

lished, it becomes possible to divert the money to a large extent from the objects for which it was intended, and that this operation has been applied to the departments of chemistry and geology. Obviously these are matters which will have to be looked into.

In the conflict which is going on there can be no doubt that, assisted as it is by the prominence of the many practical problems, of which the dyes are the most notorious example, science will ultimately win the day. The purely classical people will have to give way, and there is evidence that all over the country some progress has been made in the quality of the science teaching in the schools. It is to be hoped that in the triumph of the practical the interests of the liberal will be duly safeguarded. We can no more afford to let go ancient literature and history than modern physics and chemistry. All that the representatives of science ask for is that the new may be admitted to an equal place alongside the old, where both may stand in mutual honour and esteem.

The indifference to the value of science appears to be almost attributable to a natural conservatism inherent in the British character. It certainly has pervaded a large part of the business world up to quite recent times, when the pressure of war-work has served as a wholesome stimulant. The newspapers are full of discussions as to what is to happen when the war ceases, but for the most part they have rather a specialist character. A series of articles appeared in the *Times* of July and August last in which "The Elements of Reconstruction," in reference to the Empire, were discussed in an unusually broad and thoughtful spirit. They have been reprinted with an introduction by Lord Milner,<sup>1</sup> and both articles and introduction deserve to be read carefully and digested by all thoughtful men. The keynote of the whole may be said to be *co-operation*. This means that, in the view of the writers, the methods of business will have to be changed completely; there must be among manufacturers mutual support and confidence instead of suspicion and rivalry; and in the interests of the State many small businesses in competition with one another must be united. There must be national scientific education, and the men who control the industries must be fully qualified by education, liberal as well as special, not only to understand fully their own processes, but to deal in an enlightened spirit with all the problems connected with labour.

Whether the doctrine that food production, fuel, and transport are not to be left under the control of private ownership, but transferred to public administration, will within our time be put into practical operation is a question. The author's opinion is that such a development can be realised, not by the Socialist panacea of "expropriation," but "by amalgamation, by co-ordination and co-operation, by bringing the State into partnership, and an increasing partnership, in the big businesses that result from these amalgamations, by develop-

ing the crude beginnings of the 'controlled establishment,' by the *quid pro quo* of profit-sharing and control in the national interest in exchange for the national credit and a helpful tariff."

Labour and trade-unions provide another text which needs much careful thought. A temper must be cultivated free from class hostility and the use of aggressive phraseology. The war has doubtless done some little to clear away jealousy and suspicion between employer and employed, to so large an extent the fruit of traditional misunderstandings. "The efficacy of ignorance," to use an expression of Dr. Johnson's, has been tried long enough, and that is why at the outset the prime importance of education was assumed. It is interesting to notice that in the opinion of the authors of "Eclipse or Empire?" reviewed in *NATURE* of November 9, the falling-off which they claim to have observed in inventions is due to our defective system of education. Here there are evidently two distinct propositions, of which the former is open to question. If the former is established, there will not be much difficulty in accepting the latter.

The lack of clear thinking is one of the evil influences of the past, and as labour continues to make its voice heard, sometimes above other voices, it is imperatively necessary that the broadening of the higher education in school and university shall be accompanied by a lengthening and deepening of the course in the elementary schools.

#### ACCESSORY FACTORS, OR "VITAMINES," IN DIET.

IT was known to Captain Cook that fresh food, especially green vegetables, contained something which was absent from the preserved food used by him in his voyages, but was necessary to maintain health. Stepp showed, a few years ago, that bread and milk, if extracted with alcohol, did not suffice for the growth of rats, but that addition of the residue from the alcohol extract restored the adequacy of the diet. Hopkins then found that rats are unable to grow on a diet, otherwise complete, composed only of pure protein, fat, carbohydrate and salts, although this diet can be rendered perfectly adequate by the addition of a minute amount of milk. Further research by Osborne and Mendel and others in the United States confirmed these results.

There are, therefore, certain necessary constituents of food the presence of which is not obvious to chemical examination, owing to the very small amount contained. For these substances the name "vitamines" was suggested by Funk, on the basis of chemical work which was afterwards found by him to be incorrect. Unfortunately the word has come into use. Since we are, as yet, ignorant of their chemical nature, which is probably of several kinds, it is preferable to use the longer name, "accessory factors."

An interesting account of some of the aspects of the problem, especially those of practical interest,

<sup>1</sup> Nisbet and Co., Ltd. 1s. net.



was given in a lecture by Prof. Carl Voegtlin to the Washington Academy of Sciences, and published in the *Journal of the Academy* for October 4. After directing attention to such diseases as scurvy and beri-beri, due to deficiency in certain constituents of food, Prof. Voegtlin discussed the chemical nature of "vitamines." They are somewhat readily destroyed by temperatures above 100° C., especially in alkaline reaction. The acidity of lime-juice thus preserves the anti-scorbutic properties of the fresh fruit. They are removed from solution by adsorption on the surfaces of various inert powders, such as kaolin, charcoal, and mastic, a property which will probably be of value in obtaining them in a concentrated form. The lecturer makes a slip, however, when he states that it is necessary that a substance should be in the colloidal state in order that it may be adsorbed. It is merely necessary that its deposition shall reduce the surface energy of the adsorbent; amyl alcohol, for example, is largely adsorbed by powders. According to McCollum there are two kinds of accessory factors which it is necessary to add to polished rice in order to make it effective for growth, neither being sufficient alone. One of these is contained in butter, the other in wheat germ; this latter appears to be insoluble in fat, although soluble in alcohol and in water.

Vitamines are not manufactured by the animal organism, but they do not readily disappear from it when once supplied. It seems that they do not suffer loss by chemical change. This fact suggests that their action is of a catalytic nature, somewhat like that of traces of zinc in the growth of *Aspergillus*, shown by Raulin. Or they may be related to the hormones of internal secretion.

The remainder of the address is devoted to the consideration of the relative content of various foodstuffs in these substances. It is pointed out that ordinary mixed diets contain a liberal supply, but that tinned foods may be deficient. An exclusive diet of highly prepared cereals, such as polished rice, is dangerous. Owing to the value of fresh vegetables in this respect, we may note the importance of not restricting the import of such fruit as oranges, which are apt to be the only vegetable consumed in the poorer districts of London.

It appears that, although phosphorus is not known to be a constituent of vitamins, yet a fairly accurate index of the vitamin content of cereals may be given by their phosphorus content. With regard to bread, attention is directed to the use of sodium bicarbonate in its manufacture. This is converted on baking into the carbonate, and the resulting alkalinity tends to destroy the vitamins. If acid substances, such as butter-milk or cream of tartar, are also added, the effect is obviated.

Owing to the small quantities of these essential factors which are present in foods, the difficulty of investigation is great. But the problem is being attacked by many workers and valuable results are being obtained.

W. M. BAYLISS.

SIR E. B. TYLOR, F.R.S.

AFTER a period of twilight of seven or eight years and a few days' illness, Emeritus Prof. Sir E. B. Tylor peacefully passed away on the night of January 2, and with his death closes a memorable chapter in the history of anthropology in England.

Edward Burnett Tylor was born at Camberwell on October 2, 1832, and was educated at Grove House School, Tottenham, belonging to the Society of Friends. At an early age he entered his father's business, but his health soon broke down, and he travelled abroad for several years. In 1856 he visited Mexico in company with the ethnologist, Henry Christy, who doubtless stimulated his interest in ethnology. The observations made during this tour were published in his first book, "*Anahuac; or, Mexico and the Mexicans*" (1861). Thenceforth he led the strenuous, uneventful life of a student. In 1858 he married Miss Anna Fox, of Wellington, with which town he was closely associated until the day of his death.

Tylor never had a university training, but several universities honoured themselves by conferring on him an honorary degree. For many years he was keeper of the University Museum at Oxford, and he took great delight in and did much to improve the Pitt Rivers Museum. He was reader in anthropology in the University of Oxford from 1884 to 1895, when a professorship of anthropology was instituted for him; he became emeritus professor at the close of 1909. The Royal Society elected him to a fellowship in 1871. He had the distinction of being invited to be the first lecturer under the Gifford Trust at Aberdeen, but his lectures, given in 1889-91, have, unfortunately, never been published. The honour of knighthood was conferred on him in 1912. Many other distinctions by learned societies marked the high appreciation in which he was universally held. Tylor was a tall man of imposing appearance, and his friendly, modest courtesy will never be forgotten by those who had the privilege of knowing him.

The publication of his masterly work, "*Researches into the Early History of Mankind and the Development of Civilization*" (1865), at once brought Tylor to the forefront as an ethnologist. In some respects it was pioneer work, as in it he assembled multitudinous facts culled from a wide range of reading, and so grouped them as to bring out new conclusions. His reputation as a thinker and as an exponent of "ye beastlie devices of ye heathen" was further enhanced by the publication in 1871 of "*Primitive Culture: Researches into the Development of Mythology, Philosophy, Religion, Language, Art, and Custom*" (2 vols.). His great erudition was presented with such a charming literary style and flashes of quiet humour that the book was read with delight by people of very varied interests. It speedily became a "classic," and such it will always remain. As Andrew Lang said in the "*Anthropological Essays* presented