

semiconductors is explained in the next chapter. Thermoelectric effects with metals have for long provided thermometers; with semiconductors they promise other uses. The chapter is timely and should prove a useful reference for some years. Prof. G. F. J. Garlick contributes a chapter on the electrical properties of phosphors. Experiments can be more accurately defined now that single crystals of some phosphors can be grown, but results still need cautious interpretation. The next chapter explains the limitations of conventional junction transistors at radio frequencies and restates the merits of *p-n-i-p* and unipolar transistors. Written before the middle of 1955, it contains no mention of graded bases or of diffusion transistors. French authors provide the last two chapters, on the photo-magneto-electric (PME) effect and on field effects. The former effect has received much attention lately, and its finer points are better understood; it is being used to measure some basic properties of semiconductors and is well described here. Progress with field effects has been slow; the interpretation of results is hindered for lack of independent methods of measuring some surface properties.

The volume cannot escape some criticisms. The information content, per unit area, of some of the diagrams, particularly six at the beginning of the last chapter, is very low. The writing, in places, lacks the clarity and flow that one expects of good review articles—for example, those of "Advances in Electronics and Electron Physics", which admittedly has had several years in which to get into its stride. None the less, the new series has made a good start.

J. R. TILLMAN

ENZYMOLOGICAL RECIPES

Methods in Enzymology

Edited by Sidney P. Colowick and Nathan O. Kaplan. Vol. 2. Pp. xx+987. (New York: Academic Press, Inc.; London: Academic Books, Ltd., 1955.) 23.80 dollars.

THIS is the second of four volumes dealing with methods and techniques in enzymology, the first volume of which was published last year (see *Nature*, 177, 810; 1956). It completes the part of the series which is devoted to the preparation and assay of individual enzymes. The remaining two volumes are to cover preparation of substrates and special techniques used in the study of enzymes.

The 152 articles in this volume are arranged in five sections, namely: enzymes of protein metabolism; phosphate metabolism; nucleic acid metabolism; coenzyme and vitamin metabolism; and finally, respiratory enzymes. This arrangement of enzymes according to their functional relationship in the metabolic pattern tends to obscure important similarities between enzymes carrying out similar reactions; for example, the phosphokinases are scattered throughout the book, and indeed throughout Vol. 1 as well.

More than a hundred and thirty authors have contributed to the present volume, and the articles naturally vary considerably in style and quality, although there is a fairly standard system of headings, with sections on assay method, purification procedure, and properties for each enzyme. Some articles give a useful short review on the occurrence and metabolic importance of the enzyme being treated, together

with several methods of preparation. In other cases the article is virtually a reprint from the original literature of a single paper on the preparation of the enzyme. The multiplicity of authors has led to a certain amount of duplication; for example, Elliott's method of preparation of glutamine synthetase from peas is quoted verbatim on p. 339 and again (under the heading of γ -glutamyltransferase, with which it is identical) on p. 264. In this case the reproduction of the original paper includes an inconsistency, most annoying to the worker who is attempting to use the procedure, which is probably a misprint in the original (3.7 l. is given as 0.05 vol. with respect to a volume which is more than 144 l.).

Only a part of the material in this book will be of any permanent value. When an enzyme has been obtained in a pure state in high yield, the method may become classical: but many of the preparations given are necessarily merely extracts of tissues of exceedingly low purity, which will soon become outdated as research on the enzyme in question proceeds. On the other hand, as a summary of present knowledge of enzyme purification, the two volumes are remarkably complete.

From such a large collection it is difficult to single out any for special mention, and in any event, such a mention may merely reflect the interests of the reviewer. However, as samples may be mentioned some excellent accounts of the proteolytic enzymes of digestion, of the more well-defined components of the blood-clotting system, of the bacterial system which cleaves aromatic rings, and of the enzymes which break down coenzyme I. The whole section on the enzymes of coenzyme metabolism is perhaps particularly useful, as many of these enzymes are of very recent discovery and it would be difficult for the newcomer to the field to track down the relevant papers. A certain amount of material in this section has not been published elsewhere.

There is no question that this is a work which should be in every biochemical library and will be of value to all who at some time or other, for research or teaching, have to prepare enzymes.

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MOTIVES IN THE CLASSROOM

Educational Psychology in the Classroom

By Prof. Henry Clay Lindgren. Pp. xv+521. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1956.) 40s. net.

THE educational psychologist is increasingly turning his attention to classroom problems; but this does not mean that he has all to teach and nothing to learn. The situation in the classroom is, however, more complex than earlier generations of teachers assumed and calls for the kind of understanding that contemporary psychology can supply.

Prof. H. C. Lindgren's book is written in this tradition and in a helpful spirit for the teacher. He stresses the value of group methods, of active learning and of the partnership between teacher and taught. Authoritarian methods are condemned. We understand that unless a pupil likes school, little headway will be made, for in a way the teacher is leader of his class only in so far as he is made so by his pupils. Lindgren also draws on sociological studies such as "Elmtown's Youth" and insists that to know a