one health week a year if we do little or nothing during the remaining fifty-one weeks. It is the constant driving home of the simple truths we all know that will do most good in the long run. Above all we must avoid, as Sir Thomas Horder has so well pointed out, the creation in the public mind of any idea that health is an extremely difficult thing to secure or that there are any such things as the "secrets of good health." "Health is a broad and well-paved road; Nature is both an excellent road maker and an excellent road mender. Not only does it require very little skill, and but a modicum of good fortune to keep to it; the wayfaring man must be a fool indeed if he errs therein."

THE THERAPEUTIC VALUE OF THE HEAVY METALS IN PULMONARY TUBERCULOSIS.*

BY

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THE heavy metals have a place amongst the many drugs that have been used in the treatment of pulmonary tuberculosis. Mercury and copper were both believed to cause fibrosis, and to lead to the healing of tubercle, but in practice it was found that they were of no value. A few years ago copper was much advocated, especially in Germany and Japan, in the treatment of tuberculosis, and very encouraging results were described at first. The intravenous injection of copper is frequently followed by a short febrile reaction, or even a rigor, which occasionally leads to improvement in the general condition of the patient. The same result is seen in shock produced by other means, such as serum, tuberculin, protein, colloidal gold, reaction to sun rays, etc. Chart 1 shows reactions following the subcutaneous injection of anti-tuberculosis serum in a febrile case of pulmonary tuberculosis.

CHART 1.

It will be seen that no reaction followed the injection of 10 c.c.m. of the serum, but the administration of 40 c.c.m. caused sharp reactions followed by a lowering of the temperature; later the patient had anaphylaxis and nearly died when 20 c.c.m. had been given; after this the temperature became settled, and she rapidly improved, being able to leave hospital and go to a sanatorium. A shock reaction may, of course, start an acute spread of the tuberculosis, which rapidly proves fatal, but improvement is so often seen to follow the initial shock that one is bound to doubt whether the treatment—be it gold or copper, serum or tuberculin—is acting by virtue of any specific action on tuberculosis. May it not be that the shock stimulates some defensive process in the body and thus leads to improvement? If this is the case it would seem immaterial which method is used to produce the shock, and up to a point I think this is so.

The metal which is most used at present in the treatment of pulmonary tuberculosis is gold, and the best preparation is a double thiosulphate of gold and sodium called "sanocrysin," which was made by Moellgaard. Chart 2 shows a febrile reaction after sanocrysin. The temperature later settled down to normal. In many cases, however, there is no apparent reaction, and yet the patient shows signs of improvement. While, therefore, some of the effects of sanocrysin (such as can be produced

by various other substances) are no doubt due to the shock, there appears to be some other factor besides this. The most notable change resulting from sanocrysin treatment is the diminution in the quantity of sputum and the disappearance of tubercle bacilli from the sputum; the chief indication, therefore, for using sanocrysin is when the sputum continues and contains tubercle bacilli. In the majority of cases I have chosen patients with chronic pulmonary tuberculosis where the disease is slowly progressing and tubercle bacilli are constantly present in the sputum. This type of case is very common in every sanatorium, and may be regarded as that which ultimately does badly, so that some additional method of treatment is much needed.

CHART 2.

Another type of case in which I have found sanocrysin of use is when collapse has been induced in one lung by artificial pneumothorax, and the disease begins to spread on the other side; in these cases it is sometimes possible to check this development and thus to secure the maintenance of the pneumothorax. In cases of acute pulmonary tuberculosis I have not found sanocrysin of great value, but if it is combined with pneumothorax I think the patient obtains the best chance. My practice is to induce collapse in the worst lung and to give sanocrysin in the hope of checking the spread of the disease in the other lung.

When sanocrysin was first introduced in 1923 there were many complications and cases of metal poisoning, but now it is usual to give smaller doses, and a serious complication is very rare. It is given by intravenous injection, and I start with a dose of 0.1 gram. If there is no reaction three days later I give 0.25 gram, and then at weekly intervals 0.5 gram, 0.75 gram, and 1 gram; I repeat this last dose three or four times at weekly intervals. If there is a reaction after one dose I wait until it has completely subsided, and then repeat the same dose if the reaction was a small one, or give a smaller dose in the case of a large reaction. In children, small women, or delicate, thin patients I do not give as large a dose as 1 gram, but stop when 0.5 or 0.75 is reached. It is very unusual to get any reaction under a dose of 0.75 gram, although in exceptional cases I have seen a reaction even after 0.1 gram. To avoid serious complications the injections should never be given at shorter intervals than one week (except after the initial small dose of 0.1 gram), and should not exceed 1 gram at a time. The complications that occurred in my series were:

1. Albuminuria was present in about half the cases, but was transient and mild; I did not have to stop the treatment on account of it in any case.
2. A metallic taste in the mouth was experienced occasionally, but only two in my first series of 60 patients had stomatitis.
3. Vomiting occurred directly after the injection in 20 per cent. of the cases, but passed off quickly, causing no ill effect.
4. A few patients complained of rheumatic pains in the joints, and I had to stop treatment in one instance owing to the severity of these symptoms.
5. A slight febrile reaction directly after the injection occurred in one-third of the patients, but this settled down in a few hours. A temperature rising to 101° F. or more—sometimes associated with a rigor—was not uncommon, and occurred in 13 of my first 60 cases, but settled down within forty-eight hours in every instance. A long febrile reaction lasting a week or more was noted in only 4 cases in this series.
6. An erythematous rash occurred in 11 of my first 60 cases, and in 3 of these it was severe. In the severe cases the rash went on to a desquamative dermatitis, and was by far the most serious complication noted in any of the series. At the same time, all these cases with severe skin reaction did very well as regards their pulmonary condition.
7. Sometimes a little sanocrysin is spilt round the vein and causes a swollen and painful arm. A 10 per cent. solution of sodium thiosulphate injected into the swelling will give great relief in these cases. For stomatitis or for

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the dermatitis following the sanocrysin treatment a daily intravenous injection for three or four days of 5 c.cm. of this 10 per cent. solution will often give relief.

In the early days of the treatment serum was given before sanocrysin in order to ward off the complications. I have never found this of any value, and think its use has now been abandoned by most physicians.

RESULTS OF TREATMENT.

It must be remembered that in all my cases the patients were having rest in bed, with pneumothorax or some other form of treatment. It is not possible, therefore, to give statistics which would be of any value in coming to a conclusion as to the direct results of sanocrysin. Moreover, the treatment has not been employed for a sufficient length of time to enable one to judge anything beyond its immediate results. It is possible, however, to form some idea of these by noting what changes take place when sanocrysin is given while the rest of the treatment remains unchanged. Chart 3 shows a chronic fibro-caseous case with pyrexia.

On March 7th daily injections of ether benzyl-cinnamique were given for a fortnight, and after five days' interval a second course was given. It will be seen that the treatment had no apparent effect on the temperature; the condition of the patient and the quantity of sputum remained unchanged. On April 12th sanocrysin was started; the chart shows that in a few days the temperature began to settle. The sputum became less, and after a reaction on May 15th, following 1 gram of sanocrysin, it dried up altogether. It is useless to draw conclusions from one case, but in this patient the improvement followed so dramatically when sanocrysin was given that it is at least suggestive.

In 28 cases where patients had chronic fibro-caseous tuberculosis and were slowly losing ground in spite of hospital or sanatorium treatment I added sanocrysin to the treatment, and in 15 of these cases tubercle bacilli disappeared from the sputum in six weeks or less.

In this chronic type of pulmonary tuberculosis patients have periods of comparative good health alternating with others when the disease progresses; in other words, they have a series of relapses. Sanocrysin does not seem to prevent these relapses, but it does seem, in many cases, to check a relapse and bring about a period of arrest. Many of my patients relapsed, and in some the relapse was controlled by a second course of sanocrysin. I have not seen any benefit in chronic fibroid afebrile cases, but a course of sanocrysin may cut short an acute exacerbation arising in them.

Cases of very active bilateral disease sometimes do very well if treated by pneumothorax and sanocrysin. I had 6 such cases in my first series, and 5 of them improved, 4 losing the tubercle bacilli. In acute conditions sanocrysin alone does not yield very striking results. Although sanocrysin is not a specific against tuberculosis, and is most certainly not a cure, it may be regarded as a useful addition to other methods of treatment.

DIABETES MELLITUS AND HEREDITY.

BY

P. J. CAMMIDGE, M.D.

THE possibility of heredity playing a part in the etiology of diabetes appears to have been originally suggested by Rondolet, a physician of Montpellier in the sixteenth century,¹ but nearly two hundred years elapsed before the idea was definitely formulated by Johann Peter Frank, who has also the distinction of having differentiated diabetes mellitus from diabetes insipidus. Most subsequent writers on diabetes mellitus accepted Frank's view, and many published statistics showing the proportion of their cases in which a family history of the disease had been traced: Frerichs, for example, stated that such a history had been met with in 9.8 per cent.; Seegen gave a higher figure, 14 per cent.; and Naunyn found a still higher proportion, 17 per cent.—to quote only a few. Writing on this subject, Naunyn² declared that the more carefully the family history was inquired into the more often was evidence of heredity discovered; and this would seem to be the experience of more recent authors, for, with the exception of John,³ who found only 9.7 per cent. of his cases gave a family history of the disease, they have generally quoted figures in the neighbourhood of 25 per cent., while Hoogslag⁴ has reported as high a proportion as 43 per cent. Statistics and general experience alike, therefore, agree in indicating that diabetes mellitus, or a condition predisposing to its development, tends to run in families and is hereditary; but as modern work on genetics has demonstrated that purely statistical methods and general impressions cannot be relied upon when an attempt is being made to establish the inheritability of a character, other evidence must be obtained before a reliable conclusion can be reached.

Our present exact knowledge of heredity in plants and animals has been gained almost exclusively by experimental selective breeding and analysis, but this method is obviously not applicable to man. The alternative usually adopted is to collect all the available data regarding the family histories of a number of individuals exhibiting the character under investigation, arrange them in the form of pedigrees, and compare the results with standard cases resulting from experimental work. In this way it has been found possible to demonstrate Mendelian inheritance in a number of deformities and diseases affecting man, such as brachydactyly, tylosis, night-blindness, haemophilia, etc. Most of these conditions are rare and present striking features by which they can be readily recognized, so that the collection of the necessary information is not difficult once a family suffering from the abnormality has been encountered; but with diabetes it is not so easy, for, in spite of the disease being comparatively common, it is unusual to meet with patients who are sufficiently acquainted with the intimate history of their family to make it possible to construct even a tolerably accurate pedigree of its incidence among their immediate relatives, and still less among distant connexions. On going through my records I find that 224 out of a consecutive series of 800 cases (28 per cent.) gave an ancestral or family history of diabetes. In the majority the known facts are too incomplete for any reliable deductions to be drawn, but some patients have given pedigrees resembling so closely in essential particulars those obtained in experimental breeding that it seems worth while taking representative examples and considering how far they support the view that diabetes mellitus, or a condition predisposing to its development, is transmitted as a Mendelian character.

Before doing so it will be helpful if I describe briefly the results of some of the breeding experiments with animals Mr. Howard and I commenced several years ago with the object of throwing fresh light on the still obscure etiology of diabetes. Working with mice⁵ we found that if those having a naturally high fasting blood sugar (116–120 mg. per cent.) were mated together they always produced offspring with similar high blood sugars, but that when mice with high blood sugars were crossed with others