the faeces and indican in the urine being produced by low protein fleshless feeders who were put on a high protein meat diet. At the same time they displayed symptoms due to this increase of protein, such as headache, loss of appetite, loss of energy, and general malaise. A striking table is quoted showing the amount of indol produced in equal quantities of various foodstuffs (25 grams) mixed with 10 grams of human faeces, and incubated for three days. The figures were an average of 8.54 mg. of indol for meats, 1.045 for milk products, 0.181 for vegetable foods, whilst cereals were 310 times less toxic on this method of examination than mutton, which, strange to say, was the most toxic flesh food.

Beisacher has shown that the removal of the thyroid gland of a dog is quickly followed by death if the animal is fed upon a meat diet, while life is prolonged indefinitely and the animal enjoys good health when fed upon a diet of bread and milk. Blum and Kishi hold that the function of the thyroid gland is to neutralize the poisons derived from the putrefaction of albumen in the intestine.

In the ingenious Eck fistula experiment an anastomosis is made between the portal vein and the vena cava, a ligature being applied to the portal vein close to the liver, thus cutting out the liver from the portal circuit. A dog thus prepared fed upon meat dies in three days; when fed upon bread and milk the animal lives in excellent health for an indefinite length of time. Pawlow has shown that the urotoxic coefficient of such a dog is trebled after tying the portal vein, showing that the liver has three times more work to do on a high protein flesh diet than on a low protein fleshless diet.

Hirschfeld has shown that with a diet of 70 grams of albumen a healthy kidney eliminates 10.1 grams of nitrogen, a diseased kidney 9.3 grams. When the albumen ration is increased to 130 grams the healthy kidney eliminates 14.5 grams, and the diseased kidney only 11.7 grams, and this disproportion increases the longer the high protein diet is maintained.

Flesh foods contain on an average 200,000,000 putrefactive bacteria in every gram, so that it is appalling to think of the number one swallows in the course of a day. It is comforting to think that Nature has provided the body with many defences against this terrible risk of poisoning: the most important, of course, being in the hydrochloric acid of the gastric juice, and the maintenance of the effective digestive capacity in the stomach and small intestine. We can see, therefore, how it is wise in old age, when the acidity of the gastric juice is diminished, to lower the flesh ration. The mucous membrane of the intestine next exercises a protective function, not only in its epithelial cells and leucocytes, but also in the outflow of mucus which hinders the absorption of the poisons by preventing their contact with the living tissues.

The liver and thyroid gland, as we have seen, and probably other antitoxic glands, are likewise on the lookout for any poisons which may escape the toils of the gastric juice and intestinal mucous membrane, so that the healthy man is fairly capable of dealing with the poisons contained in a flesh diet, a fact of which we have abundant evidence every day of our life.

Most of these facts are already familiar to those who have read Combes's treatise on "Auto-intoxication," and it is recognized that there are at least four efficient reasons why auto-intoxication does not exist in healthy people, even although all the local conditions may be present in the alimentary canal. Where, however, hypochlorhydria is present, or the colon is catarrhal, or the liver and the thyroid and other glands are defective in their activity, the toxins are admitted into the blood and exert their malign influence on the body.

CONCLUSIONS.

An attempt to reconcile the doctrines of these three sects will apparently meet with little success.

The low protein feeders admit flesh into their dietary, have not the slightest objection to purins in soups or xanthins in tea, coffee, etc., and lay no special stress upon the observance of other laws of health, such as the necessity for exercise, abstention from tobacco, etc.

The purin-free feeders expunge all purins and xanthins from their diet list, insist upon at least 50 per cent. more protein, and one would be disposed to infer from reading

the published treatise of its author that these are the only practices essential to perfect health.

The flesh abstainers agree with the low protein advocates in the smallness of their protein content and with the purin-free feeders in their objection to purins and xanthins, but, in addition to this, expunge every possible toxin from their diet list, and place the greatest emphasis on the performance of every known law of health. Their chief apostle, Dr. Kellogg, preaches the necessity of three evacuations of the bowel each day, and for this purpose consumes at each meal liberal quantities of agar-agar in compressed tablet form.

The one thing upon which they all agree is in the diminished amount of food, and so we come back to the fundamental doctrine of moderation in all things, which has not only been taught from time immemorial, but is actually practised by all sensible men at the present time. It is quite possible that the sedentary man may err in eating a little too much animal food, but this is practically forced upon him by his habit of taking too little exercise. But the average man will be very much surprised if he will sit down and carefully estimate the caloric value of his day's food. He will most likely find that it is very much below the 40 calories per kilo, amounting to over 2,500 calories per day, allowed by von Noorden, to say nothing of the 3,000, 4,000, and even 5,000 calories mentioned by some other authorities. I have frequently estimated the caloric value of my own diet, and have sometimes been depressed because I could not get it to exceed 1,800 calories. I have been much comforted, however, to discover in a little book by Max Einhorn on diet and nutrition that his own average was 1,650, or 32 heat units per kilo, and this was on a mixed diet, which, he informed me, he was profoundly convinced was the only rational dietary for a healthy man. Probably most men conform more closely to the low protein diet than they are willing to admit. The healthy man can live on any system of diet by attention to moderation and regularity, but the unhealthy man must look to the dietetic expert to guide him in the selection of the best system or kinds of food to suit his case.

REFERENCE.

¹ BRITISH MEDICAL JOURNAL, 1908, vol. ii, p. 1327.

THE TREATMENT OF CHLOROSIS.*

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CHLOROSIS is a very common ailment, and, generally speaking, one that is readily and fairly quickly cured. Each of us probably has his favourites among the twenty or so pharmacopoeial preparations of iron, and it only occasionally happens that one comes across cases that resist one or other of them. Nor are we usually neglectful of the auxiliary methods of treatment, the regulation of the bowels to prevent intestinal toxæmia, the prescription of fresh air, and, above all, of proper food, since its occurrence seems to be so frequently bound up with improper diet. We do not, perhaps, often carry out the line of treatment suggested by my friend Dr. Eustace Smith,¹ who relates the cure of a case of chlorosis by means of small doses of zinc sulphate, which, by frequently clearing out the stomach, and by preventing the fermentative changes which had been going on in the alimentary canal, removed what he took to be the underlying cause of the disease, though there is another way of looking at his case which I shall refer to later.

But it does occasionally happen that cases come or are sent to us, in whom all the ordinary measures have been employed and found wanting, and on whom all the new, so-called "organic" preparations of iron which the skill of German chemists has evolved, and the enthusiastic if somewhat commercial advocacy of German physicians has pressed upon the profession, have been tried with little or no success.

It is particularly in these cases that the routine treatment which I shall describe is likely to prove of value, though even in the less stubborn cases it is of service since it shortens a good deal the time required for recovery.

* A communication to the Association of Physicians of Great Britain and Ireland, Dublin, June, 1909.

The method is based upon the researches of Haldane and Lorrain Smith, who have shown by their carbon monoxide method that in chlorosis, although the percentage of haemoglobin in the blood is so much diminished, the total amount of haemoglobin in the body is fully up to the normal; that is to say the anaemia is only relative, being due not to a deficiency of haemoglobin but to an excess of plasma. Theoretically, therefore, it should be possible, if we can only diminish the fluid portion of the blood, to cure chlorosis without the use of iron. What one has to aim at, therefore, is a reduction in the fluids of the body, and the prevention of reaccumulation, and there are a variety of means which may be employed to this end.

The removal of water by the bowel has long been recognized as a valuable line of treatment in chlorosis, so that a small dose of magnesium or sodium sulphate usefully forms a part of any mixture employed. The secretion of urine should be encouraged; citrate of caffeine or diuretin may be employed, or theocin sodium acetate, which I have found the most reliable diuretic, in doses of 5 grains four times in the day. Whichever of them is used, it is well to give at the same time 5 minims of tinct. digitalis, since they may all prove ineffective unless the blood pressure in the renal glomeruli is properly maintained. Here, again, it is of interest to note that the empirical use of digitalis in the treatment of chlorosis has long been recognized. Loss of fluid by the skin may be encouraged by the use of jaborandi in some form, or by hot baths, vapour baths, or hot packs. I have never, however, found it necessary to resort to these measures, though in Germany, where hydrotherapy is more in vogue, some physicians lay great stress upon their use in chlorosis.

There is one other mode of removing fluid from the body which I have not so far made use of. That is the treatment, already alluded to, by small doses of zinc sulphate, by which repeated emesis was produced. Although Dr. Eustace Smith attributed the success of this line of treatment in his case to removal of fermenting food remains from the stomach, I am of opinion that the withdrawal of fluid from the body in this way played a part, if not the main part, in the case.

Not only, however, must this elimination of water by the bowel, by the kidney, or by the skin be encouraged, but the intake of water must be limited at the same time. In some of the cases in which I have asked the question, the patients have told me that they drank unusually large quantities of fluids, though in others I have failed to get this history. It is important to impress upon them the necessity of drinking less than they have been in the habit of doing; at the same time, I recommend them to take as little salt with their food as possible. The power of salt to retain fluid in the body is well recognized, and in persons whose kidneys are defective an excess of salt may lead to the appearance of oedema, and deprivation may lead to its disappearance. Indeed, it has struck me as a possible explanation of the origin of chlorosis, which is still wrapped in mystery, that the kidneys might be functionally incapable of secreting urine containing more than a certain proportion of salts, such as is well known to be the case in chronic interstitial nephritis, with resulting retention of salts and retention of fluids to keep the salts in solution. In this connexion I would refer to certain oedemas in young children. It is not uncommon to get sudden oedema, with pale, swollen face and puffy eyelids and swelling of the dorsa of hands and feet, which at once suggests acute nephritis. Examination of the urine, however, fails to reveal evidence of any organic kidney trouble; there is a complete absence of albumen and casts, and the condition appears to be due to a wholly functional inability of the kidney to excrete the normal percentage of sodium chloride, with consequent retention in the tissues and accompanying oedema. The rapidity with which the oedema disappears on a salt-free diet is startling, and fully bears out the suggested etiology of the condition. I have in prospect some experiments to determine the power of the kidneys in cases of chlorosis to get rid of excessive intake of salt, but so far, from my observations on the specific gravity of the urine in these cases, I do not get much support for my suggestion; it is not so constantly low as it should be if the explanation were correct. On the other hand, some observations of Moraczewski² though incomplete in certain ways, led

him to conclude that the excretion of chlorides in the urine was sensibly diminished in cases of chlorosis.

I have had the patients weighed from time to time, and as they improved by the elimination of their excess of fluid their weight steadily fell. In one case the nurse whose duty it was to weigh the patient was seriously perturbed at the steady loss of weight, since in her previous experience the result to be looked for in successful treatment was a gain in weight.

Theoretically, as I have said, the disease should be amenable on those lines without the use of iron, but in the few cases in which I have followed this course without iron the improvement, though present, has been very slow, to increase rapidly on the addition of iron to the treatment. Practical considerations, therefore, must be allowed to outweigh pure theory. I have tried it now on a considerable number of cases with, on the whole, very gratifying results, particularly in those cases in which the excess of fluid in the body appeared most evident, in which the face, and in fact all the loose tissues of the body generally, had a distinctly "puffy" appearance.

REFERENCES.

- ¹ BRITISH MEDICAL JOURNAL, 1908, ii, p. 1144.
- ² Virchow's Archiv, cxlv, p. 459, 1895.

CASE OF TETANUS TREATED WITH CARBOLIC INJECTIONS: RECOVERY.

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THE following case of recovery from tetanus may be of interest, since, in the absence of antitetanic serum, injections of carbolic acid proved of undoubted value.

A boy, aged 13, was first visited on June 22nd, 1909. His parents stated it to be then the third or fourth day of illness since the onset of spasms and difficulty in opening his mouth, and about the twentieth day from the date of injury. The seat of infection was a small cut on the left middle finger on the dorsal surface of the proximal interphalangeal joint. No attempt had been made to protect or clean the wound, and septic synovitis had resulted. His condition on examination was typical. His whole body, the arms excepted, was in a state of continuous rigidity; opisthotonos was marked and trismus severe. Paroxysms of increased rigidity occurred once in every thirty or forty minutes, sometimes oftener. In the intervals between the spasms his jaws could be separated for nearly $\frac{1}{2}$ in. The temperature and pulse were normal, but he was pale and exhausted from lack of food and sleep. He was at once given an egg beaten up with brandy, and his finger washed and treated with caustic carbolic. Amputation being refused, the wound was opened as freely as possible. He was then given a mixed draught of potassium bromide and chloral hydrate, 15 grains of each, morning and evening, the dose being increased later to 20 grains. His parents were instructed to feed him as liberally as possible. After his strength had been recruited by sleep it was soon found that there was no lack of appetite, which was in fact exceptionally keen. He was fed chiefly upon a diet of raw eggs and a Chinese gruel made of egg and flour. Aperients were administered frequently to keep the bowels freely open, and according to the usual routine in our practice he was treated for *Ascaris lumbricoides*. On one occasion eight worms were passed in his stools, but the condition is so universal here that it bears no special significance in his case.

As his parents were convinced that there was no hope of recovery, and the Chinese all prefer to die at home, they refused to allow him to be brought into the hospital, and as they had not the smallest control over him and were helpless in administering the medicine themselves, it was necessary to visit him twice daily for that purpose. These visits were continued for fifteen days. During the first three days of treatment there was a slight improvement in his general condition, owing chiefly to the nourishment and sleep obtained, but no abatement of the symptoms. As the days went on these seemed to be increasing in intensity, and on the eighth day it was decided, as a last hope, to try injections of carbolic acid, no antitoxin being available in these remote regions.

The first injection (1 c.cm. of a 4 per cent. solution) was given on the evening of June 30th, and from that time onwards repeated twice daily, more frequent injections being impossible at his own home. At first there was a distinct improvement in his condition, the spasms were less severe, and the intervals between them considerably prolonged, trismus being markedly relaxed, but on July 3rd there was a relapse. The boy, according to Chinese habit, had been lying quite uncovered on his bed, and must have contracted a chill. His temperature rose slightly, the voice became very hoarse, and coryza troublesome. He was irritable and refused both food and medicine. The paroxysms became again more frequent, and so severe and prolonged that asphyxia was threatened, and the pain caused beads of perspiration to appear on his brow. The parents, fearing the end