

BOOK REVIEWS

Bioorganic Chemistry, Volume 2. Edited by E. E. VAN TAMELEN, Department of Chemistry, Stanford University, CA. Academic Press, Inc., 111 Fifth Avenue, New York, New York 10003. 1978. xx+371 pp. 15.5 x 23.5 cm. \$43.00.

This volume, which deals with topics collected under the somewhat arbitrary title of "Substrate Behavior", is the second in a four-volume series on bioorganic chemistry. The editor of the series points out that there was no attempt to cover selected areas of bioorganic chemistry and contributors were given a free hand to write on the subjects of their choice and that the chapters were published without utilizing outside referees. Given this policy, it is understandable that there might be difficulties in achieving any degree of coherency or uniformity, and with thirteen chapters the expected diversity of topics is certainly present. While this in itself is of no great detriment to this volume, there is an inevitable unevenness of quality, and in one case, the treatment of the same topic in separate chapters by two authors is a reflection of the lack of editorial direction. The thirteen chapters include Studies in Sesquiterpene Biogenesis (N. H. Andersen, Y. Ohta, and D. D. Syrdal), Mechanisms for Proton Transfer in Carbonyl and Acyl Group Reactions (R. E. Barnett), The Withanolides—a Group of Natural Steroids (E. Glotter, I. Kirson, D. Lavie, and A. Abraham), Novel Piperidine Alkaloids from the Fungus *Rhizoctonia Leguminicola* (F. P. Guengerich and H. P. Broquist), Enzymatic Stereospecificity at Prochiral Centers of Amino Acids (R. K. Hill), Bioformation and Biotransformation of Isoquinoline Alkaloids and Related Compounds (T. Kametani, K. Fukumoto and M. Ihara), Carbanions as Substrates in Biological Oxidation Reactions (D. J. Kosman), Synthetic Studies in Indole Alkaloids (J. P. Kutney), Mechanisms of *cis-trans* Isomerization of Unsaturated Fatty Acids (W. G. Niehaus, Jr.), The Synthesis and Metabolism of Chirally Labeled α -Amino Acids (R. J. Parry), Reactions of Sulfur Nucleophiles with Halogenated Pyrimidines (E. G. Sander), Vitamin D: Chemistry and Biochemistry of a New Hormonal System (H. K. Schoes and H. F. Deluca), Recent Structural Investigations of Diterpenes (J. D. White and P. S. Manchand).

There are several exemplary chapters. Among these is a beautifully lucid account by R. K. Hill which covers the subject of biological specificity of both primary and secondary metabolic processes involving amino acids. It is a great pity (both for the authors and the readers) that the material in this chapter is covered from the same viewpoint by R. J. Parry in his chapter on The Synthesis and Metabolism of Chirally Labeled α -Amino Acids. Equally impressive is the Chapter by J. P. Kutney who provides a clear account of his research group's contribution to their synthetic studies in the indole alkaloid field. Similarly, H. K. Schoes and H. F. Deluca have compiled a comprehensive chapter on Vitamin D, drawing strongly from their own contributions in a subject area which has developed rapidly in the last few years. The chapter on the Withanolides by the Israeli group is well organized and gives a valuable survey of the structures of these highly oxygenated steroidal natural products. Kosman's chapter on Biological Carbanion Oxidation is likely to prove controversial but nevertheless the reviewer found this to be one of the more stimulating chapters in this book. The chapter by White and Manchand on Diterpenes, which deals with these author's studies of this particular family, is informative and clear. In contrast to this, much of the elegant chemistry reported by Anderson and co-workers in their chapter is obscured by poor readability. Aside from two interesting reviews in the chapters on Proton Transfer in Carbonyl and Acyl Group Reactions and the Dehalogenation of Halopyrimidines, remaining topics of this volume are likely to provide little enlightenment for the reader. The elimination of chapters in this latter category would not only have made it more attractive to the reader but could conceivably have reduced the price to where it might have appeared on private bookshelves.

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Isoquinoline Alkaloids Research 1972-1977. MAURICE SHAMMA and JEROME L. MONIOT, The Pennsylvania State University, University Park, PA. Plenum Press, 227 West 17th Street, New York, NY 10011. 1978. xvii+425 pp. 16 x 23.5 cm. \$34.50.

One of the most critical problems in Natural Products Research is that of the burgeoning literature. It is becoming increasingly difficult to be apprised of key developments in even limited areas and consequently any relief from this problem should be welcomed.

In the alkaloid field, regular reviews appear in the Chemical Society Specialist Periodical Reports, and these undoubtedly fill a tremendous void. However, annual reviews suffer from the drawback that it is difficult to cover any area in great depth or to integrate data from year to year. The classic alkaloid reviews are "The Alkaloids" series, originally brought to prominence by the late Professor Manske, but these reviews are highly detailed and of somewhat irregular occurrence for a given subject area.

It is the intermediate approach which is the *raison d'être* for a book such as this, for there is a void in the literature for reasonably priced books which will update major research areas. Shamma initiated this area in 1972 with his book "The Isoquinoline Alkaloids" and the present monograph brings this area currently to mid-1977.

Chapters are organized along the same lines as those in the earlier book and therefore include isolation, structure elucidation, chemistry, synthesis, biosynthesis and pharmacology. This refreshing format for the integration of information on an individual alkaloid group works just as well here as it did in the original volume.

Besides the authors however, there is one other group that should be complimented, namely the publisher. Although the quality of the paper is lower than usual (presumably for economy reasons) this is more than made up by the high quality of the diagrams and the clarity of the typesetting. These factors contribute enormously to the presentation of the material.

There are some inconsistencies as to which classes of alkaloids are included and this reviewer does not understand why certain major alkaloid groups (morphine and colchicine for example) derived from the isoquinoline nucleus are not included.

In spite of this minor criticism this book is highly recommended to all chemistry libraries and to anyone interested in alkaloids; it is essential to those working in the field of isoquinoline alkaloids.

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Marine Natural Products Chemistry, edited by D. J. FAULKNER and W. H. FENICAL, Scripps Institution of Oceanography, University of California, San Diego. Plenum Press, 227 West 17th Street, New York, NY 10011. 1977. x+433 pp. 17.5 x 25.5 cm. \$42.50.

In recent years, especially within the last decade, the tempo of research involving organisms from marine sources has increased significantly. Consequently, continuing studies of marine natural products, which are concerned primarily with the chemistry of secondary metabolites, increasingly require interdisciplinary knowledge in such allied fields as biochemistry, marine biology and ecology, pharmacology, taxonomy, and toxicology.

As one approach towards providing this knowledge, a conference on marine natural products was held during October 12-17, 1976. Six months later the lectures, presented by distinguished scientists, were published as part of the NATO Conference Series (Series IV: Marine Sciences, Volume 1). In publication circles, this feat is most commendable, although it is fair to surmise that not all papers were subjected to the review process. However, for the most part, these contributions have appeared elsewhere in the primary literature either before or subsequently to the conference.

This volume contains 34 separate contributions, which are authored or co-authored by 92 individuals and which vary in length from 3 to 25 pages. A total of about 850 references have been cited. Unfortunately, the nature of this volume precludes the inclusion of all the titles, author names, and specific comments on the individual contributions in this review.

The contents, however, do offer the reader a representative array of selected problems which are of interest to the natural product chemist. These include field observations, chemical studies on phenolic compounds, pigments, terpenoids, steroids, and their metabolites isolated from marine sources, steroid metabolism, alga constituents and chemosystematics, dinoflagellate toxins, and toxic polypeptides. In addition, there are chapters pertaining to the search for drugs from the sea, the role of organic compounds affecting the behavior of marine organisms, and the various forms of bioactivity associated with these organisms.

Taken as a whole, these papers will be useful to beginning students and current investigators in this field of research, since they succeed in providing an insight into the types of problems which confront the marine natural products chemist. They thus serve to satisfy, according to the preface, the conference's objective of encouraging "... a dialogue between organic chemists who study the metabolites of marine organisms and biologists, ecologists and pharmacologists who study the effects of these metabolites on other organisms."

The book is relatively free of typographical errors. Its format of presentation is generally consistent despite the fact that these papers reflect the individual styles of the authors who publish selectively in either the biological or chemical journals. Although both subject and genus-and-species indexes are included, the former is not as extensive in treatment as it could be.

Overall, I find this volume to be a valuable source of information on marine natural products. It should certainly be purchased for library holdings, although its relatively high cost will be a deterring factor for individual purchasers.

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The Structure, Biosynthesis, and Degradation of Wood. Recent Advances in Phytochemistry, Volume 11. Edited by FRANK A. LOEWUS, Washington State University, Pullman, WA, and V. C. RUCKELSHAUS, The University of British Columbia, Vancouver, BC. Plenum Press, 227 West 17th Street, New York, NY 10011. 1977. xii+527 pp. 16.0 x 23.3 cm. \$48.

It was the objective of this book, as specified in the preface, to provide a review of the many facets of the properties and the utilization of wood with the emphasis upon the living tree and the changes it undergoes in relation to its ultimate utilization. The monograph constitutes contributions by several authors to the Symposium on The Structure, Biosynthesis, and Degradation of Wood by the Phytochemical Society of North America, held at the University of British Columbia, in Vancouver, B.C., in August 1976.

The book presents a scope of contributions that far exceeds the usual spectrum of topics treated at conferences on wood-related subjects. It is this broad scope, and depth of treatment of each topic, which convinces the reader that phyto-organisms, plants, are no longer mysterious and misunderstood, but that, in the words of Herrick and Hergert, "the time has come to admit that we know a great deal about the chemistry of each major component of the commonly available woods." The broad scope also entails a challenge to the reader's comprehension of such diverse fields as biology, electron microscopy, enzymology, chemical engineering, and even product marketing. However, in accord with the stated objectives, the primary focus remains on changes in the living tree, and thus on the biochemistry of plants. In addition, valuable and generally comprehensible contributions are provided from several outside areas.

The subject matter is presented in the form of 11 chapters, which begin with a treatment of the ultrastructure of wood in relation to its chemical composition by W. A. Coté. After gaining an understanding of the ultrastructure of wood and plant cell walls, the reader is introduced to the biosynthesis of cell wall polysaccharides (by D. P. Delmar) and to the structure, biosynthesis, and significance of cell wall glycoproteins (by D. T. A. Lamport). The field of lignin chemistry is reviewed from the standpoint of protolignin's behavior during analytical hydrolytic and hydrogenolytic degradation (by A. Sakakibara) and from that of the biosynthesis of lignin precursors (by G. G. Gross). This twofold emphasis somewhat obscures important aspects pertaining to the mechanism by which plants control lignification, as well as lignin's chemical structure and physical properties. Other important phenolic plant constituents and lipid polymers (cutin and suberin) are reviewed subsequently in a chapter by P. E. Kolattukudy. This is a summary account of the chemistry, biosynthesis, and possible role in the pathogenesis of these plant constituents. A review of secondary changes in wood is given by W. E. Hillis in a chapter which is bound to become the important reference text in this area for many years to come. With the help of 365 references, Hillis describes symptoms of secondary wood formation; reviews the process of heartwood formation; discusses these changes in terms of wood quality; surveys the origin of extractives; and assesses the role of ethylene on the process of forming cell walls and polyphenols.

With this seven-chapter account of the structure and biosynthesis of plants and their individual components, the editors now turn to natural decay processes, to non-specific defense mechanisms, and to the chemical utilization of plant resources. E. T. Reese provides a well structured review of the degradation of polysaccharides by microbial enzymes; and Kirk, Connors, and Zeikus introduce the reader to the present status of microbiological degradation of lignin. These chapters are followed by a report on how plants are designed to defend themselves in non-specific ways during the penetration of the bark surface, the vascular cambium, and the sapwood during wounding, insect, and pathogen attacks (by D. B. Mullick). The final chapter introduces the industrial viewpoint of utilizing the abundant plant resource by chemical means. The reader is left with the impression that the enormous complexity of the resource, in terms of structures, types and non-uniformity, is responsible for the absence of simplistic utilization schemes. The promise that the wood resource holds for solving some of the worldwide energy and material needs seems to require a skillful fine-tuning and sensitive integration of many technological approaches in relation to resource characters and end-product properties.

It is inherent to a multi-author book that several chapters emphasize conceptual understanding, where others stress specific experimental approaches and details. The wide scope of the book promises to attract readers from a large market, yet it also limits the number of readers that will be interested in studying more than a few chapters. The wealth of information provided (1317 references), and its timely character (published only one year after the symposium) assures the monograph of a prominent place in the reference collection of many scientists and engineers. It is only unfortunate that the presumably large market size and the omission of expensive type-setting procedures in favor of photostatic reproduction techniques from typewritten manuscripts did not allow the publisher to offer the book at a more reasonable price.

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