

occupied the minds of men for so long, cannot be dismissed once and for all from the realms of biological thought, and with it the inability to recognise "limits to the possibility of knowledge," so that full attention can be given to the acquisition of those positive additions to knowledge by means of which alone real progress can be made. H. E. B.

Enzymes.

Enzymes: Properties, Distribution, Methods and Applications. By Prof. Selman A. Waksman and Prof. Wilbert C. Davison. Pp. xii + 364. (London: Baillière, Tindall and Cox, 1926.) 25s. net.

THE authors of this book state that it has been their endeavour to collect in as concise a form as possible the available information in regard to enzymes and to indicate the original sources from which more detailed knowledge may be obtained. To piece these irregular and loosely fitting fragments together has been their object. Special attention has, they say, been paid to the occurrence and preparation of enzymes, to the methods of the measurement of their activity, and to the practical application of these agents.

The text is divided into four sections, each of which is subdivided into chapters as follows: (a) Properties of enzymes (four chapters); (b) distribution of enzymes (three chapters); (c) methods for the preparation and study of enzymes (seven chapters); (d) practical application of enzyme activity (one chapter).

There is a bibliography giving references to 1323 original papers, none of which, however, is later than 1925. The book is brought to a close with an index.

The introductory chapter gives an outline of the history, general characteristics, nomenclature and classification of enzymes. The next three chapters deal with chemistry, biology, and physics. The major portion of the next chapter is devoted to the occurrence and distribution of enzymes in animal secretions and tissues. This is followed by two shorter chapters on the enzymes of the higher plants and of micro-organisms.

The section commencing with Chapter viii. is the longest in the book, covering as it does 128 pages of text. Although containing some most useful information, clearly set forth and well arranged, it is here that we venture to make some criticism. Under methods of measuring diastatic action, the authors describe Wohlgenuth's iodine method and Lintner's saccharometric method. In regard to the latter, a modification is described which is more complicated and does not appear to lead to

increased accuracy. No mention is made of the titration method devised by Prof. A. R. Ling, which has been adopted by the Institute of Brewing as one of the standard methods of malt analysis. Nor is there any mention that when the activity of malt diastase is measured by a saccharometric method, the production of reducing sugar must be kept within the limits laid down by Kjeldahl in 1879 if the results obtained with two or more samples are to stand in direct proportion.

In dealing with the synthetic action of enzymes, the work of Bourquelot—by far the most important on the subject—is not alluded to in the text. In that part of the book dealing with desmolases—oxidases, oxido-reductases, and zymases—sometimes the difference between supposed direct oxidase action and dehydrase action is described in a manner likely to prove misleading to the student. The authors make no reference to the discovery by Hopkins in 1921 of an autoxidisable constituent of the cell which he named glutathione, although they *do* refer to the significance in respiration of substances containing the thiol group SH which is present in reduced glutathione. Another serious omission is that of a reference to the recent work of Robison on the part played by calcium hexosephosphate and its enzyme on ossification and dentition.

If there are defects in the preceding parts of this book, there are more pronounced cases in the last chapter which deals with the uses of enzymes. Barley is said to absorb 40-50 per cent. of its weight of water in the steeping process—the first in the conversion of barley into malt. The fact is that barley after steeping contains about 50 per cent. of water. In describing the mashing process the temperatures given are 23°-13° C. too low for distillery practice and 26°-16° C. too low for brewery practice. The subject matter on the hydrolysis of starch by enzymes given in the book is out-of-date, as is also that dealing with the estimation of starch by enzymes, and the latest methods adopted in England find no mention. These are only a few of the defects which could be cited.

We close our review with a feeling of disappointment. Some portions of the book are such as to recommend it, whilst others show that the authors have omitted important observations or have failed to understand the true significance of some points to which they have referred. It is hoped that a new edition will be published in the near future in which the entire work will be recast, for the authors have not attained the objects which they set themselves to achieve.