

## THE PRINCIPLES OF DIETETICS.\*

By R. J. S. McDOWALL, D.Sc., F.R.C.P. Edin.

(*Professor of Physiology, King's College, London.*)

When there are so many professional dietitians in London, I am still wondering why I was asked to introduce this course. Nevertheless, at a time when a diploma in dietetics is about to be instituted I, as an ex-dyspeptic, who has subjected himself to the whole gamut of biochemical and X-ray examination, feel very strongly on the subject. Particularly, I feel that in the near future the science of dietetics, which has become already a music-hall joke, will become discredited through the advent of non-medical dietitians, for I believe that however excellent chemists some of them may be, they are not in possession of sufficient knowledge to see the larger and more important aspect of the picture. Our biochemists have added enormously in recent years to our knowledge of nutrition, a subject of itself of the greatest possible national importance, but we medicals must insist that the terms dietetics and nutrition are not synonymous.

The subject of dietetics cannot be separated from the subject of digestion, and, as the titles of the subsequent lectures in this course indicate, it is impossible to separate digestion from the rest of the body. The tragedy is that we know so little about digestion and absorption, and what we do know is in a very molten state. Practically no one is working on it. Its methods are biochemical, but since most biochemists are not medical, and the subject of digestion contains so much which cannot be expressed in terms of chemistry, the subject of digestion falls between the two stools of biochemistry and physiology. I really believe that the study of digestion in relation to dietetics is in extreme danger of being unduly overlooked, and it cannot be too often stressed that the condition of the average dyspeptic is not brought about by errors of diet, and will not be cured by any dietetic formula. We must insist, as Hippocrates did 2,500 years ago, that we must no longer attempt to repair complaints of the stomach and intestines—we must cease to treat a case of gastric ulcer or of flatulent dyspepsia—we must treat Mr. Jones or Miss Smith, who happens to have a gastric ulcer or flatulent dyspepsia, which is quite another matter.

I will now give you two examples. The first obvious one is that whole families do not suffer from dyspepsia at the same time, a fact which at once indicates that there are other more important factors concerned than diet. My other example refers to nutrition, and as a physiologist has very little opportunity of studying dietetics except in his own family, perhaps I may be allowed to give an example of a child of my own suffering from decayed teeth. Being a physiologist, I see that my household is liberally supplied with vitamins. Indeed, to ensure this my children get cod liver oil in the winter time. At the age of nine, my small daughter began to suffer from dental decay. I therefore paid still more attention to her vitamin supply. Imagine my chagrin when at the end of a year she returned from the dentist with the advice that her teeth were not worth stopping and that they might as well all be taken out. As you can imagine, my faith in Mrs. Mellanby had for a moment sunk to a very low ebb. I did, however, notice that she had a bad breath, which I scarcely thought came from the teeth themselves. I therefore cut down her roughage and stopped her cod liver oil. Having seen the experiments in Sheffield and as Vitamin D seemed to be the sole remaining hope, I gave

\*Introductory lecture in the series on "Diet and Dietetics," delivered under the auspices of the Fellowship of Medicine on Wednesday, October 24th, 1934.

her a concentrated Vitamin D preparation. From that moment the teeth steadily improved; the little black spots which heralded approaching decay disappeared, and the mouth became again healthy. (Of course, one could not expect the already wrecked teeth to become whole again.) I am not absolutely prepared to give an exact explanation for this result—I find it a little difficult to believe that one child of a family should require very much more calcium than another, although admittedly she was growing very fast. I am much more inclined to think that as the result of giving her excessive roughage and fat her digestion had become sufficiently upset to interfere somehow with nutrition, possibly with the absorption of calcium. She had, of course, no alimentary complaint.

The other aspect which is commonly neglected in dietetics is the mental and physical factor in digestion. Recently the Bishop of Durham brought to light at the opening of a Medical School an experiment carried out by the Emperor Frederick of the Holy Roman Empire. He caused two men to be given a good meal. One was sent to work, the other was sent to rest. He then had them both disembowelled in his presence, and the physicians reported that the one who had rested had digested his food the better. It is little wonder that that particular emperor was nicknamed Barbarossa! That, of course, is an extreme example, but every physician is aware that dyspepsia is a complaint of the black-coated, and he could give you many examples of the effects of the mental state on digestion. This is summed up rather clearly when we use in vulgar parlance, certainly north of the Tweed, the expression that so-and-so "is worrying his guts out." It is little use treating a man in such a state by dietetic means only, and any attempt to do so will merely result in the discrediting of dietetics. That, I feel sure, will occur if we allow dietetics to fall into the hands of professional non-medical dietitians. As yet we have very little direct evidence, largely because we have not looked for it, of the effect of such mental states on nutrition, but I cannot help feeling that evidence on this point will come along in due course.

Support for the view that the physical state of the body bears an important relation to digestion comes, of course, also from methods of successful treatment, for it is becoming agreed that for a very large number of gastric complaints physical rest is of the greatest possible value. There is indeed a school of thought which believes that cases of gastric ulcer can be treated just as successfully on a full diet as on a restricted diet, provided the patient is kept rigidly in bed for a sufficient length of time. I can conclude this introduction, then, by saying that if a man has a digestive ailment we must look beyond his diet for its cause.

We can now classify dietetics under three headings: (1) dietetics in relation to digestion; (2) in relation to nutrition; and (3) for special diseases. The first we can divide into two, extraneous factors affecting digestion—I have already mentioned physical and nervous, but of course there are others, such as circulatory and general disease, which I imagine will be dealt with in relation to diet for convalescence.

And now diet itself from the point of view of digestion—first, its physical state. Of recent years we have heard a great deal about roughage in the diet. It is claimed that adequate intestinal movement will not continue unless a large amount of indigestible material is taken, notably fruit and vegetables. While it is quite true that certain individuals suffering from constipation may improve on taking a diet with more roughage, it is just as certainly true that many will not—indeed,

may get worse, because the roughage sets up an undue spasm of the large colon. Further, we must remember that children on milk do not necessarily suffer unduly from constipation. It is in relation to the stomach, however, that the effects of roughage are commonly overlooked. We must consider it quite wrong for anyone who has not been accustomed to taking roughage to commence taking it in too large quantities. We can imagine quite reasonably that just as the epithelium of hands unused to spade work gives way if such work is undertaken, so also the epithelium of the stomach may suffer, especially if there are any other conditions present, which tend to cause gastric irritation. What a stomach can stand depends entirely on what it has been accustomed to. A large meal of nuts and fruit, including skins, would probably give many of us indigestion, but others would be unaffected. We have all seen people eat the skins of baked potatoes. I have even seen a man eat a herring like a sausage, and apparently he was none the worse for the experience. In this respect we must, however, believe that it is not the diet that is at fault, but our digestions, for the average carnivorous animal simply bolts whole chunks of food and bones without apparently suffering materially. The other physical state of food which is liable to interfere with digestion is that which joins together again after we have taken the trouble to chew it, viz., badly cooked combinations of fat and starch, such as we meet in pastry and suet crusts. In the same sort of category is new bread.

Next is the chemical state of the diet, and at the top of the list I am afraid we must put alcohol, particularly on an empty stomach—I mean especially, of course, spirits, as whisky or cocktails. Next, excessively hot or strong tea or coffee. In the same category as alcohol and hot beverages come condiments and spices. I think it would be a very good idea if we could get it appreciated generally by the public that nothing should be allowed to go into the stomach which feels uncomfortable to the tip of the tongue. Next, possibly, comes cooked fat. I was interested to notice that Dr. Robert Hutchison, in his book refers to this particular point, as it is one of which I have considerable personal experience. Fat, as you know, is used for roasting, frying and, nowadays particularly, in deep fat cooking. I wonder how many of you know what this means. It means having a pan of fat, the temperature of which can easily be raised to 300 degrees and the food to be cooked is dipped into the boiling fat for a few minutes—particularly fish. The fat is used over and over again, with the result, of course, that the products of combustion of fat must necessarily accumulate in it. Theoretically, the fat is supposed to be boiled up with water periodically and clarified, i.e., the soluble substances which have accumulated in it are removed, but I am afraid the average English cook is a forgetful person, and this is not done sufficiently often. Often a patient thinks he is taking a very bland diet when he eats a piece of fish—actually, he is taking a bland diet coated with the most irritating material. In the same category is coffee, which many people find disagrees with them. It is, of course, not the caffeine, because tea contains as much caffeine as coffee—it is the fats which it contains, which may get partially burnt when the coffee is roasted. We are all, of course, familiar with the chronic gastritis of the chronic alcoholic, but there can be little doubt that there are many stages between this and normality—stages which are the forerunner of more important complaints. We have of recent years seen pernicious anæmia brought into this category, and there is little doubt that we shall see others in the course of time.

There is one other point, which is perhaps not quite relevant to diet, but it might, I think, be said that possibly every dyspeptic succumbs sooner or later to advertisement, and takes some variety of alkali, which is certainly comforting at the time, and may help to protect him against gastric ulcer, but at the same time it stimulates gastric secretion, increases gastric movement and prolongs the irritation. It would seem reasonable to believe that once a stomach has become irritable, the irritation becomes exaggerated by rough fibrous food.

And now we come to the nutritional aspect of digestion, which is one that has been receiving a large amount of attention of recent years. From the point of view of nutrition, the diet must contain protein; carbohydrates and to a lesser extent fats; salts; vitamins and water. These I shall, however, have to hurry over more rapidly. They are dealt with fully in any text-book of physiology or on diet. The carbohydrates and fats supply the energy necessary for physical work—fats are merely a more concentrated way of taking in carbon and hydrogen, and it is only when the physical work done is great in amount that they are really essential to the diet, except as sources of vitamins. If we take in more carbohydrate or fat than we can burn, we store it and become fat. If we burn up more fuel than we take in, we call upon our bodily reserve, and become thin. It cannot be too often emphasised in these days when so many people complain of stoutness that there is no other method of entrance into the body of carbon than by the mouth. Of course, there are always amongst us a few people who at rest burn much more fuel than others, or much less. Apart from pathological abnormalities, such as disease of the pituitary, we know that in such persons the actual effect of taking food, i.e., the specific dynamic action of food, is greater or less than in average people. They ought, therefore, to eat more or less accordingly. I shall not, however, trespass any further on the ground to be covered in the succeeding lectures.

The protein part of the diet is important from the point of view of tissue repair—we build our bodies from the bodies of plants and animals, which we kill and break down for this purpose. It is not possible for me to enter into the pros and cons of vegetarianism, but at a time when the protein constituents of the diet are by far the most expensive—the matter is an economic as well as a physical problem. Perhaps we can sum it up like this. It is quite true that vegetables appear to be capable of supplying very cheaply most, if not all, of the proteins required by the body—indeed, they do this in the herbivorous animals. At the same time, we know that vegetables are not nearly so completely digested in man as in the herbivorous animals, and there is commonly a waste, which it is said may amount to forty per cent. Moreover, it is becoming increasingly evident that many of the important hormones of the body, such as those elaborated by the thyroid or suprarenal glands are formed from amino-acids, which are by no means so plentiful in vegetable matter, and unless very large quantities of the latter are consumed, the body may quite easily be inadequately supplied. We must remember that the herbivorous animals spend a very much larger amount of their time eating than do the carnivorous animals, which are in other ways much more active. Nor are all animal foods alike in the extent to which they benefit the body—eggs, meat and milk stand much higher, or as we say, have a higher biological value than those from other sources. One might say here in parenthesis that eggs can be put even higher than milk in the scale of biological values, and one might almost suggest that they are in many ways more suitable than milk for government subsidy. But those who recommend subsidies have had their attention more drawn to cows than to hens the keeping of which requires less labour and less land. One point in

relation to protein is often overlooked. There are many who imagine that life would be almost impossible without a considerable supply of butcher meat daily—it should be emphasized that the protein wastage of the body, provided a man is not doing intensely hard physical exercise, is very small indeed, and as a source of energy meat is about equal to carbohydrate and much inferior to fat.

The salts of the diet we commonly neglect, as they are so abundant in our various articles of diet. It is only when illness appears that we realize how essential they are. Studies of goitre, for example, have shown us that iodine is an essential constituent; the anæmias have emphasized the necessity for iron for the formation of the red blood corpuscles, and in this connection it is now being suggested that copper is an important adjuvant. Calcium is essential for a vast number of body processes—muscle requires it for contraction, the blood for coagulation, and the bones for their stability. Phosphorus, too, is necessary for the bones, and plays an important rôle in the maintenance of the normal body reaction. I have mentioned but a few, but there is increasing evidence that minute traces of other elements may have some rôle as yet unknown in body metabolism. It should be remembered, however, that it is not enough merely to take these things in by the mouth—it is the absorption that is important. In the cases of iodine, iron and calcium, we know that alimentary conditions may be present which may result in deficient absorption, although these substances are present in adequate amounts in the diet, and goitre, anæmia and rickets may result.

As for the vitamins, they are indeed in the melting pot. It is unnecessary for me to enumerate them—all I need say is that we are slowly becoming disillusioned regarding them. There was a time when they were considered to be amines essential to life, and obtainable only from other living things. First we learned they were not amines, and now many of them have been produced completely artificially, and have been demonstrated to be relatively simple chemical substances, which exercise, however, an enormous influence in controlling body processes.

Finally, we require water—first, for digestion, because much which we absorb requires to be in solution. We require it also for metabolism and the subsequent excretion of waste products. Of course, we must remember that so far as excretion is concerned, we manufacture an enormous amount of water from the combustion of dry food.

I am afraid it is not possible for me to go further into the intricacies of dietetics. Ponderous volumes have been written on the subject, and this lecture is but to introduce a course. I cannot, however, close without emphasizing, as I did at the beginning, the importance of maintaining an unrestricted view as to the meaning of dietetics, and how profoundly the value of any specific article of diet may be affected by digestion and related to substances. It would be well indeed to remember again that Hippocrates emphasized the importance of individual diagnosis. We must not treat a case of gastric ulcer or a case of dyspepsia, or even a case of constipation—we must treat Mr. Smith or Mr. Jones or Mr. Brown, who happens to have one of these conditions.