



Fig. 1.

in the same system. In this case only 13 mg. of sample was used. A comparison of the actual and theoretical curves indicated a purity of about 93%. On the basis of the small (about 20%) purification effected in the distribution experiments, it would be expected that the product would be of the same order of activity (100–150 USP units/mg. of peptide) as the starting material. This has been the

case only when hydrogen sulfide has been used in the distribution system. Without antioxidant considerable losses in activity have been suffered without any substantial change in distribution pattern.²

A preliminary amino acid determination has been made on the purified material using a paper-chromatographic technique.³ Within the limits of error of the method (10%), the empirical formula appears to be: Arg₂His₁Lys₃Phe₂Ser₁Leu₂Val₂Glu₄Asp₁Gly₂Ala₂Pro₃. Tryptophan has not yet been determined on the purified product, but values obtained on Fraction ID by the method of Spies and Chambers⁴ correspond to one residue. On portions of the pure material which have been deionized by electrolytic means, the amino acid composition accounts for 88.5% of the dry weight. The identity of the remaining 11.5% is under investigation.

Since type ID material has been shown to be a parent of the hydrolyzed forms of ACTH,¹ we propose the term Corticotropin-A for our purified product. This is done in the realization that an adjustment in the nomenclature will be required in the event that a more complex naturally occurring form of porcine ACTH is isolated.

Acknowledgment.—The author wishes to acknowledge the technical assistance of Mr. A. M. Gross, Mr. S. W. Leslie and Mr. R. L. Peters.

(2) In many experiments with hydrogen sulfide and other antioxidants, we have never obtained significant increases in total activity. The effect has only been one of protection against loss.

(3) Details are to be published under the authorship of J. F. Roland and A. M. Gross of this Laboratory.

(4) J. R. Spies and D. C. Chambers, *Anal. Chem.*, **20**, 30 (1948).

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W. F. WHITE

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BOOK REVIEWS

Biochemical Preparations. Volume 2. By ERIC G. BALL, Editor-in-Chief. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1952. vii + 109 pp. 15.5 × 23.5 cm. Price, \$3.00.

Detailed directions are given for the preparation of twenty-three compounds, which are representative of a wide range of biochemical interests. The ultimate cost of some of these compounds, which can be readily obtained from supply houses, would probably approximate the purchase cost, unless large scale operations were introduced. Nevertheless, the information provided in this volume will be of great value for the further purification of commercial products. Moreover, since the directions are clear and detailed, the book should be of great value in courses in biochemistry in which preparative work is stressed. In criticism, it may be said that considerable space is given to compounds which will be of interest to a small group of workers only. Moreover, several preparations could have been published more appropriately in "Organic Syntheses." In view of the large number of publications in the current literature dealing with the purification of enzymes, it is surprising that only one enzyme is discussed in this volume.

On the whole, this volume, as well as Volume 1 of "Bio-

chemical Preparations" will be a valuable asset to both the teachers and research workers in biochemistry.

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A. A. CHRISTMAN

Annual Review of Nuclear Science. Volume I: By COMMITTEE ON NUCLEAR SCIENCE, National Research Council Annual Reviews, Inc., Stanford, California. 1952. x + 645 pp. 16.5 × 22.5 cm. Price, \$6.00.

This first volume of a projected series of annual reviews on nuclear science is an interesting account of researches published for the most part in 1950. It is really too bad that in a rapidly moving field a time lag of two years has to intervene between the time the material actually appeared in the literature and the appearance of the review volume. Although recognizing that a considerable time lag is inevitable, the reviewer feels that to include the date 1952 as a prominent part of the title, as done on the present volume, gives the prospective reader a misleading impression of timeliness. The lag is felt seriously in some fields, less so in others;

and with the proviso that the data and issues presented are those of two years and longer ago the book is certainly worthwhile and will be useful.

The book contains twenty-six articles covering a wide range of topics; in many cases each topic is also exceedingly diverse. Roughly half the pages are devoted to subject matter usually considered to be in the domain of physics, about one-third to chemistry and the remainder to biology and biochemistry.

The surveys of meson physics, theory of nuclear structure, nuclear energy levels, nuclear moments, nuclear interactions of cosmic rays and high energy accelerators of various sorts will be of interest mainly to nuclear physicists. The attentive chemical reader will, however, even here, run across incidental matters of considerable chemical interest. In Lauritsen's article on nuclear energy levels he will see mentioned, for example, the possible application of a magnetic particle spectrometer to the analysis of surface films only a few tens or hundreds of atoms thick. In Ramsey's brief survey of nuclear moment research he will be made aware that apparent nuclear moments are affected by the state of chemical combination, and that these effects may provide a new means of exploring solid state and molecular properties; he will also be startled to see reference in this article to a state of negative temperature.

According to the preface, the articles are supposed to be critical appraisals of a year's progress in certain fields of nuclear science. The articles in fact vary widely in the extent to which they have the character of critical appraisals. At one extreme one finds chapters which are largely catalogues of papers published, with very brief citation of results and a minimum of interpretation or criticism; at the other are a number of chapters which really attempt to summarize, interpret and evaluate, and which consequently are more readable, more interesting and themselves more valuable. Among those which the reviewer especially liked, in the latter category, were: Lauritsen's chapter, already mentioned, on energy levels of light nuclei; Nier's on the mass and relative abundance of isotopes; Clewett's on the chemical separation of stable isotopes; Jordan's very lucid and helpful essay on the detection of nuclear particles; Dieke's survey on atomic and molecular spectroscopy (in relation to nuclear masses and structures); and Lane's survey of low temperature phenomena (largely devoted to the fascinating behavior of He³ and He⁴ in the liquid state and to superconductivity).

The latter two subjects belong to "nuclear science" in an indirect way, namely, through the influence of various nuclear properties on atomic and molecular phenomena; such indirect connection is characteristic of many of the subjects reviewed.

Thus, Katz and Manning's brief article on the chemistry of the actinide elements is strictly chemical in character, and describes researches on the chemistry of the elements at the open end of the periodic system; the connection with nuclei is that several of the substances are obtainable only through nuclear reactions. Edward's survey of isotopic tracer research discusses experiments on exchange reactions, isotope effects, reaction mechanisms, and diffusion and surface phenomena, as carried out with stable and radioactive isotopes. Rodden's remarks on analytical nuclear chemistry are addressed to chemists who are interested in analysis, but not necessarily in nuclei. Rogers and Spedding discuss progress in metallurgy, mainly from the point of view of metal systems of interest in nuclear reactors.

The biochemical articles deal with the effects of radiations on living organisms and with the use of isotopes as tracers in studying movement and chemical turnover of substances in living systems. The uninitiate, in reading these sections, is astounded by the multiplicity, complexity, and number of problems being studied and of results reported. The reviewer's impression was of information being accumulated at a rate very much greater than the rate at which it is being assimilated and put together into a unified picture of life processes. However, greater unity may be apparent to specialists in the field.

This difficulty is inevitable in an attempt to cover in a single volume such a wide range of subject matter in the different disciplines of science. One is inclined to ask whether "nuclear science" should be interpreted as broadly as it is here. One can easily imagine that several of the reviews in the present volume would more appropriately have appeared in the "Annual Review of Physical Chemistry,"

and several of the others in the "Annual Review of Biochemistry." The reviewer is inclined in this direction, and would also tend to favor a smaller number of articles, more thorough and more critical than the average of those in the present volume. The title list for volume 2 (1953) suggests a step in this direction.

The book is well printed, on glossy paper, with a not excessive number of typographical errors. The binding is satisfactory, but not particularly attractive.

CHEMISTRY DEPARTMENT
BROOKHAVEN NATIONAL LABORATORY RICHARD W. DODSON
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A Source Book in Chemistry 1400-1900. By HENRY M. LEICESTER, College of Physicians and Surgeons of San Francisco, and HERBERT S. KLICKSTEIN, Edgar Fahs Smith Library in the History of Chemistry, University of Pennsylvania. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y., 1952. xvi + 554 pp. 16 X 23.5. Price, \$7.50.

Traditionally, we have tended to regard the history of science as unimportant for science students. And what little history has been taught has often been badly taught. Happily, this tradition is dying out today and there are developing in several important centers well organized programs in the history of science.

Historians of science, however, have been working under tremendous handicaps, due to the past neglect of the field, the dearth of historical materials in translation, and the failure to bring even the little there is together. The extension of science into the general education field to provide an understanding of science for the non-scientist has placed new emphasis on the need for such teaching aids. Indeed, the dearth of primary materials for such use was the subject of extended consideration at a recent Harvard Conference on General Education in Science.

It is most heartening, therefore, that in spite of many unavoidable delays and obstacles the present authors have been able to complete this volume in the outstanding series of Source Books in the History of the Sciences. It adds a most significant set of historical papers in the development of chemical theory.

From Biringuccio and Agricola to Werner and Curie, covering a period of four centuries, the volume traces the rise of chemical theory through the significant and well-selected papers of eighty-two outstanding scientists. The translations used in most cases are those of contemporaries of the original authors in order to ensure more faithful interpretations. The papers are selectively excerpted but all are of sufficient length to tell the important aspects of the theoretical development concerned.

As the writers well say, "No two historians of chemistry, working separately, would ever choose exactly the same selections for a book of this sort." However, in going over the list, both of scientists and of papers included, one can find no important omissions and, indeed, none he might wish to omit of those included. If anything is lacking, it is in the biographies of the scientists themselves. For understandable limitations of space, these had to be regrettably abbreviated. But the twelve excellent pages of *Bibliography of Bibliographies* with references both to books and journal articles, many of recent origin, more than compensate for this lack. The authors have deliberately excluded descriptions of the discovery of elements and processes, and have thus retained a significant thread of continuity through the development of chemical theory.

Although, as a source book this volume does not pretend to pass judgment on great scientific controversies of the past, the authors have accepted in one instance a judgment of history which is, at best, doubtful, when they state (page 163), "Here we have the result of the stimulus of Priestley's communication to Lavoisier of his discovery of 'dephlogisticated air'—oxygen (October 1774)." The later (1775) publication of Priestley's final results certainly stimulated and assisted Lavoisier, but there is serious doubt that the oft quoted conversation between the two scientists in 1774 provided any real stimulus or assistance to Lavoisier.

Having thus offered a modest criticism, which seems to be the duty of a reviewer, one can with full conscience go on to praise the volume in highest terms. It is a notable addition to the history of science which will be invaluable to

those teaching science to scientists, science to non-scientists, and the history of ideas to both.

Thanks and congratulations go to the authors who have, with such devotion, achieved this excellent result, and to the publisher who has spared no pains to make it pleasing to the reader.

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SIDNEY J. FRENCH

Der Raman-Effekt und Seine Analytische Anwendung. (Anleitungen für die chemische Laboratoriumspraxis, Band V). DR. WALTER OTTING, Max-Planck-Institut für Medizinische Forschung Heidelberg, Institut für Chemie. Springer-Verlag, Reichpietschufer 20, Berlin W 35, Germany. 1952. vi + 161 pp. 14 × 21 cm. Price, DM 12.60.

This little book appears to be well written and within the space limitations set by the 150 odd pages exhibits the characteristic thoroughness of German scientific authorship. The author has brought many of the more recent developments in the subject into their proper perspective.

The reviewer obtains the impression that the beginning worker in the field can obtain considerable understanding and perspective of the subject in a relatively easy manner by reading this book. Dr. Otting has given sufficient references so that it is not difficult for the reader to pursue the subject in more detail if he so desires.

The section of the book dealing with analytical procedures is well written. The author in his enthusiasm for his subject might be criticized for failing to point out forcefully that the Raman effect and infrared spectroscopic methods are not equal partners in analytical procedure. The opinion of the reviewer is that because of greater experimental difficulties and much less wide spread applicability the Raman effect should only be made use of for analytical purposes where infrared methods are either impossible or inexact.

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D. H. RANK

Advances in Protein Chemistry. Volume VII. By M. L. ANSON, Research Division, Lever Brothers Co., Edgewater, New Jersey; KENNETH BAILEY, University of Cambridge, Cambridge, England; and JOHN T. EDSELL, Harvard Medical School, Boston, Massachusetts (Editors). Academic Press, Inc., 125 East 23rd St., New York 10, N. Y. 1952. viii + 411 pp. 16.5 × 23.5 cm. Price, \$8.50.

The seventh volume of "Advances in Protein Chemistry" adds six reviews to the list which has appeared in this series. Three of these concern themselves with proteins as molecular species, illustrating the application of organic and physical chemistry to protein structure. The other three are more biochemical in nature and deal with subjects in which the emphasis is as much on living tissues as on the proteins they contain.

In the first group F. Sanger, writing on "The Arrangement of Amino Acids in Proteins," reviews the extraordinary progress in this field in recent years, especially by the author himself. His summary of the methods available for this frontal attack on protein structure will be compulsory reading for all those who in the near future will attempt to emulate with other proteins the success which has attended Sanger's work with insulin. G. B. B. M. Sutherland, writing on the infrared spectra of amino acids, peptides and proteins, and G. H. Beaven and E. R. Holiday, dealing with the ultraviolet spectra of these substances, review fields which must still be considered in their infancy. In both articles, especially in Sutherland's, problems as yet unsolved are clearly brought to the reader's attention, and they should provide a stimulus for future research.

In the more biochemical group, H. H. Weber and H.

Portzehl discuss "Muscle Contraction and Fibrous Muscle Proteins." They describe the properties of muscle proteins, and contrast them with the behavior of whole muscle, and of individual fibers or threads. R. S. Bear reviews "The Structure of Collagen Fibrils" and K. M. Rudall "The Proteins of the Mammalian Epidermis."

All of the reviews are sufficiently long for a complete discussion of the subject matter. They should not only appeal to the specialist, but should also provide informative reading for anyone interested in a general way in the topics discussed. In this respect, they provide a happy contrast to the short (usually annual) reviews so frequently encountered, which are usually incomprehensible to anyone but the expert.

There are very few errors, but most of the reviews are already somewhat out of date. For example, possible structures of the epidermal proteins are discussed without reference to the work of Pauling and Corey. The same is true of the review on muscle contraction, in which field Pauling and Corey have made specific suggestions, a critique of which would have been welcome. These and similar deficiencies are, however, inevitable, in view of the time which must elapse between the planning and writing of a lengthy review and its publication. They are an indication of the tremendous rate with which our knowledge of protein chemistry is increasing.

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CHARLES TANFORD

Dynamic Aspects of Biochemistry. Second Edition. By ERNEST BALDWIN, B.A., Ph.D., Professor of Biochemistry at University College in the University of London, formerly Fellow of St. John's College, Cambridge. Cambridge University Press, 32 East 57th Street, New York 22, N. Y. 1952. xx + 544 pp. 14.5 × 22 cm. Price, \$5.00.

This volume is packed with specific information, but facts are so woven into the fabric of dynamic narration that the whole makes a fascinatingly readable work of literature.

As in the 1947 edition, there are two parts, Part One devoted to the known enzymes, their substrates, and the mechanisms of their actions. In Part Two, entitled "Metabolism," the ways in which nitrogenous substances, carbohydrates, fats, and intermediate compounds are handled by living organisms are presented in a series of illuminating chapters. The importance that enzymes have achieved in studies of biological processes is fairly indicated by the fact that of the 494 pages of text, 246 are devoted to Part One, and that in Part Two, the role of the enzymes is interwoven with the discussion of practically every aspect of metabolism.

The successive discussions are of lucid clarity and follow each other with such well-ordered and logical arrangement that the reader is led on from chapter to chapter. The breadth of material covered is extraordinary; it includes organisms from bacteria to mammals, yet the material is presented in such a manner that a discussion of processes in microorganisms seems to facilitate the understanding of the processes in the higher animals and plants.

Among the numerous additions that have been made to the 1947 edition is a chapter on "Biological Energetics," which particularly captivated the reviewer. The presentation of the concepts of free energy and entropy is the clearest that it has been the reviewer's fortune to encounter, and the application of energy concepts to biological processes is beautifully consummated.

Professor Baldwin's volume is one which neither the student nor the specialist in any field of biology involving chemistry can afford to be without. To the student, it affords an extraordinarily well-balanced, clear, and complete introduction to the fields that are covered. To the specialist, it provides an integration such as has not hitherto been available.

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