



tant and a similar effect has been noted for a vinylogous thio ester.<sup>2</sup> Carbanion **6** (X = NCH<sub>3</sub>) appears to be the first carboxamide-stabilized species<sup>1-3, 14, 19</sup> which is not also a vinylic or benzylic anion. It is clear that the actual amount of inductive stabilization provided by the

dipole is a matter of conjecture and, in fact, a homo-enolate ion<sup>29</sup> could be postulated as an alternative to **6**, although analogous species are not reasonable for many of the precedents.<sup>1-22</sup> The proposal of **6** raises a number of intriguing mechanistic and structural questions, which are under investigation.

**Acknowledgement.** We are grateful to Professors R. R. Fraser and R. A. Olofson for preprints and cogent discussion and to the National Institutes of Health for support of this work.

(29) A. Nickon, J. L. Lambert, R. O. Williams, and N. H. Werstiuk, *J. Amer. Chem. Soc.*, **88**, 3354 (1966).

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## Book Reviews\*

**Analysis and Simulation of Biochemical Systems. Volume 25 of the Proceedings of FEBS.** Organized by H. C. HEMKER and B. HESS. North Holland/American Elsevier, New York, N. Y. 1972. vi + 460 pp. \$25.75.

The Eighth Meeting of FEBS, held in Amsterdam in August, 1972, gave rise to the 31 papers reproduced in this volume. They are largely concerned with models for enzyme systems and are organized in six groups: Thermodynamics, Mathematics, Enzymology (General), Spatially Structural Systems, Studies on Specific Enzymes, and Computation of Structure. They are photographically reproduced from the authors' typescripts, in the interest of prompt appearance, but they include many figures and, of course, references. All are in English. The publishers are to be commended for providing an index.

**Cellular Antigens.** Edited by ALOIS NOWOTNY. Springer Verlag, New York, N. Y. 1972. xi + 329 pp. \$26.00.

The thirty lectures and summaries of a conference held in Philadelphia in 1971 are collected in this book. They demonstrate the intense interest in determining the structure and chemical nature of antigens as a basis for understanding their biological function. The papers are nicely reproduced, with illustrations, figures, tables, and references, together with subject and author indexes.

**Compendium of Organic Synthetic Methods.** By I. T. HARRISON and S. HARRISON (Syntex Research). Wiley-Interscience, New York, N. Y. 1971. xv + 529 pp. \$11.95.

The title of this volume inevitably invites comparison with other recent works in which synthetic organic chemistry is treated. In format it resembles "Annual Reports in Organic Synthesis," in that there is no discursive text but only equations with succinct notations of conditions and yields. This allows a very large amount of information to be presented in uncluttered, easily scanned form.

The material is organized into fourteen chapters by functional group (e.g., "Olefins," "Ethers and Epoxides," etc.). Within each chapter the content is divided into sections according to starting material (e.g., "Olefins from Aldehydes"). References for each method are given adjacent to the equation, which saves time; they are given in condensed form, without authors' names (e.g., "JACS (1946) 68, 1085"). Important reviews are also noted. The literature coverage extends into 1970, with emphasis on recent works, and the sources are eclectic. The logical arrangement of the material obviates need for an index.

This book is essentially complementary to such works as Buehler and Pearson's "Survey of Organic Syntheses" and Fieser and Fieser's "Reagents for Organic Synthesis." It is a very usable volume and a bargain at just over 2¢ a page; it deserves a wide sale.

\* Unsigned book reviews are by the Book Review Editor.

**Drugs and Society.** Edited by VICTOR SNIIECKUS (University of Waterloo). Department of Chemistry, University of Waterloo, N2L 3G1, Canada. 1973. 39 pp. \$1.00.

The four lectures composing a symposium held in 1972 are given in full in this booklet, together with biographies of the lecturers and transcripts of the discussions. The subjects are: Plant Hallucinogens (R. E. Schultes); Non-Medical Use of Drugs (H. Kalant); Recreational Drugs and the Law (A. C. Whealy); and Combat of Narcotic Abuse (I. J. Pachter). The articles provide excellent orientation to chemists who are increasingly being asked about these subjects regardless of their personal specialties.

**From Plasma to Planet. Nobel Symposium 21.** Edited by AINA ELVIUS. Wiley-Interscience, New York, N. Y. 1972. 389 pp. \$25.00.

This book embodies the proceedings of an international invited symposium held in 1971 to bring together cosmogonists and space-research scientists. The twenty-four papers are concerned with matter in cosmic space, particularly plasma, from the viewpoint of possible origins of the planets. There runs through the Symposium the implied general acceptance of condensation of plasma as a major phenomenon in the origin of the Solar System; it will be interesting to see how this view stands the test of time, since so many other seemingly satisfactory hypotheses have eventually had to be discarded.

Not all the papers are by any means chemical; they range from "Atomic and Molecular Reactions in Space" to "Semantics," but in general make fascinating reading. Much space is given to reproducing the discussions following the papers; it is a pity that a little bit could not have been spared for an index.

**Handbook of Chromatography. Volumes I and II.** Edited by GUNTER ZWEIG (Syracuse University Research Corporation) and JOSEPH SHERMA (Lafayette College). CRC Press, Cleveland, Ohio. 1972. Vol. I: 784 pp. \$36.50. Vol. II: 343 pp. \$21.50.

The first volume of this work consists of a collection of 549 tables of *R<sub>f</sub>* values for gas, liquid-column, paper, and thin-layer chromatography. These tables are organized in a consistent form, and present clearly the absorbent and the developing agent, with references to the literature sources conveniently located beneath each table. Some tables are quite short, but some, such as those on Steroids and Derivatives, are extensive.

The last 125 pp of Volume I is a compound index, by which it is intended that one can quickly locate the tables in which a given substance is listed. It is an alphabetical index, and the compilers appear to have used the names as published by the original investigators, without attempt at standardization. This is a serious drawback to the use of this work, for it has led the compilers unthinkingly to scatter the entries for a single compound under different names,

without cross-indexing. For example, index entries under "caproic acid" refer to Tables LC7 and PC77 and 79, but entries for the same substance under the name "hexanoic acid" refer to Tables LC57 and TLC 134. The index abounds with such situations, and the user must look up every imaginable synonym in order to be sure to find all the data listed. This unfortunate situation could have been avoided by the inclusion of a formula index or a line-notation index. The compilation itself is a wonderful accomplishment, but its value is in direct proportion to the accessibility of its content, and is thus considerably reduced. Nevertheless, the amount of information is immense, and there is nothing else like it.

Volume II is subtitled "Principles and Techniques" and contains separate sections on Gas, Liquid-Column, Paper, and Thin-Layer Chromatography. The major portion of Volume II, however, is devoted to Practical Applications and deals extensively with detection reagents, sample preparation, and sources of materials. The inside back cover contains a list of abbreviations used in the tables; among the more interesting to contemplate is "ms," meaning "mustard." "Chromatography Book Directory" and author and subject indexes conclude this volume. It is packed with useful information and should be a valuable guide for chemists and non-chemists alike.

**Physics of Thin Films: Complete Bibliography.** By HERBERT MAYER (Technische Universität Clausthal). Wissenschaftliche Verlagsgesellschaft MBH, Stuttgart. 1972. Vol. 1: 898 pp. Vol. 2: 304 pp. DM 320.

This monumental bibliography was developed from the personal card file of Professor Mayer and was completed to 1969 with the help of collaborators. No less than 18,800 references are listed in alphabetical order of the first author's name, and, for each, the full title is given in addition to the usual data. The original language is used for these titles, except, apparently, for Russian entries, which have been translated into English. The second volume is a kind of index according to subject, so arranged that one can easily locate review articles, theoretical discussions, papers on chemical reactions, luminescence, temperature effects, etc. Although the coverage is aimed at being encyclopedic, certain areas have had to be curtailed or omitted owing to practical considerations; these include protective coatings and purely technical applications, and monomolecular films on water. The last topic is planned to be covered in a future volume, and another volume is planned for 1973 to cover publications appearing in the 1969-1972 period. Professor Mayer's collection provides a key to an important area of literature whose components are scattered widely in time and among journals, and its publication should be of great value to surface chemists.

**Proceedings of the International Symposium on Atomic, Molecular, and Solid-State Theory and Quantum Biology.** No. 6. Edited by PER-OLOV LÖWDIN (Uppsala University). Wiley-Interscience, New York, N. Y. 1973. xxi + 465 pp. \$24.95 (softbound).

The forty-five papers and nine "Workshop Letters" presented at the Symposium held at Sanibel Island in January, 1972, comprise the contents of this volume. Only such part of the ensuing discussions as were submitted in writing are included. There is an author, but not a subject index.

**Reactivity of Solids. Proceedings of the Seventh International Symposium (1972).** Edited by J. S. ANDERSON, M. W. ROBERTS, and F. S. STONE. Halsted/Wiley, New York, N. Y. 1973. xvi + 812 pp. \$35.00.

This photo-offset book was originally published in England by Chapman and Hall. It includes papers grouped under the following topics: Defect Chemistry; the Vitreous State; Diffusion Processes and Diffusion-Controlled Reactions; Amorphous Materials and Phase Transformations; Dislocations and Nucleation; Reactions of the Organic Solid State; Solid State Reaction Mechanisms in an Applied Context; Surface Structure and Processes; Reaction Processes—Structural and Mechanistic. Each paper is complete with abstract, figures, references, and sometimes the ensuing discussion. There is an author index (at the front), but the lack of a subject index for such a large book is unfortunate.

**Preparative Gas Chromatography.** By A. ZLATKIS (University of Houston) and V. PRETORIUS (University of Pretoria). John Wiley and Sons, Inc., New York, N. Y. 1971. viii + 402 pp. \$18.00.

Preparative chromatography in both gas and liquid, in this reviewer's opinion, is by far the most difficult mode of chromatography with respect to sample preparation and equipment design.

This comprehensive treatment of the subject has been long overdue in gas chromatography, and Zlatkis and Pretorius are to be commended on their selection of authors and subject matter.

The book contains ten chapters, three of which are devoted to applications in organic chemistry, flavor research, and the biochemical and biomedical fields. There are also chapters on basic theory, inlet and outlet systems, column technology, programming, and more.

In this reviewer's opinion, one of the most meaningful and well-written chapters is on preparative column technology by Pecsar. The section in this chapter on preparative column packing techniques should be read with considerable interest by all chromatographers. The chapters on equipment design are also well written with sufficient illustrations to add more meaning to the chapter for the average analyst. The first chapter on basic theory is not really basic, and, in my opinion, the author gets carried away with equations. The chapters on applications are well done but could have included more illustrations on isolation of peaks, fraction collecting, and recycling of collected fractions for further purification.

Each chapter in the book is well referenced, and this wealth of information alone is worth the price of the book. This book is not for the novice chromatographer, nor do I think it was intended to be, but it is essential to the library of all practicing preparative chromatographers.

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**Membrane Molecular Biology.** Edited by C. F. FOX and A. KEITH (University of California at Los Angeles and Pennsylvania State University). Sinauer Associates, Stamford, Conn. 1972. xiii + 525 pp. \$24.00.

Over the past decade the increase in our knowledge and awareness of cell membranes has been dramatic indeed. Accordingly, we have seen recently a burgeoning of the original literature of such an extent that monographs and review volumes play a vital informational role for workers both within and without the membrane field. This book presents a collection of 15 chapters embracing three broad areas of membranology: composition and isolation, physical properties, and function and assembly. The various contributors are all well known for their work in the various fields covered. The editors' objective of providing a comprehensive introduction to membranes that is of value to students, teachers, and researchers seems to have been well realized even though the book does not seek to document comprehensively any of the areas of discussion.

The virtues of this volume appear to me to be twofold. First, it provides an interesting and nicely styled introduction to several basic areas of membrane structure and function including isolation, lipid-protein association, transport function, etc., that will be of substantial value to the student and new researcher. Second, the individual contributions are sufficiently critical that they will also be of substantial value to the active researcher. In this respect, I found the various chapters on bacterial transport, energy coupling, and membrane assembly to be most stimulating.

However, for a volume of this type there is a remarkable omission of reference to the problems of membrane excitability. While it may, with justification, be agreed that this area remains at a more phenomenological level than others, addition of a section dealing with the current understanding of electrical and chemical excitability would certainly have provided a more complete volume. Despite this omission, however, the book is recommended to students and researchers both intrinsic and extrinsic to the membrane field.

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**Advances in Enzymology. Volume 36.** By A. MEISTER (Cornell University Medical College). John Wiley and Sons, Inc., New York, N. Y. 1972. viii + 374 pp. \$15.95.

This is another excellent volume in a long series of books devoted to review articles in the general area of enzymology. Each of the eight chapters is clearly and concisely written and larded with many well-chosen illustrations and tables comprehensive in content and with extensive indexes usually complete through 1971.

The first chapter by S. J. Kerr and E. Borek on "The tRNA Methyltransferases" includes information on their interaction with 5-adenosylmethionine, recognition sites, modulation in biological systems, and natural and synthetic inhibitors and stimulators.

With his usual excellent presentation, Pedro Cuatrecasas explains a technique in which he is the principal developer, in a chapter entitled "Affinity Chromatography of Macromolecules." He discusses, adequately for most purposes, the theory of affinity chromatography, the selection and preparation of carriers and adsorbents,

and linking reactions. The technique has been applied in purifying enzymes from hydrolases to reductases, sulfhydryl proteins, chemically modified proteins, antigen and antibodies, cells, receptors, and many other materials. The current and potential uses of this procedure appear limitless. Understanding the technique is therefore very important, and Dr. Cuatrecasas successfully convinces us of that fact.

In their chapter "Biochemistry of  $\alpha$ -Galactosidases," P. M. Day and J. B. Pridham discuss the occurrence, methods of measurement, isolation, physical properties, analysis, specificity, and kinetic properties of these enzymes. The authors complete their review with the limited information presently available regarding the mechanism of action of  $\alpha$ -galactosidases.

The interesting chapter on the "Enzymatic Basis for Blood Groups in Man" was written by Victor Ginsburg, who limits it to A, B and H<sup>1</sup> antigens and the related Le<sup>a</sup> and Le<sup>b</sup> Lewis antigens. After reviewing the structure and inheritance factors involved in the blood group determinants, the author presents pathways to the complex carbohydrates involving the stepwise transfer of monosaccharides from nucleotide-linked sugars catalyzed by glycosyltransferases. The actions of the four glycosyltransferases and the carbohydrate structures found provide an explanation for "gene interaction."

The structural relationships of the aldonolactones, powerful, competitive, and highly specific inhibitors of all  $\beta$ - but only certain  $\alpha$ -glycosidases, introduce the chapter on "The Inhibition of Glycosidases by Aldonolactones" by C. A. Levvy and S. M. Snaith. Aldonolactone formation by catalytic oxidation of pyranose sugars as well as their chemical changes in aqueous solution is described in considerable detail. The inhibiting specificity of the aldonolactones are proving valuable in elucidating the mechanism of glycoside enzymes. The final section of the chapter discusses related compounds such as glycals and the antibiotic, nojirimycin, a nitrogen analog of glucose.

Succinyl CoA synthetase [EC 6.2.1.5] is responsible for producing high-energy nucleoside triphosphate compounds at the substrate level in the citric acid cycle. The chapter by J. S. Nishimura and F. Grinnel on the "Mechanism of Action and Other Properties of Succinyl Coenzyme A Synthetase" briefly but adequately describes the function, occurrence, purification, substrate specificity, and Michaelis constants for the enzyme. Most of the emphasis and detail were applied to discussing the evidence for intermediary steps in the overall mechanism, especially for the existence of a phosphorylated enzyme. The final pages were devoted to the present knowledge of the quaternary structure of the enzyme.

In the longest chapter of this volume, H. Tabor and C. W. Tabor present a great deal of information on the "Biosynthesis and Metabolism of 1,4-Diaminobutane, Spermidine, Spermine, and Related Amines." Their review summarizes the synthesis and metabolism of diamines and polyamines in microorganisms, with the main emphasis on *E. coli*, animals, and plants. It is postulated that the polyamines function as polycationic substances in some essential role and not just as nonspecific intracellular cations. Four hundred and seventy-one references are cited.

The final chapter on "Acyl Carrier Protein" by D. J. Prescott and P. R. Vagelos emphasizes the properties, function, and interaction of the acyl carrier protein with enzymes of fatty acid biosynthesis. The complete amino acid sequence of *E. coli* ACP is known and many chemical modifications with kinetic studies of the derivatives have been performed. The prosthetic group, 4-phosphopantetheine, is linked through a phospho ester bound to the serine 36 hydroxyl group. The 1-74 residue peptide of the 77 residue-containing native ACP has been synthesized by the solid-phase procedure. After a detailed discussion of the synthesis and turnover of the prosthetic group and the importance of ACP in the biosynthesis of fatty acids, the authors fully cover phospholipid and cyclic peptides. Mention of several experiments which verify that ACP is located on or near the inside surface of the membrane completes this fine chapter.

There are complete author and subject indexes for the present volume and a cumulative author and subject volume for the entire series, Volumes 1-36.

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**Analysis of Triglycerides.** By CARTER LITCHFIELD (Rutgers University). Academic Press, New York and London. 1972. xvii + 355 pp. \$19.50.

The book under review, though relatively brief, is a most valuable addition to the secondary literature of lipid chemistry: in this case, the literature of triglyceride analysis. It is everywhere lucid, though concise, and with just the right mix of practical and theoretical material to make the book as much a laboratory manual as a background text, for the book contains a generous number of accounts of analytical procedural details. The result is that any chemist working in this field will either want to own a copy or make certain there is one available for his use.

The introductory section makes the point that, until the advent of gas chromatography in the mid-'50's, the lipid chemist had available only fractional crystallization and permanganate oxidation as means for the analysis of natural triglyceride mixtures: analysis here meaning determination of the structure, both molecular and stereochemical, of each individual triglyceride present in a given such mixture. The years subsequent, however, have seen a stunning proliferation of applicable analytic techniques such that, now, the previous question, "Can I analyze for XYZ triglyceride content?" becomes, "Which method should I use to analyze for XYZ triglyceride content?" Among the many such techniques described at chapter length, some are worthy of special note: silver ion adsorption chromatography and partial deacylation reactions among them, the latter because it describes the use of enzymes with proclivities toward certain ester linkages, while ignoring others.

Natural fat triglycerides contain so many distinct molecular species—50 to 1000 or more—that rarely can a single analytical technique provide the required results in satisfactory detail. Thus, the author provides, fittingly in the last chapter, a detailed guide to the multiple methodology required for the complete identification of all of the triglyceride species present in any given natural fat, admitting, however, that his intent is in part pedagogic, for the amount of effort required is so prodigious that no such instance of complete analysis has yet been reported.

To the Reviewer, the chapter on stereospecific analysis is the most interesting, for it is this chapter that relates most crucially to determination of the molecular structures and chiralities of the component triglycerides of the fat from which derived. Despite the impressive success of the total methodology described in this chapter, however, as well as in the book as a whole, Litchfield pleads for solutions to a number of major problems with triglyceride analysis that remain unsolved. Among them, one of the most urgent is the lack of sufficient sophistication to resolve triglyceride mixtures containing four-, five-, and six-double-bond acids: those found, for example, in certain aquatic animals. Another outstanding problem is the need for automation in the use of silver ion adsorption and liquid-liquid partition chromatography, including automated monitoring and fraction-collecting capabilities. A procedure allowing for more rapid stereospecific analysis than permitted by those now in use is a further urgent need felt by the triglyceride analyst: a need that derives from the dozens of such analyses that must be performed on a naturally derived mixture. A delightful, though remote, such possibility would be the discovery of a suitable stereospecific lipase.

Chapter headings other than those referred to thus far include: "Extraction, Isolation, Measurement, and Fatty Acid Analysis;" "Preparation of Chemical Derivatives before Separation;" "Gas-Liquid Chromatography;" "Fractional Crystallization;" "Partial Deacylation Reactions;" "Physical Properties;" and "Distribution of Fatty Acids in Natural Triglyceride Mixtures."

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