

BOOK REVIEWS

New Synthetic Methodology and Biologically Active Substances. Edited by Z.-I. YOSHIDA, Department of Synthetic Chemistry, Kyoto University. Elsevier Scientific Publishing Company, 52 Vanderbilt Avenue, New York, NY 10017 and 1 Molenwerf, P. O. Box 211, 1000 AE Amsterdam, The Netherlands. 1981. x+281 pp. 17.5 x 25 cm. \$78.00.

This book is volume 6 of the series "Studies in Organic Chemistry". It is a collection of the invited and plenary lectures presented at the first International Kyoto Conference on New Aspects of Organic Chemistry, held in December, 1980. The contents are presented in fourteen chapters, as follow: "Recent Developments in Biomimetic Polyene Cyclizations", by W. S. Johnson (18 pp., 36 refs.); "Selective Synthetic Reactions by Means of Organoaluminum Amphoteric Reagents", by H. Nozaki et al. (20 pp., 23 refs.); "Synthetic Control Leading to Natural Products", by T. Mukaiyama (16 pp., 18 refs.); "Some Asymmetric Syntheses Catalyzed by Chiral Phosphine-Transition Metal Complexes", by M. Kumada et al. (20 pp., 27 refs.); "Selectivity in Organic Synthesis", by B. M. Trost (19 pp., 24 refs.); "Syntheses of 1-Oxacephams, A Novel Class of β -Lactam Antibiotics", by W. Nagata (17 pp., 18 refs.); "Novel Stereoselective Total Synthesis of Steroid Hormones via Intramolecular Cycloaddition", by T. Kametani (24 pp., 30 refs.); "Recent Progress in Pheromone Synthesis", by K. Mori (17 pp., 37 refs.); "Asymmetric Reactions Applied to Synthesis of d- α -Tocopherol", by G. Saucy et al. (21 pp., 38 refs.); "Novel Synthetic Approaches to the Biologically Active Heterocycles", by Y. Ban et al. (23 pp., 39 refs.); "Cycloadditions in Industrial Syntheses", by H. König (21 pp., 40 refs.); "Recent Chemical Studies of Bioactive Microbial Secondary Metabolites: Genetics, Active Structures, Development of Effective Agents", by H. Umezawa (16 pp., 61 refs.); "Synthesis of Formylmethionine Transfer Ribonucleic Acid from *Escherichia Coli*", by M. Ikehara et al. (21 pp., 25 refs.); "Synthesis and Properties of Novel Peptide Ionophores", by V. T. Ivanov (18 pp., 44 refs.).

These offerings from recognized leaders in their respective areas go far to match the stated goals of the conference to (1) demonstrate the importance of new synthetic methodology and (2) highlight new areas in which organic chemistry can make a contribution to related fields. Most chapters present background material and recent advances from the authors' laboratories in the stated areas. However, most of the information presented has appeared in the primary literature and much has appeared in review articles.

This volume exemplifies the quickening tendency of publishers to provide (at great expense) transcripts of symposia and conferences in the biomedical sciences, usually as part of a series. This is an area of concern since these books place a substantial burden upon increasingly tight library budgets, especially since most librarians feel the justifiable need to complete and continue serial collections once they are begun.

In summary, this is a high-quality collection of lecture transcripts (prepared as camera-ready copy) describing results from the laboratories of leading organic and bio-organic chemists. The book provides interesting and informative reading, but the cost will probably preclude individual purchases by any but the specialist in the areas addressed. However, even in light of the generally-directed caveat stated earlier, this book would be a useful and educational addition to a library collection.

STEVEN D. BURKE, *University of South Carolina*

Rodd's Chemistry of Carbon Compounds, Second Edition. Supplement to Volume III, Aromatic Compounds. Edited by M. F. ANSELL, Department of Chemistry, Queen Mary College, London. Elsevier Scientific Publishing Company, 52, Vanderbilt Avenue, New York, NY 10017. 1981. xviii+358 pp. 15.5 x 23 cm. \$78.75.

This volume reviews the recent chemistry of several groups of aromatic compounds. The chemistry of benzoquinones and related compounds (quinone methides, quinols, and some simple aza and thio analogs), derivatives of aromatic compounds with substituents containing nitrogen atoms, and aromatic compounds of the transition elements is presented. In some cases consideration is given to the occurrence of natural products, their biosynthesis, and physiological properties, but in the main the treatment follows that of previous volumes of *Rodd's Chemistry*, offering a broad coverage of physical properties and organic reactions. The literature coverage is from 1973 through 1979, and seems very complete; the reader is directed to many excellent review articles and monographs which offer a more comprehensive coverage than is possible in the rather terse style of this volume.

I doubt that the supplement will find its way into many individual collections as an isolated volume; as an integral part of an on-going and most excellent series, however, its purchase is a must for any comprehensive library. *Rodd's Chemistry* is certainly one of the key reference texts for any practicing organic chemist, and this supplement is not to be missed.

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The Alkaloids: Chemistry and Physiology. Volume XVIII. Edited by R. G. A. RODRIGO, Wilfred Laurier University, Waterloo, Ontario, Canada. Academic Press, Inc., 111 Fifth Avenue, New York, N.Y. 10003. 1981. xvi+411 pp. 15.5 x 23.5 cm. \$65.00.

This 18th volume of the Manske series on "The Alkaloids" continues in the same excellent tradition as its predecessors. It covers a variety of topics in alkaloid chemistry, each of which is approached by the authors in a manner appropriate both to the subject and the state of the art, and is informative and helpful to the reader. The first chapter, by Dyke and Quesy, on *Erythrina* and related alkaloids, summarizes our knowledge of these compounds, some of which are of continuing interest as potential antitumor agents. The next chapter, the longest in the book, is a detailed account by Pelletier and Mody of the most recent developments in the chemistry of C₂₀-diterpenoid alkaloids. Here the main interest is in the intricate and almost balletic rearrangements and transformations undergone by these compounds under a variety of simple and not-so-simple chemical circumstances. The detailed treatment which the authors give to the subject is ideally suited to the need, and clearly reveals the intricacies of the chemistry. The next chapter, by Hughes and MacLean, on the ¹³C-NMR spectra of isoquinoline alkaloids, will be valuable in its own right and as a supplement to some of the other collections of ¹³C spectral data in other alkaloid families which have appeared in reviews during the last few years. The fourth chapter, on the *Lythraceae* alkaloids, by Golebiewski and Wrobel, is especially timely as methods for the synthesis of these compounds continue to advance in directness and speed, and the last chapter, on microbial and enzymic transformation of alkaloids *in vitro* serves as a succinct summary of the state of this field at the present time.

This book clearly continues the same honorable tradition of its predecessors in this series and will be welcomed by all alkaloid chemists as a valued reference, which many will wish to own.

PHILIP W. LEQUESNE, *Northwestern University*

Biological/Biomedical Applications of Liquid Chromatography II (Chromatographic Science Series, Volume 12). Edited by GERALD L. HAWK, Waters Associates, Inc., Milford, Mass. Marcel Dekker, Inc., 270 Madison Avenue, New York, N.Y. 10016. 1979. xiii+504 pp. 16 x 23.5 cm. \$45.

This book contains selected papers presented at the Second Liquid Chromatographic Symposium held October 1978 in Boston, Massachusetts. The book contains 24 papers dealing with separation, purification, derivatization, quantification, and identification of compounds of clinical significance. Many liquid chromatographic methodologies which are immediately applicable in the majority of clinical laboratories for the analysis of therapeutic drugs from clinical specimens are listed and their references cited. A noteworthy item of the book is the inclusion of five impressive trend-setting papers dealing with the LC analysis of peptides. This is a significant area and a promising one for the application of HPLC.

The book is easy to read and figures and tables are very well reproduced. The book contains a glossary of LC terms which is an interesting idea, but it is judged to be too basic for the average reader. The book would serve as an important source of information for researchers in the clinical and pharmaceutical fields.

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Guide to the Prices of Antiquarian and Secondhand Botanical Books (1970-1979) Cryptogamic Literature. Edited by L. VOGELZANG, Rijksherbarium, Leiden. Boerhaave Press, P. O. Box 1051, 2302 BB Leiden, The Netherlands. 1982. v+517 pp. 17 x 25 cm. Dfl. 95.00.

This book records the prices paid for antiquarian and secondhand botanical books during the period 1970-1979. Prices are expressed in U. S. dollars, but there is a handy conversion table included with the book to enable conversion to any of ten other currencies for any year during this period. Some fairly dramatic price changes were observed: thus "Illustrations of the Fungi of Our Fields and Woods", by S. Price, two volumes, 1864-5, sold for \$210 in 1974 but \$800 in 1978. Prices sometimes decrease, however: a work which sold for \$450 in 1974 was listed at \$40 in 1979.

Although this volume is confined to the cryptogamic literature, another volume devoted to phanerogams is promised. These volumes will prove indispensable to collectors of botanical books.

The Lawrence Review of Natural Products. Pharmaceutical Information Associates Ltd., P. O. Box 186, Collegeville, Pa 19426. \$15.00 per annum.

The *Lawrence Review of Natural Products* is a semi-monthly newsletter which describes the origins, chemistry, uses, abuses, and toxicities of natural products. Recent articles have included ones on caffeine in "look-alike" preparations, ipecac, catnip, ginseng, etc. The articles appear to be short (typically 1-2 typed pages), and are not referenced.

Introduction to Alkaloids—A Biogenetic Approach. GEOFFREY A. CORDELL. University of Illinois, Wiley-Interscience, John Wiley and Sons, Inc., 605 Third Avenue, New York, NY 10158. 1981. xvi+1055 pp. 16.5 x 23.5 cm. \$125.00.

In an era when large, multiauthored, textbooks have become more the rule than the exception, Prof. Geoffrey A. Cordell has single handedly authored a one thousand page conspectus of the chemistry of the alkaloids.

Following a useful introduction, and a concise chapter on the general principles of biogenesis of plant natural products, the author devotes individual chapters to various alkaloidal groups based entirely on their mode of biogenesis. There are chapters on alkaloids derived from ornithine, lysine, nicotinic acid, polyacetate, anthranilic acid, phenylalanine and tyrosine, tryptophan, histidine, and terpenoids.

Each chapter starts with a presentation of the alkaloids, followed by a discussion of their chemistry and synthesis, and continued by a summary of their spectral properties, biogenesis and pharmacology.

As justified by their relevant importance, the isoquinoline and indole alkaloids are granted the lion's share, with nearly 300 pages devoted to the former group, and 260 pages to the latter.

To cover all of the important chemistry of the alkaloids represents a herculean undertaking which the author has essentially carried off successfully. As a consequence of relying solely on himself, even down to the drawings of the structures, Prof. Cordell's book has the distinct advantage of excellent organization and a unity of presentation which would, of necessity, be lacking in a multiauthored text. What is more, the biogenetic approach used in the presentation is the only one that is rational and meaningful.

There are some limitations, however, as to what even a completely dedicated and single-minded author can achieve with a work of such range and magnitude. Several typographical and spelling errors have crept in, and a few of the structures are incorrect. Additionally, in a few instances, credit is not assigned to the original group responsible for a new concept, but is instead given to a derivative team. In other instances some of the latest developments have not been covered. Additional references in some instances would have been welcome.

Still, the above criticisms are minor, and overall the author has achieved his aim admirably. The essential value of this book is that the chemistry, spectroscopy and biogenesis of each alkaloidal group has been collected in a concise and intelligent form. The book thus provides an excellent starting point for a student willing to acquaint himself with any phase of alkaloid chemistry. It offers ready access to the groundwork that must be mastered for an understanding of the latest developments in any phase of alkaloid chemistry. Following the reading of any chapter in this book, the student desiring to gain a still deeper understanding could follow up by referring himself to the relevant detailed material in Manske's "The Alkaloids" or "Specialist Periodical Reports, The Alkaloids." The author should be commended for an outstanding achievement. The world of alkaloid chemistry owes a debt of gratitude to Prof. Cordell. If one were to be allowed a wish, maybe the author and publishers could be convinced to come up, maybe biennially or triennially, with a concise summary of recent developments in the field of alkaloids, including appropriate references, so as to keep this encyclopedic work up-to-date.

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Anticancer Agents Based on Natural Products Models. Edited by JOHN M. CASSADY, Department of Medicinal Chemistry and Pharmacognosy, Purdue University, and JOHN M. DOUROS, Natural Products Branch, National Cancer Institute. Academic Press, 111 Fifth Avenue, New York, NY 10003. 1980. xiv+500 pp. 16 x 23.5 cm. \$49.50.

It is ironic that this book was published shortly before the National Cancer Institute decided to reduce its effort in the area of natural products, since it provides excellent documentation of the work that has been done in the development of anticancer agents from natural products over the last twenty years. In fourteen chapters written by twenty authors it covers almost all the major classes of naturally occurring anticancer agents: The Development of New Antitumor Anthracyclines (F. Arcamone), Trichothecanes (T. W. Doyle and W. T. Bradner), Nucleosides (M. Ohno), Mitomycins (W. A. Remers), Recent Progress in Bleomycin Studies (H. Umezawa), Streptozocin (P. F. Wiley), Terpenoid Antitumor Agents (J. M. Cassady and M. Suffness), Dimeric Catharanthus Alkaloids (K. Gerzon), Podophyllotoxins (I. Jardine), Maytansinoids (Y. Komoda and T. Kishi), Harringtonine and Related Cephalotaxine Esters (C. R. Smith, Jr., K. L. Mikolajczak, and R. G. Powell), Camptothecin (M. E. Wall and M. C. Wani), Microbial Transformations as an Approach to Analogue Development (J. P. Rosazza), and Miscellaneous Natural Products with Antitumor Activity (M. Suffness and J. D. Douros).

The chapter listing above gives some idea of the scope of the work; all the major classes of natural anticancer agents are included except the actinomycins, which were presumably omitted because an author was unable to complete his manuscript in time. Fortunately this omission is not a grievous one, since a chapter on the actinomycins appeared recently in "The Chemistry of Antitumor Antibiotics. Volume 1."

As is the case with any multi-authored work, the level of coverage varies from chapter to chapter. Most chapters provide information on the chemistry and structure-activity relationships of a wide variety of anticancer agents of a particular class, but in some cases the coverage is less than comprehensive. Thus the chapter on bleomycin deals primarily with studies carried

out since 1975, while the chapter on dimeric catharanthus alkaloids is concerned largely with vindesine and its congeners, and neglects much of the large amount of work on new naturally occurring dimeric catharanthus alkaloids from other laboratories. It was also surprising to find that a clinically active drug such as mithramycin was given only a very brief discussion in the chapter on miscellaneous natural products.

The criticisms itemized above are of a minor nature, however, when considered in the light of the positive value of this book, which provides in one convenient volume a summary of the most recent work on a wide variety of naturally occurring antitumor agents. The book seems likely to stimulate further research on the synthesis or structural modification of natural anticancer agents, and its purchase at what must be considered a reasonable price in these days is recommended to all natural products researchers with an interest in anticancer compounds.

DAVID G. I. KINGSTON, *Department of Chemistry,
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Biosynthesis of Isoprenoid Compounds, edited by J. W. PORTER and S. L. SPURGEON, W. S. Middleton Memorial Veterans Hospital and the University of Wisconsin. John Wiley and Sons, Inc., 605 Third Avenue, New York, NY 10158. 1981. xiii+558 pp. 16.5 x 24 cm. \$59.50.

The vast literature on, or pertaining to, the biosynthesis of terpenes and sterols, is dispersed throughout the botanical, biochemical, chemical, and medical journals. Consequently the present monograph, the first of a two-volume work on the biosynthesis of isoprenoid compounds, is a most welcome contribution. This volume deals with the individual reactions leading from acetate to the various acyclic precursors and the biosynthetic pathways to the lower molecular weight terpene classes from monoterpenes to triterpenes and sterols. The biosynthesis of carotenoids, polyisoprenoids, and specific terpenoid hormones is slated for the second volume. The ten chapters of this multi-authored volume have been prepared by recognized authorities and established researchers in the subject areas. The authors have taken pains to document their contributions thoroughly with a total of about 2,000 references and to provide many critical appraisals of the literature.

Following an account of the historical highlights and early studies in isoprenoid biosynthesis by the editors, N. Qureshi and J. W. Porter review the enzymology of the six reactions on the pathway from acetyl CoA to isopentenyl pyrophosphate (IPP). A full chapter by R. E. Dugan is devoted to the regulation of HMG-CoA reductase, attesting to the current importance of research on this, the rate-limiting step of cholesterol biosynthesis. Insights into the enzymology and mechanism of action of prenyl transferases, IPP isomerase, and squalene synthetase as well as useful advice on methods for investigating these enzymes are available in two chapters by C. D. Poulter and H. C. Rilling.

An interesting chapter by R. Croteau not only reviews current knowledge on the biosynthetic pathways to monoterpenes, but also provides important information on compartmentation, metabolic turnover, and secondary transformations. Although there is at present little experimental basis or precedent for the speculative mechanisms involving X-group participation also given, these will no doubt serve as a spur for future investigations. The deduction of the stereochemistry and mechanisms of sesquiterpene biosynthesis from fascinating labelling studies and degradations is featured in a chapter by D. E. Cane. The experimental basis of the main conclusions and critical analyses of their validity are carefully presented. The author is also to be credited with including important unpublished results from Arigoni's laboratory. A review by C. A. West on diterpene biosynthesis ranging from purely chemical aspects to enzymology, regulation, and physiological functions is certain to stimulate research on several fronts.

Although the scope and complexities of the pathways to the plant sterols are well reviewed by T. W. Goodwin, pentacyclic triterpene biosynthesis is given a superficial treatment in this chapter, no doubt partly for reasons of space. However, it is unfortunate that the important contributions of Arigoni, Seo, and Suga confirming the Ruzicka mechanism for formation of α - and β -amyrin were not presented. The tritium and carbon-14 labelling patterns shown for β -amyrin, hopene I, and fernene (pp. 470 and 472) are purely hypothetical since little or no degradation was actually performed in this work. The current status of research on sterol biosynthesis in animals is outlined in the final chapter by J. L. Gaylor who emphasizes the special characteristics and problems associated with membrane-bound, multi-enzyme systems. Unfortunately the biosynthetic pathways from cholesterol to the various steroid hormones were excluded from this review and evidently are not to appear in volume two.

Despite some deficiencies of coverage and depth, this volume seems likely to become the standard reference for isoprenoid biosynthesis. Although the book will be primarily useful for individuals engaged in research in these and related fields, it would also be a very valuable source for instructors and students in advanced-level courses.

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