masses, but could scarcely be considered of bacterial grade. Certainly all undoubted Protozoa are of the cellular grade and are characterized by nuclei more or less different from typical nuclei of tissue cells.

The discussion on syngamy and sex, although slightly halting in argument, is admirably presented. Minchin apparently favors the rejuvenescence theory, but finds a logical difficulty in the phenomena of parthenogenesis and autogamy and has apparently overlooked some recent work on variations as an outcome of amphimixis, as well as works recording failures to rejuvenate after conjugation in cultures. This general problem, however, has been so recently re-opened that the literature may not have reached him in time to be incorporated.

In dealing with the flagellates, especially the blood-dwelling forms, Minchin is perfectly at home and speaks with a first-hand knowledge that carries conviction. The life histories of the Trypanosomes and other hæmoflagellates are given with a firm touch and many of the facts are from his own hitherto unpublished results.

In the section on general physiology the usual physiological activities are concisely, but well, treated. The matters of degeneration, regeneration, and the phenomena of decreasing vitality in Protozoa are somewhat disappointing in the mode of treatment; so also is the neglect, throughout the volume, of evidence derived from the study of various types of Protozoa by the bacteriological culture methods, which for certain groups of the Protozoa, notably the Amœbæ, promise to throw a flood of light on the vexed question of pathogenic species. It is most uncharitable, however, to cavil over these minute defects, if indeed they are defects, when the vast and rapidly growing literature on the Protozoa is so admirably welded together in a readable whole, and we shall have occasion many times repeated, to thank the author for his labor, his critical insight, and for the judicious care with which he has selected the material embodied in this volume.

GARY N. CALKINS

Food in Health and Disease. By NATHAN S. DAVIS, JR., A.M., M.D. P. Blakiston's Son & Co. 1912. Second edition. Pp. 449.

It is fair to assume from a statement in the preface that the author expects this work to be used in the instruction of physicians and nurses. It would seem desirable that any publication to be used in this way for instruction in the principles of nutrition should present the latest and most reliable knowledge. This volume fails to meet this requirement. Not only does it contain many statements which must be regarded as erroneous, but some of the most important advances in our knowledge of food chemistry and metabolism receive no consideration.

One looks in vain, for instance, for a discussion of the recent additions to our knowledge of the efficiency of individual proteins for constructive and maintenance purposes. Osborne and Mendel have shown that the alcohol-soluble protein of maize, when it is the only protein fed and is supplemented by the other classes of nutrients in efficient forms, does not serve to maintain life, much less build tissue. Marked differences are observed in the efficiency of other proteins. Without question, the influence of certain food substances upon the secretion of the digestive fluids should also receive extended attention in a study of dietetics. It would seem that whoever is to assume the direction of the diet of the well and the sick should have some inkling of this most important new knowledge.

It is easier to be charitable toward omissions of this kind, however, than towards inaccuracies and looseness of statement. It is fair to inquire what justification there is for the statement that carbon dioxide "aids digestion by promoting chemical changes and muscular activity." The statements that "tissue waste is most rapid under a protein diet," "that nitrogenous food in greater quantities than are strictly needed to maintain nitrogen equilibrium will cause a waste of tissues as well as repair," and "in other words, all changes are stimulated by proteins," are most surprising. It is true that the body tends to

adjust its protein catabolism to the protein supply and that a sudden increase of protein in food causes a quite immediate increase in protein cleavage. This does not mean, however, that an excess of protein causes tissue waste because this increase in protein catabolism, due to an increased protein supply, undoubtedly occurs at the expense of nitrogen compounds that are still in a circulatory or labile condition.

There can be no disputing the fact that "animal food requires a considerable quantity of oxygen for its utilization"! It is well established, to be sure, that the amount of heat liberated by the use in the body of a given volume of oxygen is somewhat less for proteins than for carbohydrates. In view of the facts that oxygen consumption is practically proportional to the amount of energy developed and that all the nutrients require for their oxidation in the body "a considerable quantity of oxygen," the above statement seems to be somewhat peculiar in form, to say the least.

We are not told on what experimental evidence it is asserted that proteins are required for the production of nervous energy, nor is the difference between nervous energy or any other energy explained.

To make the terms "fibrinogen" and "casein" synonymous as the principal protein in milk is hardly excusable. Fibrinogen is a term given to the mother substance of fibrin. It is possible that the author had in mind caseinogen, a name once proposed for the casein of milk before coagulation.

Starch, cereals and vegetables, when cooked imperfectly, are characterized as "indigestible" and we are told that a "vegetable protein is very imperfectly digested and absorbed." In the first instance, the term indigestible may be used in the popular sense, difficult of digestion, for the author, in several places, confuses the meaning of the terms digestion and digestibility, but to state that a vegetable protein is very imperfectly digested and absorbed is, as a general statement, in utter defiance of facts. The records of digestion experiments with human foods show that on the average between 80 and 90 per cent. of the protein of cereals, vegetables and fruit is digested and absorbed. Vegetable proteins, according to this author, "are mostly globulins." The proteins of wheat flour, of which we consume more perhaps than any other vegetable forms, consist chiefly of glutenin and gliadin, neither of which is globulin. It does not appear to be true that globulins predominate in other cereals. Legumin is made to resemble casein "in many of its chemical reactions." We now know that the legumins are globulins and they appear to have little similarity to the principal protein of milk. The theory that by churning "the albuminous envelopes of the fat globules of the cream are broken and the fat particles are permitted to commingle and form a solid mass" was abandoned long ago. Those who are making a study of milk advance the theory that by adsorption the fat globules cause a concentration of albuminous matter around them, but the breaking of the envelope through the agitation of the cream is now not accepted. The statement that sodium chloride acts in the blood as a solvent of the globulins would seem to be somewhat precarious.

In discussing cow's milk, the author informs us that "after the first week, it is usually the richest and remains about the same for months, provided the animal's diet is uniform." The fact is, as shown by numerous analyses of the milk of cows through the entire period of lactation, the milk is the least rich a few weeks after parturition and increases in richness as the period of lactation progresses, especially when there is a decrease in the yield. It seems to be assumed that a change in diet changes the composition of the milk which, in the main, is contrary to the results of extended observations.

When the author enters the field of practical dietetics, he still seems to be subject to error. In dealing with the influence of the diet upon the mother's milk, he gives a set of rules which, in the light of recent observations, should be lightly regarded. For instance, we are told that to increase the total quantity of milk and to decrease the total solids, there should be an increase in the proportion of

liquids in the diet. Such investigations as have been made do not bear out this statement. Nuts are said to be of little value as food, but their composition and digestibility show them to be highly nutritious. Fish is classed as "an economical kind of protein food." This may be true of certain species, especially when salted or smoked, but some species when bought in the fresh condition, as for instance blue fish, furnish a very expensive diet, much more so than even the expensive meats.

Gravity cream is said to contain 16 per cent. of fat. If the term "gravity" is used in the usual sense as applied to cream raised by deep setting and pan setting, then under some conditions it would contain double that percentage of fat and even more. Cream does not have a uniform composition, but varies greatly according to conditions.

It is hardly necessary to multiply these references. There is running through the first part of the volume, which relates to the general principles of nutrition, a general tendency to inaccuracy and indefiniteness of statement. For the purposes of instruction, the language might wisely be condensed and reference to unimportant details omitted.

No discussion is attempted in this connection of the author's recommendations as to the diet for invalids and for persons in health under various conditions because he states that the recommendations "are largely based upon my own observation" and such observations constitute original data. No intelligent discussion is possible unless the extent and character of these data are understood.

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Home University Library of Modern Knowledge. Edited by Herbert Fisher, Gilbert Murray, J. Arthur Thomson and William T. Brewster. New York, Henry Holt & Company.

The Cambridge Manuals of Science and Literature. Edited by P. Giles and A. C. Seward. New York, G. P. Putnam's Sons.

An anecdote which greatly impressed my boyish imagination some thirty-five years ago related to certain little scientific primers in terra-cotta colored cloth, written by such men as Huxley, Tyndall and Lubbock, and published, I think at a shilling, by Macmillan. The story was that some one had remonstrated with Macmillan for getting such eminent men to prepare these simple little works, when "any schoolmaster could have written them." The publisher replied that his experience had shown him that it took just such men to write good primers; that it was one of the most difficult things to accurately and effectively present the gist of any scientific subject, and attempts to have such work done cheaply by inferior men had always given more or less unsatisfactory results. Since that time multitudes of elementary scientific works have appeared, and the opinions attributed in the story to Macmillan have not been shared by all their publishers. We could hardly say, at the present time, that excellent works may not be written by men of small scientific reputation; but it assuredly remains true that they must be written by men of good training and ability. The abounding faults of our current text-books bear witness to the reprehensible lightness of heart and mind with which, in a commercial age, the teaching profession attempts to gain money and reputation.

The two series of volumes now before us, issued from New York, but prepared and originally published in England, represent new attempts to carry out the Macmillan plan. Essentially products of the universities, they are part of the general scheme of "university extension" which now finds so much favor. Varying greatly in literary and perhaps scientific merit, they maintain on the whole a high standard; and in nearly every case it may be said that the author is an eminent representative of the branch of science he discusses. The field covered is so large that no reviewer can critically consider more than a small minority of the volumes, yet in a sense he can judge best the ones on unfamiliar sub-