

## THE LATER EXPERIMENTAL WORK ON VITAMINES.

A LECTURE DELIVERED AT THE VIROL RESEARCH LABORATORIES TO NURSES AND HEALTH VISITORS ON APRIL 23, 1920.

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In addressing you to-day on the subject of the bearing of some of the recent work on accessory food factors, or Vitamines, as they are popularly called, I do not propose to discuss the details of the experimental evidence, but rather to indicate broadly their practical bearing on the problems with which you, in your daily—and may I say, most useful—work, are frequently confronted.

Let me first review the history of the subject during the last few years. Only a very short time ago dietetics was not recognised as a science at all by the average person. In fact, it consisted in a collection of opinions—which could hardly even be called pious—based on very little but personal facts, and characterised by a tendency to differ widely on every important point.

It was pretty much the same, or perhaps worse—because the victims could not complain—in the practice of infant feeding, where a long list of modified milks and patent foods bewildered the unfortunate nurse and vied with the pin under the binder in the production of abdominal emergencies. Much work, even at this time, had been done in the physiological laboratory, on the comparative value of food stuffs, but it had not penetrated either to the consulting room or the nursery to any valuable extent.

Then came the war with its shortage of some articles and expensiveness of many more, and we began to think of food not in kind but in calories, and we bought it for its value to the body in the production of heat and energy rather than for its palatability. Beef gave place to beans—with or without the exiguous portion of transatlantic pork.

But the pendulum, as usual, swung too far, and there was a tendency to think that so long as the body got its proper quantity of fuel—for that is what the caloric point of view came to—it did not matter very much what we started the fires with.

Then the public discovered the physiologist, in much the same sort of way, by the bye, as a certain daily paper published a sensational account of the recovery of a patient after tracheotomy for diphtheria some fifteen years after every resident in a fever hospital had

been doing it successfully in his daily round. Vitamines, therefore, became popular.

Now let me sum up the position. If a young animal is fed on a diet consisting of chemically pure protein and carbohydrate together with either cooked fat such as lard, or purified vegetable oil, in quantities more than sufficient for its daily output of heat, energy and tissue waste, it is found that it soon *ceases to grow* and *its resistance to bacterial infection is lowered*. Furthermore, it may develop rickets, scurvy, or a variety of peripheral neuritis akin to the disease known as beri-beri. If now this diet is supplemented by a very small quantity of fresh milk, growth is renewed and these diseases disappear. That is the broad outline of the basal facts. I show you slides of two curves illustrating the growth of young rats on the pure diet with and without the fresh milk supplement.

Further research showed that there were three essential principles in the fresh food, to which the name of vitamine was given; namely, "Fat soluble A," which is responsible for growth, resistance to infections, and for the prevention of rickets; "Water soluble B," for prevention of neuritis, and probably also partially concerned with healthy growth; and "Water soluble C," for the prevention of scurvy.

The distribution of each of these principles has been worked out and is given in a very valuable table in the pamphlet on the subject recently published by the Ministry of Health, which I advise you all to read. I need not now give the details, but I may remind you that Fat soluble A is present in fresh animal fats, but absent from those of vegetable origin; it will stand a temperature of boiling point for a short time in a closed vessel (*i.e.*, without much exposure to air), but is destroyed by prolonged heating. Fresh milk and lightly boiled eggs therefore contain it. The animal derives it originally from fresh green vegetables and stores it up in its tissues, but to obtain a sufficient quantity of it direct from the vegetable kingdom we should have to eat larger quantities of cabbages, etc., than our intestine could possibly accommodate.

The Water soluble B factor is found mainly in the germ or outer part of grains—which incidentally is removed in the preparation of white flour—and in meat. It is remarkably resistant to heat and will stand all ordinary cooking.

The Water soluble C is present in fresh vegetables, and notably in fresh fruits and their juices—lemon juice being about the best—but it is destroyed by even a slight amount of heat

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