

of propane and butane mixtures in their Bishop, Texas, plant. Four determinations of the carbon isotope ratios of this acetic acid gave the following averages: $R_M = 0.010896 \pm 0.000004$; $R_D = 0.010839 \pm 0.000004$. Upon combination, these data yield: $R_C = 0.010782 \pm 0.000006$; $R_M - R_C = 0.000114 \pm 0.000007$. The results obtained for the acetaldehyde were similar, but subject to larger error: $R_M - R_C = 0.000100 \pm 0.000020$. In the air oxidation process, it would appear that little if any discrimination between C^{12} and C^{13} in the aldehyde groups occurred during the oxidation of that compound, but that most of the difference in isotopic constitution of the acetic acid carbon atoms arose antecedent to that oxidation, most probably in the step in which the symmetry of the

original hydrocarbon molecule is destroyed. This is a particularly interesting result because of the reported essentially random distribution of the carbon isotopes in petroleum hydrocarbons.

Samples of acetic acid and related compounds from other sources are being examined. It is hoped that the findings will assist in the understanding of the complicated oxidations involved in the production of these materials in nature and in commerce.

This research was supported by the A.E.C. We are indebted to Mrs. R. W. Hill for the mass spectrometer analyses.

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RECEIVED SEPTEMBER 8, 1953

BOOK REVIEWS

Elsevier's Encyclopaedia of Organic Chemistry. Series III—Carboisocyclic Condensed Compounds. Vol. 14—Supplement 2, Triterpenes. By F. RADT AND DORA STERN (Editors). Elsevier Publishing Co., 402 Lovett Boulevard, Houston, Texas. 1952. xxxii + pp. 939s-1346s. 18 × 26 cm. Price, Single Issue \$40; Series Subr. \$35; Set Subr. \$30.

In view of the recent extensive developments in the chemistry of tetracyclic and higher cyclic compounds, a field covered in volume 14 of this series, the appearance of a supplement is most timely. To date, two such supplements have been published, the first covering compounds of this series excluding triterpenes and sterols and the present volume which includes only the chemistry of the triterpenes. The authors state that a supplement covering steroids will appear subsequently.

The triterpene Supplement covers the field between the years of 1937 and 1946. In most cases, however, the important work reported by early 1952 also has been included. The expansion made in this book over the original volume can be illustrated by the following figures; the entire discussion of the triterpenes was only 85 pages in the original volume whereas the Supplement contains 400. A typical expansion is to be found in the tetracyclic triterpenes where the chemistry of lanosterol has increased from 2 to 53 pages.

The general arrangement of this Supplement follows that employed for the original edition (for a review see *THIS JOURNAL*, 70, 1294 (1948)) and, in addition, certain desirable features have been added. At the top of every other page, a skeletal structure complete with the ring numbering employed has been inserted. Each section has a general flow sheet of the transformations reported, complete with reaction conditions, literature references and the supplement page number where the compound will be found discussed in detail. Again, the preparation of these reaction schemes has been done in a wonderful manner and the clarity of the set-up is to be commended.

With regard to nomenclature and ring numbering, the authors have employed that used by the workers in the field. For example, the tetracyclic triterpene lanosterol has been indexed as a C_{30} -sterol. As a result of this change which has only been in the literature for a year, the ring numbering in the Supplement will be different from that in the majority of papers in the literature quoted. The compounds related to euphol, however, have been retained as derivatives of triterpenes.

An additional section has been added to the Supplement which looks ahead to the future when the interconversions

between arbitrary series have become so numerous that the compounds will be arranged on the basis of ring structure. Accordingly, 26 pages have been devoted to listing, systematically, the triterpenes as derivatives of polycyclic aromatic hydrocarbons.

In view of the completeness, clarity and timeliness of this supplementary edition, it will be of great value to workers in the field of triterpenes and related subjects.

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WILLIAM G. DAUBEN

Experimental Nuclear Physics. Volume I. Edited by E. SEGRE. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1953. ix + 789 pp. 15.5 × 23.5 cm. Price, \$15.00.

The Preface to this wonderful book gives its purpose as that of "bringing the experimentalist up to date in experimental techniques, point out to him the significant facts and data, and indicate the broad lines of theoretical interpretation." The reviewer believes this is exactly the end accomplished.

The sections are five in number, the first, written by Hans H. Staub, being on Detection Methods—Geiger counters, scintillation counters, crystal counters, proportional counters, ionization chambers, cloud chambers, photographic plates and Cerenkov counters, as well as the principles of the ionization of gases by ions and electrons, the behavior of electronic instruments, and typical constructions and methods of operation of the instruments described. The second part, written by H. A. Bethe and Julius Ashkin, on the Passage of Radiations through Matter, has the usual completeness and authority of Bethe treatises on this subject. The third part is a beautifully written and up-to-date account of Nuclear Moments and Statistics, by Norman F. Ramsey. Part IV, also by Ramsey, is on theoretical nuclear two-body problems and nuclear structure. This of all the sections was least pleasing to the reviewer, but it is understandable and interesting. Part V, by K. T. Bainbridge, on mass spectroscopy and isotopic abundances and masses, is magnificent in its clarity and precision and completeness.

The reviewer, a physical radiochemist, is completely convinced that this book should be in the hands of all experimental physicists and most radiochemists. It probably will prove to be the first of an indispensable series. As far

as it is known to the reviewer, there is nothing else like it in the American literature. The book begins with first principles and proceeds rapidly to laboratory art and detail.

There are omissions and inadequacies. For example, Part I on Detection Methods does not touch on a number of developments which have been found useful, but there is no hope that such completeness could be attained in 165 pages of written matter on such a broad subject. Part II is a little theoretical in its treatment of the penetration of beta rays through matter. Part III is, as far as the reviewer can tell, superb in all respects. Part IV on nuclear theory was the least appealing; and Part V was absolutely excellent.

On the whole this book is superb and it is to be hoped the remaining volumes in this series will retain this high standard.

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The Metabolism of Protein Constituents in the Mammalian Body. By S. J. BACH. Oxford University Press, 114 Fifth Avenue, New York 11, N. Y. 1953. viii + 272 pp. 17 × 24 cm. Price, \$9.25.

Glycine, alanine, valine, leucine, isoleucine, serine, threonine, cystine and methionine are the amino acids with which this volume is concerned. The extensive recent research on the biochemistry and metabolism of cystine and methionine is the subject of the major chapter (150 pages) of the book. The review of the role of the sulfur-bearing amino acids is written in the spirit of the author's general intention to "tell a coherent story of the development of the various problems which present themselves in the metabolism of amino acids." The integration of nearly seven hundred references on cystine and methionine has yielded a chapter which can be read with interest both by the specialist and by "scientists working on the fringe of the field." The research on methyl-transfer in biological systems is dealt with in detail in terms of the experimental data together with the author's own interpretation of the trend of the results in instances where he feels there are divergent views. The chapter on glycine covers, among various topics, the participation of this amino acid in the formation of uric acid, hemoglobin, bile acids, and glutathione. The book provides a valuable guide to the literature and reflects the author's interest in both the chemistry and the physiology of the subject.

It is necessary to point out that the title of the book is misleading as to the scope of the volume. It is understandable, particularly in view of the completeness with which the selected topics are treated, that the author should find it desirable to deal with the subject in sections. The title, however, indicates that this book is a comprehensive monograph on the metabolism of protein constituents, whereas the author mentions in his introduction that he is preparing a further volume on the remaining amino acids. The reader looking for information on the acidic, basic or aromatic amino acids will not find it in the present book, which probably should have carried a "Volume I" designation.

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STANFORD MOORE

Blood Cells and Plasma Proteins—Their State in Nature.

By JAMES L. TULLIS (Editor). Academic Press, Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1953. xxi + 436 pp. 16.5 × 23.5 cm. Price, \$8.50.

This book is based on a series of seminars delivered at Harvard University in 1951. It is in seven sections, dealing with the following topics: the formed and fluid parts of human blood, blood coagulation, immunity, erythrocytes, leucocytes, plasma enzymes and lipoproteins. Most of these sections include contributions by several different authors.

The most recent advances are stressed, and many of the topics have not been discussed elsewhere in summary form (at least outside the medical literature). This is true, for example, of the sections on plasma enzymes, leucocytes and much of the section on lipoproteins.

A somewhat unfortunate aspect of the book is that the factual matter has not been entirely separated from the authors' prejudices. Thus J. F. Enders states (p. 175) that "a large body of evidence indicates that most of the normal thermostable factors behaving as antibodies are indeed qualitatively the same as those arising from known antigenic stimulation," while J. L. Oncley (p. 180) finds "reason to believe that they may be appreciably different." J. L. Tullis, writing on white cells (p. 272) appears to consider lymphocytes as a class of leucocytes and ascribes to them "a major protective role by production and transport of antibodies." C. A. Janeway (p. 165), on the other hand, makes sharp distinction between leucocytes, lymphocytes and other white cells and rejects the theory that the lymphocytes are antibody carriers. In the same section (p. 164) Janeway discusses the "lymph nodes, where antibody formation takes place," an idea which appears to be disproved (p. 189) by Ehrlich.

The statement on the dust cover of the book that it assembles for the first time "a coordinated picture of the current state of knowledge about blood and its component parts" is thus hardly true. In view of this statement it might also be worthwhile to point out that many important subjects of blood chemistry are not discussed at all: oxygen and carbon dioxide transport, the physical chemistry of serum albumin, and similar topics receive no mention at all.

The first section of the book, dealing with the formed and fluid parts of human blood, contains an interesting historical prologue, ranging from Wadham College, Oxford in 1649 to Harvard University in 1951. Its chemical chapters, however, abound with unfounded assertions concerning the interactions of plasma proteins, and can only confuse the reader.

To those with a real interest in the special topics discussed this book will be very valuable. Its benefit to the general reader, however, is likely to be limited. It would have been greatly enhanced if each section had contained a critical summary like that presented by J. S. Fruton at the conclusion of the section on plasma enzymes.

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CHARLES TANFORD

Changements de Phases. Paris, 2-7 Juin, 1952. Comptes Rendus de la deuxième Réunion Annuelle tenue en commun avec la Commission de Thermodynamique de l'Union Internationale de Physique. Société de Chimie Physique, 13, Rue Pierre Curie, Paris-V^e, France. 1952. ix + 486 pp. 22 × 27 cm. Price, 3,750 fr.

The increasing importance of the study of phase transitions is evident in the variety of fields in which it is involved and in the theoretical attention it is attracting. The general and lively interest in the subject is strikingly brought out in this collection of the papers and discussions presented at a meeting attended by outstanding specialists from the world over and covering a wide selection of sub-topics.

Except for a brief preface by E. Bauer (Paris), nothing has been added to these "transactions," presenting sixty-six papers by eighty-eight authors. The accompanying questions and discussions on the individual papers include brief remarks by twenty-five additional persons. The format is that of the current issues of the *Journal de Chimie Physique*. Two of the articles are presented merely as abstracts. There is a table of contents and an alphabetical list of speakers with page references, but no index.

The symposium is divided into eleven sections, with two to nine papers in each, under the following headings: general principles and condensation theory; critical phenomena; phase equilibria involving solutions; solutions of polymers and colloids; cooperative phenomena in solids; polymorphism and rotational transitions; kinetics of phase changes in solids; ferromagnetism, lambda points and electronic phenomena; fusion; transitions in amorphous materials; transitions in surface phases. These headings serve merely to group together papers bearing on the same special field. The subdivisions are not like the "chapters" of a "book," for there is here no unified point of view, no systematic attempt to avoid overlapping and repetition between articles, no great concern with making sure that all aspects should be uniformly and adequately covered. Some of the

articles are purely mathematical, some purely speculative, and some purely experimental.

Naturally, there is, correspondingly, a considerable range in the quality, effectiveness and value of the articles. As an ensemble, however, the effect of the arrangement and of the great variety of points of view and of interest is definitely revealing and stimulating.

The section on "fusion," for example, containing nine articles, starts with a discussion by F. E. Simon (Oxford) on the improbability of a solid-liquid critical point, with direct reference to new experimental work on helium. After two articles by M. Born (Edinburgh) and C. Domb (Oxford), G. Borelius (Stockholm) proposes the hypothesis of a certain continuity of the solid-liquid transition in metals, somewhat in the van der Waals sense of the continuity of the liquid and vapor states. The contrast, however, between this position and the expectation that the solid-liquid transition will never lead to a critical point apparently provoked no discussion in the comments reported on these papers.

The only disappointing section in the collection is that entitled "kinetics of phase changes in solids," comprising just two papers. The first, by N. V. Aguéev (Moscow), on "Mendeléev's periodic law and the nature of metallic phases," does not mention the words speed, rate, velocity or kinetics at all. The second, by I. I. Kornilov (Moscow) is general and empirical.

In an article under "polymorphism and rotational transitions," J. Timmermans (Brussels) speculates about the relation between the polymorphism of organic compounds and the phenomenon of dynamic isomerism. Based on familiar phase diagrams of pseudobinary behavior, the argument involves, in the reviewer's opinion, erroneous interpretations of certain aspects of phase diagrams which vitiate the hypothesis.

More typical of the whole collection, perhaps, is the excellent section on "critical phenomena," with an introductory general article by J. E. Mayer (Chicago), followed by articles on the following special topics: A New Equation of State, by Y. Rocard (Paris); Surface Tension and Density, by J. Yvon (Paris); Opalescence and Fluctuations in Binary Systems, by R. Furth (London); Gravitational Effects and Ultrasonic Transmission, by W. G. Schneider (Ottawa); The Critical Phenomenon in the System Cyclohexane-Aniline, by R. W. Rowden and O. K. Rice (North Carolina); and Specific Heat at Constant Volume by A. Michels and J. Strijland (Amsterdam).

The very diversity of interests and of emphasis brought together in this impressive symposium makes it worthwhile and rewarding reading. The collection should prove useful not only to those actively interested as researchers but also to students and teachers generally.

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JOHN E. RICCI

Progress in the Chemistry of Fats and Other Lipids. Volume 1. By R. T. HOLMAN, Associate Professor of Physiological Medicine, Hormel Institute of the University of Minnesota; W. O. LUNDBERG, Director, Hormel Institute of the University of Minnesota; and T. MALKIN, Reader in Organic Chemistry, University of Bristol (Editors). Academic Press, Inc., 125 East 23rd Street, New York 10, N. Y. 1952. iii + 186 pp. 16.5 × 24.5 cm. Price, \$7.00.

This book is the first of an annual progress series in which the chemical, biochemical, physical and biophysical aspects of the fats and oils will be reviewed. It is the aim of the editors that each section shall be an authoritative, critical and up-to-date survey of some special branch of this rapidly expanding subject. In the present volume the editors have succeeded admirably in accomplishing these objectives. Included in the first chapter by Malkin is a discussion of X-ray diffraction and the crystal form of fatty acids, polymorphism of odd and even acids and their ethyl esters, and alternation in long chain compounds. The second review by Bergmann is concerned with the structure, properties,

distribution in nature, isolation and chemical determination of sterols and related substances. A new system of classification of these compounds, based on their degree of optical rotation, is used. In the next section by Desnuelle the subject of the phospholipids is reviewed from the standpoint of state and distribution in nature, chemical structure, component fatty acids, and techniques of analysis and separation. In the fourth chapter by Holman an excellent summary of recent advances in the chromatography of the fatty acids is presented. Included in the discussion are elution, frontal and displacement analysis, and carrier, reverse phase and paper chromatography. It is clear from this review that chromatography has not been systematically explored as a method of analysis of lipid material but holds great promise as an analytical tool. The last chapter by Harwood is concerned with the chemistry and properties of certain long chain derivatives of the fatty acids. The topics discussed include acid chlorides, aldehydes, ketones, acid anhydrides and a variety of nitrogen compounds ranging from primary amides to quaternary ammonium salts. Each review has a comprehensive bibliography, and the editors have provided author and subject indexes. The typography of the numerous tables, graphs, and photographic illustrations is excellent.

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BOOKS RECEIVED

August 10, 1953-September 10, 1953

ARNOLD M. BASS AND HERBERT P. BROIDA. "A Spectrophotometric Atlas of the $^2\Sigma^+ \rightarrow ^2\Pi$ Transition of OH." National Bureau of Standards Circular 541. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 1953. 22 pp. \$0.35.

R. H. F. MANSKE AND H. L. HOLMES (Edited by). "The Alkaloids—Chemistry and Physiology." Volume III. Academic Press, Inc., 125 East 23rd Street, New York 10, N. Y. 1953. 422 pp. \$11.00.

ARTHUR A. MARYOTT AND FLOYD BUCKLEY. "Table of Dielectric Constants and Electric Dipole Moments of Substances in the Gaseous State." National Bureau of Standards Circular 537. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 1953. 29 pp. \$0.20.

E. H. RODD (Edited by). "Chemistry of Carbon Compounds." A Modern Comprehensive Treatise. The Elsevier Press, 402 Lovett Boulevard, Houston, Texas. Volume I, Part B—Aliphatic Compounds. 1952. Pp. 779-1462. \$17.50; to subscr. \$15.00. Volume II, Part A—Alicyclic Compounds. 1953. 487 pp. \$12.50; to subscr. \$11.25.

LEOPOLD SCHEFLAN AND MORRIS B. JACOBS. "The Handbook of Solvents." D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York, N. Y. 1953. 728 pp. \$10.00.

E. SEGRE (Editor), P. MORRISON AND B. T. FELD. "Experimental Nuclear Physics." Volume II. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1953. 600 pp. \$12.00.

W. THEILHEIMER. "Synthetic Methods of Organic Chemistry—An Annual Survey." Vol. 7. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1953. 450 pp. \$14.90.

J. FREDERIC WALKER. "Formaldehyde." Second Edition. American Chemical Society Monograph No. 120. Reinhold Publishing Corporation, 330 W. 42nd Street, New York 36, N. Y. 1953. 575 pp. \$12.00.