Book Reviews

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BOOK REVIEWS

Advances in Heterocyclic Natural Product Synthesis. Volume 2. Edited by WILLIAM H. PEARSON. JAI Press, 55 Old Post Road, No. 2, Greenwich, Connecticut 06836. 1992. 400 pp. $78.50. ISBN: 1-55938-333-X.

Volume 2 of this series covers five topics in the synthesis of heterocyclic natural products. The first chapter, by Boger, covers the synthesis and DNA binding properties of CC-1065 analogues and the related duocarmycins. Fukuyama covers the synthesis of naphthyridinomycin. The third topic, by Jacobi, describes bis-heteroannulation methodology as applied to the synthesis of furanoterpenes, butenolides, and lactones. Topic four, by Harring, Edstrom, and Livinghouse, reviews the use of episulfonium and episelenonium ions in the synthesis of a variety of different natural products. Topic five, written by Moody and Thomas, reviews the structure and synthesis of pyridoacridine alkaloids from marine sources. Each review provides a useful table of contents, up-to-date references, an introduction, and contributions of other researchers to this field as well as the authors' work. There is no subject index.

Boger's chapter on CC-1065 and the duocarmycins covers almost the first half of this volume (188 pages out of 400) with literature references up to 1991. It is a very complete account of this group's attempts to resolve the role of the noncovalent binding portion of CC-1065 and the duocarmycins in the sequence-selective DNA minor groove binding of these antitumor agents. The synthetic methodology is clearly presented, as are the gel electrophoretic data used to correlate the DNA binding sites with the synthetic analogues. The review contains a great deal of physical biochemistry, including thermodynamic binding parameters as well as the corresponding cytotoxicity data of the numerous analogues. It concludes with appendices containing details of the X-ray and molecular modeling studies, including colored plates of space filling and stick models of the drug and analogues bound within the DNA minor groove, and summary tables of in vitro and in vivo testing results.

The naphthyridinomycin chapter by Fukuyama describes the synthesis and biosynthesis of this complex and very labile isoquinoline antitumor antibiotic. It includes the synthetic efforts by Evans, Danishefsky, Joule, and Garner as well as Fukuyama's own synthesis. Failures and successes are presented which will be of interest for graduate students as well as experts in the art of organic synthesis. The literature is covered through 1990.

Jacobi reviews bis-heteroannulation methodology using the intramolecular Diels-Alder reaction of acetylenic oxazoles to prepare furanoterpenes which can in turn be functionalized to terpenoid buteneolides and other naturally occurring lactones. The utility of this method is nicely illustrated in the synthesis of the very simple furanoterpene evodone, and the more complex furanoeremophilanes such as ligularone and petasalbine, as well as other sesquiterpene lactones and norsecurinine, a member of the Securinega class of alkaloids.

Harring, Edstrom, and Livinghouse present a very thorough review on the utility of episulfonium and episelenonium ions in the synthesis of a variety of interesting terpenes, prostacyclin analogues, and mitomycin precursors carried out by the authors and other research groups. This chapter could have stood a more critical proofreading as there are some inconsistencies in the depiction of the structures. For example, structures **177** and **178** are not in bold type, as are the other structures, and are not aligned correctly on the page. Also somewhat confusing is the use of the unnatural enantiomorph for some of the terpenoid structures. The structure for ponalactone A, **198** on page 372, is incorrect and the Vahl and Masters reference 86 on page 369 does not match the one in the list of references at the end of the chapter. Despite the problems with some of the structure depictions, the writing is clear and the synthetic schemes clearly presented.

The last chapter, written by Moody and Thomas, describes the isolation, structure determination, synthesis, biosynthesis, and biological activity (DNA intercalators and topoisomerase II inhibitors) of some pyridoacridine alkaloids from marine sources. The description of the difficulty of the structure elucidation of some of these alkaloids and the role of synthesis in unraveling their chemistry makes for interesting reading. A more complete description of the numbering system used for these alkaloids would have been helpful. The literature is covered up through 1991.

In summary, this is a well written and referenced book that contains much interesting and useful chemistry that will be worthwhile not only to experts but to nonexperts as well. Except for the one chapter mentioned above, I found relatively few typographical errors.

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Enantioselective Synthesis. Natural Products from Chiral Terpenes. Tse-Lok Ho, John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1992. xii + 324 pp. 16 × 24 cm. $69.95. ISBN O-471-54819-7.

This book is an excellent collection of examples of the use of enantiomerically pure terpene starting materials from nature's chiral pool in the synthesis of a wide range of optically active natural products. Each chapter describes total syntheses of naturally occurring target molecules employing specific, readily available chiral terpenes including citronellene, citronellol, linalool, limonene, menthone, piperitone, perillaldehyde, pulegone, carvone, carenes, thujone, pinenes, camphor, and others. The concept, organization, scope, and flow of the book are commendable. Syntheses are delineated in sufficient detail to render the book a valuable source of reference for all organic chemists interested in the area of asymmetric synthesis. Any chemistry library with a synthetic focus should highly consider the acquisition of this book.

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Plantes Medicinales Africaines, Volumes 1 and 2. J.-L. POUSSET. Ellipses, 32, rue Bargue, 75015 Paris, France. Volume 1, 1989. 156 pp. 14.5 × 19 cm. ISBN 2-7298-8918-3. Volume 2, 1992. 159 pp. 14.5 × 19 cm. ISBN 2-7298-9225-7. Price not available.

Plantes Medicinales Africaines, Volumes 1 and 2 is one more addition to the literature of African healing plants.

In Volume 1, the introduction gives a review of the development of traditional pharmacopoeia and of the traditional medical practices of Africa, based on experiences of west tropical Africa, while the bulk of the book (125 pages) gives a monograph-style inventory of 55 flowering plant species in 51 entries. For each species, brief data are given on the following: a common name(s), review of its uses worldwide, taxonomic description, review of the experimental literature, current uses in west tropical Africa, and (in most cases) selected references on experimental (chemical and pharmacological) studies. Each species is illustrated with good color photographs. As the end of the book, a glossary of botanical terms, a glossary of medical terms, an index of therapeutic categories, and an index of diseases are given.

As the title indicates, the introduction to Volume 2 states that the purpose of this volume is to recommend the further industrial development of plants listed, based on data derived from experimental studies. The bulk of this volume comprises an inventory of 56 flowering plant species considered by the author as promising for further development. For each species, a succinct taxonomic description and a summary of its medicinal uses, a brief review of the experimental and clinical literature, and a list of references are given. The volume ends with therapeutic and an industrial-use indices.

In brief, the two volumes present a capsule summary on the medicinal uses and the results of scientific studies of more than 100 flowering plant species and may be used as a guide for their botanical identification, primarily through the well taken and reproduced color photographs. Apparently, the volumes have been written with scientists, students, laymen, and the industrial sector in mind and are intended to be popular, as evidenced by the soft and full-color covers and the full color illustrations throughout, as well as by a good book-binding quality to assure durability with constant use. Consequently, depth and details have been compromised. For example, references (pre-1990) given in the two volumes are highly selective and are incompletely cited in the text. No botanical and medicinal-use references nor authority of the Latin binomials are given; in Volume 1, not even the family name of the species is provided.

Prospective owners should be aware: (1) that the more than fifty plants treated in Volume 2 are not the same ones (except one species) as those treated in Volume 1; (2) while in Volume 2 species names (with family) are listed alphabetically throughout the book, therapeutic category is used as entry heading; (3) many plants treated in both volumes comprise well known (non-native African) species, a number of which are already proven source of drug entities in worldwide clinical use.

For anyne who has an interest in African medicinal plants, I would recommend this book as a general reference.

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Advances in Heterocyclic Natural Product Synthesis. Volume 1. Edited by W.H. PEARSON. JAI Press, 55 Old Post Road, No. 2, Greenwich, CT 06830. 1990. xi + 193 pp. 15 × 23 cm. $78.50. ISBN 1-55938-169-8.

The first volume of the new JAI Press Series entitled *Advances in Heterocyclic Natural Product Synthesis* contains four chapters. The first of these, by R.K. Boeckman, reviews the applications of cyclopropylimine systems to alkaloid synthesis. It is well written and gives due credit to the late R.V. Stevens who contributed much of this strategy to the field of alkaloid synthesis. Various permutations of this rearrangement, including those from the author's laboratory, provide an updated review of this field.

The second chapter, by G.W. Gribble, deals with the review of ellipticine alkaloid synthesis—a topic of wide medicinal significance. These compounds tend to be overlooked by the modern synthetic audience because of the absence of chiral centers; nevertheless, their chemistry and synthesis are important and the author has done a valuable job in presenting the material in sections, depending on synthetic strategy used (i.e., metallations, cycloadditions, and acylation chemistry of indoles and pyrridines). The author's own synthetic efforts in this area are included.

The third chapter, by A.I. Meyers, includes the interesting asymmetric induction chemistry associated with chiral formamidines. The details of mechanistic and synthetic scope are presented along with applications to the synthesis of isoquinoline, piperidine, and pyrrolidine alkaloids. This chapter is particularly useful to a student of asymmetric induction methodology or as a summary of most of the recent work from the author's laboratory.

The last chapter, by C. Kibayashi, also stresses asymmetric induction and stereoselective synthesis, via the popular nucleophilic addition to carbonyl compounds and their derivatives. This topic has received much (perhaps too much) attention and continues to dominate the synthesis of polyhydroxylated linear compounds, even though the rules and the predictability of these methods tend to break down with compounds containing four or more chiral centers. Nevertheless, the chapter is well written and is useful as a reference source in the field of nucleophilic additions to carbonyls and imines.

Overall, the volume is a useful reference source, although quite limited in scope. Notably absent are oxacyclic compounds or more complex alkaloids, not to mention sulfur-containing natural products. The editor's own view of organic synthesis is partially responsible for this oversight, which will, we hope, be amended in the future volumes.

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