, either in the bladder or ducts, without their presence being suspected or causing any morbid symptoms. If of small size, they may escape unnoticed, particularly in the case of persons of advanced years, in whom there is diminished sensibility of the visceral nerves. Stones situated in the gall-bladder oftener escape detection than those in the ducts. Whatever morbid symptoms arise from their presence are commonly attributed to functional derangements of the abdominal viscera. In some cases cholelithiasis may be pretty accurately determined by a crackling sound produced by manipulation in the region of the gall-bladder, or when a hard nodular tumor is felt in the position of that organ.

Therefore, unless the patient is attacked with hepatic colic, the diagnosis of cholelithiasis is mainly conjectural.

On the contrary, the diagnosis of hepatic colic is usually readily determined, especially is this the case when successive paroxysms occur. The diagnostic points are: The rapid invasion of the paroxysm; its occurrence two or three hours after a meal, or soon after some violent muscular effort; the location of the pain to the right of the epigastrium; the gastric derangement; the icteric appearance of the conjunctiva and skin, the absence of fever, the retardation of the pulse, and the sudden cessation of the pain. These symptoms, when present, point conclusively to the nature of the disorder.

The affections for which hepatic colic may be mistaken are: gastralgia, renal colic, acute indigestion, and intestinal colic. The invasion of gastralgia is more gradual, and the pain is not as intense, and has not the marked remissions of hepatic colic. The pain of gastralgia begins soon after eating, that of hepatic colic two or three hours after a meal. There is absence of tenderness on pressure in gastralgia, whereas tenderness and soreness are conspicuous features of hepatic

colic. In protracted cases jaundice is a distinctive symptom, present in hepatic colic, but wanting in gastralgia.

Renal colic may be recognized by the location of the pain in the neighborhood of the ureters, by urinary derangements, retraction of the testicles in the male, and presence of blood-disks in the urine.

Intestinal colic has more marked remissions, and the pain is at, or around, the umbilicus. Lead colic is differentiated by retraction of the abdominal wall towards the spine, and by other well-known signs of lead-poisoning.

Neuralgia of the hepatic plexus of nerves closely simulates biliary colic, and cannot be distinguished from it. Hepatalgia is, however, of very rare occurrence, and many writers doubt its occurrence. In doubtful cases, the group of symptoms attending each individual case, or the finding of calculi in the fæces, can alone determine the diagnosis with any certainty.

The existence of biliary fistulæ can seldom be ascertained. The passage of a large calculus from the intestines, or the impaction of one in the intestinal canal, which is not preceded by an attack of hepatic colic, is presumptive evidence of a fistulous opening.

Prognosis.—The prognosis of hepatic colic is generally favorable. Still, the opinion of the physician should be guarded, in view of the many complications which may arise during the progress of a gall-stone, from the beginning of its advance until its final escape from the body. The accidents which may occur are: impaction of the stone in the cystic or common duct, with resultant inflammation and ulceration, chronic icterus, rupture of the gall-bladder or ducts, impaction in the intestines with occlusion, perforation of various organs, peritonitis, etc. As regards the termination of cholelithiasis, the prognosis should be still more guarded. Although in a certain proportion of cases expulsion of the calculi is apparently followed by complete relief, yet the predisposition to their formation continues, and attacks of hepatic colic may recur in consequence of fresh formations, even after the lapse of many years.

Treatment.—Treatment may be considered under two heads, namely: first, arrest of the formation of stones and solution of calculi already formed; secondly, treatment of hepatic colic.

As hepatic colic is, in the majority of cases, the initial symptom which directs the attention of the patient and physician to the existence of calculi in the gall-bladder and biliary ducts, it will be proper to consider its treatment prior to that of cholelithiasis.

It is seldom that specific medication will be of any avail. The pain and other symptoms are due to mechanical rather than to pathological conditions, and the chief indication is to relieve the intense suffering of the patient with the most effective means at our command.

A hot bath will often be of marked benefit, or if the patient is too

restless to tolerate the bath, hot fomentations may be substituted for it.

The remedies which are chiefly indicated are: *Nux vomica*, *Atropia sulphas*, and *Chelidonium*.

Nux vomica relieves the pain by its action on the contracting fibres of the ducts, thus facilitating the passage of the stone. It acts better in the low potencies.

Hempel and Arndt (*Materia Medica and Therapeutics*, vol. ii., p. 486) say of *Nux* in hepatic colic: "Nux will be found eminently useful in hepatic colic, a colic characterized by the sudden invasion of the most excruciating pain in the epigastrium and right hypochondrium, nausea and vomiting, spasmodic contractions of the abdominal muscles, coldness of the extremities, profuse cold perspiration." It may be necessary to give large doses in this affection; if the attenuations fail to relieve, I should not hesitate to give the strong tincture in five-drop doses, or the pulverized *Nux* in half-grain doses, repeating every half hour, until some three or four doses had been given.

Belladonna, or its alkaloid, has proved serviceable in mild cases in which the paroxysms of pain are not very intense.

A case has been recently reported to the writer as cured with *Chelidonium*. The patient, a woman, thirty years of age, had suffered for several years with repeated fits of hepatic colic. Under the continued use of *Chelidonium* the attacks became less and less frequent, and finally ceased altogether, the patient at this date having been well for three months.

Cinchona, *Podophyllum*, *Card. mar.*, *Cheonanthus*, *Colocynth.*, *Laurocerasus*, *Berberis*, *Lycopodium* have in their pathogeneses some of the symptoms characteristic of hepatic colic, and may be exhibited with benefit.

As before remarked, the agonizing pain of colic is in consequence of mechanical distension of the ducts and resulting laceration as the concretion is forced along its narrow channel; therefore I am convinced of the expediency, and even necessity, for the administration of anodynes and anæsthetics in this most distressing affection, not only to relieve the intense pain, but to avert the exhaustion and prostration consequent upon so much suffering. It is advisable to administer the morphine hypodermically. As the system in this disease is tolerant of the drug, one-sixth to one-fourth of a grain may be injected in the arm once in two hours, until the pain is relieved. If administered internally, it is liable to be rejected by vomiting. In very severe cases, or in cases in which morphine is contraindicated, inhalation of chloroform may be given with all the proper precautions needful. It is not necessary to produce complete anæsthesia, but only to give enough to allay the pain.

Having brought the patient successfully through one or more attacks

of hepatic colic, the treatment should, in the second place, be directed to the prevention of future attacks, either by preventing the formation of new concretions, or by promoting the solution of those already formed. First in importance and efficiency are hygienic measures. Indolent and sedentary habits, luxurious living, and over-indulgence in the use of distilled and malt liquors, favor the formation of gall-stones. It is, therefore, of the highest importance that the habits of the patient should, in such respects, undergo a radical change.

Sleeping in a well-ventilated room, early rising, moderate and regular exercise in the open air, a diet so regulated as to improve digestion and assimilation, and to promote normal alvine evacuations, and moderation in the use of vinous and malt liquors are essential adjuvants in the treatment of cholelithiasis.

The principal remedies for this affection are Berberis, Chelidonium, Calcarea carb., Cinchona, Lycopodium, Sulphur, Terebinthina.

The testimony to the efficacy of these remedies rests on alleged clinical experience. It is impossible to give definite indications for their administration for very obvious reasons. Chloroform, ether, olive oil, alkaline mineral waters, are all believed to possess the power to dissolve biliary calculi, or to arrest the process of their formation. It is undoubtedly true that a course of certain alkaline waters, notably those of Ems, Vichy, and Carlsbad in Europe, and some of not so well established a reputation in the United States, are followed by immunity of greater or less duration from attacks of hepatic colic. Chloroform and olive oil are supposed to act as solvents of gall-stones, but it is very doubtful if they have any such property.

If a large stone is impacted in the intestines, producing symptoms of intestinal obstruction, the usual treatment proper in such cases should be followed. As a last resort, the abdomen should be opened, and, if possible, the calculus, by gentle manipulation, be passed along the intestines; if this fails, it should be removed by an incision.

ACUTE HEPATITIS.

Synonyms.—Local parenchymatous hepatitis, Suppurative hepatitis, Suppurative inflammation of the liver, Abscess of the liver.

Definition.—An inflammation of the liver, either diffuse or circumscribed, ending in resolution or in suppuration. That variety which is diffuse and ends by resolution is almost never seen outside of hot countries, is, at best, little more than a tradition in medicine, is of no practical interest, and deserves only slight consideration. The circumscribed variety results almost uniformly in hepatic abscess, is usually simple, though sometimes multiple, is occasionally met in temperate latitudes, and possesses quite an interest. It attacks those

in the prime of life, is often coincident, if not interdependent, with dysentery, and has a duration so variable that the number of days which measures one case may be the number of months which marks the continuance of another. Taking no account of the multiple abscesses of portal phlebitis, Murchison has remarked the fact that hepatic abscess may be the result of pyæmia. In this case it is not the disease, but a symptom of the disease; yet the local pathological condition is the same.

Ætiology.—Let solar heat come beating downward in vertical rays upon an atmosphere saturated with malarial vapor, put into this poisoned air and underneath this blistering sun a man of intemperate habits, and you have done all that science can do to produce an inflammation of the liver with a resultant abscess whose overflow shall be measured by pints. Heat is a prime requisite. Other things being equal, the hotter the climate, the more hepatic abscesses. Those other conditions are malaria and liquor-drinking. Heat and malaria are the two causes specially wrapped up in each other; heat without malaria is robbed of half its terrors. If two climates be taken for observation, both of high temperature yet differing decidedly in the degree of heat, it will be found that the less torrid is the more fruitful in inflamed livers if it be steeped in malaria, while the hotter region is free from this poison. So noticeable is this that the causal relation of heat has, at times, been denied, although it would seem impossible that a comprehensive view of the climatic and geographical home of inflammatory disorders of the liver could leave a doubt in any mind. Even those who urge that a cold north wind striking persons coming out of heated ballrooms in Calcutta is often as “a dart to strike through the liver,” suggest as prerequisite a cachexia induced by life in the tropics. Again, the comparative rarity of hepatic abscess in our own latitude, although the malarial taint abounds, emphasizes the importance of climatic heat as a cause of this disorder. Take it all in all, a high temperature is unquestionably the foremost of all the causes which may be enumerated.

Malaria has already received incidental mention as a cause of hepatic abscess. Such mention leaves upon the mind a very just impression as to the estimate which may properly be placed upon its influence as a factor in the production of this disorder. It is significant, yet its significance is mainly incidental to the existence of other influences. Though there be not enough malarial poison in the system to produce the characteristic pyrexia, still, it may be sufficient to so oppose and clog the hepatic life as to make it the ready prey of an influence which might not otherwise eventuate in an inflammation. Perhaps its proper rank could not be better expressed than by denominating it a predisposing cause.

Intemperance occupies much the same plane as malaria, possibly

surpassing miasmatic conditions in its power for evil. Waring's elaborate statistics show, among other things, that in forty cases of hepatic abscess, sixty-seven and one-half per cent occurred among those addicted to the use of alcoholic liquors. It may well be believed that a habit which so notoriously affects the structure of the gland as to give cirrhosis the popular name of "gin-drinker's liver," may be an effective agent in imposing upon its substance an inflammation which finds no halting place short of suppuration. Maclean encountered only one case resulting from direct violence, and that was in the person of a drinking soldier who, while intoxicated, was thrown from a runaway horse against a gate-post. It is fair to suppose that the alcoholic cachexia was, in this instance, responsible for the enormous and fatal abscess which followed; for blows upon the right hypochondrium should tend to produce peritonitis rather than hepatitis. The use of liquor is a constant menace to the soundness of the liver, and may, at any time, render efficient for destruction adverse influences which had otherwise been successfully counteracted by the conservative forces of nature.

A large share of the discussion which has been had respecting the causation of hepatitis has gathered around the question whether any causal relation exists between dysentery and hepatic abscess. That suppurative inflammation of the liver is often attended by a precedent or coincident dysentery or intestinal ulceration is a matter of frequent observation; but that the two disorders hold the relation to each other of cause and effect is not so clear. Eminent authorities in this department differ in their conclusions. Budd maintains that the decomposing products of ulcerations occurring almost anywhere throughout the digestive tract furnish the poison which is at the bottom of the mischief in the liver, access to the gland being obtained through the portal vein. Moxon went so far in contending that dysenteric, or other intestinal, ulcerations were the primary, and hepatic abscess the secondary, lesion that he considered "primary abscess of the liver at least as doubtful as primary suppuration of the brain!" On the other hand, such men as Frerichs, Morehead, and Murchison believe the connection to be only apparent and purely incidental, and have the weight of statistical evidence in their favor. Waring states that "out of 2758 cases of dysentery treated in the Madras Presidency, abscess of the liver occurred 68 times." In his collected fatal cases of inflammation of the liver, 300 in number, it was "the primary affection in 131, or 43 per cent., while only 82, or 27 per cent., were admissions from dysentery." In our own climate dysentery is of frequent occurrence, the familiar acquaintance of every physician; yet nothing is further from our thought than any apprehension that these cases may end in hepatitis. As both diseases are essentially heat-disorders, and as in this latitude we have the dysentery alone, while in tropical re-

gions they have, in numerous cases, the dysentery *plus* the hepatic derangement, it may not be amiss to consider both of these maladies as essential and practical manifestations of the destructive influence of high temperature. Under this assumption dysentery becomes the expression of the lesser degree of heat, and, under favorable conditions, consecutive dysentery and hepatitis the expression of the greater degree. This view assigns both to an identical cause of varying intensity, and recognizes a connection between the two which cannot be ignored, while repudiating the supposition of cause and effect, which is hardly tenable.

Besides the generic causes already considered, cases are on record the result of special circumstances. Thus in one instance the post-mortem examination of a consumptive revealed an abscess in the liver containing a needle two and one-half inches in length, the discharge making its way into the duodenum without exciting suspicion of hepatic trouble. Penetration by lumbricoid worms and impacted gall-stones have also furnished nuclei for suppuration.

It is not incredible that failure to recognize the lesion has shortened our knowledge of the list of causes which produce this disease of the liver. In 1878 Hammond put himself on record as having found that in certain cases of gastric derangement, of cerebral hyperæmia, of insomnia, and of mental depression, there is a coexistent abscess of the liver. This fact was not determined by the ordinary symptoms, which were wanting, but by the free use of the aspirator. Out of twenty-six of these exploratory punctures, the needle being thrust through one of the two intercostal spaces between the eighth and tenth ribs into the right lobe, fifteen determined the presence of an abscess, and evacuated the pus. In the current edition of his work on the Nervous System he says that "since the publication of the original paper on the subject (in the *St. Louis Clinical Record*) other similar cases have come under my notice." The researches of the late J. Marion Sims led him to corroborate the statements of Hammond. This astonishing disclosure claims our very thoughtful consideration, for when a man has actually sucked pus through the needle of his aspirator it will hardly do to dismiss this fact with a discussion of the possibilities of mistake, and a suggestion that no pus was really obtained; that would be carrying scientific skepticism to an unscientific extreme. Knowledge of the fact that hepatic abscess may be so insidious in its development as to call no attention to the liver, and that it has been found coupled with remote and seemingly heterogeneous disorders, may be helpful in obscure conditions, possessing, as we do, a means of actual exploration which is harmless and safe.

Pathology.—Suppurative inflammation of the liver is always limited to one or several isolated patches; and with the exception of congestive turgor of the contiguous texture, the remaining portion of

the gland is rarely implicated. We do not often see the pathological changes which characterize the commencing stage, as suppuration is established before opportunities for investigation are offered. The disease is supposed, however, to commence with active hyperæmia, followed by effusion of lymph and degeneration of the hepatic cells, causing the affected part to become swollen or prominent, pale, yellowish, and softened; the suppuration begins in points in the centre of the lobules, which gradually coalesce, forming abscesses of various sizes. Sometimes the tissue surrounding the abscess is of a dark color and indurated; in others, the dark color gradually fades into a pale yellow, and sometimes the boundary is sharply defined. In recent abscesses the cavity is found filled with a pale yellow pus, and the walls consist of softened hepatic tissue, which hangs in threads into the interior. They vary in size from a pea to a hen's egg, or may attain much larger dimensions. Flint* reports a case where five and a half quarts were at once evacuated by an opening made through the thoracic walls. He also mentions a case in which an abscess was found to contain, after death, eighteen pints of pus, the entire organ, except the left lobe, being transformed into a mere sac. At first the abscess usually assumes a rounded form, but if it becomes incorporated with other cavities in the immediate neighborhood, it becomes irregular in outline, the walls bulging in a sinuous manner, and traversed by cord-like processes or bridges of hepatic tissue. The walls at first consist of the hepatic tissue, but after a time a cyst is formed which increases in thickness and firmness with age. Sometimes the walls become gangrenous. If absorption occurs before the abscess becomes encysted, the walls of the abscess approximate, unite, and ultimately nothing remains but a linear cicatrix. It frequently happens that no defined boundary is formed, and the inflammatory process continues to extend, forming an enormous purulent collection, until perforation occurs and the pus finds an outlet. The discharge rarely takes place into the peritoneal cavity, producing a fatal peritonitis, but in a large proportion of cases the evacuation is through the thoracic or abdominal walls. Sometimes the pus dissects downward along the spine, discharging in the inguinal region, or by the sacrum posteriorly, or it ulcerates through into the stomach, duodenum, or colon, or makes its way upward, perforates the diaphragm, the lungs, and is discharged through the bronchi. In rare cases the abscess has found its way through the central portion of the diaphragm into the pericardium, or has discharged into the portal vein or inferior vena cava.

Hepatic abscesses are sometimes superficial, but more often are deep-seated, and most frequently occur in the posterior portion of the right lobe. The number of abscesses present at the same time depends greatly upon the cause; usually there are from one to three, rarely

* Flint's Practice of Medicine, p. 550.

more, except when developed in consequence of pyæmia, when the abscesses may occur in larger numbers. The purulent matter contained in these abscesses may not differ in its characters from ordinary pus, but frequently it contains more or less of the remains of the disintegrated hepatic tissues, and they sometimes contain bile. The hepatic vessels are rarely involved in the suppuration, but it is quite near them, they are liable to become inflamed, and their lining membrane becomes rough and covered with fibrinous deposits which fill up their calibre more or less completely. Anatomical lesions of other organs sometimes occur; especially is the gastro-intestinal tract liable to be implicated, its mucous lining being the seat of exudation-processes and ulceration. This is especially the case when the disease occurs in tropical climates.

Symptomatology.—Taking into account the active life of the liver, its double circulation and double function, the tolerance of inflammation and abscess which it displays is little short of marvelous. That a gland of such size, and discharging such important offices, should make so little complaint of invasion is not what a knowledge of physiology alone would lead one to anticipate. So quietly does it accept the intrusion of the inflammatory process that the symptoms are often obscure, and even the existence of any trouble, if we receive the testimony of the aspirator, is, at times, overlooked. As usually set down, the symptoms are a moderate degree of pain or uneasiness and tenderness in the region of the liver and right shoulder, impaired appetite and disturbed digestion, lassitude, and an aversion to both mental and physical exercise. These symptoms alone are hardly sufficient to give a clear conception of the disorder. But there is one little peculiarity of the liver which, kept in mind, will do much to give meaning to a train of symptoms otherwise meaningless and obscure. It is this: While its investing membrane is endowed with perhaps a fair measure of sensibility, its substance possesses very little. It might be put, with considerable accuracy, in the language of physics, and affirmed that, passing from the circumference of the liver to its centre, the sensibility decreases as the square of the distance. If, then, we have an inflammation deep in the substance of the gland, there will generally be fever with the onset of the disorder, with little, if any, pain. But as the disease in its progress outward attacks the capsule, and a circumscribed peritonitis is added, so that by means of adhesion a continuous, and therefore safe, channel may be made for the exit of the pus into the bronchial tubes, through the abdominal walls, or into the stomach, there is a sudden accession of sharp, stabbing pain, marked chill, active fever, and often cough. Thus the more acute symptoms are likely to occur just before the termination of the disease, and not at the outset. This is so contrary to our habit of thought that we must needs have our wits about us if we do not care to mistake the end for

the beginning. In the beginning, the symptoms of inflammation masked and obscure; in the ending, inflammatory symptoms well marked and obvious—this is the typical hepatitis. So true is this that diagnosis can press into its service nothing of a greater value than these characteristics. It runs in exact parallel with them, its mere suspicion of the liver amid the symptomatic obscurity of the first stages being changed into reasonable certainty by the straightforward behavior which marks the establishment of the last stage. Pus having been formed, it is at first bounded by the substance of the liver. It may seek immediate exit without waiting for the formation of any limiting membrane, and the case will then move rapidly toward its termination. At other times, a cyst-wall is thrown around the pocket of pus, and there ensues a period of latency the length of which depends upon the toughness of the cyst. In such cases the lesion may be unsuspected, the liver working around this intruder and quietly accomplishing its functions without apparent disturbance. But sooner or later the pus makes its way to the surface of the liver and is discharged. It may remain an indefinite period of time, but discharge must take place eventually, if life be not otherwise destroyed. The pus may empty into the lung, the pericardium, the stomach, the duodenum, the colon, the peritoneal cavity, or through the abdominal wall. If into the pericardium or peritoneum, collapse and death are inevitable. If into the stomach or duodenum, pronounced vomiting occurs; if into the colon, diarrhoea may be expected, and the issue is not necessarily fatal. Fortunately, the safest route is that oftenest taken, egress being obtained through the abdominal wall, a point just below the ensiform cartilage being the favorite spot. In this event we may look for the symptoms of circumscribed peritonitis. Next in point of safety is discharge into the lung and removal by means of expectoration, a course frequently adopted. Here the symptoms are those of pleuritis, and cough is a necessary auxiliary.

Diagnosis.—Reference has already been made to the fact that in the beginning of the disorder the diagnosis can be little more than a suspicion. In searching for the true condition of affairs it is first in order to determine what organ is at fault. We must be content to travel by the circuitous path of exclusion. We cannot come to our decision in a single bound, as in the case of a pneumonia or a cholera morbus. It is not impossible to mistake as between the stomach and liver, lapses of the one having been charged to the other. First of all, then, we must patiently and logically assure ourselves that the derangement is hepatic. If suppuration has taken place, a fluctuating tumor may present itself in the region of the liver. In the person of a child eight years of age, presented at the Hospital Saint Jacques, Paris, the tumor appeared on the anterior aspect of the gland, pushing the ribs upward.

Such a tumor must be distinguished from those which may appear as the product of other causes. It must be distinguished from the tumor which marks the evolution of an hydatid. The growth of the latter is unaccompanied by systemic depression, neither is there local pain and tenderness. It must be differentiated from an abscess of the abdominal wall, which, by its hard, red, painful character and by its history, is easily recognized. If a cancer, the familiar cachexia and the nodulated "feel" would guide us, and the existence of a gall-bladder, distended by calculi or through obstruction of its outlet would be determined by the history, the situation, the shape and the mobility of the part.

Besides these means of differentiation between the various conditions mentioned, we may avail ourselves of the important services of the aspirator. It has been shown how the aspirator brought to light the coexistence of hepatic abscess with disorders presumably disassociate. When we are in doubt as to the nature of a tumor presenting in the region of the liver, there is no reason why the needle of an aspirator should not be employed to settle the question at once. Even when no tumor is apparent, no valid objection can be urged against an exploratory puncture if the presence of pus is suspected, although the perforation of the liver seems, at first blush, a rather heroic measure. If the search prove fruitless there is nothing to regret, since no harm results if the instrument has been in intelligent hands.

Should the pus appear through a self-made opening in the abdominal wall, all questions of diagnosis would then be at an end. Should it take one of the interior routes, the symptoms already detailed as attending its emptying into these neighboring structures must dictate the diagnosis. In those cases where the abscess discharges through the lung, the previous good character of the lung and the large amount of pus expectorated should preclude any liability to mistake the hepatic lesion for a pulmonary disorder.

Prognosis.—Hepatitis being a disease which properly belongs to the Torrid Zone, while enlightened Medicine is the child of temperate climates, the two hardly made each other's acquaintance until the British garrisoned India, and trained physicians were posted throughout that hot peninsula. Their observations have been the chief contributions to our knowledge of this disease. In their experience evacuation of the abscess by means of trocar and canula, or other instruments, was not followed by favorable results, and their verdict was in favor of allowing the pus to find its way out unaided. Taking into account the uncertainty of the pus, unassisted, selecting the least dangerous course, and adding to this the contingencies which lie in the path of the most favorable transit, it will be anticipated that the prognosis has been universally regarded as doubtful and inauspicious. But with the introduction of the aspirator a new factor entered into the question of

prognosis, increasing the probabilities of recovery. Eighty-one cases treated by operative interference, without the aspirator, showed a mortality of seventy-two per cent. Fourteen cases treated by aspiration showed a mortality of forty-three per cent. But in noting this difference it must be remembered that the eighty-one cases cited would doubtless have exhibited a less mortality had no evacuation by operation been attempted. Yet it is unquestionable that the introduction of the aspirator marked an era in the prognosis of hepatic abscess which cannot be ignored. Its skillful use does lessen the danger. After all, one can but wonder at the number of recoveries which take place under any and all methods of treatment. Not unreasonably it might be supposed that an inflammation of an important abdominal viscus, ending in suppuration, would be almost certain to terminate fatally. But out of two hundred and three cases collected, irrespective of treatment, forty-one recovered. The disease falls far short of being a hopeless one, though there are no reliable data which will enable the physician to foretell the issue with even approximate accuracy.

Treatment.—The long and animated discussions as to the value of blood-letting and saturation with Mercury may safely be ignored. Neither procedure is worthy of serious consideration. In the earlier stages of the disease, when the diagnosis is uncertain, the expression of the disorder through its subjective symptoms will yet give the homœopathist a scientific basis on which to rest an intelligent treatment. Any initial inflammatory symptoms will suggest a treatment too familiar to need rehearsal here. Beyond this the remedies specially applicable are *Bryonia*, *Phosphorus*, and *Silicea*.

Bryonia will possibly do good in the incipient stage of the disease, before suppuration has commenced. The symptoms preceding suppuration are included in the pathogenesis of *Bryonia*. There is pain and sensitiveness in the right hypochondrium, pain and tension in the right shoulder. Hughes has used this remedy, and holds that it is demanded in those cases where the surface is the part most affected, *i. e.*, perihepatitis.

Clinical experience has demonstrated the utility of *Phosphorus* after suppuration has been established. I cannot give any provings to show its adaptability.

Silicea, in its provings, has swelling, inflammation and suppuration of glands; abscesses, with tardy recovery. This would indicate its use in protracted cases. In the case of a patient who died, life was prolonged for eighteen months after the abscess was formed, and she died finally of general anasarca. I did not see her until eight months after the abscess opened.

It is not without interest, in connection with the widely divergent views held by those of the old school who have encountered this malady on its native heather, concerning the efficacy of mercury, to

note that Hughes obtained pleasing response from the prescription of *Mercurius solubilis* 3ʳ. Jahr seems to lay as much stress upon *Belladonna* and *Mercurius* as upon *Bryonia*. Other remedies which have received mention are: *Chamomilla*, *Chelidonium*, *Hepar sulph.*, *Kali carbonicum*, *Lachesis*, *Lycopodium*, *Nux vomica*, *Pulsatilla*, *Sulphur*.

So soon as the presence of pus may be reasonably suspected, it is good practice to draw it off through the needle of an aspirator. If the needle fails to find pus, no harm is done; on the contrary, positive good seems to result to an extent quite unaccountable. All who have placed on record their experience in those cases where abscesses have, by this means, been actually found and emptied, are unanimous in the assertion that the result is good, and only good. Many times recovery follows with great promptness. With no risk attending the puncture, whether the diagnosis be correct or mistaken, the wound being so slight as to leave no cicatrix which a post-mortem can discover, with prompt and positive convalescence often resulting, it would seem that failure to call in, or, at least, consider, this method of active interference, could hardly be justified. It is true that the instinctive feeling is that such a proceeding must be risky. The first man who tapped a dropsical abdomen must have held his breath. But careful hands will inflict no damage though a slight mistake be made. In attempting to reach an abscess of the liver, the gall-bladder has been entered, but I cannot find that any untoward result followed. Even the pericardium has, by design, been punctured without disaster. If a rational conception of the exact amount of risk involved be once compassed, patients will hardly be denied the benefit of this measure for their relief merely because physicians have not the courage to carry their convictions into practice.

ACUTE ATROPHY OF THE LIVER.

Synonyms.—*Hepatitis diffusa*, *Parenchymatosa*; Yellow atrophy of the liver.

Definition.—An acute disease of the liver, characterized by rapid decrease of size and structural change, with jaundice. The disease is accompanied by severe disorders of the nervous system.

History.—The disease, under different appellations, has been recognized and described by some of its more marked symptoms, by various writers, as far back as the time of Hippocrates. The peculiar color of the liver was first pointed out by Valsalva.

Rokitansky, in 1842, was, however, the first observer who by a description of the clinical symptoms and by a subsequent autopsy gave acute atrophy of the liver a well-defined place in nosology. During the last forty years many writers, particularly in Germany, have patiently and thoroughly studied the symptomatology, pathology, and

histology of this rare malady, and have furnished many valuable contributions to the elucidation of the subject. Those more especially worthy of mention are Klob, Klebs, Wunderlich, Opholzer, Frerichs, and Liebermeister.

Ætiology.—The causes of acute atrophy of the liver are very obscure. In a large proportion of cases it is impossible to assign any definite cause. Age, sex, condition of life, antecedent disease of the liver, mental emotions, venereal excesses, and acute infectious diseases have been named as predisposing and exciting causes. As regards the age at which the disease is most liable to make its appearance, it has been ascertained that about three-fourths of all cases occur between the ages of sixteen and forty. Before and after this period of life the number diminishes rapidly. Of 143 cases, nine occurred during the first five years of life, but none between the ages of five and nine years, while during the period between twenty and thirty years of age there were no less than seventy cases.

The disease occurs more frequently in females than in males, the proportion being as three of the former to two of the latter.

Of the women attacked, nearly one-half were pregnant. It would, therefore, appear that pregnancy is one of the exciting causes of acute atrophy, but the disease does not manifest itself in the earlier months of gestation. Of eighty cases occurring during pregnancy, none were observed during the first three months. Notwithstanding the fact that a large proportion of cases occur during the pregnant state, yet the disease is of very unfrequent occurrence in women in this condition. Carl Braun observed it in but 1 out of 28,000 pregnancies.

The disease occasionally develops during the course of cirrhosis, associated with long-continued obstruction of the hepatic ducts, and also in fatty degeneration and other chronic diseases of the liver.

A certain proportion of cases of acute atrophy follow some intense mental emotion, as inordinate anger, great fear, or long-continued anxiety.

To venereal and vinous excesses other cases may be reasonably attributed, but repeated experiments upon animals of acute alcoholic poisoning do not, with any certainty, develop appearances characteristic of the malady.

According to Thierfelder (*Ziemssen, Cyclopædia*, vol. ix., p. 246), the granular degeneration of the hepatic cells, which forms an alteration uniformly present in the majority of acute infectious diseases, may exceptionally attain so high a degree in some of these affections—such as puerperal fever, recurrent fever, abdominal typhus—that an acute wasting of the liver is thereby produced. Bohl observed in a form of puerperal fever, described by him as pyæmia, associated with peritonitis, parenchymatous degeneration of the liver in every stage, even to a most typical picture of acute atrophy of the liver. Two

cases of puerperal peritonitis are likewise described by Hugenberger, in which the liver presented all the characters of acute atrophy. In the epidemic recurrent fever at St. Petersburg in 1864, Kaillner found in several cases the liver of a consistence resembling perfectly that presented by the organ in acute atrophy. Similar lesions have been described by Frerichs in sporadic cases of typhoid fever; also by Op-
holzer and Eppinger. Liebermeister observed the development of the disease in a man, sixty-three years old, during the course of a catarrhal fever with ultimate croupous pneumonia.

Pathology.—Acute atrophy of the liver offers many striking anatomical characters, and is supposed to involve a peculiar morbid process which is not fully understood. Most authorities consider that this unknown morbid process excites an acute diffuse parenchymatous inflammation of the liver which results in the condition known as acute yellow atrophy. The disease has also been attributed to obstruction of the smaller bile-ducts, or to excessive formation of bile within them, whereby pressure is exercised on the surrounding structures.

The liver undergoes a rapid and notable reduction in size, the diminution amounting to a third or a half, or even two-thirds, of the original size, the weight being proportionately lessened. This diminution in size occurs in "every direction, but especially in the thickness of the organ, which is sometimes reduced to an inch at its thickest, the gland being flattened out. The capsule presents an opaque, puckered appearance; the parenchyma is flabby and shrivelled, so that it is unable to bear its own weight, and folds up, or collapses. The tissue is soft, easily broken down, and is sometimes pulpy. The peritoneal layer is roughened and wrinkled. The cut surface of the organ presents at those places where the disease has advanced farthest, and these are usually in the left lobe, an ochre-yellow, or rhubarb-like color; the bloodvessels are here empty, and in most cases the outline of the lobules is no longer visible. At other places where the morbid process is at an earlier stage, some of the capillaries are filled with blood, and occasionally there may be seen extravasations, or their remains, in the form of crystals of hæmatoidine. Between the lobules, which are encircled by the congested vessels, and separating them from one another, a dirty grayish-yellow substance is deposited. At a later period, the capillary congestion recedes, the size of the lobules diminishes, and their color becomes yellower, whilst the relative amount of the intervening gray substance disappears at those places where the atrophy of the gland is most apparent, and the organ assumes more and more a uniform yellow tinge, from which the outlines of the lobules by degrees completely disappear."* Microscopic examination reveals fatty degeneration and destruction of the gland cells, until ultimately nothing remains but a granular detritus, oil-globules, and

* Frerichs, *Diseases of the Liver*, William Wood & Co., 1879, vol. i., p. 158.

pigment. There is generally only a little gray mucus or a little unhealthy bile in the gall-bladder and bile-ducts. Extravasations of blood in the alimentary canal and other parts, with ecchymoses, are not uncommon. The spleen is usually, but not invariably, increased in size. The kidneys exhibit degeneration of, and deposits of pigment in, the epithelium cells. Leucin and tyrosin are found in the blood, as well as in the tissues of the liver, spleen, and kidneys. The muscular tissue of the heart undergoes more or less fatty change, but this alteration is found with many other acute diseases.

Symptomatology.—Gastric derangement and jaundice are, in a majority of cases, the symptoms first observed. In some instances, however, the premonitory symptoms are mild, and in no wise indicate the gravity of the disease or the approach of danger. The patient is affected with loss of appetite, feeling of languor and debility, pressure and uneasiness at the epigastrium, furred tongue, nausea and vomiting. There may be also slight fever. The bowels are either constipated or loose.

In a few days jaundice, resembling in many respects catarrhal jaundice, is superadded to these symptoms. The symptoms already detailed constitute the first or prodromal stage, and usually are not sufficiently severe to confine the patient to the bed or even to the house. After a period of from two or three days to several weeks, the disease passes somewhat suddenly into the second or nervous stage. The first stage may, however, be protracted to a much longer period, or, on the other hand, be limited to less than a single day.

Without much warning, severe disturbances of the brain appear. The patient becomes restless, uneasy or delirious, finally passing successively into a state of drowsiness, sopor, coma, or convulsions. Repeated vomitings and involuntary discharges of urine and fæces frequently occur. The stools, which at the outset of the disease were tinged with bile, become of a clay color. Cramps of the involuntary muscles are occasionally observed.

Important changes in the blood often appear, manifested by vomiting of grumous matter from the stomach, hæmorrhages from the intestines, vagina, and kidneys, extravasations of blood into the connective tissue, and ecchymosed spots.

In the second stage the fever, if there has been any, subsides. The urine is diminished in quantity, becomes of a darker color, and contains bile, tyrosine, and leucine.

Towards the last, the coma and insensibility become more profound, the pulse becomes rapid, feeble, and irregular, symptoms of œdema of the lungs or of collapse appear, and death ensues with indications of profound prostration.

Physical Signs.—Occasionally, during the first stage, examination shows a rapid decrease in the area of dulness, indicating a dimi-

nution in the size of the liver, but atrophy usually begins with the advent of the second stage. As a rule, however, the reduction in size becomes appreciable only in the latter phases of the disease, usually during the last three days of life. The diminution becomes first apparent in the left lobe, the dull sound in the angle formed by the angle of the ribs being replaced by tympanitic resonance. In the right lobe the shrinking proceeds from below upwards, until finally only a narrow strip of dulness is perceived between the lungs and the intestines. The liver appears to be bent backwards, and the anterior space to be filled by coils of intestines. The diminution in size is not only evident by the decrease in the area of dulness, but the fingers forced up under the ribs fail to detect the organ in its normal position. In some cases acute atrophy of the liver is preceded by increase in bulk. In one case the first examination showed a normal area of dulness; two days later, there was increased area of dulness, and at the end of two days more, it was less than normal. In other cases no apparent decrease in size has been observed, either in consequence of the rapid progress of the disease to a fatal termination, or because the disappearance of the granular cells was accompanied by hyperplasia of the intestinal tissue.

Sensitiveness in the region of the liver is, in the majority of cases, perceived even when the patient is in a state of coma, as is evidenced by a contraction of the facial muscles and by a shrinking from pressure upon the organ.

It is doubtful whether the manifestations of pain are due to increased sensitiveness of the liver or to hyperæsthesia of the skin, inasmuch as many patients shrink from pressure upon other parts of the body. Pain is not by any means a constant symptom, being, according to Frerichs, present in only three-fourths of the cases recorded by him. By other observers its absence is expressly noted in a certain proportion of cases.

Of the three most prominent characteristic symptoms of the disease, namely: gastric derangement, icterus, and cerebral disorder, more particular mention will need be made.

Gastric Symptoms.—Impairment of appetite is the first and most constant derangement. Vomiting occurs in the first stage in the majority of cases, and nausea is usually present in the remainder. In the second stage, and especially with the advent of the cerebral manifestations, vomiting is a constant symptom. The ejected matter is mixed with mucus, and not unfrequently it is tinged with bile. The bowels, as a rule, are constipated, diarrhœa being of rare occurrence. The stools at first contain bile, but in the second stage become clay-colored. Occasionally they contain blood, more or less altered in character.

Icterus.—Jaundice may appear simultaneously with the gastric

symptoms, or after an interval of several days. In a few instances it does not make its appearance until after the lapse of six or seven days. At first the skin is not as dark as in obstructive or catarrhal jaundice, but as the disease advances the color increases in intensity, and becomes of a deep yellow, saffron, or greenish tinge. The urine is scanty, of a dark color, and shows the presence of bile under the usual tests. In rare cases jaundice is absent. Bamberger reports a fatal case in which no trace of jaundice was discovered during life, nor on the cadaver, and yet the liver presented a well-marked example of atrophy, with almost complete disintegration of the hepatic cells.

Cerebral Symptoms.—Coincident with the appearance of jaundice, or soon after, disorders of the nervous system manifest themselves. These do not follow a well-defined order, but vary widely in intensity and variety of symptoms. Usually the patient complains of headache, is irritable, moody, and restless. Less frequently there is abnormal sensitiveness to light and noise. These lighter symptoms continue for a few days, when severer manifestations appear.

When, however, the disease runs a very rapid course, the milder nervous symptoms may be wanting, and active delirium, stupor, coma, or convulsions appear without previous warning.

The delirium is commonly of an active, violent character, manifested by screaming, throwing oneself about, excessive loquacity, incoherent talk, and efforts to escape. At times the delirium assumes the form of mania. Delirium is not present in all cases, it being absent in about one-fifth of the whole number. Unconsciousness, varying in degree from somnolence to profound sopor and complete coma, is present in nearly all cases. Convulsions generally occur in patients who have not passed the period of childhood; in adults they are observed in nearly one-third of the cases. Muscular tremors and twitchings of groups of muscles are occasionally seen; paralysis in some instances occurs.

The nervous symptoms, as a rule, constantly augment in severity until the end. The coma becomes more profound, the pupils are widely dilated, the respiration becomes sighing, and finally stertorous, and in some cases irregular and intermittent. As death approaches, the number of respirations increases, and may rise to forty or fifty per minute.

Duration.—The duration of the disease varies considerably in different cases. In the milder cases the premonitory symptoms may last from two or three days to several weeks. The second stage lasts from one to ten days. Jaundice may appear in the first stage, or may even precede the other manifestations. In some cases, characterized by a sudden appearance of the severer symptoms, the attack often ends in death in two or three days, or even sooner. From a table of 102 cases

prepared by Thierfelder, it appears that the duration of the disease ranges from two to thirty-two days.

Diagnosis.—At the outset of acute atrophy of the liver it is very difficult, and in many cases impossible, to determine with any certainty the nature of the disease.

The gastric derangements which so frequently precede the advent of the severer symptoms are not of a character to sufficiently indicate the nature of the morbid changes which are going on in the liver. It is not until icterus, conjoined with cerebral disorder, appears that the true nature of the malady can be with any confidence determined. Acute atrophy is liable to be at first confounded with simple jaundice. In the second stage the diagnosis is more readily made. The jaundice, the cerebral symptoms, the hæmorrhages, the presence of tyrosine and leucine in the urine, the subsidence of the fever, and the rapid diminution in the size of the liver, evidenced by the decrease of the area of hepatic dulness, constitute a train of symptoms which do not belong to any other disease.

Acute phosphorus poisoning can, with extreme difficulty, be distinguished during life from acute atrophy of the liver. There is a striking similarity in the clinical symptoms, and care should be taken to guard against an incorrect diagnosis by thorough investigation. Thierfelder considers that if decrease in size of the liver can be distinguished before the expiration of the first week, phosphorus may, with certainty, be eliminated from the possible causes of the disease.

Prognosis.—The prognosis is exceedingly grave. Very few recover from a well-marked case of acute atrophy. A few alleged cures are recorded, but it is doubtful if the diagnosis in such cases was correct. As before remarked, the duration of the first stages varies considerably, but after the invasion of the second stage death occurs in the large majority of cases in from one to three days. Out of 118 cases only three survived more than nine days.

The conclusion of all observers of this most formidable disease is that it is almost absolutely fatal.

Treatment.—The only remedy which promises any favorable result is Phosphorus. Inasmuch as poisoning by Phosphorus develops a train of symptoms which can, with difficulty, be distinguished from those of acute atrophy, the drug is certainly pathogenetic to the disease. I cannot ascertain that any cures are recorded from the administration of Phosphorus, but it is worthy of a thorough trial.

Allen, in his article on Phosphorus (*Encyclopædia of Pure Materia Medica*), collates the symptoms from 232 cases of poisoning and provings. I find, among others, the following group of symptoms similar to those observed in acute atrophy.

Mind.—Violent delirium, at first alternating with periods of consciousness; sudden delirium, followed by a comatose state; *violent*

delirium (with intense icteric color of the skin); delirium, with constant efforts to escape; delirium, with symptoms of paralysis; loquacious delirium, anxiety, and restlessness; stupor, succeeded by low muttering lethargy; complete apathy; pupils insensible to light; pulse small, thready; stertorous respiration; great prostration, followed by death.

Gastric.—Nausea, vomiting; vomiting of matter resembling coffee-grounds; vomiting of ejecta, at first yellowish, afterwards blackish-brown; hæmatemesis; atrophy of the liver, associated with meteorismus, thin colorless stools, furious delirium, much jaundice, followed by sopor, rapid pulse, contracted pupils, and death; constipation, followed by diarrhœa; hæmorrhage from the bowels; hæmaturia; hæmorrhage from the vagina.

Skin.—Jaundice; skin deeply orange-yellow; petechial spots in the skin; ecchymosed spots on the skin; spots similar to purpura hæmorrhagica at the base of the neck, the shoulders, and back of the hands.

For a disease which has so uniformly proved fatal, it is difficult to suggest a line of treatment which will be at all satisfactory to the physician, or which will afford a hope of recovery. The remedies other than Phosphorus, which merit careful consideration, are Arsenicum, Belladonna, Hyoscyamus, Hamamelis, and Cinchona.

CHRONIC ATROPHY OF THE LIVER.

Synonyms.—Cirrhosis, Hobnailed liver, Granular liver, Interstitial inflammation of the liver.

Definition.—Chronic atrophy of the liver is a chronic disease of very slow progress, in which the organ becomes indurated and more or less diminished in size. It generally begins with gastric derangement, but sometimes with hepatic enlargements, followed by atrophy. The progress of the disease is attended with considerable diminution in size of the liver, ascites, anæmia, and progressive debility.

Ætiology.—The immoderate use of intoxicating drinks is the most frequent cause. The more powerful stimulants, as brandy, gin, and whiskey, are much more potent factors in producing the malady than vinous and malt liquors, though the excessive and continued use of the latter has been known to produce the same effect as the stronger liquors. So many cases of cirrhosis are the result of excessive consumption of spirits that the disease is known in England and Germany by the name of "gin-drinker's liver." Budd attributes the frequency of cirrhosis in India to the immoderate use of curry and other stimulating condiments. Frerichs says the disease is sometimes induced by excessive use of spices and strong coffee.

Other causes are syphilis and malarial fevers. Frerichs cites six

cases of cirrhosis which were undoubtedly attributable to syphilitic poisoning.

In localities where malarial fevers are severe and of frequent occurrence, the malarial cachexia constitutes an important ætiological factor in the development of cirrhosis. In the tropical regions of North America, and in parts of Europe where malarial fevers abound, the structural changes in the liver which occur as a consequence of malarial influence, result in a variety of atrophy of the liver closely resembling cirrhosis.

Trousseau holds to the opinion that some cases of the disease are due to passive hyperæmia of the liver depending on a cardiac affection. This author (*vide* Trousseau's *Clinical Medicine*, vol. ii., p. 757) says most of the immediate causes of cirrhosis may be grouped under three heads, viz. : First, chronic hyperæmia of a passive character, depending on heart disease or paludal cachexia ; second, chronic hyperæmia of an active character depending on alcoholic toxæmia ; and third, chronic active hyperæmia depending on syphilis.

Age and sex constitute predisposing causes. Cirrhosis is generally a disease of middle life. Of 165 cases, 108 were between the ages of thirty and sixty years. In early childhood and old age very few cases occur. One case is reported at the age of eight years, one at nine, one at ten, two at eleven, one at thirteen, and one at fifteen. Five of these are attributed to the use of alcoholic stimulants. Men are more subject to the disease than women, the proportion being as five to two. Of 147 cases, 107 were men and 41 women. This fact is to be accounted for by the greater prevalence of drunkenness among the male sex rather than to any special predisposition.

Pathology.—Several distinct morbid conditions of the liver have been included under the head of chronic atrophy of the liver, or cirrhosis, which have totally different modes of origin. The genuine disease is usually considered as resulting from a chronic interstitial inflammation, extending into the minutest portal canals, and leading to proliferation of cellular tissue in the lobules ; or, as some pathologists describe, to the formation of an exudation which undergoes organization, and then contracts, with consequent pressure upon, and obliteration of, the vessels, and atrophy of the secreting elements. This is the pathological view generally held at the present time. According to Dr. Goodeve,* it has yet to be determined whether cirrhosis is the result of a primary degenerative process, or of inflammatory exudation or congestion, but he thinks it probable that it may originate in either of these processes. The commencement of cirrhotic disease is marked by an increase in size, the organ being hyperæmic. At this time the granular appearance is absent, or but slightly marked, while the entire organ is congested, and is described as being occupied

* Reynolds, *System of Medicine*, vol. iii., p. 377.

by a succulent, vascular, grayish material, consisting of young connective-tissue elements, containing spindle-shaped cells. The color of the organ at this period is a brownish-red, or it may be greenish by staining of the bile pigment; or the deposition of fat may give it a pallid appearance. The liver now gradually becomes contracted, atrophied, and diminished in weight, being sometimes reduced to two-thirds or one-half of the normal size. This diminution occurs especially in the left lobe, which, not unfrequently, is shrivelled up into a small membranous-like appendage, with a soft flabby rim of connective tissue at the margins of the organ. The surface is pale, and is covered more or less with semi-globular knobs or prominences, like hobnails, sometimes of a uniform, at other times of an unequal, size and form; hence comes the name of granular or hobnailed liver. The serous capsule is thickened, opaque, and of a grayish-white color, especially in the depressions between the granulations. Numerous bands of connective tissue pass from it to neighboring organs, such as the diaphragm, colon, and stomach. The substance of the cirrhotic liver is very hard and cartilaginous. On section there is often as much resistance as on cutting into scirrhus, and on the cut surface we find the same granulations as on the surface of the liver. They are imbedded in a dirty-white, dense, non-vascular tissue. At some places the parenchyma has entirely disappeared, and the dense tissue alone remains. On microscopic examination in this stage we no longer find the first elements of connective tissue, this being fully formed, and inclosed in concentric layers or groups of liver cells, the latter constituting the substance of the granulations. These remain intact for a long period, but ultimately become filled with fat and various sorts of pigment. The abnormal pigmentation is due to the compression of the terminal ducts and stasis of the bile. The whole tissue which the microscope reveals is generally supposed to be made up of fully developed fibrous tissue, or of young connective-tissue elements in process of development, and chiefly resulting from proliferation. It has sometimes been described as consisting in some instances of the remains of the vessels, ducts, and other tissues which have not undergone destruction. According to Frerichs* the vascular system of the liver undergoes important changes. Many of the smaller branches of the portal vein are compressed or obliterated, and its capillaries are destroyed. The vessels lose their rounded form, and become angular and bulging. The main trunk of the portal vein, and the larger branches, are often dilated, and may be occupied by thrombi. The hepatic artery also becomes dilated, and supplies the newly formed vessels of the recently developed connective tissue, and black pigment is frequently found in its branches. The chief divisions of the hepatic vein remain unchanged; but their obliteration may take place by in-

* *Op. cit.*, p. 73.

flammation, from the capsule of the liver, being propagated to the walls of the vessels, when the capillary tributaries are gradually obliterated, and their communication with the portal capillaries is interrupted. The remaining capillaries are commonly in a state of fatty degeneration.

The origin of the bile-ducts at the periphery of the lobule is destroyed by the pressure of the new connective tissue, and there is apt to be catarrhal tumefaction of the mucous membrane of the larger branches. These various changes occurring in the liver may give rise to a long train of secondary functional derangements of a serious character. "(1) Functional derangements of the chylopoietic viscera, arising from the interruption to the circulation from the portal into the hepatic veins, causing stasis in the whole range of the portal system; (2) Impairment passing on to complete suspension of the hepatic functions,—the formation of bile, glycogen and urea; (3) Impairment of those functions which, in addition to the secretion of bile, the hepatic parenchyma perform in the metamorphosis of matter and in the elaboration of blood."*

Symptomatology.—The physician seldom has the opportunity of observing a case of chronic atrophy of the liver in the incipient stage. Usually when the patient seeks medical advice, the disease has made considerable progress, and he seeks relief from the ascites or one of the numerous complications which occur during the course of the malady. It is only in exceptional cases that the first development of the disease is attended with much suffering.

If cirrhosis commences with symptoms of acute inflammation, there is at the outset decided pain and tenderness in the region of the liver, aggravated by deep inspiration, and severe in proportion as the capsule and upper portion of the liver is involved. In these cases, the liver is generally increased in size at first, so as at times to show considerable enlargement, extending even to the umbilicus. The increase in size is due to inflammation and hyperplasia of the connective tissue, and gradually disappears with the subsequent shrinking of this structure, and degeneration and atrophy of the hepatic lobules.

In the majority of cases the disease commences without any signs of inflammatory action. The symptoms in the early stages are obscure, and mainly referable to disorders of the digestive organs. The appetite is poor or variable; digestion is imperfect, and is attended with eructations, nausea, flatulence, and feelings of oppression at the epigastrium. The bowels are irregular, sometimes constipated, at other times loose. The stools are often mixed or coated with transparent mucus. Owing to variations in the quantity of bile secreted by the liver, the stools are at one time dark, at another clay-colored. Frerichs observed that the stools were not unfrequently parti-colored

* Frerichs, *op. cit.*, p. 74.

from the admixture of bile in the contents of one portion of the intestinal tract and its absence in another part. These symptoms may continue for months without any material change in the condition of the patient, except increasing debility, emaciation, and anæmia. Towards the close of life diarrhœa and tympanitic distension of the intestines are almost invariably present. The stools then become pale and watery.

With the progress of the disease, attended by increasing atrophy of the liver and consequent compression and obliteration of the hepatic vessels, effusion of serum into the abdominal cavity takes place. The ascites is attended, or soon followed, by distension of the superficial veins of the abdomen. Thierfelder accounts for the dilatation of the superficial abdominal veins by the pressure of the effused fluid upon the vena cava, thereby obstructing the blood current and impeding the outflow from the veins of the abdominal integuments.

Ascites is usually developed slowly, increasing in proportion to the progressive atrophy of the liver. In some cases there is a decrease in the quantity of the ascitic fluid, or even a complete arrest of the effusion, in consequence of an enlargement of the collateral blood channels.

The effused fluid is generally clear and of a straw color, but sometimes is brown from the presence of bile pigment, or reddish in consequence of extravasated blood-cells. The fluid contains from one and a half to three per cent. of solid matters, of which about one-half is albumen.

Œdema of the lower extremities commonly follows within a variable period after the appearance of ascites. The pressure of the fluid in the abdominal cavity upon the iliac veins impedes the return of the venous blood and leads to effusion of serum into the connective tissue. The œdema eventually affects the scrotum, labia, loins, and anterior abdominal walls. The upper part of the body is rarely implicated.

There are, however, many exceptions to the rule. Œdema may appear in the lower extremities and in the whole lower half of the body before the mechanical conditions producing intra-abdominal pressure are produced. It may appear in the first period of the affection when its course is subacute, and marked abdominal symptoms are presented, as hepatic and intestinal pain, dyspepsia, vomiting, albuminuria, etc. Œdema may also be slow in making its appearance in cirrhosis, whether before the symptoms of the hepatic affection are well defined or when it has already arrived at an advanced stage.

According to Dr. Giovanni, the principal course of the œdema of the lower part of the body is a special lesion of the inferior vena cava, and not pressure upon the intra-abdominal veins. The inferior vena cava in these cases is always found in a very marked state of hydræmia and

dilatation, with well-defined lesions of peri- and endo-phlebitis, and with considerable thickening of the vein walls. When, on the contrary, no œdema appears during life, the vena cava is found in a perfectly normal state.

Vomiting of blood and, less frequently, hæmorrhage from the bowels occur when the quantity of ascitic fluid greatly distends the abdomen. Occasionally, hæmatemesis takes place prior to the appearance of ascites. Rollet observed (Ziemssen's *Cyclopædia*, vol. 9, page 194) hæmatemeses recur during a period of two years, almost regularly at intervals of from two to five weeks, after which the ascites, that had in the mean time re-accumulated in each instance, abated.

Hæmorrhages from other parts of the mucous surfaces are sometimes observed.

Dyspnœa is generally an accompaniment of great distension of the abdomen, the diaphragm being impeded in its action by the pressure from below.

In the later stages of cirrhosis, petechiæ and ecchymoses frequently appear on the body. They are probably due in part to mechanical congestion, and partly to some depraved condition of the blood.

The spleen is generally enlarged. According to the observations of Frerichs, Bamberger, Opholzer and Wagner, enlargement of the spleen is absent in only about 20 per cent. of all cases. The enlargement is not great, seldom exceeding two or three times the normal size of the organ.

In some cases the increase in size is not perceptible by reason of the great distension of the abdomen from flatulence and effusion of serum. Occasionally the splenic tumor is of considerable size, extending downward as far as the umbilicus.

The functions of the kidneys are not seriously disturbed. In the more advanced stages of the disease the urine is diminished in quantity and of a reddish-yellow or red color. In the early stages the secretion is nearly normal in quantity and appearance.

Physical Signs.—In those cases which begin with inflammatory action, the liver, in the first stages, will be found increased in size, and with an enlargement of the area of dulness; but as the disease progresses, the enlargement gradually recedes. Atrophy begins in the left lobe and secondly involves the right. As the left lobe shrinks, there is absence of dulness on percussion between the right lower margin of the ribs and the ensiform cartilage, while the area of dulness in the right hypochondriac region will be nearly normal. As the atrophy increases, the right lobe contracts from below upwards until only a narrow band of dulness is perceptible. The shrinking of the liver, as a rule, proceeds slowly; only in exceptional instances is the reverse the case.

It is often difficult to accurately determine the decrease in size for

the reason that the liver retracts more and more beneath the ribs, and the accumulation of ascitic fluid may cover it.

The diminution in size can generally be determined most satisfactorily after paracentesis, and it is also possible to perceive at the same time nodules in the form of small prominences varying in size from a pea to a small marble. In some instances the nodules are arranged in well-defined groups. At points where the liver lies in contact with the abdominal parietes a friction or grating sound will sometimes be heard, caused by the roughening of the peritoneal surfaces from the effusion of lymph. The sound indicates perihepatitis.

As the disease advances to a fatal termination, the emaciation and debility of the patient increase. The pulse becomes more feeble and rapid, the appetite fails, and symptoms of complete exhaustion appear.

The general aspect of the patient is characteristic. The skin is sallow, the countenance pinched and shrunken, the upper part of the body emaciated, offering a striking contrast to the oedematous legs and distended abdomen, the skin spotted with petechiæ, and marked over the abdomen with meandering and distended veins.

Duration.—Cirrhosis is a disease of slow progress. It is frequently protracted to a period of two or three years from the occurrence of the incipient symptoms to the development of portal obstruction. The duration of the second stage is from three to twelve months. In some instances the disease has a much briefer duration, terminating in death within six weeks from the appearance of the initiatory symptoms.

The complications most frequently observed in cirrhosis are pneumonia, bronchitis, pericarditis, and erysipelas. Pneumonia is most liable to occur in those cases of cirrhosis which have been induced by the excessive use of intoxicating liquors, and death from an intercurrent attack of acute pneumonia is not an unfrequent termination.

Diagnosis.—In the early stages of cirrhosis the diagnosis is very obscure and difficult. The symptoms do not clearly point to any lesion of the liver, but indicate, rather, gastric derangement and a general impairment of health.

In the first stage of slowly developing cases the disease is liable to be mistaken for an aggravated form of dyspepsia. Usually, it is not until symptoms of obstruction appear, evidenced by ascites and general cachexia, that the true nature of the malady is suspected. The habits of the patient, or a known exposure of some duration to malarial influences, followed by the symptoms already detailed as belonging to the first stage of cirrhosis, should lead us to suspect that degenerative disease of the liver has commenced. Thierfelder observes in regard to the diagnosis of cirrhosis (*Ziemssen's Cyclopædia*, vol. 9, page 201): the diagnosis does not amount to a certainty, however, strictly speaking, until we have succeeded in feeling the granulations.

The diagnosis is often first of all rendered possible by puncture, not only from the circumstance that immediately after the evacuation of the peritoneal transudation the abdominal integument, then relaxed, permits, as a rule, the manipulation of the liver, but also because previous thereto we are often quite unable to define with certainty the size of the organ. Where we succeed in demonstrating only the diminished volume and increased consistence of the liver, but not the granulated condition of its outer surface, it must then remain undetermined whether we have to deal with cirrhosis or that form of *chronic perihepatitis*—extremely rare no doubt—in which, owing to the great shrinking of the thickened capsule, a diseased condition is developed, completely analogous in other respects to that of cirrhosis. Moreover, two other diseases of the liver, which likewise occur far more rarely, indeed, than cirrhosis, are occasionally so similar to it in appearance that they can be distinguished only when we have an opportunity of tracing their course, or when the ætiology furnishes a sufficient clue; these are occlusion of the portal vein by adhesive thrombi, or by compression, or by simple atrophy of the liver. The *occlusion of the portal vein* appears invariably as a secondary lesion consecutive upon other chronic diseases of the abdominal organs, and is usually followed by a more rapid development of the symptoms arising from mechanical obstruction than is cirrhosis; but on the other hand, this lesion never gives rise to enlargement of the liver, nor, indeed, to such remarkable lessening in size as frequently takes place in cirrhosis.

In *simple* atrophy which occurs almost exclusively in decrepit persons, and in which it is only in exceptional instances that ascites supervenes earlier than anasarca, the reduction in volume proceeds at a uniform rate in both lobes; in cirrhosis, on the other hand, it is, as a rule, quite far advanced in the left lobe, when in the right it first begins to be perceptible. *Diffuse chronic peritonitis*—the simple form as well as the tuberculous and cancerous variety—presents, moreover, under certain circumstances a complication of symptoms which render the diagnosis from hepatic cirrhosis extremely difficult. Where there exists an abundant exudation the fluctuation may be as evident and as extensive as in ascites, while the liver, being forced upward and backward, may be apparently diminished in size; here enlargement of the spleen may also be present (especially in tuberculosis, but also—according to Galvagni—in simple peritonitis), while the sensitiveness of the abdomen is wanting.

In cases of this class a careful consideration of the remaining conditions will occasionally aid us in forming a correct diagnosis. Simple and tuberculous peritonitis are, as a rule, attended with fever, and the skin does not present that dirty-yellowish hue observed in cirrhosis, but is simply pallid; in tuberculosis and cancer of the peritoneum there are also commonly found in other organs changes important as regards

the diagnosis (caseous deposits in the epididymides and lymphatic glands, carcinoma of the abdominal viscera and of the mammæ).

The *cyanotic atrophy and induration* of the liver is characterized, indeed, in common with genuine cirrhosis, by a gradual reduction in the volume which is usually at the outset enlarged, and by the presence of ascites; but here the anasarca precedes the ascites, and the dependence of the symptoms upon the insufficient action of the right ventricle may be determined with certainty from the appearances found in the circulatory and respiratory organs. A persistent *occlusion of the large excretory bile-ducts* which ultimately gives rise, likewise, to a gradual reduction in the size of the liver, is distinguished—independently of the symptoms of the highest grade of biliary obstruction which may also be present in cirrhosis in consequence of complications—from the latter by the circumstance that it does not induce swelling of the spleen, and that ascites is either absent or falls far short of attaining that height usually met with in cirrhosis.

In brief, the symptoms upon which a correct diagnosis can be found are: greatly diminished size of the liver, nodular feel of the organ, ascites, enlargement of the superficial veins, œdema of the lower half of the body, emaciation, sallow, dirty complexion, and cachectic appearance of the patient.

Prognosis.—The prognosis is exceedingly grave, particularly in the case of patients addicted to the excessive use of intoxicating liquors.

Although life may be prolonged for several years, and in some cases there may be remissions of the graver symptoms, yet a favorable termination of the disease can be rarely looked for. I have not been able to find a well-authenticated case of recovery from cirrhosis after the diagnosis had been well established. The prognosis generally relates to the time the patient may survive under careful and judicious treatment and nursing, rather than to the ultimate termination of the disease. Should a free collateral circulation be established, the progress of the disease will be much slower. Cases are recorded in which the ascites and œdema have disappeared for an indefinite period in consequence of a free circulation being established through the collateral blood-channels.

Death may occur from exhaustion in consequence of extreme emaciation and debility, or may be caused by one of the complications of the disease. In some cases death comes suddenly from profuse hæmorrhage of the bowels or from hæmatemesis. In other cases delirium, convulsions, or coma usher in the final scene, as in acute yellow atrophy.

Treatment.—The importance of an early diagnosis is in no disease more evident than in cirrhosis, for if any treatment is likely to be of benefit it must be directed against the disease in its first stages. When

cirrhosis is fully established, and symptoms of obstruction of the portal circulation manifest themselves, our best-directed efforts are of little avail to arrest its progress.

When a confirmed drinker begins to exhibit symptoms of severe gastric derangement, together with some enlargement of the liver and manifest disorder of the hepatic functions, it may reasonably be suspected that cirrhosis is impending. If he is warned by the physician of the threatened danger, he may heed the warning and, by promptly abandoning his cup, escape the disease.

If cirrhosis is a sequel of syphilis or of malarial fever, remedies suitable to combat the effects of these diseases should be administered, and in this latter case the patient, if dwelling in a malarious locality, should be advised to seek a more healthy residence. Independent of the morbid condition of the liver, the great number of accessory symptoms will require individual treatment, such as dyspepsia, constipation, diarrhoea, icterus, ascites, œdema, hæmorrhages, petechiæ, etc. Appropriate remedies for each of these conditions will need to be exhibited when indicated. It will hardly be necessary, neither would it be easy to call attention to the special indications for the remedies to meet the varying symptoms of the malady.

I would suggest *Nux vomica* on account of its well-known antagonism to the injurious effects of alcoholic excesses and malarial cachexias, and also for its curative action in constipation and dyspeptic symptoms; *Mercurius* and *Kali hyd.* as anti-syphilitic remedies when the disease shows evidences of syphilitic origin; *Arsenicum* and *Cinchona* during the stage of enlargement of the liver, and also when the disease is attended by hypertrophy of the spleen.

These remedies are also used when cirrhosis can be traced to the effects of malarial poison. *Bryonia* and *Chelidonium* for hepatic pains; *Apis* and *Apocynum* for serous effusions into the peritoneal cavity and connective tissues; *Digitalis* for cardiac complications and debility.

The only remedy likely to arrest the progress of atrophy is, I think, *Phosphorus*. In the exhaustive provings of this drug I find the following: Dulness over the liver, increasing (fifth day); the next evening the lower margin of the liver could be distinctly felt above the navel; on the seventh day the margin of the left lobe of the liver could be felt three inches to the left median line, and dulness over the liver extended above the fifth rib; diminution in the volume of the liver took place the twenty-third day; on the seventy-ninth day dulness over the liver was found to be unnaturally small; there was none to the left of the median line.

These symptoms correspond to those cases of cirrhosis in which enlargement of the liver is followed by atrophy.

For the complications which may supervene during the course of cirrhosis, such as pneumonia, bronchitis, pericarditis, erysipelas, etc.,

the same treatment is required which is indicated in the same diseases occurring primarily.

Other remedies to be considered are: *Arsenicum*, *Nitric acid*, *Plumbum*, *Aurum*, *Lachesis*, *Iodum*, *Conium*, *Podophyllum*, *Argentum nitricum*, *Lycopodium*. The totality of symptoms must guide in the choice.

If the accumulation of fluid in the abdominal cavity is large and becomes a source of serious inconvenience, or even danger, to the patient on account of the distressing dyspnoea arising from the pressure upon the diaphragm and heart, paracentesis should be performed. The operation should, however, be deferred as long as practicable, for experience has demonstrated that the fluid re-accumulates very rapidly, necessitating a second tapping in a week or two. Nevertheless, cases are recorded in which after repeated tapplings the ascites has disappeared for a considerable period.

Although the operation affords decided relief in many respects, yet it is generally followed by increased weakness in consequence of the loss of albumen caused by the rapid secretion afterwards.

But frequently paracentesis is the only alternative—the pressure of the effusion so greatly impeding respiration as to endanger life. The operation may be performed with a small-sized trocar or—as I prefer—with the aspirator, using the largest needle. With the latter instrument the fluid escapes slowly, thereby greatly lessening the liability to syncope. There is comparatively little risk of peritoneal inflammation or erysipelas.

An additional advantage in the employment of the aspirator is that its use is attended with little pain and discomfort.

FATTY LIVER.

Synonyms.—*Hepar adiposum*, *Adiposis hepatica*, *Degeneratio hepatis adiposa*.

Definition.—Fatty liver is that form of hepatic degeneration which is characterized by the accumulation of a large amount of fat in the parenchyma of the gland, accompanied by a symmetrical enlargement of the entire organ. As the fat globules are deposited in the secreting cells of the liver, and increase at the expense of the proper substance of the gland, it has happened in rare instances that the pressure thus caused has resulted in absorption of the real hepatic tissue, and so brought about a condition of atrophy instead of hypertrophy. But these cases are the extremely exceptional cases, and fatty liver is always classed among those diseases which produce enlargement.

The bare fact of the presence of fat in the liver is not sufficient to warrant the conclusion that disease exists, for the normal construction of the liver includes four per cent. of fat; and the ingestion of a large

amount of fatty matter may be followed by the temporary presence of an increased amount of fat in the liver. A distinction should be drawn just here, which is very helpful toward an easy apprehension of the true significance of an unusual deposit of fat in the substance of this gland.

This distinction turns upon the difference between fatty infiltration and fatty degeneration. When the accumulation of fat in the hepatic substance is symptomatic of a destructive pathological process, it is proper to speak of it as fatty degeneration. When some passing cause, as an excessively fatty dietary, sends into the liver a surplus of oil globules, which are speedily removed and are the expression of no really pathological condition, it is equally proper to denominate this state of affairs fatty infiltration. The cases of fatty liver found in course of post-mortem examinations held upon the persons of those killed by accident when in the full tide of health, should be classed under the latter head. But this distinction cannot be demonstrated in the living subject, for fatty infiltration has no subjective symptoms, and does not go far enough to attract attention by enlargement of the organ. Even fatty degeneration is not easily recognized, so that the distinction between the two is not clinical, but explanatory.

Ætiology.—It is hardly possible to touch upon the causation of this disorder without having brought to mind the Strassburg geese. It is with the name of this city that that peculiar mode of fattening these fowls which has for its special object the production of a greatly enlarged liver is most familiarly associated, though the ancient Romans were no strangers to the practice. The plan pursued is to confine the fowls in a dark place, deny them all opportunity for exercise, and stuff them with food to the last degree, even to pushing it down their gullets. This results in fatty degeneration of the liver with enormous enlargement, and the gland in this condition is esteemed a great delicacy. It has been asserted that by confining the geese and exposing them to an elevated temperature continuously sustained, and at the same time depriving them of all food, febrile action and emaciation are set up, and great enlargement of the liver produced. Conceding this account to be reliable, it is yet a fair question to ask what is the pathological condition thus forced upon the liver. When we consider the ordinary method of producing hepatic degeneration in the goose, it is at once apparent that the human goose, by virtue of his anserine qualities, is liable to suffer a similar affliction. Those whose chief delight in life is found upon the dinner table, and whose chief abhorrence is physical and mental exercise, have no right to be surprised if they eventually find themselves in the condition of the Strassburg geese. The use of alcoholic liquors, a habit which is so full of promise of various hepatic diseases, is another cause of this disorder. Frerichs ranks it high among the known causes, placing it next to tuberculosis.

In a second class of causes the responsibility rests with associate disorders, and not upon indolent habits of life or upon a faulty dietary. In the majority of cases fatty liver is a secondary disease, the primary affections being tuberculosis, cancer, gastric ulcer, or chronic dysentery. The occasional association of fatty degeneration with the three last-named disorders has been seen often enough to call attention to the fact, but has not been sufficiently investigated to develop facts of special interest. Its association with tuberculosis, however, is a point of much ætiological importance. A French physician, Louis by name, first called attention to the frequency with which fatty disease of the liver follows in the wake of tubercular phthisis. In his examination of tuberculous subjects he found fatty liver coexisting in about thirty-three per cent. It has been shown that the significance does not lie in the fact that the primary disorder is pulmonary, but in its tubercular nature, for pulmonary maladies other than the one signalized by deposit of tubercle are accompanied by no such hepatic derangement; on the other hand, let the tuberculous deposit take place elsewhere than in the pulmonary tissue, in the mesentery for instance, and the liver is as liable to suffer as though the tubercles were in the lung. So intimate is this connection between the tuberculous diathesis and fatty degeneration of the liver, that it has been recognized by all observers, and authorities are pretty well agreed that the existence of the former is the largest factor in the ætiology of the latter.

Pathology.—To some extent the presence of uncombined oil or fat in the human liver is a normal condition, being usually about equal to three or four per cent. of the whole liver substance, the secreting cells of the liver being at certain times and under certain circumstances constantly filled with fat. It is reasonable, therefore, to infer that the fat thus contained in the liver is necessary for the due performance of the functions of that organ; nevertheless, an increase of fat beyond a certain amount undoubtedly constitutes an abnormal condition, and we may only judge where to draw the line between health and disease by the morbid phenomena which an undue amount of fat in the liver creates. From his extensive observations Frerichs* concludes that the fatty contents of the liver rise and fall in relation to certain definite periods of development, and that these are possibly influenced by pathological conditions. It is altogether probable that the quantity of fat in the same person, in health, varies considerably at different times, according to variations in diet and other conditions, which will be hereafter considered. The deposition of fat is always limited to the secreting cells, never being found in the intercellular spaces. It is present in an oily or fluid shape, solid granules of fat being rarely found. The accumulation of fat usually causes the cells

* Op. cit., p. 197.

to enlarge, and when the disease is in an advanced stage their form is altered, their angular outlines disappearing, and the cells assuming a rounded form; when the accumulation of oil-matter is very considerable, the outer surface of the cell assumes an uneven character from the projecting oil globules. In proportion to the increase of the fatty matter, the remaining contents of the cells recede, and soon no trace of them is to be found.

Frerichs* distinguishes three stages in the development of fatty liver. In the first stage, the cells in the neighborhood of the ramifications of the portal vein become fatty, and this abnormal appearance gradually disappears towards their centre, the cells being here partly normal in their characters, but for the most part loaded with pigment. In the second stage, the deposit of fat advances more than half way to the centre of the lobules, and it is only in the immediate neighborhood of the central veins that we can detect cells still containing pigment and free from oil. In the third stage the change extends as far as the central vein. In well-marked fatty liver, post-mortem examination reveals enlargement and increase of weight of the organ, though the specific gravity is diminished, the organ sometimes being so light as to float on water. The margins lose their natural sharpness, and become thickened and rounded, and the surface is smooth. The enlargement is usually uniform, and the inferior border may extend more or less below the false ribs. A whitish or yellowish color, with opacity, prevails both externally and on section, this being generally mottled with red. Rokitansky describes the color to be like autumnal foliage. There is softening of the tissue, which has a doughy, inelastic feel, pits on pressure as in œdematous parts, and it readily breaks down or tears. The organ is anæmic, but little blood escaping from the cut surface. There is a loss of distinctness of outline of the lobules, and evidences of the presence of much fat may be obtained either by the knife, by blotting-paper, or by ether. A piece of the diseased structure held in flame, after the water is driven off, burns readily, throwing off blue sparks. A thin slice placed on a piece of white paper and exposed to heat, exudes oil in abundance, greasing the paper. The cut surfaces give to the finger passed over them an unctuous feel. Fat adheres to the scalpel in making the incision. The liver may yield as much as from 43 to 45 per cent. of oily matters, which consist of olein and margarin, with traces of cholesterine. Microscopical examination shows enlargement of the cells, which also become spherical, and are more or less loaded with fat. In advanced cases this may sometimes be observed without the aid of the microscope, but the latter is the most reliable test for the presence of fat in the hepatic cells, and it is altogether probable that before the microscopic test was

* Op. cit., p. 205.

employed, other conditions were not unfrequently confounded with fatty liver.

Symptomatology.—The symptomatology is singularly meagre. There are no subjective symptoms. In extreme cases there may be some sensation of weight and heaviness in the right hypochondrium, but even then there is no pain, neither is pain caused by thorough manipulation. The objective symptoms are those of a symmetrically enlarged liver. The surface is smooth, the edge blunted or rounded, the consistence soft and lax. The skin presents a change to the eye, assuming a semi-transparent and waxy appearance; and to the touch, under which the sensation is unctuous, velvety, or satin-like. Addison was so enthusiastic over this cutaneous condition as to call it “pathognomonic.” If the pressure within the substance of the liver be sufficient to impede the blood in its passage through the capillaries, and, therefore, through the portal vein as well, the resulting hindrance of the abdominal circulation may set up an irritation of the stomach, or an irritation of the intestinal tract, finding expression in diarrhoea, or distend the veins of the rectum to such a degree that hæmorrhoids are the consequence. Further than this there are no symptoms which are more than occasionally present. Ascites is rare, and jaundice is usually wanting, and always slight.

Diagnosis.—The diagnosis of fatty liver is no easy matter. Though we may fancy that we have that peculiar condition of the skin belonging to this disease, yet the enlargement of the liver is the leading physical sign. The peculiarities of this form of enlargement are its thickened border, smooth surface, and softness under pressure. This seems to distinguish it from cancer of the gland, with its familiar hardness and nodosities. Cancer elsewhere is sometimes accompanied by fatty liver, and is even considered one of its causes. The waxy liver attains greater size, is harder, and more tense.

In this poverty of diagnostic signs, when determining the presence of this disorder, dependence must be largely placed upon our knowledge of its causes. These causes have already been detailed and, with the frequent tendency to a coincident deposit of fat in other tissues, must enter largely into a diagnosis which must be one of probabilities rather than demonstration.

Prognosis.—There is no immediate danger, and almost no ultimate hope. When secondary to such a disease as phthisis, whose hopeless prognosis is a matter of universal knowledge, there can be no hope of recovery. In those exceptional cases where the disease is idiopathic, and reformation of habit regarding eating, exercise, and the drinking of liquors promises to remove the greater part of the cause, there is just reason to anticipate that the disease may be kept at bay. Be the cause what it may, there is no probability of a sudden fatal termination, as from the rupture of an hepatic abscess or

hydatid. The final issue of the case is, however, always unfavorable.

Treatment.—When the disease is the penalty for violation of hygienic laws, the treatment consists in the establishment of proper habits of life. Over-eating should be supplanted by a diet from which are excluded fats and the fat-producers; total abstinence must be rigidly enforced. Indolence should give place to exercise, caution being observed if there be reason to suspect that fatty degeneration has invaded the heart as well as the liver. As in the majority of cases fatty liver is secondary to some other disorder, it follows that the treatment must be largely directed to the primary disease. These primary diseases being fatal, it is plainly to be seen why the therapeutics of the hepatic affection are almost a blank, and why experience has so little to suggest. Phosphorus is strictly homœopathic to this disease, and Bayes claims to have used it with satisfactory results.

CANCER OF THE LIVER.

Synonyms.—Carcinoma of the liver, Hepato-scirrhus.

Definition.—Cancer of the liver is a term needing no definition beyond that belonging to the malignant dyscrasia whose local expression may be at the expense of almost any organ or tissue of the body. It is the commonest of all the hepatic disorders which involve organic changes, cirrhosis occupying the second place in point of frequency. Before the cancerous nature of the infiltrations, with the enlargements and nodules of this disease, was recognized, these various lesions received such names as tubera, steatomata, white tubercles, and hard tumors; and the older synonymy of the disorder includes these names. But now that the identity of the disease lying back of these apparently differing conditions is clearly understood, all its manifestations are grouped under the single designation of cancer of the liver.

Ætiology.—As is the case with cancer elsewhere, the only cause decipherable is the hereditary taint. Inquiry prosecuted in directions which promised to enlarge the boundaries of its ætiology has yielded little fruit. Sex is without influence here, the recorded cases showing a very even balance between the male and female. Age has some influence, as the disease is more common during the latter half of adult life; yet it has been found in infants. When the hepatic cancer is secondary to cancer preceding it in some other organ of the body, it may be said to have an immediate cause in the primary cancer located elsewhere; but this statement is destitute of real ætiological interest, and the whole subject of causation is contained in constitutional dyscrasia.

Pathology.—Cancer of the liver many occur primarily, but in a great majority of cases it is secondary to carcinoma in other parts,

and in one-third of the cases it has been found to be secondary to cancer of the stomach. When primary, it is usually limited to the liver and contiguous structures and organs, rarely spreading farther, the peritoneum covering the liver, the diaphragm, the duodenum, the stomach, and the pancreas sometimes becoming involved from contiguity of tissue.

Cancer of the liver is very liable to develop after the extirpation of cancerous tumors on the periphery. As a rule, it presents the characters of ordinary simple cancer, having characters intermediate between those of scirrhus and encephaloid, approaching more towards one variety or the other in different instances, this preponderance being in favor of the encephaloid or medullary variety. Usually, a cancerous growth in the liver assumes the form of distinct nodules or isolated tubercles imbedded in the hepatic parenchyma. These nodules vary greatly, both as to size and number, being small at first, and gradually enlarging until they may ultimately reach the dimensions of a child's head, or even attain a larger size than this. Ordinarily, several are found unequal in size, and by their coalescence considerable tracts of the organ are sometimes involved. Sometimes extensive portions of the hepatic tissue are infiltrated with cancerous matter, without any definite line of demarcation. Originally the shape of the nodules is rounded, but when they reach the surface they become flattened or, in many cases, depressed and umbilicated, presenting shallow concavities. This umbilication is produced by a fatty metamorphosis of the centre of the mass and contraction of the peripheral portion. The peritoneum is usually adherent, and is cloudy, thickened, and covered with a membranous exudation; but it may remain normal. The nodules, as a rule, are not separated from the surrounding tissue by any definite structure, but occasionally a distinct cyst exists around a cancerous mass. Usually the consistence of the mass is moderately firm, but it may range from that of a soft, brain-like, semi-fluctuating substance to a hard cartilaginous tissue, and the amount of cancer-juice which can be expressed will vary accordingly, being in proportion as the cancerous growth is soft and medullary. The color, on section, is in most cases white, or yellowish-white, but more or less dotted and streaked with red, on account of the vessels present; it may, however, be extremely vascular and dark red, resembling "fungus hæmatodes." The liver is usually enlarged in proportion to the number and size of the growths, being often extremely large and heavy, as well as irregular in shape. Its tissues are more or less destroyed and compressed, the vessels and ducts are encroached upon or obliterated, and, as a consequence, jaundice and signs of obstructed circulation are often present. Sometimes thrombosis occurs in the portal branches or trunk. New vessels are developed, formed by the hepatic artery. These vessels vary greatly in number, being most numerous

in the medullary varieties. Sometimes they are aggregated together in such large numbers as to cause the mass to have a dark-red hue, as before mentioned.

The explanation of the origin of the growth differs, some observers holding that it begins in the centre of the lobules, but it is pretty generally admitted that the morbid change originates in the interlobular connective tissue.

The new vessels developed from the hepatic artery have very delicate walls and are liable to rupture, infiltrating the mass with hæmorrhagic extravasation. When the periphery of the organ is reached by the new formation, hæmorrhage may take place into the peritoneum, and sudden death ensue from this cause.

When the cancerous deposits are near the surface of the liver, the serous covering is usually involved, localized peritonitis being excited, with consequent thickening and adhesions. Neighboring tissues may be involved by extension, and the lymphatic glands in the portal fissure are often implicated.

Rokitansky describes a form of hepatic cancer which he calls "infiltrated cancer," in which large portions of the liver are found converted into a white cancerous mass. The obliterated vessels and gall-ducts, which are surrounded by rudimentary liver-cells atrophied, fattily degenerated and colored by bile, often traverse this white mass as a coarse yellow framework. Towards the periphery the infiltrated cancer gradually passes into the normal parenchyma, as there are places where cancerous masses, and others where the liver-cells, are in excess. The growth of hepatic cancer is sometimes extremely rapid, especially in the soft variety, but hard scirrhus cancers increase very slowly. The increase, in most cases, seems to take place in paroxysms, periods of apparent repose alternating with others in which the nodules are painful and grow rapidly. Changes indicative of retrograde metamorphosis and decay occur in hepatic cancer just as in the same form of disease situated in other organs and tissues of the body. According to Frerichs* these changes consist in fatty degeneration of the carcinoma, as well as in its atrophy and shrivelling up. The cells lying in the meshes of the fibrous stroma become filled with oil-globules, and present a white opaque appearance; in this way the cancer structure assumes a reticulated aspect, or, owing to the atrophy of large groups of cells, nodular-like masses are originated. Ultimately the fatty cells may become disintegrated, and as a consequence an emulsive fluid may be formed, which gradually undergoes absorption. These changes occur chiefly in the central portions of the morbid growths, and the fibres of the reticulated stroma, when they take place, are densely aggregated, the meshes becoming smaller until there remains only a firm, cicatrized tissue, yielding on pressure

* Op. cit., p. 48.

no cancer-juice. These changes have been regarded by Oppolzer, Bochdalek, Hughes, Bennett, and others, as indications of the commencement of cicatrization and spontaneous cure of hepatic cancer. Frerichs doubts the conclusions to which these observers have come, and thinks they may have confounded carcinoma with the syphilitic cicatrices of the liver, the nature of which is now much better understood than formerly. He states that although the retrograde change may be distinguished in the centre of the cancerous nodule, a progressive development of disease is observed at the circumference; and from this he concludes that the morbid action has not expired, but is only locally destroyed. Melanotic, cystic, and colloid or alveolar cancers are so unfrequently found in the liver that their pathological peculiarities do not require special mention.

Symptomatology.—The enlargement and asymmetry of the organ, and the pain and tenderness experienced in this region, are the most important symptoms. While in rare cases the enlargement has been absent, and the diagnosis consequently obscured, yet the increase in size is a very constant symptom, and has its notable peculiarities. These are loss of shape in general outline through hypertrophy of a single lobe or portion of the liver, and deformity of its surface from the formation of nodules or tuberosities which sometimes become sufficiently prominent to be visible through the abdominal walls. Either or both of these peculiarities may be present in a given case; or the fact that the liver is misshapen may not be made out so clearly as the simple fact of general enlargement.

This process of enlargement is usually a rapid one, and the size attained is often very great, a case being on record in which the gland reached a weight of 15 pounds. Under palpation, the sensation commonly imparted is that of a body of considerable hardness, the exception being with the medullary variety of the disease, which is softer and may even afford fluctuation. The pain so characteristic of malignant growths, and the tenderness on pressure, become symptoms of moment because they are full of meaning as to just what is going on within, and offer a marked contrast to waxy and fatty degeneration and to hydatid disease.

These two chief symptoms, the objective symptom of enlargement and the subjective one of pain, are flanked on either side by another set of symptoms, one belonging to the early stage, and one to the latter stage of the disease. The early symptoms are those of deranged digestion; the bowels are distended with gas, the eructations showing its fetid nature; the appetite fails, there are nausea and vomiting and constipation. The group of symptoms appearing in the latter stage is made up of an excited and irregular heart-beat, dyspnoea, emaciation, a colliquative diarrhoea which has taken the place of the earlier constipation, the cancerous tinge of the skin, exhaustion, and death.

Certain other symptoms are occasionally present, but are of minor importance. Among these is jaundice, which may be caused by the incidental occlusion of a biliary duct from pressure exerted by an enlarged lymphatic gland, although the most extensive destruction of the hepatic tissue may fail to induce it. Once appearing, the jaundice never disappears. Whether it be present or not, the urine is scanty and high-colored. Ascites and œdema of the extremities are also occasional symptoms.

These various symptoms and sets of symptoms may extend over a few weeks, or be drawn out over as many months; but it is not often that the disease exceeds a year in duration, its course being comparatively rapid. Perforation of the diaphragm, rupture of the tumor, emptying its contents into the peritoneal cavity, and inflammation of the pleura or peritoneum, are accidents which are immediately fatal. But these accidents are exceptional, death usually resulting from the slower process of exhaustion.

Varieties.—Cancer of the liver may be either primary or secondary. When primary, there is developed but little tendency to the lighting-up of cancerous inflammations in other quarters of the body, only those tissues lying in the immediate vicinity being liable to suffer. The structures thus liable to invasion by reason of their contiguity, are the peritoneal covering of the liver, the duodenum, the stomach, the diaphragm, and the pancreas.

More frequently, however, cancer of the liver is a secondary affection; the primary seat of the disease being then, in most cases, in the stomach, pancreas, spleen, or intestine. These organs all belong to the portal system, and it has been remarked by various observers that secondary cancer of the liver follows, in a majority of cases, cancer of some viscus whose venous blood is poured in upon the liver. Frerichs's table of ninety-one cases of hepatic cancer shows forty-six to have been inaugurated in the secondary manner through the portal system, thirty-four of these originating in the stomach. Twenty-three other cases, out of the ninety-one, were secondary to cancer occurring outside of this portal circle of the circulation, leaving but twenty-two cases in which the cancer of the liver was the primary manifestation. Those cases in which the hepatic affection is secondary, and yet the primary disease is not within the portal system, will be found to have followed cancer of the mamma, lung, uterus, ovary, testicle, kidney, bone, or skin.

Turning from the division into primary and secondary cancer to question the exact nature of the cancerous growth, it is discovered that the varieties exhibited in the liver are coextensive with all the known varieties encountered in other localities. Scirrhus and medullary are the commonest forms, but cases have been reported embracing all the other varieties.

Diagnosis.—Like the other organic diseases of the liver, cancer in its earliest stages has nothing to offer whereby a correct diagnosis might be reasonably assured. The first symptoms are quite as suggestive of gastric disturbance as of hepatic mischief. But when the disease has progressed so far that the nodulated enlargement becomes apparent, no hepatic disease of an organic nature is easier of diagnosis. The enlargement, its lumpy, uneven character, the pain and tenderness, and the general cancerous cachexia make up a group of phenomena not liable to be mistaken. It is true that in very exceptional cases there is no enlargement; but even then the pain and tenderness will help determine the nature of the case, for painfulness becomes a significant symptom in an organ so wonderfully tolerant as is this, and such authorities as Frerichs and Da Costa agree that this is the most constant of all the symptoms of this disease. While care and discrimination are required, it is only exceptionally that the diagnosis cannot be made with a good degree of certainty.

Prognosis.—Rarely exceeding one year in duration, and, at times, completing its work within a few weeks, the termination is uniformly and invariably fatal. The prognosis is at once certain and prophetic only of death.

Treatment.—Without hope of curing the patient, there yet remains much to be done toward mitigating the miseries of the sufferer. The derangements of digestion and nutrition afford a very considerable field in which the proper remedies are not slow to show their usefulness; these are more especially *Nux vomica*, *Ipecacuanha*, *Pulsatilla*, *Antimonium crudum*, *Carbo vegetabilis*, and *Arsenicum*. The special indications for such familiar friends on such familiar ground need not be here rehearsed. In addition to the use of these remedies, supervision of the diet is important, lean meats, soups, vegetables, bread, and milk being the most desirable forms of food; these must be taken in small quantities and frequently.

Pain and sleeplessness are harassing accompaniments which demand relief. This is best accomplished by the use of Opium and the second decimal trituration of Atropine in such doses as may be adequate for the purpose. In those cases where ascites is present, and in such degree as to be burdensome from its weight and effect upon respiration, the fluid should be removed. This is done with little pain and perfect safety by means of the aspirator.

Nothing can be said of remedies to be applied for the direct purpose of curing the disease. Still, one cannot readily abandon altogether the hope that some such remedy as *Conium*, *Hydrocotyle*, *Hydrastis*, or *Arsenicum*, may some day substantiate its claim to active helpfulness in this now hopeless malady.

HYDATID TUMORS OF THE LIVER.

Synonyms.—Echinococcus of the liver, Hepatic cyst.

Definition.—Hydatid tumors of the liver are those cystic formations which spring up around the echinococcus when it has found its way to, and penetrated into, the substance of the liver. The echinococcus is the larval form of the *tænia echinococcus*, or dog-tapeworm. It is to the fully developed worm precisely what the caterpillar is to the butterfly. In its state of complete development this variety of tapeworm is a parasite infesting the several members of the canine family. But as the dog is the only member of this family which has been domesticated, and is, therefore, the only source of human infection, this worm is commonly spoken of as appertaining to him, although an exact statement would include the fox, the wolf, and the jackal. Like the other species of tapeworm, it finds its home in the alimentary canal; unlike the others, it never attains any considerable size, being about one-quarter of an inch in length, and having but four segments. While it is never found in the human intestine, yet, when by some accident or circumstance its ova, having made their escape with the excrementitious matters of the dog, find their way into the human body, they do not find their environment so inhospitable as to cost them their existence. They develop into the intermediate and rudimentary form, and bury themselves in the liver, there to set up the pathological process whose outcome is the hydatid tumor.

Ætiology.—It is seldom that the causes of a disease may be set forth so definitely and satisfactorily as in the present instance. They are: immediate cause, parasites; remote cause, dogs. This tells the whole story. To enlarge upon these two factors would be a work of supererogation. It might be said that the disease occurs among the poor rather than the rich; but that is only one way of saying that the squalid herd with dogs, eat, drink, and sleep with dogs, while the more thrifty classes do not.

Hydatid tumor of the liver is a very rare disorder in this country. Dr. Austin Flint makes the statement that Prof. Janeway, of Bellevue Hospital, with the largest opportunities for post-mortem observation, in ten years encountered but three livers so affected. A most extensive practice will fail to encounter more than a case or two. But this is not true of all countries. Europe seems to show a much greater frequency, while Iceland bears the unenviable reputation of being its favorite haunt. One authority states that on this island this disease affects one-sixth of the population; another, that it is the cause of one-seventh of the entire mortality; and a third, that the resident physicians have, at times, from eighty to one hundred patients so afflicted. With Dr. Kane's testimony as to the filthy habits of life within the arctic circle, added to the fact that in those regions dogs bear as im-

portant a relation to society as does steam in our own latitude, we need not be at a loss to know why this northern isle should be so scourged by the ravages of this parasite.

There appears to be some connection, which has received as yet no explanation, between external violence and the development of the hydatid growth. Frerichs and Budd both note the fact that in quite a proportion of the recorded cases the tumor was noticed after a blow on the side, of which the patient supposed it to be the consequence; of Prof. Janeway's three cases, to which reference has been made, two had suffered mechanical injury of the liver. No plausible explanation of these coincidences has been offered.

One other possible element in the ætiology of this affection has received considerable attention. Sheep are liable to infection with this variety of tapeworm, its career in their organism being exactly the same as in the human system. When a human being is thus affected, there is no danger of his communicating the disease to any other individual. If he dies, his disease is buried with him. Not so a sheep. Presumably healthy, it may be slaughtered for food; and dogs devouring the offal may swallow some of these echinococcus cysts. The contained worm, theretofore immature, is now once more in its most congenial home, and grows to maturity, thus infecting a previously healthy dog, and creating a new centre for the dissemination of the ova of the parasites. On this score it is held that shepherd-dogs and butchers' dogs are specially liable to form, with the sheep with which they come in contact, a complete apparatus for the cultivation of the two forms of this worm. Nor is it necessary that the dogs should feed upon the liver of the sheep, for the echinococcus is not confined to the liver, but may be present in any viscus.

Anatomical Description and Pathology.—In most cases only a single hydatid is developed in the liver,* but they are sometimes very numerous, and occur more frequently in the right lobe than in the left. In the hydatid tumors found in man there is usually seen in the contained liquid a number, varying greatly in amount, of globular bladders or cysts similar to that lining the sac. These small cysts are of very different sizes, some being as small as a pea, others larger than a walnut. These are the *Acephalocysts* described by Laënnec, and which Frerichs looks upon as hydatids containing no scolices. The anatomical characters of a typical hydatid cyst are thus described by Roberts †: 1. Externally there is a firm, whitish or yellowish, fibrous, vascular capsule, the result of proliferation of cellular tissue from irritation, which is adherent to the surrounding structures. 2. Within this, moulded, as it were, to its interior, but easily separated from it, is a delicate cyst or bladder, elastic, grayish, semi-transparent or gelatinous in aspect, and compared to boiled white of egg; under the micro-

* Frerichs, *op. cit.*, p. 7.

† *Theory and Practice*, vol. ii., p. 223.

scope this is seen to consist of several hyaline, concentric layers, a section presenting a characteristic laminated appearance. The most internal layer is extremely delicate, and is studded with minute transparent cells. The term mother sac or vesicle is usually applied to this structure as a whole; but it has also been limited to the internal lamina just mentioned, likewise termed the germinal membrane. 3. A quantity of fluid is contained within this cyst, usually completely filling it, perfectly colorless, transparent, and watery, as a rule, occasionally slightly opalescent, of low specific gravity, 1007 to 1009, generally alkaline or neutral in reaction, but occasionally acid, and consisting mainly of a strong solution of chloride of sodium, without any albumen or other organic substance, but said to contain succinate of soda. 4. Floating in this fluid, or attached to the inner surface of the mother cyst when small, are numerous secondary or daughter cysts; in some instances these amount to hundreds or thousands, and completely fill the space, so that there is little or no fluid, and they become flattened by natural pressure; each daughter cyst has precisely the same structure as the mother sac, and within the larger of them there may be a third generation, and, rarely, a fourth is observed. 5. When the walls of the sacs are examined carefully, little whitish opaque spots are visible on the inner surface, which are the scolices of the echinococcus in various stages of development, usually arranged in groups or clusters, but occasionally single. These may also be free in the fluid, rendering it somewhat opaque. Each scolex is very minute, measuring from $\frac{1}{2}$ th to $\frac{1}{3}$ th of a line in length, but the length and form vary according as the head is retracted into the body or extruded. The head presents a proboscis, four suckers, with a double circle of characteristic curved hooks, which are movable and of unequal length; a constriction separates it from the body, the latter being striated longitudinally and transversely, and presenting posteriorly a depression with a pedicle, by which the animal is fixed to the sac in its early condition. Numerous round and oval calcareous particles are imbedded in the tissue. The size of the cysts varies greatly. Sometimes one will attain such dimensions as to completely fill the abdomen, and even to encroach upon the chest. The daughter cysts usually range from a millet-seed to an egg in size, but subsequent generations are very minute. The size, shape and appearance of the liver varies with the number, position and growth of the cysts. With their development the hepatic tissue is correspondingly atrophied, by being encroached upon, while the rest of the organ remains intact, or undergoes hypertrophy, or becomes hyperæmic. The larger blood-vessels and bile-ducts are seldom affected by the cysts, so that jaundice and ascites rarely occur, but they both may suffer, sometimes becoming entirely obliterated. Sometimes, by a breaking through of the bile-duct in the course of the development of the cyst, a communication is

established between the two, and bile entering the cyst causes an arrest of its growth. Sometimes the vesicles escape into the bile-ducts and, becoming impacted there, cause dilatation of the ducts, and ultimately pass into the gall-bladder or the bowel, and may be thrown off from the latter, a cure thus being effected. Sometimes, also, in the same way, after adhesions are formed, the cyst may be evacuated into the stomach or neighboring bloodvessels; or, when the diaphragm has been gradually thinned, and finally perforated by the pressure, the sac may empty into the pleural cavity or into the lung adherent to the pleura, or, more rarely, into the pericardium. Occasionally the cysts undergo calcification, the envelope becoming thicker and tougher, and calcareous salts being deposited; expansion and growth are prevented, the parasites die, and are found flattened and contracted. In other cases there is developed on the interior of the capsules a dense, honey-like or puriform fluid, which had previously been clear, and then milky, and remains of the scolices, especially of the hooklets, are found floating in, or mixed with, the contained fluid. Crystals of hæmatoidine and bile also are found mixed with the wasting cysts. According to Frerichs, in a large proportion of cases the echinococci of the liver are in this manner destroyed and become harmless. Sometimes the cyst ruptures through the distended and thinned peritoneal covering of the liver, the contents of the sac entering the peritoneal cavity and exciting a severe peritonitis. Frequently local peritonitis is excited by the presence of the enlarged organ, and thickening and adhesions occur.

Virchow* describes a rare form of this disease which he called "Ulcerative multilocular echinococcus-tumor," or the multilocular hydatid cyst. The liver is found occupied by a mass, in some cases as large as a child's head, or even larger, consisting of a stroma or cellular tissue, usually altered considerably by fatty degeneration, in which are imbedded cells or alveoli of various sizes, inclosing a gelatinous substance, microscopic examination of them revealing fragments of the laminated membrane of hydatids, hooklets, or occasionally even perfect scolices, as well as abundant calcareous particles. The centre of this mass is very liable to undergo suppuration, thus altering its characters considerably. This arrangement of the tumor has been attributed to the embryos having been deposited in the lymphatics, bloodvessels, or ducts of the liver; or to the absence or early rupture of the external fibrous cyst, so that the parasites are able to grow and migrate in various directions, and may thus enter the different vessels.

Symptomatology.—This disease is altogether destitute of symptoms until the hydatid has attained a size which challenges the attention by presenting a tumor or enlargement of the liver. Up to this point there are no symptoms. There is no disturbance of hepatic function, no jaundice, no digestive derangement, no irritation of the

* Virchow's "Archiv.," vol. xxxiii., p. 16.

lung until the growth is large enough to cause mischief by its mechanical presence. Pain, febrile action, and constitutional depression are entirely wanting. In this absence of any signal of distress up to the point where the cyst reaches a certain size, it must be true that any hydatid which halts by self-limitation before reaching this size, necessarily passes unsuspected and unrecognized. Only those cases can be apprehended by the physician which attain a development great enough to exhibit enlargement and to produce disturbance. How many cases fall short of such development and pass an undiscovered existence, can only be a matter of conjecture. The remains of old cysts of this sort have been more than once brought to light by post-mortem examinations. But as these small cysts give no sign and do not threaten life, they are devoid of clinical interest except as they bear upon the question of the frequency of the disease.

Those cases which pass beyond incipiency, and come under the physician's observation, present first an enlargement of the liver. This is progressive, until either a tumor may be made out, or the enlargement of the liver becomes notable for its lack of symmetry, the increase in size seeming all to tend toward some one quarter of the gland. The tumor or enlargement may be projected from any aspect of the liver. It is smooth, elastic, and somewhat soft and fluctuating. Some subjective symptoms also appear, such as fulness, uneasiness, weight, and dragging. When the growth is in the direction of the thorax, pushing up the diaphragm, we are met with embarrassment of respiration, cough, and cardiac irritability. If it encroach upon the stomach and intestines, disturbances of digestion become prominent. More rarely, pressure upon the vessels of the liver itself induces ascites or jaundice; or crowding of the vena cava results in a swelling of the lower extremities which is partly cedematous and partly due to the varicose condition thus thrust upon the veins whose outlet is obstructed.

As a matter of course, there is a sudden accession of severe and alarming symptoms whenever the cyst may chance to burst. When the contents are emptied into the pericardium, the new symptoms are those belonging to cardiac oppression and fatal pericarditis. When into the vena cava, some secondary cyst finds its way into, and plugs, the pulmonary artery, and death is by asphyxia. When into the cavity of the peritoneum, the resulting peritonitis is sharp and hopeless. When into the cavity of the pleura, pleuritis is excited, not necessarily fatal, as relief may be obtained through the lung and bronchi. Discharge into the stomach will give us vomiting; into the intestine, no special symptom save the escape of characteristic matter per anum; and discharge by either of these routes may be followed by a favorable termination.

Diagnosis.—As suspicion of the presence of the disease is not aroused until the tumor or enlargement becomes perceptible, the first,

and about the only, problem to be met in the diagnosis is to determine the growth to be an hydatid rather than the product of some other disease of the liver accompanied by increased size. The task is not a difficult one. The affections which, by reason of the enlargement they produce, present themselves for exclusion, are abscess, cancer, waxy and fatty degeneration, and distension of the gall-bladder. An abscess so prominent as to present a tumor-like appearance is an abscess so well marked that the ordinary constitutional and local symptoms could not well be absent, to say nothing of the slow evolution of the hydatid as compared with the rapid course of abscess. It is true that suppurative inflammation has been set up within the hydatid tumor, when differential diagnosis is scarcely possible even with the aspirator. But in such an event the hydatid disease is, to all intents and purposes, transformed into an hepatic abscess; and to so diagnosticate would be clinically correct, though it might be considered theoretically inexact.

The cancerous growth is painful, nodulated or lumpy, and hard, all three of which characteristics are in sharp contrast with those of the hydatid. The latter is painless, presents a smooth surface, and is soft enough to yield fluctuation. This fluctuation is peculiar, and has been described as the "purring tremor," "thrill," or "fremitus," and likened to the sensation imparted by the trembling of a mass of jelly. It is best obtained by placing two or three fingers flat on the surface, directly over the growth, and by striking them sharply, while held firmly in position, with the fingers of the other hand. Frerichs records a case of hydatid disease mistaken for cancer, because of the existence of pain; but it is very rarely that pain is attendant upon the growth of this cyst, and, taken with the other points of difference, mistake is unnecessary. Waxy and fatty degenerations are distinguished from hydatid disease by the symmetrical enlargements of the two former, and the altered shape of the liver, or tumor, resulting from the latter. A distended gall-bladder should be known by its situation, shape, accompanying jaundice, and attacks of colic.

Pleuritic effusion may simulate hepatic enlargement by increasing the area of percussion dulness, and so possibly suggest the presence of a cyst projecting from the superior surface of the liver and pushing its way upward. But in effusion the upper boundary line of dulness, when the patient is in the erect posture, is horizontal, and is changed by the assuming of a recumbent position, while the hydatid shows an arched outline unaffected by change of position.

The pulsation and pain of aneurism of the aorta are points of difference ample for the avoidance of blunder in this direction. But if, even in the face of these marks of distinction between hydatid and the various other disorders, doubt still lingers in the mind of the physician, the aspirator will readily settle the matter, for the fluid from the cyst will show itself clear and transparent, remarkable alike for the absence

of albumen and urea, and the presence of chloride of sodium. In the words of Murchison, "These characters apply to no other fluid in the body, whether healthy or morbid. Even if the case should turn out to be an aneurism or cancer, no harm is likely to result from an exploratory puncture."

Prognosis.—The prognosis is very grave. In occasional cases of great rarity, while yet the hydatid is small, the contained echinococci die, and the growth undergoes a retrograde metamorphosis. Except in such cases, the tumor gradually but steadily enlarges until it bursts, unless there be operative interference. If it attain great size before bursting, there may be danger from the high degree of pressure exerted in this busy and important region. When it bursts, there are so many chances for death from a discharge into cavities or vessels unable to withstand the shock of such intrusion, to the one single chance of discharge by a less dangerous route and final recovery, that the greater probability does not lie on the side of recovery. In the fact of a circumscribed collection of fluid in the liver, in the identity of the possible and probable destinations of the fluid when it escapes from its confinement, and in the serious aspect of the prognosis, hydatid disease bears a striking likeness to hepatic abscess. The resemblance also extends to the influence for good which the prompt use of the aspirator exerts, thus making the prognosis less gloomy. But there is a sharp difference between the two diseases in their duration. It must not be forgotten that though in hydatid disease the prognosis must be very guarded, yet the probably fatal termination is long delayed. The enlargement of the cyst is very slow, the disease being measured by years. Barrier's collection of twenty-four cases would put the average duration at from two to four years, while it at the same time includes single examples in which the disease was prolonged over periods of fifteen, twenty, and thirty years. Thus the prognosis must be guarded as to the duration no less than as to the final issue.

Treatment.—Preventive treatment is a very simple matter. The entire prophylaxis is included in the single admonition to beware of the dog. Avoidance of too intimate association with the canine family, and of gross uncleanness in personal habit and home surroundings, insures escape from hydatid disease.

There is no medicinal treatment deserving the slightest degree of confidence. It has been conceived that Iodide of Potassium and Mercury might have the power to enter the growth, destroy the parasites and cause absorption. But they have proved useless. The one essential thing, which must be accomplished by any treatment worthy of indorsement, is the destruction of the echinococci. If they be once deprived of all vitality, the system will make safe disposal of the tenantless cyst. We fortunately possess ready means for the accomplishment of this end, for the withdrawal of the contained fluid is all that is

necessary to effectually destroy the echinococci which live in it. This is easily and safely done with the aspirator, its use being free from any danger of leakage into the peritoneum, or liability to set up purulent action within the sac by the admission of air. This method is obviously to be preferred to the use of trocar, canula, and drainage-tube, which might be called a ruder form of the same procedure, and which has been used with considerable success in Iceland. Still less desirable is the injection of Iodine, though it has been used in certain instances with favorable result. Up to the present time, experience had with the aspirator seems clearly to indicate that it is the best possible weapon against this disease. Murchison collected a table of forty-six cases in which a very fine trocar was used, practically equivalent to the aspirator except that it labors under the disadvantage of being liable to permit the introduction of air. Of these forty-six cases, forty-three recovered, thirty-five without accident, while suppuration in ten was met by a free opening, and two of these died. The one remaining case died from peritonitis.

The only means of cure really contesting the supremacy of the aspirator is electrolysis. At least eight cases of its successful use have been reported. The positive pole is applied to the surface in the immediate vicinity, and two needles, connected with the negative pole, are inserted into the cyst. The chemical decomposition thus induced destroys the structure of the echinococci, effecting their inevitable annihilation. While objection can hardly be raised to the intelligent use of this method, aspiration is at least as effective, and much simpler.

WAXY LIVER.

Synonyms.—Lardaceous liver, Amyloid degeneration, Colloid liver, Bacony disease, Morbus cereus, Scrofulous liver.

Definition.—Waxy liver is a rare form of hepatic degeneration in which the gland becomes greatly enlarged, while its substance acquires a firmness and solidity of texture and a semi-translucent quality not unlike beeswax—a resemblance which gives the disease its name. In the first half of the present century it was confounded with fatty degeneration, of which it was supposed to be a variety; but, though the coexistence of the two diseases is not unknown, waxy liver is now recognized as an independent and totally distinct disorder. Neither is this particular pathological process peculiar to the liver, the hepatic disease being often accompanied by a degeneration of the spleen and kidneys identical with that going on in the liver. Chemistry has not yet been able to tell us what this waxy substance is, but its behavior in the presence of iodine has suggested that it may be akin to starch. It must be confessed that the evidence to this effect is slender; and

yet, it is the feature which has given it the name of amyloid degeneration.

Ætiology.—Waxy liver depends wholly upon a previously existing dyscrasia. It is the result of a depraved habit of body. The minds of both the profession and of the laity are too apt to drift into the belief that a disease, seemingly cured, is as harmless as no disease at all. The public should be warned that, at least in the majority of cases, diseases followed by recovery do yet leave the defences of the system somewhat the worse therefor. The truth of this assertion finds emphasis in the causes of waxy degeneration of the liver. One of these is the cachectic bias attending that protracted suppuration which waits upon caries and necrosis. Another is the syphilitic poison in its later stages. The suppuration may not have been supposed to be capable of carrying with it any possibility of evil beyond the drain implied in the continued formation of pus; it may have been thought that the syphilitic poison was entirely eradicated; yet the damage sustained by the system in both these instances may have been so much greater than could be guessed that profound organic disease of a most important organ is the consequence.

Authorities differ as to which of these two causes, long-continued suppuration or syphilis, is the more prominent. But there is no question that one or the other of them stands behind most cases of waxy liver. It used to be supposed that mercurial poisoning is capable of producing this condition, but that idea is now abandoned. Waxy liver is sometimes found in association with tubercular disease, but far less frequently than is the fatty liver. Its production through the agency of malarial poison is very doubtful. As to sex, the disease is much more common in males than in females.

Pathology.—This condition depends upon a deposit in the liver-cells and in the walls of the hepatic vessels of a peculiar substance, giving the liver a somewhat translucent appearance, resembling beeswax or Canada balsam, but the exact nature of this deposit has not been satisfactorily ascertained, the general view being that it is of an albuminoid nature, being allied to albumen and other protein elements. The minute arteries and capillaries are almost always first involved, especially their muscular coat and the cells of their inner coat. The walls become thickened, the channel is narrowed, and on section the vessels remain patent, while they assume a compact, translucent, shining appearance, so that they resemble silvery cords or threads. After a time the material extends to the cells and intercellular tissues, enlarging the former and making them more spherical, at the same time displacing their normal contents, the nucleus being ultimately destroyed. The cells then coalesce, and the whole structure finally presents the peculiar glistening appearance before mentioned. It is supposed by some that the substance makes its way directly through the

walls of the vessels, and afterwards extends into the surrounding tissues. Sometimes the deposit only occurs in isolated, small or large, spots; but, most frequently, it is more or less uniformly distributed throughout the entire organ, but in such a manner that the disease is more marked in some places than in others. The liver is enlarged, sometimes enormously, but without any irregularity in form or outline, the surface being quite smooth, and the margins inclined to be rounded. The organ has a doughy consistence, and is dense and resisting. On section the surface is homogeneous, and resists the knife almost like cartilage, and is anæmic and whitish, the section being smooth, dry, and firm, while little or no stain is communicated to the blade, as in fatty liver; when the disease is far advanced, no trace remains of the proper structure of the organ. Waxy liver is frequently found associated with fatty degeneration and with cirrhotic induration, where, of course, the condition is modified to correspond with these diseased states.

The presence of the waxy deposits may be ascertained by the use of iodine and sulphuric acid. The parts to be examined must be carefully cleansed, and a solution of iodine with iodide of potassium in water, or diluted tincture of iodine, brushed over, when they assume a mahogany color, quite different from the yellow color of the healthy tissue. This reaction may be sufficiently characteristic of itself, but, if to the iodized surface is now added some diluted sulphuric acid, the affected parts, after some minutes or hours, take on a violet tint, more rarely bluish. The violet color may be very deep, almost black.

Waxy degeneration is not confined to the liver alone, but involves the spleen, the kidneys, the lymphatic glands, the intestinal mucous membrane, and other organs.

Those portions of the liver remaining unaffected by this morbid deposit are in a state of congestion, and are softer; or, as has been before mentioned, they may be involved in fatty or cirrhotic degeneration, or syphilitic gummata may be mixed up with the amyloid deposits.

The true pathology of waxy degeneration, the *modus operandi* by which it is first inaugurated, is, as yet, undetermined. Frerichs* mentions two modes by which it is possible for the condition to be established: first, the degeneration may be due to deposition from the blood; or, second, the waxy substance may be developed in the part from some albuminous matter previously deposited. Virchow† insists that the gradual infiltration of the parts in a waxy degeneration is with a substance brought to them from without. This view he bases partly on the fact that a whole series of organs is implicated, and that the morbid process is not confined to a single spot, but affects at the same time many parts of the body. Although impressed with the belief that the waxy change is determined by deposition from the

* Op. cit.

† Cellular Pathology, p. 339.

blood, neither he nor any other observer has thus far succeeded in detecting any distinct change in the blood.

Symptomatology.—The symptoms of waxy liver divide themselves into two classes, viz., those of hepatic enlargement, and those of gastro-intestinal disturbance. The enlargement of the liver is a very gradual process, continued for a long period of time, perhaps for years; but the size finally attained may be enormous, the gland reaching dimensions three or four times greater than those of the normal organ, and apparently monopolizing the entire abdominal cavity. The surface is smooth, and the feeling imparted to the hand is that of great firmness. The liver might almost be called hard. Beyond a mere feeling of fulness in the right hypochondrium there is no pain, neither does manipulation develop any tenderness.

The gastro-intestinal irritation is decided. The stomach does its work poorly and painfully, there is more or less nausea and vomiting, much gas is generated in the intestines, and the stools become liquid and lose their natural color. Not unfrequently the same pathological condition exists in the spleen and kidneys. In this event the spleen presents enlargement, while profuse, pale urine, of low specific gravity, containing albumen, betrays the implication of the kidneys. Dropsy and jaundice do not occur save as the accidental result of mechanical pressure.

In considering the symptomatology of this affection, it must be borne in mind that it is ordinarily a secondary disease, and that the anæmic symptoms which attend protracted suppuration, or the peculiar manifestations of the specific taint, will be found preceding and accompanying those symptoms which belong to a waxy liver, the latter being gradually added to the former.

Diagnosis.—Until the disease has progressed far enough to produce enlargement, diagnosis must of necessity be impossible. When it reaches that point, it is hardly liable to be confounded with more than three other hepatic affections, *i. e.*, fatty liver, syphilitic liver, and cancer. A *fatty* liver is softer, and is unaccompanied by splenic and renal disorders; a *syphilitic* liver is known by its nodules; a *cancerous* liver is tender and painful. These differences, coupled with our knowledge of the ætiology of the disease, free the diagnosis from any special difficulty.

Prognosis.—With no sudden fatality to be provided for, and with every prospect that the flame will flicker long in its socket before the lamp of life goes out, the prognosis is still unfavorable in the extreme. It is not absolutely hopeless, for cases which had not progressed very far have recovered; but the usual course of events is that of a slowly advancing chronic malady, with a finally fatal termination, the immediate cause of death being either simple exhaustion or some intercurrent inflammation.

Treatment.—An additional reason for the watchful care over syphilis and for the limiting of protracted suppurations is set before us in the fact that they threaten the liver with this profound organic disease. The therapeutics of syphilis are elsewhere detailed, and cannot be taken up here. The power of such remedies as *Calcareo carbonica* and *Silicea* in chronic suppurations is universally known; and just so far as such suppurations may be the cause of waxy liver, the remedies for the one are the remedies for the other.

As to direct treatment for this disease, there is none known. Cures have been claimed for Nitric acid and *Aurum muriaticum*; but they stand in such close relation to the syphilitic virus that it is hard to believe that any favorable result from their use could have been more than an improvement resulting from a checking of the specific poison. *Tolle causam* sums up the possibilities of treatment in this disease at the present day.

CATARRH OF THE BILE-DUCTS.

Definition.—A catarrhal inflammation of the biliary canals, resulting in tumefaction of the mucous membrane of the ducts, and usually accompanied with pain, tenderness, distension of the gall-bladder, and icterus.

Ætiology.—Catarrhal inflammation of the biliary canals is of not unfrequent occurrence. The inflammation may involve the mucous membrane lining the entire biliary tract, or it may be limited to a small portion of it.

Catarrh of the bile-ducts may arise from a variety of causes. It usually depends upon the extension of an existing gastro-enteric catarrh along the ductus choledochus to the cystic duct and to the branches of the hepatic ducts. Thus, as a sequence of gastro-enteric catarrh, it results from over-loading the stomach, or from eating indigestible foods; from the indigestion of spoiled and unsuitable food, or of substances which, owing to some idiosyncrasy, are noxious in individual cases; also from the use of copious draughts of ice-water or other cold drinks; exposure to cold or wet, or to drafts while overheated, or to sudden changes of temperature.

It may arise from the existence of malaria, or of syphilis, from the extrusion of gall-stones, from mechanical injuries, and from the irritation of distomata and other intestinal parasites; also from poisoning by chemicals and the action of irritating medicinal preparations.

In some instances the inflammation is due to blood-stasis, the result of enfeebled action of the heart or of valvular insufficiency. Occasionally the disease appears in the form of an epidemic, when it is usually referable to specific causes. Its prevalence in military encampments, where there are large aggregations of men, is doubtless due to priva-

tion and fatigue, together with lack of proper food and hygiene. In isolated cases, as well as when the disease is local and endemic, its existence is usually traceable to some definite source. Indeed, analogy would teach that catarrhal inflammation of the bile-ducts is produced by causes closely related to those which produce catarrhal inflammation in mucous membranes elsewhere. Depleting diseases, as cholera and typhus, are important ætiological factors, and Frerichs maintains that a large majority of cases are traceable to gastro-enteritis. In thirty-four out of forty-one cases (over 80 per cent.) cited by this author, there was a preëxisting inflammation of the stomach and duodenum.

Pathology.—It is only when life is terminated by some intercurrent violent disease that opportunity offers in the early stages of this affection for noting the pathological conditions attending it.

It is obvious that the appearance of the mucous membrane cannot be observed in the various stages of hepatic catarrh. Usually the existence of the catarrh is not suspected until icterus appears; but it is more than probable that the changes which occur in the mucous membrane lining the canals are analogous to catarrhal inflammations elsewhere.

Post-mortem appearances evidence the swelling of the membrane and the presence of a tenacious, viscid mucus upon the inflamed surface.

The lumen of the ducts, already diminished by the swollen membrane, is more or less occluded by the mucous secretion which partially or completely arrests the discharge of bile. The retained bile is mixed with the mucus secreted from the inflamed tissues and with exfoliated epithelial cells.

When the outlet for the bile, the ductus communis, is obstructed, the gall-bladder becomes distended, and the tissues of the liver are tinged with its secretion. Both the weight and size of the organ are somewhat increased. The lumen of the ductus communis becomes dilated above the point of obstruction when the stoppage is complete.

Beyond the point of obstruction the mucous membrane is swollen and œdematous and does not show the yellow tinge, thus giving proof of the impervious condition of the duct. At the point of obstruction will be found a plug of tough, grayish-white mucus. Usually these mucous plugs disappear with the subsidence of the catarrh.

Sometimes, however, a post-mortem examination at a later period reveals the presence of mucous plugs in the finer hepatic canals where they form a permanent obstruction to the passage of bile. If the inflammation is limited to the gall-bladder and cystic duct, there occurs but little, or no, enlargement of these organs, save that which may result from the swelling of their tissues and from the retention of a viscid mucus secreted from their lining membrane. When the cystic duct is

impervious, the gall-bladder contains a tough, ropy, light-colored mucus or a muco-purulent mass, in which are large numbers of exfoliated epithelial cells from the inflamed mucous membrane. If, on the other hand, the canal is not obstructed, the biliary secretion finds its way into the gall-bladder, where it mixes with the products of the inflamed membrane and constitutes a viscid, greenish or brownish-yellow mass of considerable consistency.

Symptomatology.—This affection is usually preceded by symptoms of gastro-enteric catarrh. The patient complains of nausea and bitter taste; the appetite is depraved, the tongue furred, and there are tenderness and distension of the epigastrium, and other evidences of gastric irritation, as thirst, fever, and general malaise.

The bowels are usually, but not always, constipated; in cases in which the digestive irritation is severe, the evacuations may become diarrhœic.

The manifestation of these symptoms in severe cases is succeeded for a few days by unmistakable evidences of hepatic obstruction. No pathognomonic symptoms betray the existence of catarrhal inflammation of the hepatic ducts. When the ductus communis alone is the seat of the catarrh, the discharge of the secreted bile is obstructed, and the gall-bladder becomes distended. When the inflammation is limited to the cystic duct, there results little or no distension of the gall-bladder; perhaps, a dull pain and general uneasiness in the right hypochondrium, with slight nausea and fever, are all the symptoms produced.

Indeed, so slight may be the complaint that it may be altogether overlooked.

When the ductus communis is entirely occluded, the stools become uniformly grayish or chalk-colored.

If the lumen of the tube is but partly obstructed by the swollen membrane, bile escapes from time to time, forcing the secreted mucus before it in its passage; in this event the stools will be more or less tinged with hepatic secretion.

Jaundice will be found a constant symptom, excepting in those cases in which the catarrh is limited to the gall-bladder and cystic duct, and in which the catarrhal condition is so slight as not to obstruct the discharge of bile. Icterus early succeeds the occlusion of the hepatic canals, varying from two days to as many weeks. Its appearance is most readily observed on the delicate conjunctiva.

The eyes and skin assume a more or less marked yellowish or orange tinge, and evidence the non-elimination of bile from the blood.

The urine is loaded with the bile, and the kidneys now become the chief organs concerned in its elimination. Chemical tests reveal the presence of the biliary acids in the urine.

Patients become irritable and, while the icterus remains, are fre-

quently affected with pruritus which is aggravated by heat and the warmth of the bedclothes. The pulse rate is retarded, and frequently drops to 55, or even 50, pulsations per minute.

Jaundice manifests itself to a lesser degree when the catarrh is limited to the finer hepatic tubes, and the stools evidence the elimination of the hepatic secretion to some degree through the digestive tract. When icterus is wanting, the other symptoms may be so slight as scarcely to attract serious attention.

Simple uncomplicated cases of catarrhal inflammation of the hepatic canals are of very brief duration, usually terminating in from 10 to 15 days. However, when gastro-enteric catarrh is the occasion of the inflammation, and when other complications exist, the period of recovery varies from three to four weeks.

Frerichs cites a case from his experience which was protracted for several months. When the inflammation is excited by a local irritation the period of duration is modified by the existence of the exciting cause. Rarely, suppuration follows the catarrhal inflammation, a sequence more liable to result in cases induced by the extrusion of gall-stones or from mechanical injuries.

Varieties.—Of this disease, Froehlick described two distinct types, distinguished more by their degree of violence than by any pathological or clinical history. The form which prevails in this latitude occurs usually in isolated or sporadic cases, though sometimes as an epidemic or endemic disease. In this variety acute yellow atrophy of the liver very rarely occurs, while during the course of the severer type, which prevails only in the warmer climates, acute yellow atrophy of the liver occurs with relative frequency. The severer form of this affection bears some resemblance to yellow fever, of which malady it is probably a variety.

Diagnosis.—The diagnosis of this affection, after the appearance of jaundice, is quite readily made. Previous to the occurrence of icterus, however, it is difficult, if at all possible. As the catarrh of the bile-ducts results in over four-fifths of the cases from gastro-enteritis, the prior or concurrent existence of that affection leads to a strong suspicion of the character of the ailment. Care is necessary in the diagnosis, in order to exclude other hepatic affections which may closely simulate catarrhal inflammation of the biliary canals.

The sudden appearance of jaundice in otherwise healthy and vigorous subjects, their previous exemption from diseases of the liver, the grayish chalk-like color of the stools, their freedom from biliary calculi, and the generally light character of the symptoms point pretty clearly to the nature of the disease.

Prognosis.—In simple uncomplicated cases of catarrhal icterus the prognosis is favorable. Sometimes, when repeated attacks of catarrhal inflammation are induced by the extrusion of gall-stones, or

when the obstruction of the bile-ducts is complete and persistent, the calibre of the canals becomes dilated, and in places sacculated from pressure of the retained secretion. These dilatations press upon the adjacent hepatic tissues and cause their absorption, while they remain permanently dilated, retaining the secretion, and impeding its flow.

A doubtful prognosis is warranted in the case of patients affected with grave lesions of the kidneys.

Where the icterus is severe, and the bile is not eliminated through the renal tract, cholæmic poisoning may supervene, and a fatal issue occur. Continued exposure and irregular habits may precipitate repeated attacks, or delay recovery. With relative frequency, long protracted jaundice is followed by an anæmic condition with much emaciation, a condition arguing a slow or doubtful recovery. Of still graver import are the severe stinging, shooting pains, occurring in paroxysms of increasing intensity in protracted cases of catarrhal occlusion of the ducts. These symptoms warrant the suspicion of a permanent obstruction of the ductus communis. In other cases, resulting from some existing hepatic affection, the prognosis must necessarily depend upon the nature of the exciting malady.

Treatment.—As catarrhal inflammation of the bile-ducts is essentially an inflammation with, in severe cases, biliary obstruction superadded, it follows that the remedies chiefly indicated are those which are useful in like conditions of other mucous membranes. Indeed, inflammation of the mucous coat of the biliary passages is seldom seen except in conjunction with corresponding affections of the gastro-intestinal tract, and the remedies which are indicated in the latter case are equally efficient in the former.

The principal remedies are Mercurius sol., Cinchona, Nux vomica, and Arsenicum.

Mercurius.—Mercurius is indicated more frequently than any other remedy on account of its special pathogenetic relation to inflammatory conditions of mucous membranes. Fever, tenderness, and swelling of the liver, catarrhal inflammation of the duodenum; diarrhoea, the stools being somewhat tinged with bile; icteric color of the skin and conjunctiva, and nocturnal itching, constitute the group of symptoms to which Mercurius is homœopathic. This remedy is also applicable to cases due to a syphilitic origin.

Cinchona.—Cinchona is indicated if the disease occurs during, or after, an attack of malarial fever; or when it follows excessive loss of the fluids of the body, or depends upon great general debility. The symptoms are nausea, canine hunger, oppression of the epigastrium, bitter taste, dryness of the mouth, soft, clay-colored stools, brown urine, icteric color of the skin, retarded pulse, etc.

Nux vomica.—Nux vomica is particularly indicated in cases of catarrhal inflammation of the ducts arising from gastric derangement, from exposure to cold, and from excesses in eating and drinking; excessive use of iced drinks, etc. Sub-acute gastritis, extending to the biliary passages, calls especially for the administration of this remedy.

The symptoms are: sensation of weight in the stomach, tenderness to pressure in the epigastrium and right hypochondrium, enlargement of the liver; anorexia; white furred tongue, constipation, hard feces, brown urine. The dyspeptic symptoms in most cases clearly indicate the use of this remedy.

Arsenicum.—Arsenicum is not so frequently indicated as are the preceding remedies. It is adapted to those cases which are attended with great irritability of the stomach, fever and the restlessness characteristic of arsenic. The patient complains of burning pain and thirst, there is nausea and vomiting, tenderness of the abdomen, diarrhoea of thin, sero-mucous fluid, and *accelerated pulse*.

Remedies of secondary importance are *Chamomilla*, *Chelidonium*, *Pulsatilla*, *Lachesis*, *Aconite*, and *Ignatia*.

The diet should be bland and nutritious. All causes which might increase the irritability of the digestive organs should be sedulously avoided.

OCCLUSION OF THE PORTAL VEIN.

Synonyms.—Thrombosis of the portal vein, Pylethrombosis, Pylephlebitis.

Definition.—Occlusion of the portal vein (Pylethrombosis) consists, in a large majority of cases, in the formation of thrombi within the vessel, with or without inflammation of its walls; in rarer instances occlusion may occur simply as the result of adhesive inflammation of the walls of the vein (pylephlebitis), without the formation of a clot.

Ætiology.—The chief ætiological factor in the production of occlusion of the portal vein is the formation of a clot in consequence of compression of the vein by some force within or without the liver, or by disease of the liver which diminishes the force of the portal circulation.

The immediate exciting causes are of various kinds. Structural changes in the portal vein and radicles, diseases of the liver, such as cirrhosis and cancer, chronic peritonitis, compression of the portal vein by tumors which have their origin and growth in neighboring organs, are the principal.

Virchow mentions a case of occlusion which was caused by pressure from abnormally dilated biliary ducts containing many calculi.

The most common cause of occlusion of the portal vein is chronic atrophy of the liver. The gradual obliteration of the hepatic branches of the portal vein which occurs in this disease seriously obstructs the current of blood, and favors the formation of thrombi.

Pathology.—The pathology of obstruction of the portal vein depends largely upon the ætiological relations which exist. Ordinarily a thrombus is the cause of the occlusion, but obstruction may occur from compression by tumors in the liver, cirrhosis, or cancerous deposits, or from chronic atrophy, the thrombosis only being a necessary consequence of the otherwise existing obstruction. If a coagulum is formed in consequence of weakened force of the circulation or, as is more often the case, from local disturbance of the circulation from the conditions before mentioned, which may induce destruction of numerous capillaries or constriction of the branches of the portal vein,

the wall of the vein at first will be found normal, but it soon becomes thickened from adhesive inflammation, infiltrated with serum, and shows a cloudiness of the mucous coat with an injection of the fibrous coat. The mass of the thrombus, as a rule, is firmly adherent to the lining membrane of the vessel, being, in most cases, firm, hard, and torn with difficulty, rarely soft and friable. Its color is grayish, red, brown, or blackish, or may be jaundiced. Various changes may occur in the thrombus itself, and likewise in the venous wall, while the consecutive derangements in the organs belonging to the portal system are so prominently developed that the presence of the occlusion is readily inferred. The pressure in the initial radicle of the portal vein being increased, a free transudation of blood along the intestinal mucous membrane occurs, hæmorrhoids form, and a watery diarrhœa takes place.

As would be the case elsewhere, efforts toward a compensatory circulation are made by the communicating veins, which appear enlarged on the surface of the abdomen. The obstruction is not always complete, so that an imperfect circulation is maintained, but usually the vessel is entirely obstructed. Sometimes the thrombus gradually atrophies, undergoes fatty degeneration, and is partly or entirely absorbed, while at the same time an inflammatory proliferation of the wall takes place which terminates in its obliteration. If the liver is examined after having been the seat of this disease, cicatricial retractions will be found on its surface, and, within the parenchyma, corresponding to these retracted places, there will be found a hard tissue in which may still be recognized the atrophied branches of the portal vein. Occasionally these contain remains of the thrombosis, colored more or less yellow by hæmatin.*

Symptomatology.—Prior to the development of what may be designated characteristic symptoms of portal occlusion there is usually observed a series of symptoms indicative of those diseases of the liver or adjacent organs which are the exciting causes of thrombosis of the portal vein. The morbid changes and conditions of those organs which precede and cause occlusion render it difficult, in many cases, to give a definite clinical history of the disease under consideration.

Nevertheless, there are, in a majority of cases, well-defined symptoms which clearly indicate the nature of the morbid condition. There is a very rapid transudation of serum, so that in a few days the abdomen is distended to an enormous size. If the fluid is removed by paracentesis, it re-accumulates in a day or two. The spleen is enlarged to three or four times its normal size.

The dejections from the bowels are then sero-mucous and bloody.

* Niemeyer's Practical Medicine, vol. i., page 684.

Hæmatemesis is sometimes observed. The urine is scanty and high-colored. The subcutaneous veins of the abdomen are greatly distended and appear as a sinuous plexus from the thorax to the groins.

The severity and gravity of the symptoms vary according to the rapid or gradual formation of the thrombus, the completeness or incompleteness of occlusion, and the degree to which the blood stasis is relieved by the establishment of a collateral circulation.

The symptoms detailed above are evidently the consequences of blood stasis, and are the natural sequence of arrest of circulation through the portal vein. If occlusion is complete, there will necessarily be a rapid transudation and accumulation of fluid in the abdominal cavity and connective tissue. If the abdominal cavity is emptied, it speedily refills.

Although rapidly developed ascites is the rule, yet, in exceptional cases, it is absent either because of copious hæmorrhages or of the establishment of a collateral circulation soon after the formation of the thrombus.

Enlargement of the spleen, thin, serous, bloody diarrhœa and hæmatemesis are accounted for on the same grounds, namely, more or less complete arrest of the portal circulation. Other symptoms which are commonly present, such as derangements of digestion, atrophy or hypertrophy of the liver, jaundice, emaciation, debility and general œdema, are not necessarily associated with portal occlusion, but pertain to other diseases of which portal occlusion is the sequel.

Thrombosis of the portal vein does not occasion any local symptoms unless associated with inflammatory irritation.

In the latter case pain is felt at the seat of the thrombus, whether situated in the portal vein or in some of its branches.

The liver is sometimes of normal dimensions, though its most frequent condition is that of atrophy. In rare instances it is enlarged.

The variations in size of this organ depend, in a large majority of cases, upon some antecedent affection of which thrombosis of the portal vein is the sequel.

As a rule, fever and increase of temperature are wanting.

Diagnosis.—The diagnosis of portal occlusion is based upon the occurrence of the series of symptoms already detailed, namely: rapid accumulation of ascitic fluid, diarrhœa of thin, serous, bloody fluid; scanty, dark-colored urine, enlargement of the spleen, vomiting of blood, enormous and tortuous dilation of the subcutaneous veins of the anterior part of the trunk.

But these symptoms do not enable us to readily determine whether portal occlusion is caused by adhesive inflammation from thrombosis or from some other condition.

If the symptoms of occlusion come on with great rapidity, we may safely assume the existence of pylethrombosis. A previous history of

chronic atrophy of the liver renders it very probable that occlusion is due to the formation of a thrombus.

Prognosis.—Portal occlusion is almost invariably fatal. The morbid conditions existing prior to occlusion are usually of a nature dangerous to life, and the gravity of the situation is still farther increased when portal occlusion is superadded. The disease may run an acute or chronic course. Its duration depends upon the previous condition of the patient, the nature of the factors concerned in its production, and the extent to which collateral circulation is established.

In the majority of cases the disease runs a brief course. Acute cases terminate fatally in a few days. Chronic cases, particularly those in which compensatory circulation is fully established, may last for months, and, in rare instances, for years, insomuch that the disease may be said to have terminated favorably. Instances where life is prolonged for any considerable period are very seldom observed. Death commonly ensues in a short time after occlusion is established.

Treatment.—No remedies are curative in portal occlusion. The indications are to check hæmorrhages and diarrhœa, to support the patient's strength, and to sustain cardiac action, in the hope that collateral circulation may be established so as to relieve the blood stasis. If the ascites increases to such an extent as to seriously endanger life, the fluid must be removed by paracentesis. The operation should, however, be deferred as long as possible on account of the rapid refilling of the abdominal cavity.

PURULENT INFLAMMATION OF THE PORTAL VEIN.

Definition.—A suppurative inflammation of the radicles or trunk of the portal vein, resulting from suppurative processes in the adjacent abdominal organs. Purulent infiltration and thickening of the walls of the vessel occurs at the seat of inflammatory action. Retardation of the current of the blood takes place in consequence, and a thrombus is formed. The thrombus in the next place undergoes purulent softening, and the vein becomes filled with pus, shreds of fibrin, and a thin, ichorous fluid. Secondary thrombi are also formed, either extending backward into a radicle of the portal vein, or forward into one or more of its hepatic branches. The second thrombus also undergoes the same degenerative changes. The inner surface of the vessels may also be the seat of ulceration.

Ætiology.—Purulent inflammation of the portal vein, although occasionally an idiopathic primary disease, is in general a secondary affection consequent upon an inflammatory suppurative process in one of the organs from which the radicles of the portal vein derive

their origin. In rare instances it develops as a primary affection in consequence of some traumatic lesion of the walls of the vein.

The most common foci of suppurative pylephlebitis are inflammation and suppuration of the cæcum, the appendix vermiformis, and the connective tissue surrounding them.

The veins in the vicinity become implicated in the inflammatory action, are contracted in diameter, and filled with small clots. The phlebitis gradually advances along the affected veins until it reaches the trunk of the portal vein and its hepatic branches. Other foci of purulent inflammation are ulcers of the stomach and small intestines, abscesses or gangrenous spots in the spleen, and suppurative points in the mesentery. In all these cases the inflammation extends to some one of the radicles of the portal vein, and advances along it to the main trunk.

Still other initial points of suppurative pylephlebitis are in the liver, the bile-ducts, and Glisson's capsule. In such cases the radicles are not affected, the inflammation being confined to the portal vein and its hepatic branches.

Pathology.—In this form of inflammation of the portal vein the morbid changes differ from those of adhesive inflammation occurring in connection with thrombus. Here the thrombus, instead of becoming atrophied, disintegrates into a purulent fluid, which is, for the most part, a finely granular detritus, containing only a few roundish cells which may be either white blood-corpuscles or newly-formed pus-corpuscles. The whole thrombus rarely breaks down at the same time. In the trunk of the vein there is often a firm coagulum, while there is a purulent fluid in the branches and roots. But more frequently, there is no disintegration in the finer branches of the portal vein, so that the coagula then prevent the disintegrated masses entering the hepatic vein, and reaching the pulmonary circulation.* According to Frerichs,† the channel of the vein is found to be enlarged and gaping upon section; the wall of the vein is thickened, softened, and infiltrated with exudation. The thrombus, in the interior of the vein, undergoes destruction at an early period; it softens from the centre into a dirty, grayish-red pulp, and afterwards dissolves more or less completely into a purulent fluid. The changes in the vein are most distinctly developed, sometimes at one part of the portal vein, and sometimes at another, according to the locality where the disease commences, and its cause; it does not, however, remain circumscribed, but spreads over extensive tracts of this portion of the venous system. As a rule, the hepatic branches of the portal are implicated. Their channel is found blocked up with coagulated blood, fibrinous matter, or pus, as far as their finest ramifications, or they appear distended and filled with purulent fluid, so that cavities resembling abscesses

* Niemeyer, *op. cit.*, p. 684.

† *Op. cit.*, p. 129.

are seen on section. Sometimes metastatic deposits are developed, as in other forms of phlebitis, by particles of thrombi being floated by the blood into the liver; these deposits are found in various stages of development, from reddish-brown infarctions to yellow cavities of pus. These metastatic formations rarely extend beyond the liver. Participation of the roots of the portal vein in the morbid process is still less constant. Sometimes they are more or less diseased, and filled with coagulated blood, fibrin, or pus; while in other cases several of the roots remain exempt, and in others the inflammatory process is seen to have passed through its various stages. This depends mainly upon the locality in the vein where the inflammation commenced, and upon the causes which gave rise to it.

Symptomatology.—The general symptoms of purulent inflammation of the portal vein are pain in the right or left hypochondrium, epigastrium, or ilio-cæcal region, depending upon the situation of the inflamed veins; chills, followed by high fever; profuse perspiration, vomiting, diarrhœa, enlargement of liver and spleen, and jaundice.

After one or two paroxysms resembling intermittent fever, the pyrexia becomes continuous, broken by chills occurring at irregular intervals. The countenance is haggard and expresses distress, the pulse becomes small and rapid, the respiration is hurried, the tongue dry and brown. In a majority of cases there is circumscribed or general peritonitis.

Clammy perspiration, great prostration, suppression of urine and, in some cases, convulsion or coma are present towards the close of the disease.

Pain is the first symptom observed. It is first perceived in the epigastrium, if the portal vein is affected; in the right hypochondrium, if the lesion is in the hepatic branches; in the left hypochondrium, if the splenic vein is inflamed, and in the right iliac region, if the phlebitis has its origin in the radicles arising in the vicinity of the cæcum and appendix vermiformis. If pain is general over the abdomen, coincident peritonitis is indicated.

The pain is increased by pressure, and gradually spreads over a greater area as the disease progresses.

Fever is a constant symptom. It is preceded by a chill of greater or less duration and severity which is indicative of commencing suppuration. The fever at first is of an intermittent type, the paroxysms of which occur at irregular intervals. The intervals vary from twelve hours to two or three days.

The chills are followed by great heat and copious perspirations. If the disease is protracted, it assumes a remittent or continued form. The temperature during the hot stage rises to 104°, 105°, and in some cases to 107°.

The pulse ranges from 95 to 130 beats per minute.

The liver is somewhat enlarged in nearly all cases. The increase in size is due to the formation of multiple abscesses within its parenchyma. If there is no enlargement, it indicates that suppurative inflammation is confined to the hepatic vessels. Icterus is present in about three-fourths of all cases; it is not observed until the earlier stages of the disease have passed. Compression of the bile-ducts by the enlarged hepatic vessels or extension of the inflammatory action to the lining membrane of the ducts has caused biliary obstruction. The urine, in consequence of retention of bile, exhibits a brown color, and the *faeces* are deficient in bile.

Disorders of the digestive system, such as loss of appetite, nausea and vomiting, watery, mucous, bloody diarrhoea, which finally becomes colliquative, are conspicuous features of the disease.

Peritonitis generally develops during the course of purulent pylephlebitis. It is circumscribed at first, but gradually extends over the abdomen. It is attended with great tenderness, tympanitis, tension, and rigidity of the muscles of the abdomen. A moderate amount of serum is usually present in the peritoneal cavity.

The liver is increased in size in the majority of cases. The enlargement is either caused by blood stasis in consequence of obstruction in the splenic vein, or is due to septic infection of the blood. Sleeplessness, delirium, convulsions and coma are not unfrequently present. They are attributable to septic influences, and generally appear during the latter stages of the disease.

The duration of purulent inflammation of the portal vein is from one to six weeks.

The disease is more protracted when it does not assume a septic character, but one of simple inflammation. Cases of the acute type generally terminate fatally within two weeks. Those not of an acute character continue from four to six weeks, and in exceptional cases to a much longer period. The average duration is two weeks.

Diagnosis.—The diagnosis of purulent inflammation of the portal vein is attended with many difficulties. In a small proportion of cases the symptoms are so strongly defined that the diagnosis is readily determined. But in many cases the pre-existent pathological conditions so frequently mask the secondary affection as to make it exceedingly difficult to arrive at a satisfactory conclusion. If, however, a disease is present, which we know from experience may be followed by purulent pylephlebitis, and superadded to this are symptoms characteristic of the latter disease, we are justified in assuming its existence. The principal symptoms, diagnostic of purulent inflammation of the portal vein, are pain in any of the several locations of the disease, violent irregular chills, followed by high fever and copious perspiration, enlargement of the liver and spleen, icterus, profuse bilious diarrhoea, emaciation, rapid loss of strength, circumscribed or general

peritonitis. In many cases, however, some of the symptoms above mentioned are absent.

Purulent pylephlebitis may be mistaken for intermittent fever, hepatic abscess, catarrhal icterus, and occlusion of the bile-ducts from gall-stones. Intermittent fever has enlargement of the liver and spleen, icterus, and successive paroxysms of chill, fever and sweat; but other symptoms distinctive of disease of the portal vein are absent. Hepatic abscess has chills, pain, and enlargement of the liver, but lacks the enlarged spleen, diarrhœa, emaciation and prostration of portal disease.

Occlusion of the bile-ducts has about the same group of symptoms as hepatic abscess, but in addition has icterus.

Catarrhal jaundice resembles purulent inflammation of the portal vein in the enlargement and tenderness of the liver, and the icteric color of the skin and conjunctiva. It is wanting in the chills, fever, high temperature, diarrhœa, emaciation, and prostration of the latter disease.

Prognosis.—The prognosis is fatal when the main trunk, the larger radicles, or the hepatic branches are involved. Recovery is possible only when some unimportant vessel is involved, and the inflammation is not complicated with septic infection.

The patient usually dies with symptoms of extreme exhaustion or merges into a state of coma.

Treatment.—Purulent inflammation of the portal vein is so uniformly fatal that but little can be done to modify or arrest the progress of the disease.

If we fail to prevent the extension of inflammation from the initial foci of suppurative action into and along the radicles of the portal vein, any subsequent efforts will be well-nigh hopeless.

The treatment must be chiefly supportive and palliative.

The remedies which are homœopathic to the symptoms are Cinchona, Arsenicum, Phosphorus, Silicea, Mercurius sol., and Carbo veg.

G. DISEASES OF THE PANCREAS.*

The pancreas is situated in the upper and back portion of the abdominal cavity, extending transversely from the duodenum on the right toward the spleen, which it frequently touches, on the left. The enlarged right extremity, usually termed the head, is in close relation to, and grasped by, the concave border of the duodenum. The body

* This article is, in part, an abstract of the report of the Homœopathic Medical Society of Philadelphia County, presented to the Homœopathic Medical Society of the State of Pennsylvania, and published in the *Transactions* (1880) of the Pennsylvania State Society. This very able report was prepared by a committee consisting of Drs. A. R. Thomas, J. C. Morgan, A. Korndoerffer, and E. A. Farrington.

of the gland rests upon the superior mesenteric artery and vein, extends transversely, tapers, and ends in the left small extremity or tail. Its length varies from six to eight inches, and its weight from two to four ounces. It is held in position by its close attachment to the duodenum on the right, by its adhesions to the bloodvessels behind, and by the ascending layer of the transverse mesocolon which passes in front.

In structure, the pancreas is a compound racemose or conglomerate gland, resembling strongly the salivary glands, though looser and softer in texture. It is made up of numerous small lobules, united by loose connective tissue, these being composed of microscopic vesicles varying from the $\frac{1}{200}$ to $\frac{1}{400}$ of a line in diameter.

The excretory ducts, originating in some obscure manner among the cells, unite, forming large branches ending in the main excretory duct, which has been named, from its discoverer, the duct of Wirsung.

The canal of Wirsung extends through the whole length of the gland nearer the lower border, increasing gradually in size, until, upon reaching the duodenum, it acquires the size of a quill. Uniting with the main duct a supplementary duct is not unfrequently found, springing either from some portion of the head, or from that portion projecting from the posterior part of the body known as the lesser pancreas; this unites with the main duct, which, upon reaching the duodenum, joins the ductus communis choledochus, and terminates usually by a single orifice at the apex of a papilla of the mucous membrane.

The position of the pancreas may be indicated upon the surface of the abdomen by a line drawn transversely at a point about midway between the umbilicus and the lower end of the ensiform process of the sternum. To reach the gland in post-mortem examination, the great omentum should be torn from the lower border of the stomach, when, by lifting the latter and dragging down the transverse colon, the pancreas may be seen in the back part of the cavity of the lesser omentum.

The secretion of the pancreas consists of a clear, colorless fluid, closely resembling saliva, containing, however, a very much larger amount of albumen and casein than are found in the saliva; the pancreatic juice, unlike the secretion of the salivary glands, contains no sulpho-cyanide of potassium. The function of the pancreatic juice is two-fold; it completes the process of converting the amylicaceous and starchy foods into sugar, and it emulsifies fat, thus rendering it fit for absorption by the lacteals.

Owing to the anatomical relations of the pancreas, and to disturbances in other organs almost always present when we have reason to suspect the existence of pancreatic disease, palpation and percussion are of comparatively little value here for diagnostic purposes. It is

at times possible to detect an enlarged pancreas by placing the patient upon the back, and producing relaxation of the abdominal covering by having the legs flexed upon the abdomen; a more or less well-defined, somewhat oblong tumor may be felt, lying transversely below the stomach, a little to the left of the median line. Dr. Aug. Kerner employs a method of physical examination which he terms "impulsion" and describes as follows:

"In order to examine the pancreas by impulsion, the patient should, if possible, stand upright, thus keeping the abdominal muscles more or less tense. Let the examiner, sitting to the right of the patient, place his left hand over the tenth and eleventh dorsal vertebræ, his right hand at the upper portion of the hypogastric region. Then, by a strong and sudden push, made with the right hand upwards and backwards, an impulse is communicated through the abdomen to the pancreas which, if the pancreas be unduly sensitive, will elicit an aching or bruised, sore feeling. The patient may at first find some difficulty in locating this new sensation, both on account of its more or less indefinite character, as well as from its being experienced at a point different from that to which the usual pain had been referred."

The pancreas is subject to inflammation of various degrees of intensity, resulting in adhesion to adjoining organs and in the various changes of structure which are the natural result of inflammation; this inflammation may be acute, subacute, or chronic, and at times takes place by metastasis from some other organ. The gland may become the seat of fatty or amyloid degeneration, of cancer, concretions, cysts, various morbid growths, hæmorrhage, and certain functional disturbances not yet understood; hypertrophy and atrophy occur, and anomalies are noted which, however, are of no practical interest. As yet, the morbid states of this organ are little understood, and their discussion here will be brief.

Acute Pancreatitis.—Acute inflammation of the pancreas may be primary or secondary. It may occur *ab initio*, or by extension, or by metastasis, or it may form part of a more general affection, as the malarial, typhoid, and other fevers, in which the liver, spleen, kidneys, and other tissues are more or less concerned in a like process. In addition may be named the catarrhal inflammation, the hæmorrhagic, the purulent, the simply metastatic, and the pyæmic; six forms being defined, probably referable to two or three original types.

The first is the catarrhal; it usually begins with duodenitis.

The second is called parenchymatous degeneration, but it is strictly an inflammation in which the gland-cells are distinctly concerned, these, on section of the reddened and enlarged gland, being found so distended and opaque as to defy definition under the microscope. The tendency is to acute fatty degeneration, the cell-protoplasm being found, even early, granular in appearance, obscuring their other con-

tents. However, by adding the solvents, acetic acid, then solution of potash, this granulation is cleared up, and the inflammatory multiplication of the nuclei is made visible; from two to five of these are found in each affected cell, with their nucleoli. The recognition of this acute parenchymatous pancreatitis is almost complete with the mere presence of an acute infectious disease (*i. e.*, a "specific fever"), and with swelling of the liver and spleen, affording evidence of a like gland-cell inflammation in these organs, and, in extreme cases, albuminuria, consequent on a similar process in the gland-cells of the kidney. Parenchymatous pancreatitis is the ordinary associate of these. The same is also found in the muscular system, in such cases. Frerichs, in discussing acute yellow atrophy of the liver, advocates the similarity of these several processes, and considers that typhoid fever, in particular, presents this condition in a moderate form. Poisoning by arsenic or phosphorus produces a similar cell-change, as well as many like symptoms during life. Pyæmia causes a like alteration, added to its deposits of puruloid matter. The jaundice often attending these various diseases may possibly, according to Friedreich, arise from compression of the gall-duct by the swelled head of the pancreas, and not alone by catarrhal tumefaction of the duct itself.

The third form of acute pancreatitis is the hæmorrhagic, which must not be confounded with pancreatic apoplexy, to which reference will be made hereafter.

This form is of rare occurrence. In a case quoted by Friedreich (Ziemssen's *Cyclopædia*, vol. viii., p. 596), the patient, a previously healthy man, was taken with violent cardialgia, which steadily increased; vomiting came on, with frequent evacuation of bile-like matter; constipation; great aggravation of pain by pressure on the epigastrium; high fever; then deathly pallor, great restlessness, and frequent faintings, collapse, death. The pancreas was found trebled in size, surrounded by extravasated blood, and with extravasation in the acini of the gland. In another case, occurring in a young man addicted to the excessive use of alcohol and tobacco, the symptoms were similar to the one cited, but the fever was slight; the pain was at first like colic in the upper abdomen, then a continuous, agonizing burning, with great anxiety, nausea and vomiting without relief. Then the upper abdomen became distended and hot, with shooting or drawing pains, violent, continuous, and greatest along the greater curvature of the stomach, shooting to the duodenum, spleen, navel, and upward toward the scapulæ; persistent constipation; constant thirst; moist, thickly coated tongue, with only a little viscid saliva; belching; headache; vertigo; cold sweat; pulse 75. Collapse was imminent, and finally, after a few days, the extremities becoming very cold, collapse took place and death ensued.

The autopsy showed the head of the pancreas dark red, livid, and in parts infiltrated with blood. The mucous membrane of Wirsung's duct was darkly reddened, and the head of the gland was studded with small yellowish and finely granular exudations.

The symptoms of *purulent* pancreatitis, judging from two cases also furnished by Friedreich, closely resemble those of the hæmorrhagic form. In the first case, post-mortem examination showed a large abscess involving the pancreas situated behind the stomach, with three perforations, as large as peas, in its posterior wall; the cavity extended backwards to the spine, and to the pylorus and spleen. The pancreas was grayish, discolored, flaccid, and extensively infiltrated with pus.

The other patient, a strong man of forty years, was suddenly seized with symptoms of acute peritonitis. The autopsy revealed general peritonitis, greatest above, with sero-purulent exudation, matting the organs together. The pancreas was the seat of a multitude of little abscesses, many of which had burst into the peritoneal cavity, thus developing the fatal peritonitis. Atelectasis of both lower pulmonary lobes had also supervened.

The *metastatic* form of pancreatitis is the counterpart of the same process occurring in mumps, affecting the testes or other parts. Friedreich mentions the case of a syphilitic woman, sick with parotitis, who, after having been thoroughly salivated, was taken with symptoms of acute pancreatitis, and copious diarrhœa. This also ceased, and suddenly, at night, both parotids swelled, without salivation. She died in collapse. The pancreas was found swollen, reddened, very full of blood, and indurated; both parotids were inflamed.

When symptoms of pancreatitis occur during an attack of puerperal fever or of pyæmia, it is held that the gland partakes of the general pyæmic condition, and in such cases we speak of the *pyæmic* variety of pancreatitis.

Diagnosis.—Amongst the most important symptoms of acute primary pancreatitis, mention must be made of colicky, or deep-seated dull pains, commencing in the epigastrium, and shooting either towards the shoulder or towards the spine. This pain may in a short time become very intense, and may be accompanied by great restlessness, præcordial anxiety, dyspnœa, tendency to faint, nausea, eructations and vomiting of a thin, bile-stained fluid, which affords no relief, or the vomit may be of a clear, or greenish, viscid fluid. Thirst is often present, though the tongue is moist. The moisture of the tongue is usually marked in pancreatic disease, standing in contrast with the dry tongue of inflammatory affections of other abdominal organs. The bowels are usually constipated; distension of the abdomen is not uncommon, and, when existing, interferes seriously with physical examination by palpation or percussion, but not to so great a degree with impulsion.

Slight pyrexia generally accompanies this condition.

In unfavorable cases the symptoms attain their greatest intensity within a few days; the pulse then becomes small, suppressed, and irregular, the extremities cold, and the features hippocratic, death taking place in acute collapse. In case the inflammatory process goes on to suppuration, we have rigors alternating with flushes of heat. If the peritoneum becomes involved, symptoms of local or general peritonitis supervene. Acute pancreatitis must be carefully differentiated from acute inflammation of the adjacent abdominal organs.

From acute gastritis it may be distinguished by the fact that this affection is generally superinduced by corrosive or irritating substances, especially the mineral and acrid poisons, as arsenic, tartar emetic, mustard, ipecacuanha, etc., or from irritative substances taken as food, such as decomposing meat, vegetables, or shell-fish, or from very cold or very hot food or drink; in addition to which we find wanting the more characteristic vomiting of all food and drink, together with the aversion to eating so common in acute gastritis.

Acute hepatitis is characterized by more or less pain in the liver, which is aggravated by pressure as well as by deep inspiration and from cough. The yellow tinge of the conjunctiva, or the more fully developed jaundice, though so characteristic of hepatitis, may also be found in acute pancreatitis when it is accompanied by much swelling of the gland, in cases where the ductus choledochus passes partially or mainly through the head of the pancreas. Swelling of the head of the pancreas, in such cases, causes closure of the duct, thus obstructing the flow of bile. Here, however, the location of the pain, and especially the marked sensitiveness of the liver on percussion or palpation in cases of hepatitis, will usually serve to prevent error.

From hepatic colic it may be distinguished by the difference in the starting-point and location of the pains; in hepatic colic the pain is referred to the gall-bladder and from thence radiates to the chest, shoulder, and other parts; again, in hepatic colic, save when of short duration, we have jaundice; this, though possible, is not common in acute pancreatitis. The previous history will also throw light on the nature of the case.

The diagnosis of *secondary pancreatitis* is a matter of conjecture, even Friedreich frankly acknowledging the impossibility of making it.

Diagnosis of Chronic Pancreatitis.—Owing to the fact that this form of pancreatitis occurs as a part of a larger pathological group, usually involving profound and extensive changes in neighboring viscera, its diagnosis is associated with very great difficulty. The epigastric pain, disturbances of digestion, vomiting, jaundice, dropsical effusions in the legs and in other parts of the body, are of no great diagnostic value; the presence of fatty stools, melituria, and the exist-

ence of a tumor in the epigastric region, probably limit the diagnosis to the pancreas, and the exclusion of cancer, from the absence of constitutional and other symptoms indicative of such a condition, would make the diagnosis of chronic pancreatitis one possibly correct.

Subacute pancreatitis is merely a transition from the acute into the chronic state.

Chronic pancreatitis may be subdivided into the catarrhal, the parenchymatous, and the interstitial.

In the *parenchymatous* form the secreting gland-cells swell, their nuclei multiply by division, the cells develop, and the gland enlarges, subject to later degenerative metamorphoses. It is not unusual, in this form, to find interstitial inflammation existing in the later stages of the disease.

Chronic inflammation of the *interstitial connective tissue* framework of this gland, as in other organs, usually occurs more or less at the expense of the parenchyma, sometimes even to its destruction, by encroachment, by pressure, by starvation of blood-supply, and thus by simple atrophy or by fatty or cheesy degeneration; the organ, at first enlarged and indurated, becomes irregularly contracted, in other words, cirrhotic. Microscopically, the connective-tissue corpuscles multiply by division, their fibrous processes extend and increase, the whole framework thereby thickens; the young and succulent tissue thus formed becomes more solid, and gradually contracts; the gland-cells perish by fatty change; the organ becomes nodulated and indurated, until the cirrhosis is complete, sometimes causing the appearance, and even the erroneous appellation, of steatoma or of scirrhus. Glandular atrophy is the proper designation of extreme states of this kind. Such a pancreas has not unfrequently been found after death from diabetes mellitus.

The *symptoms* of parenchymatous pancreatitis ought to present a scanty, condensed, but inert, secretion, and complaints during late, or duodenal, digestion, modified, or not, by the abundance or deficiency of bile, and benefited by the use of prepared pancreatine. The symptoms of chronic interstitial pancreatitis should suggest a somewhat copious, but gradually weakening, secretion, with slowly progressive dyspepsia, looseness of the bowels some time after eating, and fatty stools.

In both cases fatty matters should be found in the stools, increasing as time advances; and diabetes mellitus is always to be suspected if the symptoms indicate pancreatic disease of any duration.

Partial or limited cirrhosis may occur in the head of the pancreas, less often in the body, rarely in the tail.

The following symptoms, occurring in the living, suggest the existence of chronic pancreatitis: The previous abuse of alcohol, tobacco, mercury, quinia; old and maltreated malarial, or other, fever, followed

by fatty stools, oily or saccharine urine, with deep-seated, dorsal-epigastric pain; neuralgia; a deep-seated, transverse swelling, tender on pressure; subsequent implication of the biliary duct, or vena porta, or vena cava, with obstruction of either, and consequent jaundice or dropsy of the abdomen or legs; or disease of the pylorus or duodenum, with progressive regurgitation or vomiting of food (blood and pus, if suppurative). These symptoms, appearing in such order, may well mean primary inflammatory pancreatic disease; a reverse order would imply secondary extension from other inflamed organs, as the liver or intestine.

Fatty Degeneration.—The earliest microscopical appearance is granulation of the cell-protoplasm. This is due to the decomposition of particles of the albuminous matter, forming a microscopic oil-globule. These granules enlarge, become more plainly oily, then coalesce, hiding the nucleus. Lastly, the cell perishes, and only fatty detritus remains, sometimes filling, and even distending, the ducts.

The acinous contour is retained until these contents are absorbed or discharged, when atrophy gradually appears. If interstitial new growth, from chronic inflammation, be also present, a contracted, tough, indurated body results; if not, it appears soft, flaccid, and wasted.

One of the important features of fatty degeneration, here or elsewhere, is the frequent involvement of the walls of the bloodvessels, in which case serious hæmorrhages are liable to occur.

Amyloid Pancreas.—This condition is only a fractional part of a general tissue degeneration which finds its first location in the walls of the smaller arteries, thence extending to the cellular elements of organs, and finally involving all the tissues in its vicinity, forming a waxy, or lardaceous, firm mass; hence, the synonyms waxy or lardaceous degeneration. The term "albuminoid" is sometimes used, meaning that the abnormal matter is nitrogenous.

The liver, spleen, and kidneys are quite often simultaneously affected, are greatly and progressively enlarged, become firm, and lose their function. The intestinal bloodvessels and other tissues participate, causing a form of ulceration and chronic diarrhœa.

Its causes are found in all debilitating diseases, as bone-caries, phthisis, and, above all, syphilis. It is more common, at least in its earlier form, than is usually believed; it is only revealed by microscopic observation or by the iodine test.

By interference with adjacent nutrition, fatty degeneration becomes an occasional concomitant. Friedreich describes a case of phthisis with amyloid degeneration of the pancreatic vessels and fatty degeneration of the gland-cells.

Pancreatic Hæmorrhage (Pancreatic Apoplexy).—Bleeding in the pancreas depends upon various causes, more frequently organic

disease of the heart, lungs, liver, causing in the pancreas a series of inflammatory changes leading to fatty degeneration, breaking down of the walls of the bloodvessels, and bleeding. Klebs affirms that diffuse hæmorrhage sometimes occurs quite independently of these, the pancreas being found red, and the acini gray or pigmented. Usually, the results of hæmorrhage are fatal. If not immediately fatal, we may get a secondary peritonitis, with sloughing, or these may develop a pulsating tumor, with well-marked constitutional disturbances, and a tendency to an exacerbation of all the symptoms, likely to result in death. Stoerk mentions such a case in which the pancreas was converted into a blood-cyst weighing thirteen pounds. Sometimes hæmorrhagic spots are scattered through inflammatory or new-formed connective tissue, degenerating into oval pigmented masses, or cyst-like "spaces containing a colored serosity, and surrounded by thickened, irregular, rust-colored walls;" secondly, ordinary retention-cysts, with hæmorrhagic contents. Diseases of venous obstruction (of heart, lungs, etc.) are connected with the former, obstruction of Wirsung's duct with the latter. The greater hæmorrhages seem more closely identified with diseases of the solar plexus. The blood may find its way into the duodenum, giving rise to hæmatemesis or to bloody stools.

Cancer of the Pancreas.—This affection is found more frequently in men than in women, occurs very rarely before the fortieth year, and is probably, to a large extent, due to heredity. The earliest symptoms experienced are a sense of discomfort in the upper abdominal region and derangement of digestion. Of thirty-seven cases mentioned by Da Costa, dyspeptic symptoms existed in twenty-five; vomiting, from concomitant gastric disease, in twenty-two; whilst twenty-four had jaundice; fifteen, dropsy; nineteen, obstructed bowels; and fifteen, alternate constipation and diarrhœa.

The pain is neuralgic, involving the branches of the cœliac plexus; deep in the epigastrium, sometimes going crosswise, or running to either hypochondrium, usually the right, or to the shoulder, or the back, or sacrum, or over the whole abdomen, often aggravated by the upright posture, better by forward flexion.

The presence of a *tumor* is not readily discovered unless it has attained considerable size, and even then the utmost care and skill must be exercised not to confound it with cancer of the omentum, liver, or stomach. Symptoms of the cancerous cachexia, characteristic glandular enlargements, etc., establish the existence of cancerous trouble, and the presence of fatty stools and of renal complications, with sugar in the urine, point to the pancreas as the seat of the disease. The pressure of the tumor upon adjoining organs gives rise to a variety of symptoms, chiefly due to obstruction, which need not be enumerated; or the cancer, if primary in the pancreas, may attach to other

organs, or, ulcerating, may perforate adjacent organs or structures, making its way into the abdomen, chest, attacking the pylorus, duodenum, gall-bladder, liver, kidneys, even vertebræ, or perforating the intestine or some bloodvessel.

The *diagnosis* of cancer of the pancreas partakes of the same air of uncertainty which hangs about this entire group of affections. Occurring, as it does, in connection with similar diseases of other organs, and by the pressure upon adjoining structures giving rise to a series of symptoms well calculated to mislead, the diagnosis depends largely upon the history of the case and upon the presence of the cancerous cachexia.

“Probably one of the most important symptoms of this disease is the intense and persistent pain deep in the epigastrium. This pain is of marked neuralgic type, has times of remission, often coming on in paroxysms which may continue from a few minutes to even days; it can scarcely be said to intermit, as in most cases a constant, though less severe, pain is experienced between the paroxysms. This latter condition is not met to the same degree in chronic pancreatitis, where, though the pains may be equally severe, there are times of entire cessation.

“The pain in cancer may be either local, confined to a spot deep in the epigastrium, or it may extend across the epigastrium to either one or the other hypochondrium, most frequently to the right; or it may shoot toward the back, sacrum or shoulder. At other times the pain may spread from the epigastric region through the entire abdomen. Position exerts considerable influence in modifying the pain, it being decidedly aggravated in the upright position, and markedly relieved when the abdominal muscles are flexed. An appreciable tumor affords important evidence in this affection, though, unfortunately, owing to the position of the pancreas, this in most cases does not exist; the head of the pancreas, being the part most frequently attacked, lying beneath the liver, is beyond the reach of both palpation and percussion. Even in the more favorable cases it will be necessary to examine the patient when the stomach is empty, care being taken that the bowels have been thoroughly evacuated of all solid fecal matter. The abdominal muscles must be thoroughly relaxed, the patient either lying on the back with the knees well drawn up, or placed in the knee-elbow position. In some cases it will be necessary to employ an anæsthetic for the purpose of gaining thorough relaxation of the abdominal muscles. Even when we have discovered such tumor, unless we can exclude cancer of the stomach, liver or omentum, we are not in a position to give a positive diagnosis. Finally, if the patient be advanced in years, and of marked cachectic habit, suffers from a continuous pain in the epigastrium, and a tumor be found located deep in the same region, and in addition, we have ground to

exclude primary disease of the neighboring abdominal organs, we have fair reasons on which to diagnose cancer and to locate the disease in the pancreas. The presence of fatty stools, or melituria, adds largely to the certainty. The size, nodulation and density of the growth would distinguish it from chronic enlargement, as would the density and nodulation from cystic degeneration."

Sarcoma of the pancreas cannot be distinguished from cancer, as the symptoms and conditions accompanying the one affection are likewise found with the other.

Tubercle of the pancreas is happily a most rare affection and, it may safely be asserted, occurs almost always in connection with tubercular affection in the lung or intestine. Sarcoma may be placed in the same category. Both conditions lack wholly in clinical importance.

Concretions in the Pancreas.—These occur in the duct and its branches, even to the smallest, and are of two kinds, viz.: proteinaceous and calcareous. Incrustations may form in the duct, but commonly they assume the form of stones, of dimensions varying from the microscopic to the size of a walnut. Often they are multiple, even numerous.

Virchow described the proteinaceous concretions as microscopic, solid, and insoluble; they were found in a syphilitic woman. The calcareous forms consist of carbonate and phosphate of lime, the larger sometimes showing cavities containing smaller calculi, or chalky powder, with milk-like fluid, as if included by accumulated surrounding incrustations. Sometimes cancer coexists, either in the gland itself or in neighboring organs, as the stomach.

The causes of such concretions are similar to those elsewhere observed: first, the nature of the food and drink used must be taken into account; second, the presence of particles capable of becoming the nuclei or nidus of deposit; *e.g.*, the solidified, glassy, proteinaceous, microscopic concretions of Virchow; or blood, or catarrhal matter proceeding from inflammatory exudation, may become nuclei for large calculi; third, inflammatory deposits, containing lime-salts, which remain after absorption of the organic matter; fourth, chemical precipitation of the inorganic matters, especially lime; of the pancreatic secretions upon and into the mucous epithelium of the ducts, in which case the carbonic acid of the blood, which is believed to hold them, normally, in solution, probably escapes, perhaps aided by the superior affinity for lime of the phosphoric acid of associated alkaline phosphates, thus forming phosphate of lime; or, again, the pancreas being known as the one organ which can and does decompose fats into glycerine and fatty acids, it may be that these nascent acids form insoluble fat-salts of lime, sometimes to be further oxidized and changed to its equally insoluble carbonate; fifth, in diseases of

bones metastases of lime-salts to various parts of the body are common, and the pancreatic secretion may be affected thus, and concretions form therein; sixth, constitutional vices may determine a degenerative nutrition, simultaneously existing in various organs, including the pancreas. Thus, syphilis may involve the aorta in atheroma, ending in calcification, along with pancreatic disease, probably of similar nature and origin. Such a case occurred in the clinic of Prof. Wm. Pepper, of Philadelphia, causing jaundice, with diabetes mellitus, and albuminuria, and death, with symptoms of blood-poisoning. After death, the common gall-duct and pancreatic duct were both found impervious, owing to pancreatic concretion; and both the gall-bladder and the duct of Wirsung were so distended as to form large fluctuating tumors, felt during life.

The results of pancreatic concretions are suggested by the symptoms of this case. We may have obstruction of one or both of the companion ducts; the loss of the functions of the affected gland; formation of retention-cysts in the course of the duct of Wirsung, which may reach even to the size of a child's head, forming a fluctuating tumor in the epigastrium; distension of the gall-bladder; jaundice; diabetes mellitus, to which allusion has been made as a frequent attendant on pancreatic diseases; pressure on surrounding parts, with possible injury; atrophy and destruction of the gland-tissue itself. Inflammation of the pancreas may result; we have fatty stools and lientery from failure of the pancreatic secretion and digestion, with or without the failure of the assisting emulsifier, the bile; aneurism of the aorta, if connected with solid growth and pressure above the pancreas, with contraction of the same below, caused by pressure, and causing circulatory disturbances, etc., in the dependent parts; pressure on the vena cava, or vena porta, with obstruction, dropsy etc.; pressure on, and irritation of, the solar plexus of nerves, with vasomotor, cardiac, and other troubles; or, we may have, from extension of inflammation, the involvement of the plexus, the supra-renal capsules, etc., as in Addison's disease.

Pancreatic concretions are sometimes associated with other lesions, as cancer, either of the gland itself or of some neighboring organ, as the stomach, or with aortic calcification.

THE THERAPEUTICS OF THE DISEASES OF THE PANCREAS.

The treatment of the diseases of the pancreas can not be satisfactory so long as our knowledge of their pathology is limited to the evidence of rare and very unsatisfactory examinations of the organ after death, and so long as we are not able to recognize them in the living, unless exceptionally well pronounced. It is true, the totality of symptoms affords to the physician the greatest help in directing treatment, even

though he be ignorant of the nature of the very disease he is seeking to remove; and quite likely, many cases of pancreatic disease, erroneously placed among gastric, and other, affections, are cured by the exhibition of remedies thus selected when the prescriber is in blissful ignorance of the very existence of the foe he met and conquered. Yet, such blind dependence upon symptoms alone cannot be satisfactory to the thinking practitioner, and to such this class of diseases offers rare opportunity for profitable study. Under the circumstances, then, we must content ourselves with a comparison of symptoms, also bearing in mind the close similarity between the salivary glands and the pancreas, and the probability that a class of remedies capable of exerting a marked effect upon the former will probably not prove without value in the treatment of the latter.

Iris versicolor.—This useful remedy exerts a positive effect upon the pancreas, as shown by the experiments made upon animals by Dr. Burt, one of the provers of Iris. Having killed several cats with the tincture of Iris, Dr. Burt found in them a highly congested condition of the pancreas. "A portion of one pancreas was subjected to a critical microscopical examination, which proved the presence of intense congestion of the minute vessels, and even a rupture, and also extravasation of blood into the tissues of the gland." (E. M. Hale.)

Dr. E. A. Farrington points out the following symptoms: Burning distress in the region of the pancreas; vomiting of a sweetish water; saliva has a greasy taste; green, watery diarrhoea, worse from 2 to 3 A.M.; offensive flatus, smelling like copper. Diarrhoea contains undigested fat; bilious vomiting; sick headaches return periodically every week; dull throbbing or shooting over one eye, usually over the right, with dim vision, nausea and vomiting.

It is evident that the remedy must be of positive value in the treatment of (acute) pancreatitis.

Baryta muriatica.—Frank (Frank's Magazine, vol. ii., p. 644) relates the following case: "A young man, about thirty years old, has been subject, for a long time, several times each day, and also in the night, to such violent attacks of distress and suffocative spells, that he was obliged to roll about on the floor, after the fashion of an epileptic, save that he retained consciousness. He was compelled to sit absolutely straight, his head bent forward, a constant stream of saliva running out of his mouth. This flow of mucus occurred with even slight paroxysms; it seemed most like saliva of which a soup-plateful would run from the mouth. In the left side, a trifle below the stomach, a hard substance could be detected, and the patient affirmed that he has always been conscious that his paroxysms came from that spot. After attempting in vain to secure relief by a large number of remedies, he was given *Baryta muriatica pura*, and he was cured in two months, having used three drachms; the hardness, the flow of mucus or saliva, and the tightness across the chest had all disappeared."

Symptoms recorded by provers show general constitutional and gastric disturbances which point to *Baryta mur.* as a remedy which, in the earlier stages of pancreatic affection, might prove useful. There is swelling of the salivary glands; profuse salivation; bad taste in the mouth, even the food tastes badly; coated tongue; loss of appetite; nausea; retching; incessant, tormenting, ineffectual retching; inclination to vomiting; violent vomiting of slimy, watery fluid; vomiting of small portions of a nauseous looking and tasting substance, for six hours; troubles with the stomach; pressure in the stomach; continual pain in the abdomen; diarrhoea; profuse diarrhoea, without pain in the bowels; liquid stool; stool coated with mucus.

The experiments upon animals made by Orfila and Gmelin in their general drift correspond with the above symptoms. The remedy should prove useful in persons of a scrofulous habit, with glandular enlargements and itching-burning of the skin.

Iodum.—Rademacher claimed to have observed an epidemic of pancreatitis, continuing for a year; and a study of the cases described by him establishes pretty conclusively the correctness of his diagnosis. He employed tablespoonful-doses, every hour, of a solution of thirty drops of the tincture of iodine in eight ounces of water,

receiving uniformly rapid curative action from the remedy; he lays particular stress upon the turbid condition of the urine.

Iodine, in its action upon the salivary glands, causes increased secretion of watery saliva; it has also violent copious vomiting of a watery or sour substance; diarrhoea of copious, soft, watery, foamy stools, and violent pain in the epigastric region and back; great emaciation; voracious appetite, but grows thin in spite of eating heartily; soapy taste in mouth; pasty evacuations from the bowels; whitish stools, softer than usual.

Reil (Hirsch. Zeitschrift, iii., 101) relates the following case: An inn-keeper, *æt.* 40 years, complained of constant pressure on the stomach, with frequent empty eructations, at times vomiting of small amounts of tenacious, rancid mucus, without a real pyrosis, some constipation, and copious flow of saliva. He had to spit constantly. The parotid gland was healthy, the tongue moist, without coating, and he had much thirst. The smallest amount of food would satisfy his hunger, causing no gastric pain. Urine scanty, rather brown. Countenance somewhat pale. Mental depression and irritability. He attributes his condition to a cold taken some six months ago. There is sensitiveness to pressure in the epigastric region toward the navel, and at a spot on the spine corresponding to this. By putting the patient upon his back, with his legs drawn close up, securing the greatest possible relaxation of the abdominal muscles, I could discover a rather oblong, transversely-lying swelling. Considerable abdominal pulsation; neither stomach, liver, nor spleen at all sensitive; a chronic inflammation of the pancreas was clearly diagnosticated. The patient received the tincture of iodine (6 drops of the tincture to 6 ounces of water, a tablespoonful at a dose). Decided improvement in a week; the spitting of saliva ceased first; the vomiting disappeared, then the empty eructations; appetite and digestion better; sensitiveness to pressure of the parts involved very much better. The same prescription was continued, and the patient discharged cured two weeks later.

Mercurius.—Reil says: "Although the gastric pains which sooner or later follow all mercurial preparations cannot well be traced directly to the pancreas, but may arise from the stomach or liver, we may feel sure that the constant soft evacuations from the bowels, the whitish, gray, greenish diarrhoea depends upon salivation of the pancreas, in addition to the increase of the biliary secretion and of the intestinal mucus. Mercury is certainly homœopathic to acute pancreatitis; the soluble Mercury and Calomel are to be preferred to the more powerful salts of Mercury." Buechner also recommends Mercury, advising its use after the exhibition of Belladonna.

Belladonna.—Both Reil and Buechner class this polychrest among remedies for pancreatic affections. The former recommends it in acute and chronic inflammation, hypertrophy, and even cancer; the latter says "catarrh of the pancreatic duct is best met by Belladonna followed by Mercurius sol."—Baehr (Hirsch. N. Zeitschriften) highly recommends the Atrop. sulph., and cites at least two cases in which the diagnosis was clearly established. Describing one case, that of a girl aged 24 years, he says: The picture now became more clearly defined, and the diagnosis, pointing directly to the pancreas, became positive. The appetite usually was poor, with occasional spells of hunger. Tongue slightly coated, taste bad. In the region immediately below the stomach, a little toward the left, and also at a corresponding point in the back, she experiences pain which is not so acute as it is unendurable and indescribable. These are aggravated perhaps four or five hours after eating solid food, and are accompanied with vomiting of a reddish liquid resembling the juice of raw meat; the latter contains much phlegm and food only if she has eaten solid food during the last five hours preceding the vomiting; only once did the vomited matter contain blood. Nausea rarely precedes the vomiting, which appears suddenly after a short exacerbation of the pain; it is often exceedingly violent, and is usually followed by relief of the pain. Rather deep pressure in the region above described is quite painful, but no enlargement can be felt. Some headache; much exhaustion; the nights are restless, and, on account of the vomiting she cannot sleep until morning. Great despondency; very slight pyrexia. Occasional diarrhoea, alternating with constipation. Expression of suffering, without much pallor. Of late, rapid emaciation. A cure was made by Atrop. sulph., third dec. trituration.

Phosphorus "may prove valuable in tuberculous patients, or when there are evidences of fatty degeneration of various organs, especially of the heart, liver or kidneys; distressing burning pains in the cœliac axis; stools undigested, containing particles of fat; face pale yellow; anæmia; atrophy of the pancreas with diabetes mellitus. One of the best remedies in neuralgia of the cœliac plexus.

"The Phosphorus diarrhoea containing small particles like sago, or, as expressed by some, like tallow, is not the fatty diarrhoea which suggests the drug in pancreatic diseases." (E. A. Farrington.)

A study of the physiological action of Phosphorus strongly suggests the usefulness of the remedy in various affections of the pancreas; yet there is no clinical testimony to show that it has been satisfactorily used. Baehr points out that the "vomiting" of Phosphorus may justify its exhibition in pancreatic affections, and Buechner (*Horn. Klin.*, 1873) merely mentions it in connection with fatty degeneration and in cancer (medullary) of the pancreas. Soerge, who made and published an exhaustive study of this remedy, recommends it in various affections of the stomach and intestine, but has nothing to say in reference to its possible usefulness in pancreatic diseases.

Bearing in mind the great variety of symptoms which accompany disease of the pancreas, and the manifold disorders in connection with which evidently pancreatic disturbances are likely to arise, a very large number of remedies may be suggested as possibly useful. Prominent among these are Arsenicum, Lycopodium, Carbo, Conium, Aurum, Calcarea, Uranium nitr.

INDEX TO VOL. I.

- Abdomen, auscultation of, 91
 mensuration of, 76
 palpation of, 76
 percussion of, 85
 physical examination of, 73
 regions of, 45
- Abdominal dropsy, 849
- Abscess, diffuse cervical, 556
 in the walls of the stomach, 682
 of the nasal cavity, 134
 of pharynx, 551
 retropharyngeal, 551
- Acids, treatment of poisoning with, 630
- Aconite, treatment of poisoning with, 631
- Acute gastric catarrh, 616
- Adhesions of heart and pericardium, 416
- Adiposis hepatica, 911
 in connection with functional af-
 fections of the heart, 477
- Ætiology, definition of, 20
- Albuminoid disease of stomach, 683
- Alcohol, treatment of poisoning with, 631
- Alkalies, " " " 631
- Amyl nitrite, " " " 631
- Anæsthesia of larynx, 154
- Anal tumors, 801
- Anchylostomum duodenale, 815, 820
- Aneurism, abdominal, auscultation of, 93
 palpation in, 85
 active cardiac, 428
 aortic, 483
 cardiac, 385
- Angina gangrenosa, 548
 Ludovici, 555
 pectoris, 464
 ætiology of, 465
 prognosis of, 469
 symptoms of, 467
 treatment of, 469
 tonsillaris, 525
- Antimony salts of, treatment of poisoning
 with, 631
- Anus, fistula in the, 793
 fissure in, 790
 imperfections of, 779
 malformations of, 780
 tumors about the, 801
- Aorta, abdominal, aneurism of, 485
 prognosis, 487
 treatment, 488
 aneurism of the, 482
 atheroma of the, 481
 diseases of the, 481
 embolism of the, 491
 stenosis of the, 490
- Aortic valves, lesions of the, 361
 regurgitation of the, 362
- Aortic valves, stenosis of the, 361
- Apneumatosi, 290
 ætiology of, 292
 diagnosis of, 293
 pathology of, 291
 prognosis of, 293
 symptoms of, 292
 treatment of, 293
- Arsenic, treatment of poisoning with, 631
- Ascaris lumbricoides, 815
- Ascites, 849
 ætiology of, 849
 diagnosis of, 852
 differential diagnosis, 853
 palpation in, 80
 percussion in, 89
 prognosis, 854
 treatment, 854
- Asthma, 306
 ætiology of, 309
 bronchial, 192
 cardiac, 194
 catarrhal, 307
 clinical history of, 308
 diagnosis of, 311
 hay, 307
 humid, 308
 latent, 307
 Millar's, 308
 peptic, 194
 physical signs of, 311
 prognosis of, 312
 symptoms of, 309
 treatment of, 313
 varieties of, 307
- Atelectasis pulmonum, 290
- Atheroma of aorta, 481
 great veins, 498
- Atonic dyspepsia, 593
- Atony of stomach, 593
- Atrophy of stomach, 679
- Atropia, treatment of poisoning with, 631
- Auxiliary treatment, its province, 41
- Bacilli tubercul., diagnostic value in phthisis
 pulmonalis, 254
 phthisis, Ehrlich's method of de-
 tecting them, 255
 Gibb's method of detecting
 them, 257
 Smith's method of demon-
 strating their presence
 in the breath, 257
- Baryta, treatment of poisoning with, 631
- Belladonna, " " " 631
- Bile-ducts, catarrh of the, 933
- Bismuth, treatment of poisoning with, 631

- Bladder, palpation of the, 82
percussion of the, 90
- Bowels, cancer of the, 777
obstruction of the, 745
ulceration of the, 770
- Brain, symptoms in valvular affections of the heart, 359
- Bronchial asthma, 192
aetiology of, 192
climatic changes in, 202
diagnosis of, 199
pathology of, 197
physical signs of, 197
prognosis of, 199
symptoms of, 194
use of chloroform in, 202
use of nitre-paper in, 202
treatment, 200
varieties of, 193
- Bronchitis, 173
auscultation in, 180
diagnosis of, 181
pathology of, 181
physical signs of, 179
percussion in, 180
position of organs in, 180
prognosis of, 182
treatment of, 183
varieties of, 182
- Bronchitis, acute catarrhal, 173
aetiology, 173
cough of, 175
course of, 176
symptoms of, 174
- Bronchitis, capillary, 177
capillary, duration and termination, 179
expectoration in, 178
febrile movements in, 178
gastric symptoms in, 178
- Bronchitis, chronic, 185
chronic, bronchorrhœa, a form of, 186
catarrh, a form of, 186
diagnosis of, 188
fetid bronchitis, a form of, 187
pathology of, 189
treatment of, 189
winter cough, a form of, 186
- Bronchitis, croupous, 190
croupous, aetiology of, 190
physical signs of, 191
treatment of, 192
- Bronchophony, 59
- Broncho-pneumonia, 215
- Calculi, biliary, 873
- Camphor, treatment of poisoning with, 631
- Cancer of the bowels, article on, 777
liver, 916
aetiology, 916
diagnosis, 921
symptoms, 919
treatment, 921
varieties, 920
lungs, article on, 299
- Cancer of the pancreas, 953
peritoneum, article on, 845
pleura, article on, 329
rectum, article on, 799
stomach, 657
aetiology, 657
diagnosis, 661
morbid anatomy, 663
prognosis, 661
symptoms, 659
treatment, 664
tongue, article on, 521
- Cantharides, treatment of poisoning with, 632
- Capillary bronchitis, treatment of, 184
- Cardiac dropsy, article on, 412
orifice, stricture of, 669
- Cardialgia, article on, 606
- Cardiasthenia, article on, 479
- Carditis, article on, 422
- Caseous phthisis, 236
- Catarrh, acute nasal, 102
chronic nasal, 110
gastro-intestinal, 737
of bile-ducts, 933
aetiology, 933
diagnosis, 936
pathology, 934
prognosis, 936
symptoms, 935
treatment, 937
- of ileum and colon, 728
- Catarrhal asthma, 307
phthisis, 236
sore throat, acute, 529
anatomical features, 530
symptoms, 531
treatment, 533
chronic, article on, 535
- Cestoda, an order of intestinal parasites, 506
- Cheeka, gangrene of the, 562
- Chest, regions of the, 45
- Chloral hydrate, treatment of poisoning with, 632
- Chlorine, treatment of poisoning with, 632
- Chloroform, treatment of poisoning with, 632
- Chlorosis, a cause of atonic dyspepsia, 595
- Cholelithiasis, 873
- Cholera biliosa, 734
infantum, 737
morbus, 734
nostras, 734
- Chronic follicular sore throat, 537
aetiology, 537
anatomical features, 537
symptoms, 539
treatment, 541
gastric catarrh, 633
- Cicatrization in penetrating ulcer of the stomach, 651
- Cirrhosis of the liver, 901
stomach, 675
- Clergyman's sore throat, 537
- Clinical thermometry, 30
- Coagula (fibrinous) within the heart, 382

- Coal gas, treatment of poisoning with, 632
 Colic, article on, 717
 Colitis, article on, 720
 Concretions in the pancreas, 955
 stomach, 680
 Constipation, article on, 703
 in functional affections of the heart, 478
 some remarkable cases of, 705
 Contagion a cause of disease, 25
 Contraction of the stomach, 679
 Copper, salts of, treatment of poisoning with, 632
 Coronary arteries, diseases of, 493
 narrowing of, 427
 Corrigan's pulse, 363
 Coryza, 102
 Cough in valvular affections of the heart, 381
 Croton oil, treatment of poisoning with, 632
 Croup, 159
 etiology of, 161
 and diphtheria, differential diagnosis, 160
 breathing in, 163
 complications of, 167
 course and termination, 168
 diagnosis, 169
 dyspnoea in, 164
 exudation of, 170
 glandular enlargements in, 166
 pain in, 167
 pathology of, 168
 prognosis, 170
 remissions in, 166
 respiratory sounds, 164
 treatment, 171
 varieties, 171
 Cynanche cellularis maligna, 555
 maligna, 548
 tonsillaris, 525
 Cysticerci, 808
 Dental fistula, 508
 Dentition, diseases of, 512
 their therapeutics, 515
 Diagnosis, a branch of medical science, 34
 Diarrhoea, 728
 etiology, 728
 diagnosis, 730
 pathology, 729
 prognosis, 731
 treatment, 731
 varieties and symptoms, 729
 Diarrhoea, bilious, description of, 729
 colliquative, description of, 730
 chronic, description of, 730
 faecal, description of, 729
 lienteric, description of, 729
 serous, description of, 729
 Digitalis, treatment of poisoning with, 632
 Dilatation of heart from valvular disease, 373
 of stomach, article on, 672
 Diphtheria and croup, differential diagnosis, 160
 Disease, age a predisposing cause, 21
 climate, temperature, etc., as causes of, 24
 definition of, 17
 exciting causes of, 27
 habits of life as causes of, 22
 individual peculiarities as causes of, 21
 inherited tendencies as causes of, 23
 intermarriage as a cause of, 23
 nomenclature of, 19
 occupation as a cause of, 22
 predisposing causes of, 20
 previously existing, as a cause of, 24
 sex as a predisposing cause of, 21
 special causes of, 25
 Diverticula a cause of obstruction of bowels, 755
 Dropsy, cardiac, 412
 from valvular disease of heart, its treatment, 379
 in valvular disease of the heart, 360
 Duodenitis, article on, 701
 Dysentery, article on, 721
 Dyspepsia, atonic, 593
 etiology, 593
 an exciting cause of other diseases, 599
 diagnosis and prognosis, 598
 pathology, 595
 symptoms of, 596
 treatment of, 599
 use of electricity in, 605
 inflammatory, 616
 Dysphagia spasmodica, 577
 Dyspnoea in valvular diseases of the heart, treatment of, 381
 Embolism of aorta, 491
 great veins, 500
 pulmonary artery, 493
 Emphysema pulmonum, 285
 Endemic diseases, their nature, 25
 Endocardium, diseases of, 344
 Endocarditis, 344
 acute ulcerative, 348
 diagnosis, 350
 local applications in, 352
 pathology, 349
 prognosis, 350
 symptoms, 349
 treatment, 350
 simple, article on, 344
 Enteralgia, article on, 683
 Enteritis, article on, 690
 folliculosa, 691
 symptoms of, 696
 Entero-colitis, 691
 Epidemic diseases, their nature, 25
 Epistaxis, 128
 Epulis, 506
 Ergot, treatment of poisoning with, 632
 Ether, " " poisoning " 632

- Excesses, a cause of atonic dyspepsia, 595
 Exciting cause of disease, 27
- Fatty liver, article on, 911
- Fibroid phthisis, 237, 250
- Fistula, dental, 508
 in ano, 793
 treatment of, 795
 salivary, 507
- Flatulence in functional affections of the heart, 479
- Flux, 721
- Fœtal pulsation, 91
- Follicular pharyngitis, 537
- Food a factor in disease of the stomach, 680
- Foreign bodies in the intestine causing obstruction, 749
 nasal cavity, 135
 stomach, 680
- Friction sounds in pleuritis, 58
- Gall-bladder, palpation of, 77
- Gall-stones, 873
 ætiology, 877
 chemical composition, 875
 classification, 875
 description, 873
 diagnosis, 882
 origin of, 876
 prognosis, 883
 symptoms, 878
 treatment, 883
- Gangrene of cheeks, 562
- Gastralgia, 606
- Gastric catarrh, acute, 616
 diagnosis, 623
 morbid anatomy of, 618
 symptoms of, 621
 as a concomitant, 628
 chronic, 633
 of drunkards, 622
 of infants, 622
- Gastric fever, 616, 621
- Gastritis, 616
 chronic, 633
 subacute, description of, 621
 toxica, seu caustica, 628
 treatment, 629
 true, rarity of its occurrence, 621
- Gastrodynia, 606
- Gastromalacia, 677
- Gibb's method of demonstrating the bacillus tuberculosis, 257
- Glass, treatment for swallowing of, 632
- Glossitis, 519
- Glossoplegia, 518
- Gold, salts of, treatment in poisoning with, 632
- Gum-boils, 505
- Gums, diseases of, 505
 fungoid tumors of, 507
- Hæmatemesis, article on, 665
- Hæmopericardium, article on, 415
- Hæmoptysis, article on, 277
 as a symptom of phthisis pulm., 233
- Hæmorrhage from the intestines, article on, 709
 from the lungs, article on, 278
 nose, article on, 128
 pancreas, article on, 952
 stomach, article on, 665
 in penetrating ulcer of the stomach, 645
 into the pericardial sac, 415
- Hæmorrhoids, article on, 781
- Hæmothorax, article on, 327
- Hahnemann, on use of narcotics, etc., 41
 on the treatment of intestinal parasites, 817
- Hay-asthma, 307
- Hay-fever, article on, 124
- Heart, adhesions of, 416
 and pericardium, adhesions of, 416
 adventitious products, 462
 aneurism of, 385
 atrophy of, 425
 treatment, 426
 varieties, 425
 auscultation of the, 61
 cancerous deposits in, 421
 clots in, 382
 dilatation of, 440
 ætiology, 440
 pathology and symptoms, 441
 physical signs, 444
 prognosis, 444
 treatment, 445
- diseases of nutrition, 340
- dropsy of the, 412
- fatty degeneration, 450
 anatomy and pathology, 452
 diagnosis, 457
 prognosis, 458
 symptoms of, 455
 treatment of, 459
- fatty overgrowth, 449
- functional disorders, 474
- functions of the, 336
- hypertrophy of, 423
 ætiology, 429
 complications, 434
 diagnosis, 432
 pathological anatomy, 431
 physical signs, 434
 symptoms, 432
 treatment, 435
 varieties, 428
 with dilatation, 438
- inflammation of heart-muscle, 422
- introduction to diseases of the, 330
- irritability of, 474
- murmurs of the, 63
- nervous relationship of the, 341
- neuroses of the, 464
- palpation of the, 61
- palpitation of the, article on, 474

- Heart**, percussion of the, 61
 physical examination of the, 60
 rupture of the, article on, 463
 structure of the, 331
 tuberculosis of, 420
 valvular diseases, article on, 355
 cough in, 381
 dilatation from, 373
 dropsy in, 379
 hypertrophy in, 371
- Hepar adiposum**, 911
- Hepatic affections in functional disease of heart**, 479
 colic from gall-stones, 881
 cyst, 922
- Hepatitis**, acute, 885
 diffuse, 894
- Hepato-scirrhous**, 916
- Hernia**, a cause of intestinal obstruction, 748
 intestinalis, article on, 757
 classification as to contents, 759
 duration, 759
 location, 758
 reducibility, 759
 irreducible, 765
 reducible, 760
 treatment of, 768
- Humid asthma**, 308
- Hunter, Dr. John**, on softening of the stomach, 677
- Hydatid tumors of the liver**, article on, 922
- Hydragogues**, their use in cardiac dropsy, 380
- Hydropericardium**, 412
 ætiology, 413
 physical signs, 414
 prognosis, 414
 symptoms, 413
 treatment, 415
- Hydro-pneumothorax**, 327
- Hydrops abdominis**, 849
- Hydrothorax**, 325
- Hypertrophy, cardiac**, from valvular disease of the heart, treatment, 371
- Hypertrophy of walls of stomach**, 675
 diagnosis, 677
- Icterus**, article on, 864
- Ileitis**, article on, 728
- Ileo-cælitis**, article on, 728
- Indigestion**, general consideration of, 586
- Infantile peritonitis**, 834
- Infection**, a cause of disease, 25
- Inflammatory dyspepsia (chronic)**, 633
- Intestinal hemorrhage**, article on, 709
 obstruction, acute, article on, 745
 chronic, " " 753
 parasites, article on, 806
 general therapeutics of, 825
 varieties of, 807
- Intestine**, auscultation of, 91
 palpation of, 79
 percussion of, 89
- Intussusception**, a form of obstruction, 747
- Iodine**, treatment of poisoning by, 632
- Iron (chloride, etc.)**, treatment of poisoning by, 632
- Irritable sphincter**, 792
- Jaundice**, article on, 864
- Kidney**, palpation of the, 81
 symptoms in valvular disease of the heart, 359
- Laryngeal phthisis**, 142
 ætiology, 143
 diagnosis of, 146
 laryngeal appearance of, 144
 pathology of, 143
 symptoms of, 145
 treatment of, 145
- Laryngismus stridulus**, article on, 152
- Laryngitis**, acute catarrhal, article on, 135
 chronic, article on, 139
 syphilitic, article on, 147
- Laryngoscopy**, 67
- Larynx**, anæsthesia of the, 154
 disease of its sensory system, 154
 neuroses of, 147
 paralysis of vocal cord, 148
 physical examination of, 67
 tumors and growths of, 155
- Latent asthma**, 307
- Lead colic**, 684
 treatment of poisoning by, 632
- Lime**, treatment of poisoning by, 633
- Liver**, abscess of, 885
 acute atrophy, 894
 ætiology, 895
 cerebral symptoms of, 899
 diagnosis and prognosis, 900
 duration of, 899
 gastric symptoms, 898
 pathology, 896
 physical signs of, 897
 symptoms of, 897
 treatment of, 900
 amyloid degeneration of, 929
 cancer of, 916
 chronic atrophy of, article on, 901
 cirrhosis, 901
 colloid, 929
 congestion of, article on, 859
 fatty, 911
 granular, 901
 hob-nailed, 901
 hydatid tumor of, 922
 interstitial inflammation of, 901
 lardaceous, 929
 palpation of the, 77
 percussion of the, 85
 scrofulous, 929
 symptoms in valvular affections of the heart, 358
 waxy, 929
 yellow atrophy of the, 894

- Lung, auscultation of, 53
 inspection of, 49
 mensuration of, 49
 normal sounds of, 51
 palpation of, 50
 percussion of, 51
 succussion of, 50
 symptoms in valvular disease of the heart, 358
 syphilis of the, article on, 259
- Lye, treatment of poisoning with, 633
- Malaria a cause of cardialgia, 607
- Meat, treatment of poisoning by spoiled, 633
- Melæna, 709
- Mercury, treatment of poisoning by, 633
- Millar's asthma, 308
- Mitral insufficiency, article on, 366
 stenosis, 365
 valve, lesions of, 365
- Morphine, treatment of poisoning by, 633
- Mushrooms, " " " 633
- Myocarditis, article on, 422
- Nares, physical examination of, 71
- Nasal cavity, abscess, 134
 foreign bodies in, 135
 syphilitic affections of, 123
 tumors of, 132
- Neck, diffuse inflammation of connective tissue, 555
- Nematoda, order of intestinal parasites, 813
- Nervous affections a cause of cardialgia, 607
- Neuroses of the larynx, 147
- Nux vom., treatment of poisoning by, 633
- Obstruction of the bowels, article on, 745
- Occlusion of the portal vein, 938
- Odontalgia, article on, 508
- Edema glottidis, article on, 138
- Esophagitis, article on, 564
- Esophagocele, 570
- Esophagus, dilatation of, 570
 morbid growths in, 574
 neuroses of, 577
 organic stricture of, 567
 paralysis of, 5-2
 perforation and rupture of, 573
 spasmodic stricture of, 577
- Opium, treatment of poisoning by, 633
- Ovarian tumors, percussion of, 91
- Ovaries, palpation of, 84
- Oxyuris vermicularis, 814, 818
- Ozæna, article on, 120
- Pain, as a symptom in gastric affections, 586
 of penetrating ulcer of stomach, 643
- Palpitation of the heart, 477
- Pancreas, amyloid degeneration of, 952
 cancer of, 953
 concretions of, 955
 description and functions of, 945
 diseases of, 945
 fatty degeneration of, 952
 general therapeutics of, 956
- Pancreas, hæmorrhage from, 952
 tubercles of, 955
- Pancreatitis, acute, 947
 chronic, 950
- Paralysis of abductor of one vocal cord, 149
 abductor of both vocal cords, 150
 adductor of one vocal cord, 148
 adductor of both vocal cords, 149
 intestines a factor in obstruction, 749
 thyro-arytenoid muscle, 151
 vocal cord, 148
- Paris-green, treatment of poisoning with, 633
- Pathological anatomy, definition and importance of, 27
- Pathology, general, definition of, 18
 special " " 18
- Perforation of the stomach, 682
 from penetrating ulcer of the stomach, 646
- Pericarditis, 386
 ætiology of, 387
 anxiety and dyspnœa in, 397
 area of dulness in, 402
 cardiac impulse in, 402
 cough, hiccough, vomiting in, 398
 diagnosis of, 403
 distension of intercostal spaces, 402
 disturbance of rhythm, 397
 dyspnœa in, 397
 fever a symptom in, 396
 fremitus in, 401
 general character and varieties of, 386
 increased epigastric fulness in, 402
 increased mobility of apex-beat in, 402
 insomnia in, 398
 orthopnœa in, 398
 pain as a symptom in, 395
 palpitation " " 397
 pathology of, 390
 pericardial friction murmurs in, 399
 physical signs of, 399
 prognosis of, 406
 protrusion of chest-wall, 401
 renal symptoms in, 398
 symptoms of, 394
 syncope in, 398
 treatment of, 408
- Pericardium, adhesions of, 416
 diseases of, 386
- Perichondritis laryngis, 142
- Peritoneum, cancer of, 845
 tubercles of, 840
- Peritonitis, article on, 825
 pelvic, 833
 puerperal, 834
- Pharyngitis catarrhalis, 529
- Pharynx, abscess of, 551
 diseases of, 529
- Phlebitis, article on, 494
- Phlebotites, 499

- Phosphorus, treatment of poisoning with, 633
- Phthisis, caseous, 236
- catarrhalis, 236
 - fibroid, 237
 - florida, 250
 - laryngeal, 142, 258
 - pulmonalis, 220
 - ætiology of, 221
 - chest-pain in, 245
 - clubbed fingers and toes in, 249
 - contagiousness of, 221
 - cough in, 242
 - diagnosis of, 250
 - from bronchial dilatation, 253
 - from chronic bronchitis, 251
 - from chronic pleurisy, 251
 - from pneumonia, 252
 - from chronic pulmonary abscess, 253
 - from cancer, 252
 - from gangrene, 253
 - from syphilis, 252
 - diagnostic value of bacilli tuberculosis, 254
 - diarrhœa in, 247
 - emaciation in, 247
 - expectoration in, 242
 - fever in, 245
 - hæmoptysis in, 243
 - menstrual suppression in, 248
 - mental symptoms in, 248
 - œdema of feet and ankles in, 249
 - pathology of, 233
 - physical signs of, 239
 - predisposing causes of, 230
 - predisposition as a cause of, 228
 - prognosis of, 259
 - pulse in, 246
 - respiration in, 247
 - symptoms of, 241
 - treatment of, 260
 - varieties of, 249
- Physical diagnosis, 44
- Picrotoxin, treatment of poisoning with, 633
- Plastic linitis, 675
- Plethora in functional affections of the-heart, 477
- Pleura, cancer of, 329
 - diseases of, 316
 - tubercle of, 323
- Pleuritis, article on, 317
 - friction-sounds in, 58
- Plenrodynia, 316
- Pneumonia, article on, 202
 - acute lobar, 204
 - catarrhal, 215
 - croupous, 204
 - lobular, 215
- Pneumothorax, 326
- Polypus narium, 132
- Portal vein, occlusion of, 938
 - purulent inflammation of, 941
- Procidencia recti, 788
- Proctitis, article on, 803
- Prognosis, a branch of medical science, 36
- Prolapsus recti, 788
- Prurigo ani, 801
- Pulmonary apoplexy, 278
 - artery, diseases of, 491
 - embolism, 493
 - stenosis, 492
 - thrombosis, 493
 - cancer, article on, 299
 - treatment, 305
 - congestion, article on, 278
 - emphysema, 285
 - gangrene, 294
 - hæmorrhage, 278
 - œdema, 278
 - syphilis, 295
- Pulmonic valves, disease of, 367
- Pulse, its importance in diagnosis, 33
- Pylephlebitis, 938
- Pylethrombosis, 938
- Pyloric orifice, stricture of, 671
- Quinsy, 525
- Râles, their importance as a sign, 56
- Ranula, 524
- Rectum, cancer of, 799
 - diseases of, 779
 - fissure of, 790
 - prolapse of, 788
 - stricture of, 796
 - tumors of, 793
 - ulcer of, 790
- Regions of chest and abdomen, 45
- Regurgitation, aortic, 362
- Respiration in health and disease, 54
- Retro-pharyngeal abscess, article on, 551
- Rhinoscopy, 71
- Rose-cold, 124
- Round worm, 814
- Rupture of the stomach, 682
- Salivary fistula, 507
- Sclerosis of stomach, 675
- Seat-worm, 814
- Secretion, perversion of gastric, a factor in diseases of the stomach, 588
- Silver salts of, treatment of poisoning by, 633
- Sleeplessness in valvular disease of heart, 381
- Smith's method of demonstrating the presence of bacillus tubercul., 257
- Sore throat, acute catarrhal, 529
 - cankered, 545
 - chronic catarrhal, 535
 - diphtheritic, 545
 - follicular, 537
 - gangrenous, 548
 - malignant, 548

- Sore throat, membranous, 545
 putrid, 548
 ulcerated, 542
- Spleen, palpation of, 78
 percussion of, 87
- Sporadic cholera, 734
- St. Martin, observations upon, 618
- Stenosis of aorta, 490
 aortic valve, 361
 mitral valve, 365
 pulmonary artery, 492
- Stomach, abscess in walls of, 682
 albuminoid disease of, 683
 atrophy of, 679
 auscultation of, 91
 cancer of, 657
 concretions in, 680
 contraction of, 679
 cramp of, 606
 dilatation of, 672
 fibroid induration of, 675
 foreign bodies in, 680
 hæmorrhage from, 665
 hypertrophy of, 675
 neuroses of, 606
 palpation of, 78
 penetrating ulcer of, 641
 percussion of, 88
 perforation of, 682
 rupture of, 682
 self-digestion of walls, 677
 softening of, 677
 stricture of cardiac orifice, 669
 pyloric orifice, 671
 tubercle of, 683
- Stomatitis, 561
- Stramonium, treatment of poisoning with, 633
- Stricture, a factor in obstruction of bowels, 755
 of rectum, 796
- Strychnine, treatment of poisoning with, 633
- Summer complaint, 737
- Susceptibility to disease, 26
- Swelled face, 511
- Symptomatology, a branch of medical science, 28
- Symptoms, accidental, definition of, 29
 diagnostic, 30
 objective, 29
 pathognomonic, 30
 subjective, 28
- Syphilis of larynx, 147
 lung, 295
- Syphilitic affections of nasal cavity, 123
- Tænia solium, article on, 809
- Tape-worm, 809
- Therapeutics, general, 38
- Thrombosis of the heart, 382
- Thrush, 558
- Tin, salts of, treatment of poisoning with, 633
- Tongue, cancer of, 521
 inflammation of, 519
 paralysis of, 518
 ulceration of, 523
- Tonsillitis, 525
 malignant, 548
- Tonsils, hypertrophy of, 528
- Toothache, 508
- Treatment, auxiliary, of disease, 41
 direct, of disease, 38
 preventive, 37
- Trichina spiralis, article on, 820
- Trichocephalus dispar, 815
- Tricuspid valve, diseases of, 368
- Tuberculosis of pancreas, 955
 peritoneum, 840
 pleura, 328
 stomach, 683
- Tumors a factor in obstruction of the bowels, 756
 about the anus, 801
 of larynx, 155
 of nasal cavity, 132
 of rectum, 793
- Typhlitis, article on, 712
- Ulcer of stomach, penetrating, 641
- Ulcerated sore throat, article on, 542
- Ulceration of the bowels, article on, 770
- Urine, physical examination of, 93
- Uterine souffle, 92
- Uterus, palpation of, 82
 percussion of, 90
 pregnant, auscultation of, 91
- Valvular diseases of the heart, article on, 355
- Varicosis, article on, 499
- Vegetables, decayed, treatment of poisoning with, 633
- Veins, atheroma of great veins, 498
 diseases of great veins, 494
 embolism of great veins, 500
 thrombosis of great veins, 501
 distant effects, 502
- Veratrum, treatment of poisoning with, 633
- Vocal resonance, abnormalities of, 59
- Voice in health and disease, 58
- Volvulus, a form of obstruction of bowels, 748
- Vomiting a symptom in gastric affections, 589
 diagnosis with reference to source of, 590
 in penetrating ulcer of stomach, 644
 of blood, 665
 treatment of, 591
- Waxy liver, article on, 929
- Worms in the intestines, 806
- Zinc, treatment of poisoning with, 633
- Zymotic diseases, definition of, 26

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