

In the development of the third class of reactions mentioned above, the theory of E. Fisher is cited. It shows that there is a constant relation existing between the diastase and the chemical constitution of the bodies which are transformed by it. Fisher's theory also holds that, for instance, in the inversion of cane-sugar, there is an actual chemical compound at first formed between the ferment and the sugar, and by the subsequent breaking up of this compound there are formed the invert sugar on the one hand, while the diastase is regenerated on the other. This little work will undoubtedly be of great interest and benefit to those who are pursuing the study of catalytic reactions from theoretical and mathematical points of view.

H. W. WILEY.

THE PRINCIPLES OF ANIMAL NUTRITION, WITH SPECIAL REFERENCE TO THE NUTRITION OF FARM ANIMALS. BY HENRY PRENTISS ARMSBY, PH.D., Director of the Pennsylvania State College Agricultural Experiment Station; Expert in Animal Nutrition, United States Department of Agriculture. New York: John Wiley and Sons. 1903. Cloth. 614 pp. Price, \$4.00.

The scope of this very readable work is much broader than the second part of the title might suggest to the casual reader, since the various discussions in it apply in most cases to man as well as to the lower animals. From the preface it appears that the substance of the book was first presented to the public as a course of lectures delivered at the Graduate Summer School of Agriculture in Columbus, Ohio, in 1902; in its present expanded form it covers the whole subject in a more systematic manner than would be possible in a course of lectures and is especially characterized by very full references to the original literature.

The general subject is presented under two heads which lead to a division of the book into two parts: 1, The income and expenditure of matter; 2, the income and expenditure of energy. In Part I, which is largely chemical, there are found very clear descriptions of the early experiments of Liebig, Pettenkofer, C. Voit and other pioneer investigators in this field, and also the recent and more exact studies of the modern workers. Chapter V, 92 pages, of this part of the book deals with the question of the relations of metabolism to the food supply and it would not be easy to find a more intelligible or concise presentation of a subject on which the literature has grown to be enormous. This chapter will prove of value to the physiologist or physiological chemist for general

orientation, and through the foot-notes and literature references will serve as a guide for fuller study.

In Part II we find first a short general chapter discussing the relations of force and energy in the animal body and then a chapter on methods of investigating the liberation and transfer of energy. Although necessarily much condensed, this chapter gives a good idea of the construction and use of combustion and respiration calorimeters with discussion of methods of calculation of results. The modern devices of Atwater and others are described fully enough for the needs of the physiologist or general student. Following this chapter on methods there is a short one on the conservation of energy in the animal body and finally four longer chapters on these topics: "The Food as a Source of Energy—Metabolizable Energy"; "Internal Work"; "Net Available Energy—Maintenance"; "The Utilization of Energy". These are well-written and valuable chapters, and while the contents is largely compilation (it could not be otherwise when the magnitude and nature of the topic are considered) the presentation is such as to show the author's full acquaintance with the field and command of the subject. While most of the illustrations in this part of the work are drawn from experiments upon animals, it is clear that the results reached obtain just as certainly for man. The book may therefore be recommended to the attention of those working outside the domain of agricultural chemistry; it must be recognized as a valuable contribution to the literature of physiological chemistry.

J. H. LONG.

**TECHNICAL MYCOLOGY: THE UTILIZATION OF MICRO-ORGANISMS IN THE ARTS AND MANUFACTURES.** BY DR. FRANZ LAFAR. Translated from the German by CHARLES T. C. SALTER. Vol. II, Part I. Eumycetic Fermentation. London: Charles Griffin and Co. Philadelphia: J. B. Lippincott and Co. 1903. 189 pp. Price. \$2.50.

The first volume of this well-known work appeared in 1898 and was concerned with a discussion of schizomycetic fermentation, or the fermentations and similar changes produced by fission fungi or bacteria. In the present book, we have the first part of volume second which treats of eumycetic fermentation, or fermentation by the higher fungi, using the term fermentation in the older sense. The book is divided into three sections (Sections X, XI and XII of the whole work). The first treats of the general morphology and biology of the eumycetes; the second of fermentations by species