
NEW BOOKS

Handbuch der Enzymologie (Handbook of Enzymology).

Edited by F. F. NORD, New York, N. Y., and R. WEIDENHAGEN, Berlin. In two volumes. Akademische Verlagsgesellschaft, Becker and Erler Kom-Ges., Leipzig, Germany, 1940. In the U. S. A., Gustav Fock, 145 West 44th Street, New York, N. Y. xviii + 1545 pp., 163 figs. 15.5 × 23.5 cm. Price, \$38.50.

The editors of this two-volume treatise on enzymes are well known for their excellent editing of the series of reviews entitled, "Ergebnisse der Enzymforschung," that have appeared annually for the last eight years. The present handbook might be looked upon as the concluding and review issue of this series which appears to have been discontinued. It contains twenty-six articles on various phases of enzyme chemistry by twenty-four different authors. Many of these authors have been contributors in the past to the "Ergebnisse der Enzymforschung" of articles on the same topics as they now review. Each report, which is rich in references to the original literature, deals primarily with the results obtained during the last ten years and their interpretation. Unlike the "Ergebnisse der Enzymforschung" all articles are written in German, the three articles by English and American contributors having been translated into German. The printing and paper appear to be acceptable, though the binding does not seem to be very substantial. The copy received for review was found to have pages 1313-1328 missing.

Space does not permit mentioning in detail the various topics covered in these two volumes. Half of the first volume is devoted to various general aspects of enzymology. The structure of the living cell in relation to enzymatic processes is discussed by F. Duspiva in the first chapter. H. Holter and K. Linderstrøm-Lang then describe their ingenious methods for the study of enzymatic histochemistry and the results obtained by their application. Outside of this chapter and one by T. Bersin giving a general description of the type of methods used in enzymology, few details are to be found on methods in this handbook. T. Bersin also contributes a chapter of 30 pages in which he lists, in table form, all the substances that are known to accelerate or inhibit the action of various enzymes. The physical-chemical aspects of the subject are then dealt with in chapters on the optical specificity of enzymes by W. Kuhn, the physical-chemical properties (molecular weight, structure, etc.) and kinetics by E. A. Moelwyn-Hughes; and the oxidation-reduction potentials of various biological systems and the activity of enzymes as influenced by oxidation and reduction by R. Wurmser. The treatment of the general aspects of enzymes is concluded with an article by W. Langenbeck on catalysis by enzyme models.

The remaining articles in Volume I are devoted to the treatment of the various enzymes concerned in hydrolytic processes. The fat splitting and several other types of esterases, including choline esterase, are treated by R. Ammon; phosphatases by H. Albers; lecithinases by A. Ercoli; and nucleases by H. Bredereck. The enzymes concerned in the hydrolysis of carbohydrates are the subject of

a chapter by R. Weidenhagen, while T. Bersin contributes an article on amidases and proteases. H. Dyckerhoff discusses the coagulation of blood in a separate chapter. Volume I is completed with an article by J. H. Northrup entitled, "The Chemistry of the Crystalline Enzymes."

Of the crystalline enzymes discussed by Northrup, only one, catalase, belongs in the group of enzymes called desmolases that are treated in Volume II. This volume begins with an article by W. Franke which gives an excellent review of the historical development of the theories that have influenced the experimental approach to the study of biological oxidations, and discusses the array of enzymes known to participate in these processes today. Many of these enzymes have been shown to be composed of a protein joined to a specific prosthetic group. The enzymes in which the chemical nature of these prosthetic groups is known are treated in more detail in a chapter by H. Theorell. There then follows a discussion of the enzymes concerned in glycogenolysis by J. K. Parnas. The remaining chapters of Volume II deal with various special types of enzymes or enzyme reactions: carbonic anhydrase by F. J. W. Roughton; alcoholic fermentation by F. F. Nord; oxidative fermentation by K. Bernhauer. A short chapter of interest is that by K. Linderstrøm-Lang on the ability of organisms to alter their production of enzymes to suit their available foodstuffs, so-called enzymatic adaptation. The relation of enzymes to various aspects of immunology is discussed by O. Westphal, while the enzymology of tumors is treated by K. Köhler. Volume II concludes with a long chapter entitled, "Technology of Enzymes," by A. Hesse, which gives an interesting insight into the many uses made of enzymes in industrial processes.

The two volumes thus constitute a comprehensive, yet not too exhaustive review of the more important aspects of enzymology that have developed mainly within the last ten years. This handbook should be extremely valuable to those who are seeking to obtain an acquaintance with some particular aspect of enzyme chemistry, or who wish to be guided to the original literature for further detailed study.

ERIC G. BALL

Crystalline Protein Molecules. Volume XLI, Art. 2, pages 77-168 of the *Annals of the New York Academy of Sciences*. By EDWIN J. COHN, I. FANKUCHEN, J. L. ONCLEY, H. B. VICKERY and B. E. WARREN. The New York Academy of Sciences, care of the American Museum of Natural History, New York, N. Y., 1941. 91 pp. Illustrated. 15.5 × 23.5 cm. Price, \$1.25. This monograph is one of several which, purchased as a set, may be had at a reduced price.

The monograph consists of a series of five papers read at a conference on crystalline protein molecules that was held under the auspices of the New York Academy of Sciences. In the introduction Cohn sets forth reasons for holding the conference, namely, to consider critically the

evidence obtained from physical chemistry and organic chemistry, and one might include analytical chemistry although Cohn does not specifically mention it, regarding the composition, size and shape of protein molecules. On the whole, Cohn's appraisal of the present status of the problem is good. He points out that some proteins act as structural elements while others act as enzymes, hormones or viruses, and ventures the suggestion that this difference in physiological function may be due merely to the distribution and spatial arrangement of diverse chemical groups, whatever that may mean.

Whereas the purity of a protein preparation should be of prime consideration if the preparation is to be involved in studies leading to an estimation of size, shape or chemical composition, remarkably little attention is given in the monograph to the criteria of purity of proteins. This is indeed surprising, considering the purpose of the conference which formed the background for the monograph. Cohn, however, does offer some remarks relative to this phase of the problem, pointing out that neither crystallinity, nor electrophoretic mobility, nor dielectric dispersion, nor sedimentation velocity, may be accepted as adequate and final proof of chemical purity. The criterion that Cohn advances for purity of proteins is, "A protein whose solubility is independent of the amount of solid crystalline phase with which it is in equilibrium may be considered as a chemical individual." This criterion also is probably not adequate, if taken alone.

Cohn briefly discusses the various methods of approach to the problem of protein size, structure and composition, and ventures an appraisal of each, and points out the contribution of each to the synthesis of a more adequate concept of proteins.

In his section on the evidence from organic chemistry, Vickery adheres closely to the general theme. It is felt that he has done a very good job. There is included in his introduction a brief sketch of a historical nature that is related to his discussion. He repeats his criteria for the acceptance of an amino acid as being among those occurring in native proteins, and presents a list of the amino acids, classified with respect to their acceptability. He considers the quantitative methods for amino acid determination in the cases of those about which there is no doubt regarding occurrence in proteins. This critical discussion is with reference to the use of the various analytical data in arriving at some estimate of the minimum value for the molecular weight that may be assigned to various proteins. The case of hemoglobin (horse), of egg albumin (hen), of insulin, of serum albumin (horse) and of edestin is each considered in a brief but satisfactory manner.

The section by Oncley is on the evidence from physical chemistry regarding the size and shape of protein molecules, and deals with various physical and physical-chemical methods. At the outset Oncley side-steps the problem of purity, and thereby fails in his first task of appraising critically the evidence from physical chemistry. Much of the material he covers is dealt with in other publications that are available to individuals interested in this phase of protein research, notably in the publications of Svedberg and his co-workers, and in that respect it is merely a review. Although he does point out some of the uncertainties in the use of the various physical-chemical methods, the re-

viewers were disappointed in his section. The discussion on osmotic pressure is all too brief, the consideration of diffusion is shallow, and viscosity is dealt with in an elementary manner. He borrows the frictional ratio from Svedberg and does not give it the critical consideration that is its due. There is not even a reference to its introduction or to any paper dealing with its theoretical phases.

The section by Warren is one of orientation, and is intended as an introduction to the section by Fankuchen on the evidence from X-ray studies.

Fankuchen presents a valuable discussion, although he limits the discussion to a consideration of use of the dimensions of the unit cell in the protein crystal in the determination of some multiple of the molecular weight, and to a few very brief remarks on the use of Patterson diagrams in determining structure. He is faced with the difficulty of presenting materials of a highly technical nature in a simple and non-technical manner, and the use of more lucid and free-flowing English would have been helpful. For all of that, he leaves one with a feeling of satisfaction and of anticipation. The feeling of satisfaction is engendered by the excellent agreement of the data from X-ray with other data; the feeling of anticipation arises from the prospect of further notable advances in the field.

VERNON L. FRAMPTON
JAMES B. SUMNER

Organic Reagents in Inorganic Analysis. By IBERT MELLAN, Ph.G., M.Sc., F.A.I.C. The Blakiston Company, 1012 Walnut Street, Philadelphia, Pa., 1941. xxiii + 682 pp. 16.5 × 23.5 cm. Price, \$9.00.

Modern necessity for precise determination of inorganic materials and radicals has gradually brought about increased recognition of the numerous advantages of organic reagents for this purpose. The rapid increase in the number of such reagents has in turn compelled the development of convenient means of keeping track of their characteristics, utility, advantages and limitations. The present volume represents the latest of these devices.

This volume is built around two main parts. The first comprises some 194 pages in which about 225 organic reagents arranged in alphabetical sequence are briefly described. This part is generously supplied with structural formulas and under each heading a selected list of references to the original literature (arranged alphabetically by authors) is given. The second main part covers some 407 pages arranged in dictionary sequence according to the inorganic constituent for which test is to be made. For a given metal, spot tests, qualitative and quantitative methods are given according to the particular circumstances. This section is also generously documented. The remaining 81 pages are devoted to author and subject indexes and to miscellaneous tables.

The type size and face are pleasing and conveniently large. In many cases the number of references is so large that in the absence of any direct key to the nature of each particular article the user will suffer from an embarrassment of riches. This reviewer also misses specific directions for or references to the preparation of many individual reagents. Since the reader may be presumed to know what book he is examining, the use of the book title

as the running head of every page is redundant and could with advantage have been replaced by the particular page topic.

The book will be of definite service to science in providing quick access to the latest methods for the detection and determination of metallic constituents.

ERNEST H. HUNTRESS

Annual Review of Biochemistry. Vol. X., 1941. Edited by JAMES MURRAY LUCK and JAMES H. C. SMITH. Annual Reviews, Inc., Stanford University P. O., California. 692 pp. Price, \$5.00.

The publication of the 1941 volume of the Annual Review of Biochemistry has been handicapped by the international situation, both through its effect on the free circulation of scientific journals and the demands it has made upon scientific investigators in Europe. The contributors, in many cases, have depended upon abstracts where the original articles have been unobtainable, but have managed well in spite of this. Others have neglected all work except that available in the original. Only one review, that of E. Gorter on the Properties of Protein Monolayers, has originated outside of the United States, the editors having done quite well in finding suitable collaborators in this country to discuss the many specialized fields that have required attention. They promise that Volume XI, to be published in 1942, will be more international in scope; it is hoped that this may be possible.

There is a certain emphasis upon topics related to plant biochemistry. The reviews in this field include one by A. L. Sommer on Mineral Nutrition of Plants, that of W. J. Robbins and V. Kavanagh on Plant Growth Substances, and a discussion of Biochemical Nitrogen Fixation by D. Burk and R. H. Burris. This last, incidentally, is the first devoted exclusively to this subject in the history of the Annual Reviews. A review of the Chemistry and Metabolism of Bacteria by H. A. Barker might also be included in this group.

Of rather unusual interest are the Review of Bioluminescence by E. N. Harvey and Spectrometric Studies in Relation to Biology by T. R. Hogness and V. R. Potter. A discussion of Detoxication Mechanisms by J. A. Stekol is the first on this subject since 1937. L. A. Maynard reviews the Relation of Soil and Plant Deficiencies and of Toxic Constituents in Soils to Animal Nutrition.

The more routine topics have been handled in the following way: Biological Oxidations and Reductions, by E. S. G. Barron; Proteolytic Enzymes, by M. Bergmann and J. S. Fruton; Non-proteolytic Enzymes, by H. Tauber; Chemistry of the Carbohydrates and Glycosides, by A. G. Norman; Chemistry of the Amino Acids and Proteins, by M. S. Dunn; The Chemistry and Metabolism of the Compounds of Sulfur, by A. White; Carbohydrate Metabolism, by C. F. Cori and G. T. Cori; Fat Metabolism, by H. C. Eckstein; The Metabolism of Proteins and Amino Acids, by R. Schoenheimer and S. Ratner; The Biochemistry of the Nucleic Acids, Purines, and Pyrimidines, by F. W. Allen; The Biochemistry of Creatine and Creatinine by H. H. Beard; Hormones, by E. C. Kendall; The Water Soluble Vitamins, by A. F. Morgan; Fat Sol-

uble Vitamins, by H. A. Mattill; and Nutrition, by H. K. Stiebeling and R. M. Leverton.

WILLIAM F. ROSS

BOOKS RECEIVED

August 10, 1941-September 10, 1941

H. V. ANDERSON and T. H. HAZLEHURST. "Qualitative Analysis." Third revised edition. Prentice-Hall, Inc., 70 Fifth Avenue, New York, N. Y. 266 pp. \$3.70.

L. JEAN BOGERT. "Fundamentals of Chemistry." Fifth edition. W. B. Saunders Company, West Washington Square, Philadelphia, Pa. 528 pp. \$3.00.

L. JEAN BOGERT. "Laboratory Manual of Chemistry." Fourth edition. W. B. Saunders Company, West Washington Square, Philadelphia, Pa. 165 pp. \$0.75.

STUART R. BRINKLEY. "Principles of General Chemistry." Third edition. The Macmillan Company, 60 Fifth Avenue, New York, N. Y. 703 pp. \$4.00.

OSCAR KRISEN BUROS, Editor. "The Second Yearbook of Research and Statistical Methodology, Books and Reviews." The Gryphon Press, 32 Lincoln Avenue, Highland Park, New Jersey. 383 pp. \$5.00.

"Guide to Library Facilities for National Defense." Revised edition. Edited by Carl L. Cannon for the Joint Committee on Library Facilities for National Emergency. American Library Association, 520 N. Michigan Avenue, Chicago, Ill. 444 pp.

MALCOLM DOLE. "The Glass Electrode." John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y. 332 pp. \$4.50.

EUGENE W. KANNING. "Quantitative Analysis." Revised edition. Prentice-Hall, Inc., 70 Fifth Avenue, New York, N. Y. 471 pp. \$3.70.

I. M. KOLTHOFF and H. A. LAITINEN. "pH and Electro-titrations." Second edition. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y. 190 pp. \$3.00.

A. J. MEE. "Higher Chemical Calculations." Chemical Publishing Company, Inc., 234 King Street, Brooklyn, N. Y. 184 pp. \$2.00.

WILLIAM ALBERT NOYES, JR., and PHILIP ALBERT LEIGHTON. "The Photochemistry of Gases." A. C. S. Monograph Series. Reinhold Publishing Corporation, 330 West 42nd Street, N. Y., N. Y. 475 pp. \$10.00.

F. TWYMAN. "The Spectrochemical Analysis of Metals and Alloys." The Chemical Publishing Company, Inc., 234 King Street, Brooklyn, New York. 355 pp. \$3.50.

RALPH R. WENNER. "Thermochemical Calculations." McGraw-Hill Book Company, 330 West 42nd Street, New York, N. Y. 384 pp. \$4.00.

The Science Reports of the Tohoku Imperial University, first series, Vol. xxix, No. 4. pp. 469-672. Maruzen Company, Ltd., Tokyo and Sendai, Japan.