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Problems in Human Nutrition.

IN the acquirement of knowledge by the experimental method, with the attention to minute detail which accurate and successful work demands, it is sometimes useful to pause a while and raise the eyes from the task in hand, and to take a general survey of the field—what has already been accomplished and what still remains to be done. Some reflections on problems in nutrition are suggested by perusal of the thirteenth annual report of the Medical Research Council, more especially as one chapter of our knowledge of the elusive, but extremely important, accessory food factors appears closed, even though the next may be already partly written. The discovery that ergosterol is the precursor of vitamin D, and is converted into it on irradiation by ultra-violet light or by exposure to sunlight, has already been referred to in these columns (NATURE, vol. 120, p. 955 ; 1927) : it is now possible for the first time to produce a vitamin from a pure chemical compound in the laboratory or even in the factory, so that an ample supply should be readily available for all.

Advances made, however, in one branch of nutritional studies, striking though they are, should not lead us to forget the importance of the other elements of the diet, the salts, the proteins, fats, and carbohydrates, or even the water. All constituents of the diet are worthy of study : scientific knowledge of them is of especial importance to a country which imports the major portion of its food supply. Thus it is known that proteins differ in their 'biological value'; that is, animals can maintain nitrogenous equilibrium on smaller quantities of some proteins, usually of animal origin, than of others which are usually derived from vegetable sources. What is both the most suitable and also the most economical source or sources of protein for human dietaries ? Again, it is possible for human beings to live on much smaller quantities of protein than are usually consumed, but it is doubtful if this minimum is also the optimum. Another problem of extreme importance is the relationship which the different constituents of the diet should have to one another. Thus the quantity of vitamin B must bear a certain ratio to the amount of protein present : and vitamin A can only exert its full effect on growth in the presence of vitamin D.

The practical application of some of our recently acquired knowledge is mentioned in the Medical Research Council's report and has also been

referred to in NATURE (vol. 120, p. 440; 1927) by O. Rosenheim and T. A. Webster. The supply of milk fat is inadequate for the minimal needs of our population, partly owing to the greater cost of animal fats as compared with vegetable. The chief sources of vitamins A and D have so far been animal fats: in this respect vegetable fat products cannot replace animal. Heretofore, the richest known supplement has been cod-liver oil, but its unpleasant flavour has made it more of a medicine than a dietary supplement to most people. Vitamin D can now be supplied by irradiation of ergosterol, and vitamin A has been found to be present in large amounts in the livers of herbivorous animals, from which it can be easily extracted together with the fat. The supply of liver, fresh or frozen, should be sufficient to meet the requirements of our population for vitamin A; and the fat has the advantage that it is without the unpleasant flavour of the fish oils, so that it can be easily added to vegetable fats or other articles of the diet.

A knowledge of correct nutrition has also a direct bearing on certain medical problems and the prevention of disease. It is only necessary to mention that inadequate intake, relative or absolute, of the appropriate vitamins, is the ultimate cause of scurvy, rickets, beriberi, and pellagra, and probably plays an important part in the initiation of dental decay. It is impossible to say what light future advances in nutritional problems may throw upon certain aspects of preventive medicine.

Much of our knowledge on this subject has been derived from animal experiments: the conclusions drawn can frequently be applied directly to mankind. But it must not be forgotten that results so obtained have another aspect and may throw light on problems facing those who have to breed and maintain animal stock. In the case of the domestic animals, the problem comes back to human nutrition again, in the fattening of stock or in the production of milk of high nutritive value.

Many questions, both of general scientific and practical interest, still await investigation and solution. The nature of the change that occurs in ergosterol under the influence of light, leading to the formation of vitamin D, the further change resulting in the destruction of the vitamin when the irradiation is long continued, and the wave-lengths which are the most active in producing these effects, are still undecided. The solution of these questions has a practical bearing on the optimum conditions for effecting the transformation. Of more academic interest, perhaps, are such problems as the source of the vitamin D which is found in the liver of the cod, or the reason for the absence of this vitamin from mammalian liver. Leigh Clare has shown that the diatom *Nitzschia closterium* contains none of it, so that presumably the cod obtains it from the plankton and smaller fish it consumes, since it is unlikely to be exposed to enough light to synthesise it for itself (*Biochem. Jour.*, vol. 21, p 368; 1927). Again, the body fat of fish is usually free from vitamin A, though it contains vitamin D, but the body oil of eels is rich in both these vitamins; thus does scientific investigation confirm man's empirical selection of certain of his articles of diet. The prospects of the improvement in human well-being which may be expected to result from better knowledge of the influence of diet in the prevention of disease or ill-health make research work on nutrition and its application of prime importance and worthy of generous support from the State and the public.

Czechoslovakian Cytology.

Structure and Development of the "Living Matter." By Prof. F. Vejdovský. (Published with the Assistance of the Ministry of Education of the Czechoslovak Republic.) Pp. vii + 360 + 24 plates. (Prague: Royal Bohemian Society of Sciences; Fr. Řivnáč; London: James Smith, 1926–7.) 147*s*.

THIS volume is one of the largest contributions to cytology published by a single author in recent years. It is written in fairly good English, though in certain more technical parts the translator has not got the equivalent English terminology. Prof. Vejdovský's publications go back at least to 1888, when he brought out his first study on the "Reifung, Befruchtung und Furchung" of the Rynchelmis egg. He is to be congratulated on being at work forty years after.

There are six chapters devoted respectively to the spermatogenesis of the crayfish, the development of the cleavage spindle of Ascaris, and of Rhynchelmis, the structure and development of the somatic cells of Angiospermous plants, the spermatogenesis of the rock kangaroo, and finally a general discussion of the cell constituents. The book contains 360 pages, and the plates are nearly all in colour.

It should be said at once that Prof. Vejdovský's cytology has much in common with that of the celebrated German cytologist F. Meves—perhaps with not so much of the latter's remarkable powers of observation, for Meves, within the limits of his technique, never made a mistake. Prof. Vejdovský