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## Problems of Human Nutrition

OF the two factors which together mould the individual, heredity and environment, modern knowledge is attributing more and more importance to the latter ; in fact, as Sir Frederick Gowland Hopkins pointed out in his Sir Henry Trueman Wood Memorial Lecture delivered before the Royal Society of Arts on February 6, although inheritance must set definite limits to the possibilities before each individual, environmental influences can decide whether, within those limits, the highest level possible is reached, or only a level which may be much lower than this. Among all the demands which the body makes on its environment, that for its food is of outstanding importance, and it is to-day becoming recognised that right nutrition, especially in early life, may profoundly affect the well-being and social value of the individual. Knowledge obtained by scientific inquiry is beginning to take the place of instinct and appetite aided by very slowly growing transmitted experience. There is still to be combatted the idea that the race, having survived through the ages without such knowledge, can continue to thrive without making any practical use of it : but mere survival of a race is no proof that the majority of its members have ever lived in optimal conditions, or have ever displayed to the full their innate capacities.

Briefly, the essential constituents of a diet are proteins of good biological value, fats, carbohydrates, minerals and vitamins. The energy value should be not less than 3,000 calories *per diem* for the average man—probably it would be better to take the higher figure of 3,400 calories as suggested by the Committee of the British Medical Association. The value of a protein depends on how far its constituent amino-acids resemble those of the body in nature and grouping, so that animal proteins are of higher biological value than vegetable. Although fats and carbohydrates are interchangeable as sources of energy, yet both are necessary in the diet. Fats cannot be properly utilised in the absence of carbohydrates, and it is now known that certain fatty acids are as essential constituents of a diet as some of the amino-acids. The relationship of the mineral elements and the vitamins to different diseases is now well known. To sum up, scientific research during the last two decades has shown that nearly forty individual substances must be

present in a food supply to make it completely adequate.

It is not always realised how easily a diet, generally considered satisfactory, can be improved, or how easily experimental alterations in a food supply, carried out without complete knowledge of what constitutes a proper diet, may spell disaster. Corry Mann investigated the effect of adding  $1\frac{3}{4}$  oz. of butter or one pint of milk daily to the ordinary diet of boys in an institution. The average weight and height increases for the three groups, on diet alone, diet plus butter and diet plus milk, were, in one year, 3.85 lb. and 1.84 in., 6.3 lb. and 2.22 in., and 7 lb. and 2.63 in., respectively. Again, Christ's Hospital School, by utilising the results of the modern science of nutrition, has been able, during the past twenty years, to increase the height and weight of the boys until they are now several inches taller and several pounds heavier than boys of similar age who have not had the benefit of a sound diet. During the War, when food was short and of poor quality, and substitutes had to be used, the Christ's Hospital records show that liability to bone injuries and fractures rose rapidly and did not diminish until 1922 (*Planning*, No. 44, Feb. 12, 1935). On the other hand, a short time ago, the island of Nauru in the Pacific suffered from a most alarming outbreak of beriberi, especially infantile beriberi: the officials in charge of the island had first of all encouraged the consumption of milled cereals, and then forbidden the consumption of the intoxicating national drink—'toddy'—made from fermented sweet swathe of the coco-nut. Thus the diet was deficient in vitamin B<sub>1</sub>. It is dangerous for authority, with inadequate knowledge of problems of nutrition, to control food policy.

What then is a proper diet? Much of the teaching of modern research may be summed up in statements so simple that elaborate scientific efforts may, to some minds, seem to have been superfluous. To convey the essentials of to-day's scientific teaching, it is only necessary to insist that fresh green vegetables and fruits are not luxuries but necessities, and that cereal foodstuffs, and especially cereals artificially fractionated, must not so dominate a diet as to exclude an adequate supply of fresh animal products—if not of flesh, then of the products of the dairy. In this connexion it may be pointed out that a review of the voluminous literature indicates that pasteurisation of milk, when properly carried out

—an important reservation—affects its nutritional value to no more than a negligible degree. Nevertheless, it is a sound policy to encourage the practice of giving extra sources of vitamins A, C and D.

Why is the application of these discoveries only slowly taking place? The issue of *Planning* referred to above points out that, apart from the inherent difficulty of changing ingrained habits of thought and living, there is no general agreement on standards of nutrition and so on what constitutes malnutrition. There is an urgent need for a trustworthy standard, based upon objective tests capable of universal and uniform application, so as to yield comparable results in different places and periods.

Education of the public in the facts of nutrition as disclosed by modern research is an essential. Properly presented, public taste will respond to our increasing knowledge of the factors necessary to make a diet completely adequate; in fact, it has already responded to a remarkable degree, considering the number of obstacles—confusion, inertia, lack of co-ordination and vested interests of all sorts—which stand in the way. Thus, compared with the average of 1924–27, our 1932 *per capita* consumption of margarine fell by 20.8 per cent and of flour by 2 per cent (bread remaining unchanged), while consumption of fruit rose by 8.2 per cent, of milk by 15.5 per cent, of eggs by 32.7 per cent and of butter by 40.3 per cent. These changes are not parallel to changes in price: consumption of bread has not increased in spite of the fall in price, and the consumption of milk and eggs has increased considerably faster than prices have fallen.

At the same time, it must be emphasised that our knowledge is far from complete. We do not know the optimum intake of calories for children of different ages, or the optimum supply of the individual vitamins. We do not know what beneficial modifications of a dietary may be desirable at special periods of life, as at puberty, for example, or in the case of a pregnant woman. These are merely instances of knowledge yet to come. There can be no doubt, however, that a general and intelligent application of existing knowledge would lead to betterment in the health of the nation; large and delicate readjustments are called for, which will intimately affect social habits and will touch directly or indirectly the development of many industries and branches of distribution.