NEW BOOKS

Lou Going, Book Review Editor

BIOCHEMISTRY AND METHODOLOGY OF LIPIDS, A.R. Johnson and J.B. Davenport (John Wiley and Sons, Inc., New York, 1971, 578 p., $29.50).

The appearance of this book at this time complements similar books recently published separately on the biochemistry and the methodology of lipids. This book combines both of these areas in an accurate and well organized manner. The coverage of the biochemical literature pertaining to the books content within the self-defined limits of the authors of the book appears essentially complete. For the most part, the authors have attempted to summarize the current knowledge concerning analytical techniques, biochemical and physiological studies of lipids, and the metabolism of most lipids and their roles in living cells.

The thought of publishing a book on the biochemistry and methodology of lipids developed when the need arose in a summer school on lipid biochemistry when no single text could be found which would provide sufficient background to students not versed in lipids.

The book starts with a brief consideration of the nomenclature of lipid compounds which also covers rules and formulas for some lipids of biological interest. Chapters on typical chemical reactions of lipids and their physiochemical aspects follow. These accomplish the intent of warning the neophyte of the pitfalls to be avoided in exploring lipid biochemistry and of providing usable introductions to methodology.

The introduction to important fields of research, such as lipoproteins, their classification, biosynthesis and methodology is the format the authors use throughout the text.

Methodology is adequately covered with chapters on all phases of chromatography and spectrophotometry. Some of the terminology used in the gas chromatography chapter on columns could be better. For example, "silicone greases" is an incorrect term. Grease is a silicone oil to which a silica filler has been added and are referred to in the trade as "gums." he author makes some generalizations on preparation of column packings which shouldn't be made and some of the conclusions drawn in this section are incorrect. However the illustrations and information on detectors and factors effecting separations are very good.

It is interesting to read how UV spectroscopy of lipids is handled by introduction of chromophoric groups into molecules by internal rearrangement or by reaction with substances containing absorbing groups. The important prostaglandins may be altered to produce dienone or enones chromophores which will absorb in the UV region. Apart from these, the reader can expect only incidental mention of nonchromatographic methods for the separation and analysis of lipids. One brief chapter discusses the wet chemistry methods in the interest of relevance.

The biochemical coverage encompasses more than the title of the book might suggest. The metabolism of lipids, their distribution and function in cells is discussed in the same detail as methodology. Likewise, clinical and biochemical significance of steroid hormones, biosynthesis, metabolism and assay techniques are adequately discussed. Ruminant lipids, deposition and mobilization of lipids, and lipids as an energy source round out the text.

The editors provided a most valuable outline of the current knowledge and tools of the profession. This is understandable in the light of some of the antiquated knowledge of many of the areas in lipid biochemistry. Some of the authors are cautious in their conclusions and gentle, perhaps sometimes too gentle, in their criticisms.

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CRC COMPOSITE INDEX FOR CRC HANDBOOKS, Edited by Robert C. Weast, Coordinating Editor, G.L. Tuve (The Chemical Rubber Co., 1971, 339 p., $50.00).

The purpose of this Composite Index is to make available a quick reference source to the data and information compiled in 10 of the current CRC Handbooks. Instructions and examples for use of the *CRC Composite Index* are included in the front and back of the book. Main subject entries and subentries are listed alphabetically. Some subentry lists are very long; therefore a few pages are filled by subentries only.

The *CRC Composite Index for CRC Handbooks* does not cover all current CRC Handbooks. A new Composite Index will be issued annually which will cover all of the then-current editions in the CRC Handbook Series. Presently, 10 additional Handbooks are in preparation and will be included in the Index when completed.

This Index is of value primarily to librarians and technical information groups for a quick source to information and data in several specific disciplines. The need for this Index by any individual in a specific discipline will be

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rather limited since the current CRC Handbooks are adequately indexed.

The main advantage of the Index is that it provides a quick reference to the information and data available in several handbooks.

The disadvantages of this edition are: (a) does not cover all the present CRC Handbooks; (b) will incur a significant expense; (c) will soon be outdated by a revised edition.

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Deuterium Labeling in Organic Chemistry, Alan F. Thomas (Appleton-Century-Crofts, Educational Division, Meredith Corp., New York, 1971, 518 p.).

This text is an interesting blend of theory and practical application. The author has utilized a technique of including a description of the experimental procedure within the paragraph detailing the theory of the reaction. The various methods of deuterium labeling are covered in the nine chapters of the text. Each chapter is followed by an extensive bibliography which provides one of the greatest values of the book. Three indexes (author, subject and formula) allow for easy recovery of specific information. Previous work on this topic has been too brief and with little attention to critical evaluation of the methods listed. The work by Murray and Williams also suffered from the disadvantage of describing the methods devised before the application of mass spectrometry. The text should be valuable to those first approaching the application of deuterium isotopes as well as those who have some experience in the field.

Chapter 1 presents a discussion of the exchange reactions between water and organic compounds, the "active" hydrogen exchange. Chapter 2 covers the deuterium exchange involving carbanions, discussing labeling of hydrocarbons, sulfones, sulfoxides, thioketals, heterocyclic and quaternary compounds. Short dissertations on acidity and deuterium exchange, stereochemistry, S-bond character, inductive effects and anion stability are included.

Chapter 3 deals with the acid-catalyzed deuterium exchange involving carbonium ions. The mechanism of carbonium ion exchange is discussed, as well as polar addition of hydrogen halides and acid-catalyzed cyclizations.

A review of the methods of exchange labeling of carbonyl-containing substances is presented in Chapter 4. Both base-catalyzed and acid-catalyzed reactions are discussed. The use of metal deuterides is discussed thoroughly in Chapter 5. The stereochemical aspects of metal hydride reduction are covered by a brief survey of the published theories. Homogeneous and heterogeneous catalysts and their role in deuteration of organic molecules by exchange and addition to the double bond are discussed in Chapter 6. In Chapter 7, techniques which have not been discussed previously are presented. Reductive, photochemical, metalation, methylation and oxidation, are some of the types of methods reviewed.

The last two chapters present a discussion of the role of isotope effects in the determination of deuterium in a labeled molecule, Chapter 8, and biochemical deuteration in Chapter 9.

This book has been needed for some time and gathers together much of the information necessary for an intelligent effort in the use of deuterium isotopes. Over 2000 references cover the literature through 1970. The lipid chemist may be disappointed, as there are few references and little mention of methods for the preparation of specifically deuterated unsaturated fatty acids.

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• *Abstracts . . .*

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On the mode of interaction of β-hydroxydecanoyl thioester dehydrase with allenic acid derivatives. M. Morisaki and K. Bloch (J.B. Conant Lab., Harvard Univ., Cambridge, Mass. 02138). *Biochemistry* 11, 309–14 (1972). As a model system for the inhibition of β-hydroxydecanoyl thioester dehydrase by allenic compounds, the reaction between 2,3-decadienoyl thioesters and histidine derivatives has been investigated. Refluxing S-ethyl 2,3-decadienoate with N-acetylhistidine in methanol for 3 hr affords an adduct (Ia) which has been characterized as a β,γ-olefinic enamine on the basis of ultraviolet and nuclear magnetic resonance spectroscopy, by analysis of ozonolysis products and by mass spectrometry. Under the same conditions, the allenic thioester reacts with histidine methyl ester to form an α,β-olefinic enamine. Comparison of various derivatives of 2,3-decadienoic acid as dehydrase inhibitors established the following order of activities: thioester > oxygen ester > free acid > amide. It is also shown that an allene system conjugated with a carbonyl group is required for enzyme inhibition. The structural features in allenes necessary for enzyme inhibition and for adduct formation with histidine derivatives are compared.

The effects of pregnancy on biliary lipids in rhesus monkeys. D.E. Martin, R.C. Wolf and R.K. Meyer (Dept. of Physiol. and Wisconsin Reg. Primate Res. Center, Univ. of Wisconsin, Madison, Wis. 53706). *Proc. Soc. Exp. Biol. Med.* 139, 115–7 (1972). In an effort to determine whether alterations in biliary excretion of lipids could aid in explaining the marked hypolipemia seen during pregnancy in the rhesus monkey, the concentrations of cholesterol, phospholipids and total lipids were measured at selected stages of gestation. No significant changes in biliary lipid levels were observed, indicating that increased biliary concentration of lipids probably does not occur during pregnancy.

Metabolism of pyruvate and malate by isolated fat-cell mitochondria. B.R. Martin and R.M. Denton (Dept. of Biochem., Univ. of Bristol, Bristol BS8 1TD, U.K.). *Biochem. J.* 125, 105–13 (1971). Metabolism of pyruvate and malate by isolated fat-cell mitochondria incubated in the presence of ADP and phosphate has been studied by measuring rates of pyruvate uptake, malate utilization or production, citrate production and oxygen consumption. These results are in agreement with earlier conclusions that in adipose tissue acetyl units for fatty acid synthesis are transferred to the cytoplasm as citrate and that this transfer requires malate presumably for counter transport. They also support the view that oxaloacetate for citrate synthesis is preferentially formed from pyruvate through pyruvate carboxylase rather than malate through malate dehydrogenase and that the mitochondrial metabolism of citrate in fat-cells is restricted.

The biosynthesis of gangliosides. H.J. Maccioni, A. Arche and R. Caputto (Dept. de Quimíca Biológica, Facultad de Ciencias Químicas, Univ. Nacional de Córdoba, Ciudad Universitaria, Córdoba, Argentina). *Biochem. J.* 125, 1131–7 (1971). After injection of (6-^{3}H)glucosamine into 8-day-old rats it was found that all the major brain gangliosides and their sialyl groups were labelled at essentially the same rate, except the hematoside, which was the least labelled. In 18-day-old rats it was found that the two major gangliosides with the sialyl (2 → 8)-sialyl linkage, and their sialyl groups were more labelled than the hematoside, the Tay-Sachs ganglioside, the two major gangliosides and their respective sialyl groups. No difference was found in any of the cases studied between the specific radio-activities of the neuraminidase-resistant and -labile sialyl groups belonging to the same ganglioside. The same was found for the specific radioactivities of the galactosyl groups proximal and distal to the ceramide moiety of total brain gangliosides from rats injected with (U-^{14}C)glucose. From this it was concluded that partial turnover of the ganglioside molecule does not occur. A model for the synthesis of gangliosides is presented that accounts for results from previous experiments in vitro and the lack of precursor-product relationships observed in experiments in vivo.

Enzymatic action of sialidase of Vibrio cholerae on brain gangliosides above and below the critical micelle concentration. V. Lipovac, G. Bigalli and A. Rosenberg (Dept. Biol. Chem., M.S. Hershey Med. Center, Penn. State Univ., Hershey, Pa. 17033). *J. Biol. Chem.* 246, 7642–48 (1971). The activity of *Vibrio cholerae* sialidase was studied as a function of the physical state of ganglioside substrate. This study provides a model for the interaction of end group