

AUTOREGULATORY MECHANISMS AND THE HOMOEOPATHIC RESPONSE

Laboratory Techniques and Available Methodology

DR. IFOR CAPEL

Mr. Chairman, Ladies and Gentlemen,

Following Dr. Davey's excellent review of current thinking on endogenous opiate peptides and their possible role and relevance to Homoeopathy, I am obliged now to say something about studies we are currently doing to elucidate this.

Although these peptides are being intensively investigated, there is a very limited amount of information concerning their relevance to Homoeopathy available internationally. I propose to tell you what we are doing at the Marie Curie Memorial Foundation, and hopefully, get some benefit from coming here to speak for you today (from your comments afterwards) and your suggestions as to what I should be investigating in the homoeopathic field.

My training was basically as a biochemical pharmacologist and I find it very difficult to understand the method by which homoeopathic practitioners calculate and administer the dose. This tends to inhibit the manner in which we design our experiments to substantiate your clinical observations in terms of biochemical parameters which we can understand. To design any scientific experiment, one should have an initial hypothesis. In the case of Homoeopathy, a number could be suggested and the one that seems to be in vogue at the moment is that, possibly, homoeopathic preparations stimulate or inhibit the function of some neuropeptides as we are finding with a number of non-homoeopathic studies. You will be able to tell whether or not there is a relevance to the homoeopathic situation if I tell you about some of them.

Met-enkephalin, and the endorphins, have a great deal of similarity in their shape. They originate from a large amino acid peptide in the brain. *Met-enkephalin* is probably a neuro-transmitter within the brain, but although it has been found in the right places, it has not been proved to be released and form a wave of depolarization, which is the normal criterion for proving the existence of these substances. It has a very short half life outside the brain and only exists in the brain and gut for very short periods. Yet *met-enkephalin* and other endorphins appear to be carried in the serum to a target organ or endocrine glands where they produce a secondary effect. They could also be releasing factors.

We have assumed the existence of specific receptors, and it is possible that homoeopathic treatment might make the receptors no longer able to receive the signals or stimuli that are present. A blocked receptor, as is the

method of action of many drugs, is an obvious way of producing any effect that is required. It is therefore possible that psycho-therapy itself could be acting at the receptor level.

Met-enkephalin produces analgesic effects in the brain, inhibiting the release of substance P, which is possibly a neuro-transmitter involved in noxious or painful stimuli, which can be found in the brain and the gut. There is a surgeon who implants electrodes in the brain of patients with severe chronic pain, and he finds they produce analgesic effects. He claims he can measure met-enkephalin in the spinal fluid, following the stimulation.

Met-enkephalin is measurable, but it has a short half life, and therefore inaccuracies are bound to creep in. This is then a research tool and highly controversial.

The β endorphins appear to have a somatic function, whereas the alpha and gamma endorphins are more concerned with behaviour, memory and learning.

Leu-enkephalin does not belong to this β lipotropin sequence. It probably comes from one of the more recently isolated substances called dynorphin, which is far more potent than either met-enkephalin, endorphin or morphine. It has been isolated by Avram Goldstein's team in America.

We are also measuring *cholecystokinin*, the hormone Dr. Davey mentioned, in connection with a study at the West Middlesex. We think it indicates a 'satiety factor', and we are measuring it in obese patients for whom appetite and satiation seem to have no meaning. We could also measure these hormones in patients receiving homoeopathic therapy. Cholecystokinin could represent 'stop', whereas entero-glucon, neurotensin and a few others say 'go' in the control of feeding. Similarly, with the hormones of the pancreas, they are 'stop' 'go' as regards feeding.

However, there are numerous problems in their measurement. The sample collection is specialized. It requires specialized tubes and they have to be kept very cold; the tubes have to be coated, and the time of collection stated. Storage must be at -70°C . The determination of the amount of these substances is very tricky. Thus determination of these peptides is still very much a research rather than routine investigation.

We can measure many of these hormones, but with difficulty, as I have shown. All we require is a protocol involving Homoeopathy, a clinically measurable response, and the necessary specimens, to validate the therapy.

In animals, we have been producing and quantifying analgesia, for we are particularly interested in the pain that is associated with the progression of neoplastic diseases. We are using electrostimulation, a form of electroacupuncture which induces autoanalgesia.

Electrostimulation of rats could also inhibit the release of substance P by stimulating met-enkephalin activity.

The techniques by which we investigate experimental analgesia are not as precise as the mechanisms which elicit it. These are the conventional tech-

niques used in the drug industry to quantify analgesia. There is a machine known as the analgesiometer. It is a crude instrument whereby one applies pressure to an animal until one obtains a squeak; the length of time and the pressure for the painful sensation being measured. Following electrostimulation, these parameters are decreased. There are also heat techniques where a bright beam is shone onto the animal's head or tail, and again it is the length of time for the animal to perceive the discomfort which is quantified. Those are the things we are working on which might be applicable to the homoeopathic situation.

The analytical techniques used for measurement of neuropeptides are varied. *Radioimmunoassay* is the most widely used and sensitive, but many of the neuropeptides have shared amino acid sequences, so there can be cross reactivity. There is also no indication whether the molecules that are measured have active configuration. For activity, they have to be able to bind with, and be recognized by, the transmitters: They may have enough of the correct sequence to bind them to an antibody, but the rest may be in such a state they are no longer suitable to bind to the receptors. Interpretation of results obtained by this technique is difficult.

We more often use a *bioassay* technique, which involves measuring the response of a piece of animal tissue. The mouse vas deferens, or the guinea pig ileum, are the tissues most commonly used, but this is expensive, as it means a new animal for each test. For some hormones one has to rely on the colour change in amphibian skin. This bioassay technique is less sensitive, but at least it is specific. When you measure these substances by this method, you know they are in their active configuration, because otherwise they would not attach to their receptors.

There is another way Homoeopathy might function. This involves the manipulation of *trace elements*. There has been an increasing interest in these as much more sophisticated apparatus for their determination has become available. Trace elements are measured on atomic absorption spectrometers, which are now equipped with graphite furnace attachments which often enables measurements in the order of parts per billion. As with the neuropeptide measurements, with trace elements also, it is probably not the individual levels that count (with one or two exceptions) but the actual balance between them that is important. The best example is copper and zinc. These two trace elements are antagonistic, probably at the absorptive level.

One can measure the copper/zinc ratio in the body, and the normal ratio for men is up to 12 and for women up to 15. However, oral contraceptives and other steroids will cause this ratio to be elevated. These high ratios are associated with many diseases, including cancer, so they are an unspecific marker.

On our present Western diets, it would seem impossible to have zinc deficiency, as it is in all food. However, sources of zinc in the diet have gone down, particularly that in bread. Whole meal bread will absorb the zinc and

carry it straight through the gut. The vegetables that once were a good source of zinc, are now leached prior to freezing so that they remain bright and green when they go in the deep freeze. Subjects today have much lower zinc levels than they used to. Zinc is essential for well over 90 metallo-enzymes in the body. The symptoms associated with zinc deficiency are legion. Zinc is essential for DNA polymerase, which is concerned with cell replication and tissue re-growth. Tumours in particular, require zinc and do not grow as well in zinc deficiency.

The estimation of trace elements is not always easy. Copper can be directly estimated in the serum and is carried by caeroplasmin, which is also easily estimated. Zinc is the second most common trace element in the body, which contains some 2 grammes in man, yet the serum contains magnesium, copper calcium and iron in higher quantities than zinc. The levels fluctuate according to the quantity in food, and there are large circadian variations. It is excreted in the urine, so when you take your serum sample is most important. We have overcome this problem by adapting an American idea—the zinc tolerance trial.

A loading dose of zinc sulphate is given and the rate of change over six hours on two hourly blood samples is measured together with the 24-hour urine excretion. In normal subjects the bolus of zinc appears at once in the serum. In patients who are zinc deficient, rather like the vitamin C story, the zinc is 'swallowed up' by the liver; it does not appear in the blood and is not excreted in the urine the following day. Three of the patients so far tested have been found to be zinc deficient, and their pressure sores were not healing.

There is a protocol drawn up for the assessment of patients with non-healing leg ulcers, to test the efficacy of *Calendula* on the rate of healing, to see if it boosts the zinc level and promotes healing. To make the trial more meaningful this treatment should be compared with standard methods using zinc ointment or other local application. This trial was originally proposed for Liverpool, and is awaiting a clinical team to run it.

The psychologists present will probably know of Carl Pfeiffer's work with zinc at the Brain Bio Centre, Princeton, USA. They looked at the post-mortem samples of the brains of a large number of schizophrenics who committed suicide and found they had very high copper levels. Schizophrenic patients whose behaviour is anti-social are treated with a mixture of zinc, magnesium and vitamin B6. A large number become well enough to be sent home. Dr. Elizabeth Lodge Rees, a paediatrician of Berkley, California, treats children with psychopathic behaviour, and claims they have high aluminium levels in their hair and blood. They are treated with chelation therapy and are apparently cured.

There are a few specific trace elements which are worthy of special mention. Selenium is one such.

Selenium used to be thought to have some relationship to sulphur. Rats require about 4 parts per million in their diet, and below 1 ppm their livers

show abnormal enzymic function. Above 4 ppm hepato-necrosis occurs again, because selenium is damaging to liver. In these high concentrations selenium is a carcinogen. It shares this property with *chromium* and *nickel*, which are also trace elements essential to man, and have been proved to be carcinogenic. Selenium has only one function, as far as is known at present, and that is for the enzyme glutathione peroxidase. This is present in liver and red blood cells and is an anti-oxidant defence mechanism. It prevents haemolysis of the red blood cells by reducing lipohydroperoxides. Some of these trace elements can be very potent and fundamental.

These areas represent parameters which can be measured to verify homoeopathic treatment. Another study could involve the use of a hepatic function test. This test is one developed at the Marie Curie and adapted for cancer patients.

It is the *antipyrine test*. Antipyrine, or phenazone, used to be a popular anti-pyretic. It has the useful property of dissolving completely in body water and is not extensively bound in plasma. In order to be excreted it has to be metabolized in the liver. A mixed function oxidase hydroxylates it on the phenolic ring and then it can be easily excreted in the urine. The activity of this particular liver enzyme can be measured directly, using this particular drug.

The test involves administering the drug to the patient: 18 mg per kg, and taking samples of blood or saliva at three-hourly intervals thereafter for four samples. The rate of disappearance from the blood is estimated pharmacokinetically. From this the half-life of the drug is calculated and the metabolic clearance rate. The total body water can also be determined.

This test is much more sensitive than conventional liver function clearance tests. Compared with eight other different liver enzymes which appear in the serum, this test was much more sensitive in assessing liver cell function. The average antipyrine half life in females is 10-12 hours; in males it is 11-13½ hours; in juveniles it is 5 hours; and in geriatrics it is about 16 hours.

The value is usually changed by disease, drug therapy, alcoholism and smoking. The patient serves as his own control. The value for the patient is measured and then the treatment is given. Preferably the patient should have some liver disturbances. After therapy, the test is repeated and abnormal results should revert back towards the normal. If this was the case with homoeopathic therapy, it would be convincing proof that the treatment was effective. But everyone will tell you the liver has enormous powers of regeneration, and it will cure itself if left to itself. In many forms of liver dysfunction (in hepatitis) this is not necessarily so. Homoeopathy could certainly be compared with conventional treatment in liver disorders.

The usual therapy of cancer interferes with liver function. We are doing a study with leukaemia patients and we tend to find that liver function is very badly impaired. The antipyrine half life is in excess of 36 hours. The values tend to come back towards normal once the therapy is discontinued. We have

done this test with four patients who have had Iscador, and this treatment certainly did not damage the liver.

Finally, Homoeopathy might be tested in another system involving *animal experiments*. This is a model murine tumour system. A black mouse called the C 57BL is injected with primary Lewis Lung Carcinoma cells. The test is usually done on batches of 100 mice. After five days, the test treatment is begun. Cisplatin reduces the size of the primary and the number of lung metastases, and so does cyclophosphamide and a number of others. Some workers claim the tumour is actually cured if high enough doses are given. In our experience at the Marie, the mice die first.

At 14 days the mice are sacrificed. The primary tumour is weighed and the number of lung metastases counted. This model has been used to assess the effect of alcohol on growing tumours. Alcohol has been found to inhibit the growth of tumours, if the animals can be persuaded to drink enough. At first it was thought it might interfere with amino acid absorption and limit the tumour that way. We know now it is due to zinc deficiency. The tumour needs zinc to grow and alcohol promotes the excretion of much larger quantities of zinc. The model has also been used to determine the hazards of chloroform in toothpaste, and to determine the efficacy of cisplatin, and the effect of some of the trace metals on this.

We would like to test any forms of Homoeopathy that have been found to be effective in cancer, against this system. Using a sample of Iscador (a one in five dilution), the dose range which can be given to the mouse without killing it is being determined. Once this optimum point is discovered, the dose will be given intraperitoneally daily at what appears to be an effective dose. The effect of giving Iscador homoeopathically and then allopathically will be compared. The actual formula will be worked out with a homoeopathic pharmacist.

In summary—to a sceptical scientist the burden of proof of the efficacy of Homoeopathy lies with the practising homoeopathic physician. We and other scientists are prepared to help to validate this therapy. We have thrown down the gauntlet. If we are supplied with samples, we shall do our best to establish the benefits of this form of treatment.

DISCUSSION

Dr. Pinsent: The speakers have given us so much to think about, we may have to be very selective in the discussion that follows.

Mr. Blum (pharmacist): I am a little disturbed about these trace elements; it seems that you can have too little or too much and be affected by this. As far as zinc is concerned, it appears that if one has a tumour it is far better to have less zinc. The Chinese have found that oesophageal cancer and chicken cancer was related to a complete lack of selenium in the soil. Does that mean that with too little selenium in the soil, the zinc level went up too high?

Dr. Capel: Yes. With regard to selenium—it is the subject of extensive research, largely because it has been associated with breast cancer. In America, a study has been performed by a gentleman named Schrauzer. All over the world the selenium levels of the water supply have been determined and been plotted on a map against the incidence of breast cancer. Countries that have low selenium, for example, Britain and the United States of America, have the highest incidence of breast cancer, and countries with high selenium—low breast cancer incidence. The selenium content of the drinking water all across America has also been determined, and those States that had the highest levels of selenium had the lowest incidence of breast cancer.

Selenium inhibits the incidence of chemically induced tumours, with dimethyl benzantracene, and also the incidence of spontaneous breast tumours in C3H mice as well.

Zinc does antagonize selenium levels. Too much zinc will cause a form of anaemia, partly because of the loss of copper—copper (caeruloplasmin) holds the iron in the correct configuration in making haemoglobin; and partly because of the loss of selenium which leads to increased haemolysis. Zinc tends to inhibit the formation of tumours and is the vitamin C of the metal world. It prevents the formation of spontaneous and chemically induced tumours. Tumours require a large amount of zinc.

We are conducting an experiment at the moment with mice who have developed spontaneous tumours and ones who have been given two different types of chemical—one a polycyclic aromatic hydrocarbon and nitrosamine, to induce a tumour, and also the implanted tumour group of mice. We measure the rates at which high copper or high zinc tend to influence the development of tumours. We thought that zinc would be the protective one, but it is coming out the exact opposite. Animals in the high zinc group are dying. This is a preliminary finding and it may change as the experiment proceeds. I think zinc is stimulating the growth of the tumour to such an extent that the animal dies if the tumour is in a vital position.

Mr. Blum: The Americans have developed chelated mineral products which everyone is taking. It must be wrong then to go on self-medicating yourself.

Dr. Capel: I should strongly advocate people taking zinc, but only if they were shown to be low in the element. There are certain signs and symptoms that Carl Pfeiffer lists. He talks about the white spots on the nails of the middle two fingers of the dominant hand which is indicative of low zinc. Not everyone needs large quantities, but probably the pregnant woman needs zinc. Conventional treatment is to give iron tablets to all pregnant women, and excess iron leads to zinc deficiency. The 'stretch-marks' aftermath of pregnancy could be due to inadequate tissue recovery due to low zinc, as the foetus took all the zinc out of the mother when she was pregnant. It has also been claimed that the degree of morning sickness is dependent on zinc

levels, so that zinc has an effect on steroids and the vomiting centre.

Mr. Blum: The Arabs whom I came across in Israel use a product for diabetes from a tree. We examined this and found it had a high chromium content.

Dr. Capel: Yes, there is a reason for that. There is a substance known as glucose tolerance factor produced in the liver which has chromium as its essential trace element, and that is probably the only use for chromium in the body. This is the reason for the onset of diabetes associated with old age, when there is a chromium deficiency. A friend of mine did a study in six different American hospitals, and examined the diet and found no chromium in it at all; and three of the hospitals were for geriatric patients.

The main source of chromium (and selenium) will be fish liver and kidney, and when this is expensive, people do not eat it. Chromium deficiency can therefore develop very readily, especially in the elderly, where absorption is decreased, with signs of diabetes. The condition should be improved by the administration of chromium, though I am not sure how this could be done.

These sort of studies are tailor-made for Homoeopathy which is far gentler than the conventional manner of administering these elements. You cannot give selenium in quantity to a person who is deficient—it has to be given very gently. You can give large quantities of zinc without toxic effect. There was a patient who was inadvertently given 7 g of zinc intravenously, and died only 35 days later. She did not die immediately from the shock, as would have been the case with, for example, copper. Zinc and magnesium are readily excreted in the urine. Copper and some of the other metals have to come out in the bile.

Dr. Goldwater: Your work is fascinating. I would like to know if you test hair. Do you know Kervan's work? He has written a book on biological transmutations in which he asserts there is a transmutation of elements in the body (ref. *Biological Transmutations* by C. L. Kervan, Crosby Lockwood, London, 1972).

Dr. Capel: We do test hair and use saliva samples to detect levels of metals and for the elimination of drugs. If the drug is water soluble, it will equilibrate in the level of plasma or serum and can be detected in the saliva.

We did not use a homoeopathic potency in the antipyrine liver function test. We have great difficulty in detecting levels in homoeopathic tinctures. In a sample of dilutions, we have found that the levels of trace elements goes down as they are potentized. When they reach a certain level, they seem to go up again. The diluting fluid contains absolute alcohol and water. Whether you can ever get the diluting fluid 'clean' enough for accurate measurements on the diluent to be made is questionable.

We have just completed a study on the hair analysis of dyslexic children and we have found some odd results.

I must say I am sceptical about the transmutation of one element into

another; the energy involved would be enormous. If you are selenium-deficient, you cannot make selenium from a different element. In the sun there is the burning of hydrogen and the formation of helium, but great energy is involved.

Dr. Goldwater: The provings of the trace elements have a lot of clinical material in them. The materia medica of zinc should be compared with some of the deficiency syndromes to see if an application of the information in the materia medica would not have made it possible to detect the deficiency without-chemical analysis of hair or saliva or serum samples.

Dr. Capel: Prasad, in the States, has only recently (in the last 20 years) described the zinc deficient state. He described a population of Iranians where there is a high copper level in the water and the youngsters showed dwarfism and mental retardation and other symptoms of zinc deficiency.

Dr. Pinsent: To what extent, if any, are the neuro-regulatory enzymes, about which we have been hearing from Dr. Davcy, metallo-enzymes?

Dr. Capel: Insufficient work has been done, and so little is known at present, that any answer would be speculative.

Dr. Pinsent: We have had considerable help from Professor Warren in Vancouver, who has been taking mother tinctures and profiling the trace elements as he receives them, from samples taken from plants grown in different places. As you would expect, in the ten or so different plants coming from as many areas, he has found a wide range of trace elements, both in their quantity and presence. There is thus an established trace element variation. In so far as these variations influence preparation of remedies, the pharmacists and ourselves have a lot of problems before we can say to you this is the standard *Sanguinaria* or the reference type of, for example, *Crataegus*.

Mr. Blum: We now know how important the trace elements are in the body. Is there any way the body can regulate the maximum and minimum levels?

Dr. Capel: The homeostatic balance is regulated by the liver and kidney. When there is impairment of the organ, there are dire effects. Drugs like cisplatin really do damage the kidney very badly, with the result that the patient has low magnesium which leads to neurological effects. The clinician does not notice the effects when the patient is seriously ill, anyway.

The large range of new drugs that are introduced for blood pressure and other conditions do not necessarily have an effect on trace elements. If the diet is adequate the homeostatic mechanisms of the body are adequate to cope. The exception is copper, which tends to become elevated in response to oral contraceptives taken for six months or more. The copper/zinc ratio goes up to 2 or even higher. This ratio is also raised in persistent smoking.

Breast cancer patients also often have higher copper levels, but one cannot say that patients with a high copper level get cancer. Patients with

Wilson's disease get all kinds of neurological impairment. The metalloenzyme which carries copper, caeruloplasmin, possibly inhibits one or two enzymes in the brain. These exopeptidases might be associated with the formation of γ -endorphins. This could explain certain types of neurotic and behaviour abnormalities in women with high copper. Some behavioural changes in rats are γ -endorphin mediated, and this could be related to a high caeruloplasmin level.

Mr. Ainsworth: The homoeopathic doses of heavy metals are reputed to restore any imbalance caused by the objection or storage of too much of the element. It is interesting what you said about the iron, because, for many years in Homocopathy, we have used very low doses of iron in pregnant ladies. The blood levels are maintained. Liver function tests, or some other of your tests, could demonstrate whether a homocopathic dose of a heavy metal is actually changing any of the balances.

Dr. Capel: That would be a fairly easy experiment to devise. I should like to test that out in patients with high lead or cadmium, to see what happened to the levels when the patient was given the potentized form of the metal. Measurement in hair is difficult because the hair has to be dissolved, but plasma levels can easily be measured. The penicillamine and chelation-like therapy takes out everything, especially the zinc. You usually find that patients who are on this type of therapy end up zinc deficient. The patients have to be given a 'salt-supplement' at the same time as the chelation treatment. Recently we did a study in animals, giving chelating agents to remove zinc from the system to make the tumour more sensitive to cisplatin. All the mice died from the toxicity of the drug, which was increased in the absence of zinc. The experiment was done in groups of 25 animals, and it was not possible to manipulate the level of zinc depletion or dose level of cisplatin to individual needs, which would have been possible in humans in the clinical situation.

If there was some method of lowering blood levels of certain elements without harming the animal too much, it really would be worthwhile. It would certainly enable us to proceed towards human studies.

Dr. Lewis: I was interested by this blockage of the placebo response with naloxone. It would seem it was something one could try out some time with patients. With patients who have frantic toothache who respond to Chamomilla, one should be able to block that response. Would you consider that to support your thesis?

Dr. Davey: Yes—if someone asked if I had a model to verify what I was saying, I would have said just that. Any homoeopathic remedy that treats pain, in your experience, could be used. If it is an endorphin-peptidergic system, and in this case opiate mediated, then in theory it would block the effect.

Dr. Lewis: When the actual measurements are so difficult to do and

you don't know what you are looking for, measurement would not be a very practical approach.

Dr. Davey: There are bio-assays for serum becoming available, but not yet at an acceptable level of accuracy.

Dr. Capel: We are measuring serum levels of β endorphins in a few patients with chronic pain. A local pathologist claims that patients brought into casualty with very serious accidents which ought to involve a lot of pain, like losing a complete limb, are in a state of complete shock and experience no pain. They are collecting serum from these patients, and we are going to measure the level of β endorphins. We shall be able to see if these levels relate to their perception of pain at the time.

Dr. Davey: Another very obvious model which would substantiate this theory in the acute case, would be in the use of Carbo veg. in shock. I understand Carbo veg. is the 'corpse reviver' and if serum was taken just before the doses of the remedy and in the recovery phase, measurement of the β endorphin would be interesting.

Dr. Lewis: You did say you had done some studies on the actual concentration of trace elements in a sample which had been serially potentized. What was your method and what were the findings?

Dr. Capel: We tested four elements and used flame photometry. This would have enabled us to measure parts per million. Copper, zinc, calcium and magnesium were measured. The actual levels made no sense; there was actually more trace element in the diluting fluid than in the potency liquids. There is no way one can remove these from the diluting fluid however carefully one cleans the apparatus or distils the water and alcohol mixture. The thing that was noted was that the rate of dilution was not as would be predicted.

Mr. Blum: If you have a cancer patient and you want to reduce the zinc levels, there is a product of selenium on the market which is recommended to be given. Is that a way to do it?

Dr. Capel: One can seldom reduce the level of zinc in a cancer patient. Quite the converse is true. The patient tends to lose his taste. Radiotherapy and chemotherapy lower zinc levels and cause severe irritation of the mucosa which leads to this loss of taste. The clinicians nowadays tend to give zinc to their patients to restore taste. The patient regains his appetite, and some of the anorexic and cachectic symptoms will be reversed. It would seem better, to me, to let the zinc level go down, and I think it's never good to give a cancer patient large doses of zinc. There are a number of chelating agents that can be used to reduce the level, but this too, is probably inadvisable.

There may be some point in manipulating the zinc levels when one is using cisplatin, but the clinicians are not at present interested in investigating this. The interests of patients would indeed be served if we could sort

(Continued on page 362)

mirrored from the deep-down structural base from which it springs. It does seem to me that some of the things that we say—talking about constitutions and constitutional types—are implying something of the permanence of the genotype to the reflections. These are, of course, much more liable to modification because the mirrors, through which these things are being transmitted, are slightly curved and are catching a lot of other aspects as well. We are seeing a blurred image out of the mirage. Anything that can help us to clarify our thoughts (a computer processing and a computer enhancement) of that blurred image so that we can get nearer to the true picture, is to be welcomed. People find different tricks helpful in this situation. Body types have not been helpful to me in the past, but new ideas have been opened up today and I look forward to exploring them.

Dr. Pinsent: I feel that we cannot close this phase of the meeting without the observation that Dr. English, in para. 2 of his Summary of the Method he would follow in recording subliminal body cues, gives a very good description of what happens every November at the Miss World Competition on television. I wonder if next year he could report on the particular constitutional remedies prescribable to the ladies who will be fulfilling his instructions precisely on the screen.

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AUTOREGULATORY MECHANISMS AND THE HOMOEOPATHIC RESPONSE

(Continued from page 352)

this one out. Loss of taste is certainly not only due to zinc deficiency. Giving zinc may then be only feeding the tumour, but the tumour anyway, always takes what it needs. If one could find a way of blocking the zinc to the tumour—that would be the answer. It would interfere with DNA polymerase. Now zinc and cisplatin both affect this. Zinc makes metallothioneins which probably are also responsible for the excretion of heavy metals, including platinum.

Dr. Pinsent: We cannot allow any more discussion, though I am sure we could challenge our last two speakers for a long time yet.

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