

however, Carpenter sins in company with a number of our British colleagues. These and similar minor errors are not any more numerous than they are in the average textbook, and they do not seriously detract from the value of a well written and informative treatise, which the student should find very useful.

The book is well printed on good paper, with numerous clear illustrations. There is a good index.

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Methods in Enzymology. vols. I and II.

Preparation and Assay of Enzymes. Sidney P. Colowick and Nathan O. Kaplan. Academic Press, New York, 1955. xxv + 835 pp and xx + 987 pp. Illus. vol I: \$18; vol. II: \$23.50.

With the tremendous growth of enzyme chemistry in recent years, interest in enzymes as indicators of cellular events or as analytic and clinical tools has spread to diverse scientific fields. However, these new applications have scarcely begun. Many investigators who might have utilized enzymes in some phase of their work have either not been aware of the potentialities or have been discouraged by the vast, widely-scattered literature of enzyme methodology. The compilation of this literature in *Methods in Enzymology* provides a working handbook for the preparation of enzymes.

The two volumes reviewed here are the first in a series of four that will cover the entire field of enzyme methodology, including many ancillary subjects such as chromatographic, physicochemical and other analytic techniques. The preparation and assay of enzymes is covered in volumes I and II, while the preparation and assay of substrates and special techniques for the enzymologist will provide the subject matter for the later volumes.

It is apparent that the ambitious aims of the editors give rise to numerous problems. The problem of presenting authoritative directions has been solved by a careful choice of authors. Thus, more than 200 contributors are represented in these two volumes. Each of these has worked in at least one phase of the field he reviews and often is the original author of much of the material presented. The problem of integrating the reports of these many authors so that duplication is avoided has been approached in two ways. The first is illustrated by the organization of the series. For example, substrates that are used for more than one enzyme system are considered separately in volume III. These are then omitted from the individual descriptions, and the appropriate reference to volume

III (as yet unpublished) appears. A number of general preparative procedures are also given, and these are also omitted from reports on individual enzymes. Second, the various descriptions of individual enzymes are integrated by cross references in each article to appropriate parts of other articles. These two devices, plus an excellent author and subject index, constitute one of the most attractive features of these books. Without such organization, the subject matter could hardly have been covered in the space allotted. It should be noted that this integration means that all four volumes (or at least the first three) must be available to take advantage of these features.

Volume I contains four sections, as follows: "General preparative procedures," "Enzymes of carbohydrate metabolism," "Enzymes of lipid metabolism," and "Enzymes of citric acid cycle." The first section contains a wealth of material of general utility to the protein chemist. The review by R. K. Morton on methods of extraction of enzymes from animal tissues presents an excellent series of approaches to the first question one considers in investigations involving enzymes: How is the enzyme obtained in a soluble form? The various new techniques using butanol, which were devised by the author, are a significant, original contribution to this field. Other articles, on the preparation of various cell fractions, protein fractionation by solubility, and the use of adsorbents and resins in protein fractionation, outline the general procedures available for enzyme purification. Although some of this material has appeared previously in review articles, its inclusion here is needed in order to present a complete summary of the enzyme techniques that are available. The first section ends with a useful compilation of buffer mixtures by G. Gomori.

The order in which the various individual enzymes are described in the other sections follows, in general, metabolic sequences. For example, enzymes involved in polysaccharide metabolism are followed by descriptions of the monosaccharide kinases, then by mutases, aldolase-type enzymes, and so on. Each report follows a fairly standardized form, which includes, in order, assay method, purification procedure, and properties of the enzyme. Volume II continues the description of enzymes with five sections devoted to enzymes of protein metabolism, nucleic acid metabolism, phosphate metabolism, coenzyme and vitamin metabolism, and respiratory enzymes, respectively. This is a quite reasonable order of presentation of the material.

The list of enzyme preparations covered in each field is very complete and includes enzyme activities that can be asayed but that have not yet been separated to any degree. I have prepared two

enzymes using these volumes as a text. In both cases, the directions were sufficiently complete so that the purification procedure given could be used successfully. Reference to the original literature was needed on occasion. The directions given here for the preparation of enzymes, in general, are more complete than those given in other handbooks of preparative methods. The detailed description of the assay procedures is particularly helpful. In a few cases, where a large number of enzymes from different sources are described (such as amino acid decarboxylases), the directions are somewhat less detailed and the original literature must be consulted. A spot check for errors in references revealed none. A few typographical errors were found.

One hopes that succeeding volumes of the series will match the high standard set by these two books. Volume III appears to be well integrated (based on the outline given) with the first two. The outline for volume IV does not appear as promising. Some of the subject matter falls outside the scope of the first three volumes and might well be omitted.

It is regrettable that the cost of this series will keep it off the bookshelves of most students, for the series contains so much that can be applied to daily research work. One could consider it a "dictionary" of methods that is dipped into almost daily, if only to find a reference.

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Advances in Virus Research. vol. III.

Kenneth M. Smith and Max A. Lauffer, Eds. Academic Press, New York, 1955. ix + 338 pp. Illus. \$8.

The policy of publishing intensive reviews of rather restricted topics has been continued in volume III of *Advances in Virus Research*. However, the paper by Seymour Cohen on "Comparative biochemistry and virology" is an exception, for it ranges broadly over the virus field, including plant, insect, and animal viruses as well as bacteriophages. The emphasis is on diversity rather than uniformity, and the author closes with the well-justified warning that reasoning by analogy is a poor substitute for observation. The paper by R. E. F. Mathews and J. D. Smith on the "Chemotherapy of viruses" is not only a good review of this subject but also a good review of the biochemistry of nucleic acids. A review of "Tumor viruses" by Beard, Sharp, and Eckert is more restricted than the title would indicate, being primarily a review of rabbit papillomatosis and chicken