

## BOOK REVIEWS

*Principles & Practice of Chromatography*. B. RAVINDRANATH. Halsted Press, John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1989. 502 pp. 17 × 24.5 cm. \$79.95. ISBN 0470-21328-0.

This volume, part of the *Ellis Horwood Series in Analytical Chemistry*, aims to present a comprehensive account of the contemporary practice, techniques, and uses of chromatography. The text deals with more modern separation methods in greater depth than the older procedures, and emphasizes chemical principles governing separation mechanisms where appropriate. The book is organized into four parts, covering basic principles, gas chromatography, liquid chromatography, and chromatographic applications, respectively. In the introductory portion, there is a welcome inclusion entitled "Vistas of Chromatography," which examines the history, instrumentation, nomenclature, and literature of chromatography. Within the longest section of the book on liquid chromatography are accounts of adsorption, affinity, ion-exchange, partition, planar, and size exclusion chromatography. The volume has a convenient List of Abbreviations and Acronyms, as well as both a Compound Index and a General Index.

There is a burgeoning scientific literature on chromatography, as attested to by the author, who states that at least 158,872 chromatographic references had been published by 1986! The author makes a brave effort to condense the essentials of such extensive information into the confines of a single volume of only about 500 pages. However, given such a constraint, it is perhaps not too surprising that only one or two pages are accorded to such modern chromatographic methods as centrifugal countercurrent chromatography and over-pressured thin-layer chromatography. It is claimed on the jacket of the book that the coverage includes mention of the most modern chromatographic method, super-critical fluid chromatography-mass spectrometry. Unfortunately, although supercritical fluids are discussed to some degree, there is no schematic diagram of the instrumentation used, and no practical uses of this technique are indicated. Perhaps the weakest section of the book is that on the applications of chromatography, which covers in only about 80 pages chemical applications, biological and biomedical applications, and industrial and miscellaneous applications. Only cursory reference is therefore given to the use of chromatographic methods for the study of any of the natural products covered (hydrocarbons, lipids, terpenoids and steroids, pigments, carbohydrates, amino acids and proteins, nucleic acids, and antibiotics).

Such limitations notwithstanding, a good case can be made for employing this book as an introductory text for beginning pharmacognosy graduate students, since the basic principles and well-established methods are suitably detailed and are carefully and lucidly covered. The volume provides up-to-date references for each technique included, and is generally free from typographical error. Since the cost of the book is reasonable, it can be recommended to natural product scientists as a useful and convenient foundation volume on which to build more specialized chromatographic knowledge.

A. DOUGLAS KINGHORN, *University of Illinois at Chicago*

*Nitrones, Nitronates and Nitroxides*. ELI BREUER, HANS GÜNTER AURICH and ARNOLD NIELSEN. John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1989. ix + 435 pp. 15.5 × 23.5 cm. \$139.00. ISBN 0-471-91709-5.

This is an update from the "Chemistry of Functional Groups" series. As such, it contains three original chapters and two update chapters. "Nitronic acids and esters" (Nielsen) is reprinted from *The Chemistry of the Nitro and Nitroso Groups*. The second chapter is "Nitrones and nitronic acid derivatives: their structure and their roles in synthesis" (Breuer), which appeared originally in *Supplement F: The Chemistry of Amino, Nitroso and Nitro Compounds and their Derivatives*. Chapter 3 is an update (68 pages) of these two by Breuer and contains an additional 230 numbered references, with many from 1986 and several from 1987 publications. It also contains some sections on biological aspects and nitrone synthesis that were not included in the original articles.

The last two chapters are the original "Nitroxides" (Aurich) from *Supplement F* and the same author's "Appendix to Nitroxides." The update (28 pages) contains an additional 135 numbered references, also up to 1987.

Both updated chapters have been written with clarity and authority, and the coverage of subject matter is good. It is instructive to note the high degree of current activity in research on nitrones, nitronates, and nitroxides, as these functional groups play increasing roles in synthetic methodology. Their grouping together in this volume is clearly vindicated.

The separate update or appendix approach is not as satisfying as an integrated revision would be but is obviously much easier for the author and cheaper for the publisher. Perhaps the next update could be incorporated into a fully revised work.

The book contains useful general author and subject indexes, which enhance its value as a reference work. However, the cost is particularly high for only about a hundred pages of new material.

DAVID ST. C. BLACK, *University of New South Wales*

*Organic Electronic Spectral Data, Volume XXV 1983*. Edited by J. P. PHILLIPS, D. BATES, H. FEUER, and B. S. THYAGARAJAN. Wiley-Interscience, John Wiley and Sons, Inc., 605 Third Avenue, New York, NY 10158. 1989. xiii + 1020 pp. 15.5 × 23.5 cm. \$135.00. ISBN 0471-51505-1.

This is the latest volume in a heroic ongoing effort to record the ultraviolet-visible spectra of all published compounds. The data are assembled in molecular formula order, and the spectral data for a compound of known composition are thus relatively easy to locate; it is much less easy to locate a structure that matches experimentally observed data. The data published in this volume were originally published in 1983, and cover over 10,000 compounds, including at least 500 natural products.

This volume will be essential in any chemical research library but is not recommended for individual purchase by natural product researchers.

DAVID G. I. KINGSTON, *Virginia Polytechnic Institute and State University*

*Organic Reaction Mechanisms. 1987*. Edited by A. C. KNIPE and W. E. WATTS. John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1989. 656 pp. 16 × 23.5 cm. \$230.00.

This book is the 23rd in a series of monographs providing a comprehensive review of the literature pertaining to organic reaction mechanisms. This particular volume covers the period December 1986–November 1987. Included in this review are virtually all reaction types discussed in most textbooks of organic chemistry, as well as more advanced topics including pericyclic reactions, radicals, carbenes, etc. Major developments are thoroughly detailed, and pertinent literature references are bountiful. The book hardly constitutes "light reading" (i.e., it is not a textbook on reaction mechanisms), and coupled with the price, should not be viewed as a necessary addition to a personal library. However, the book is an excellent resource, provides rapid entry into the mechanistic literature, and would be an important addition to any major university or industrial library.

JAMES M. TANKO, *Virginia Polytechnic Institute and State University*

*Ion Formation from Organic Solids (IFOS IV). Mass Spectrometry of Involatile Materials*. Edited by A. BENNINGHOVEN. John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1989. 159 pp. 17 × 25 cm. \$61.95. ISBN 0-471-92485-7.

This book reports the proceedings of the Fourth International Conference on Ion Formation from Organic Solids, held in Münster, Federal Republic of Germany, in September 1987. The various chapters are direct photoreproductions of the authors' manuscripts, and it is thus unfortunate that the book took two years to appear in print. The book is divided into sections dealing with ion desorption by keV-particle bombardment (often referred to as fab or sims), ion desorption by MeV-particle bombardment (plasma desorption and related techniques), ion desorption by laser irradiation, and post-ionization of neutrals.

The emphasis of the chapters is on the ionization techniques themselves, but natural products, and especially peptides, are frequently used as examples of these techniques. Some of the examples are quite impressive, such as the spectrum of porcine pepsin ( $M = 34636$  u) showing peaks in the region of the molecular ion. However, the practicalities of obtaining and interpreting such spectra are another matter, and one author concludes that gas phase sequencing of peptides works faster and needs less material than fab mass spectrometry.

The book serves as a useful survey of ionization methods for involatile organic substances. It will be of interest primarily to the mass spectrometric community, and particularly to those serving a biomedical population.

DAVID G.I. KINGSTON, *Virginia Polytechnic Institute and State University*

*Structure Elucidation by Modern NMR. A Workbook.* HELMUT DUDDECK and WOLFGANG DIETRICH. Springer Verlag, 175 Fifth Avenue, New York, NY 10010. 1989. 238 pp.  $18 \times 27$  cm. \$29.50. ISBN 0-387-91348 (paperback).

This workbook illustrates the use of modern NMR techniques to elucidate the structures of organic compounds. It was first produced in 1987 in the German language. The English version reviewed here is similar in content, but the number of exercises has been enlarged from 20 to 23. Some exercises call for a proposed structure, whereas others give the structure and ask the reader to make the proper proton and carbon assignments. In still others, a partial molecule is given and the exercise requires completing the structure, perhaps with an assignment of configuration. Thus the exercises are varied and nicely resemble the range of problems faced by organic chemists in everyday situations.

In each exercise the 400 MHz  $^1\text{H}$  and 100 MHz  $^{13}\text{C}$  spectra are given, along with most of the following methodologies: DEPT spectra for the attached proton test; NOE difference spectra for estimating spatial proximities;  $^1\text{H}$ ,  $^1\text{H}$  COSY plots for elucidation of scalar  $^1\text{H}$ ,  $^1\text{H}$  coupling; and  $^1\text{H}$ ,  $^{13}\text{C}$  COSY plots for determining which hydrogen atoms are attached to which carbons. Two problems also have INADEQUATE spectra, and five have COLOC data.

Preceding the listing of the exercises is a chapter entitled "Methodology." Here the author briefly discusses each of the aforementioned techniques; numerous references are given, mostly to books and review articles. Immediately following the exercises is a "Strategies" chapter which contains a suggested approach to each exercise. The last chapter, "Solutions," gives the solution to each exercise in some detail, along with literature references.

The intent is to show the power of a few of the most useful modern multipulse techniques, and the workbook succeeds quite admirably. One who is really good with chemical shift and coupling constant correlations can realize some success in many of the problems without having to resort to the newer procedures. However, the exercises clearly emphasize the tremendous power of the multipulse techniques, and even the most recalcitrant individual will quickly be "converted."

It should be clear from the above remarks that this is not a stand-alone text in NMR structure determination. It is assumed that the reader is already familiar with  $^1\text{H}$  and  $^{13}\text{C}$  chemical shift correlations and with spin-spin splitting. Furthermore, the "Methodology" chapter only briefly introduces each of the newer techniques, so most readers will feel compelled to have a more detailed treatment on hand for additional reading.

Technically, the book is very well done. The English is good, and no errors of any significance were found. Structures are clearly drawn, spectra are reproduced with high quality, the print is quite readable, and the paperback binding is still intact at the conclusion of this review.

HAROLD M. BELL, *Virginia Polytechnic Institute and State University*

*Anthracycline and Anthraenedione-Based Anticancer Agents. Bioactive Molecules, Volume 6.* Edited by J. WILLIAM LOWN. Elsevier Science Publishing Co., P.O. Box 882, Madison Square Station, New York, NY 10159. xiii + 738 pp.  $16.5 \times 24$  cm. \$231.50. ISBN 0-444-87275-2.

During the last twenty years, doxorubicin has become one of the most useful and widely employed antitumor agents. The anthracycline antibiotics have been intensively investigated during this period. Interest in this class of compounds remains high, and new insight into the mechanism of action of anthracyclines has led to considerable improvement in the profile of second generation drugs.

This book is a superb overview of the important work that has proceeded in the anthracycline area over the last 7 or 8 years. Furthermore, the science presented here represents the types of efforts that are currently being made in the development of natural product antitumor agents and in second generation derivatives and synthetic analogues of an established clinical agent. The 20 chapters are divided into three main sections: "Isolation, Synthesis and Properties"; "Biophysical and Biochemical Studies Related to Mechanisms of Action"; "Pharmacology, Toxicity and Clinical Aspects." Each chapter is preceded by its own Table of Contents. The chapters are in general well-written and integrated. The book is made by photoreduction of typed copy for rapid publication. Unfortunately, some of the chapters have not withstood the process well, and are difficult to read. Similar variability in the quality of the figures, diagrams, and tables is also seen. The chapters are heavily referenced, but the subject index is only adequate and lacks cross referencing.

The book has several strong points. One is that many different types of anthracycline derivatives are discussed. These include numerous natural products, microbially modified congeners, semisynthetic derivatives, and two classes of synthetic analogues (anthracenediones and anthrapyrazoles). The second section of the book was especially useful in demonstrating the many biophysical methods that have been used to probe the mechanisms of action of these compounds. The book will be generally useful to those scientists interested in these classes of compounds as well as those concerned with the development of antitumor drugs.

KENNETH W. BAIR, *Burroughs Wellcome Co.*

*Studies in Natural Products Chemistry, Volume 3, Stereoselective Synthesis (Part B).* Edited by ATTA-UR-RAHMAN. Elsevier Science Publishing Co., P.O. Box 882, Madison Square Station, New York, NY 10159. 1989. xi + 543 pp. 17 × 24.5 cm. \$165.75. ISBN 0-444-87298-1.

This is the third volume in the series of three published to date. Like the first volume, it deals with the stereoselective synthesis of natural products; the second volume is dedicated to structure elucidation. The book is a compilation of 15 chapters covering a range of topics by an international cast of authors. The reader will find chapters pertaining to the development of particular synthetic methods, applications of methods to total synthesis, studies of certain classes of natural products, and even a formal total synthesis. Chapter sizes, which correlate to the extensiveness of the coverage of a topic, range from 8 to 80 pages in length. Documentation of the various chapters is on the whole very good and up-to-date. There is an average of approximately 66 references per chapter. However, there is quite a wide range, from 173 references in one chapter to only 7 references in another.

There are a number of chapters which should be of general use to investigators in those particular areas as well as to the casual observer. Noteworthy among these are the chapters concerning the synthesis of five-membered ring natural products (T. Hudlicky) which contains a useful table of triquinane syntheses, the synthesis of eight- and nine-membered ring natural products (T. Oishi), the aureolic acid antibiotics (R. Franck and S. Weinreb), applications of sigmatropic reactions to the synthesis of highly-oxygenated natural products (J. Kallmerten), synthetic studies on CC-1065 and related agents (R. Coleman and D. Boger), natural products via arynes (L. Castedo), and arteannuin and related compounds (W.-S. Zhou).

The book has some very good chapters, but it also contains some which are not overly informative. It would make a good addition to a school's or department's library, but the relatively high cost may make it prohibitive for one's personal library.

MICHAEL J. TASCHNER, *University of Akron*

*The Chemistry of Organic Silicon Compounds. Part 1.* Edited by SAUL PATAI and ZVI RAPPOPORT. John Wiley & Sons, 605 Third Avenue, New York, NY 10185. 1989. xvi + 892 pp. 16 × 23.5 cm. \$428.00. ISBN 0471-91441-X.

Organosilicon chemistry has had an extraordinary growth in the past two decades. It is an area at the intersection of basic science and chemical technology, and thus the absence of comprehensive treatises has been long lamented. The present work is not that treatise but is the next best thing, a collection of well-focused reviews of virtually every aspect of the field. It is most welcome.

It begins with a concise and valuable historical overview of silicon chemistry and a comparison of silicon and carbon, by Joyce Corey. Next comes a splendid chapter by Y. Apeloig on theoretical treatments of silicon compounds that combines thorough reporting of recent results with a clear and concise introduction to the various levels of modern quantum chemical treatment of structure and reactivity.

Several excellent chapters cover the properties of organosilicon compounds. In writing about structural aspects of organic silicon compounds, W.S. Sheldrick provides a compendium of bond lengths and angles. Robin Walsh continues to develop his definitive assessments of bond strengths and molecular heats of formation in his chapter on thermochemistry. E.A. Williams gives us a wonderfully useful chapter on the nmr spectroscopy of organosilicon compounds, and Hans Bock and B. Solouki convincingly unite experiment and theory in discussing the photoelectron spectra of silicon compounds. A.R. Bassindale and P.G. Taylor have collected valuable information on the acidity, basicity, and complex formation of organosilicon compounds.

In discussing the analysis of organosilicon compounds, T.R. Crompton lucidly explains the sources and solutions of problems encountered by most workers in the field and leads us to a discussion of chemical reactivity, already introduced by Joyce Corey. L. Birkofer and O. Stuhl present general synthetic applications of organosilanes, a particularly valuable coverage, reagent by reagent. H. Schwartz writes about positive and negative ion chemistry of silicon compounds in the gas phase.

Mechanistic organosilicon chemistry is presented in chapters by Robert Corriu, Christian Guerin, and Joel Moreau on dynamic stereochemistry at silicon and in two chapters by A.R. Bassindale and P.G. Taylor, the first on reaction mechanisms of nucleophilic attack at silicon, and the second on activating and directing effects of silicon.

As a landmark survey of where organosilicon chemistry now stands, this is a book that belongs in the hands of every worker in the field and of every scientist who wishes to understand one of the most exciting areas in modern chemistry. Unfortunately, the price of this volume ensures that it will only be found in libraries. What is one to make of a book selling for \$428, fifty cents a page, when the authors were paid only \$12 a page for their labors? Thus the publishers will have recouped the royalties that they paid to their authors after the sale of only 25 copies! Allowing for the sale of another 200 or so copies to compensate them for all editing, printing, and distribution expenses, it is clear that Wiley is heading for a huge profit. But that profit will be gained at the cost of withholding this fine book from the graduate students and working scientists who would benefit most from reading it. The price might be justified if this were a Beilstein or a Houben-Weyl of organosilicon chemistry, but this work is more topical and thus will have a shorter useful life. It is meant as well-earned praise to compare the scope and quality of this work with those of the theme issues of *Chemical Reviews* published under the inspired editorship of Josef Michl, copies of which are within the economic reach of every scientist.

PETER GASPAR, *Washington University, Saint Louis*

*The Chemistry of Organic Silicon Compounds, Part 2.* Edited by S. PATAI and Z. RAPPOPORT. John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1989. xvi + 775 pp. 16 × 23.5 cm. \$382.00. ISBN 0471-91992-6.

Part 2 of this massive (1668 pages) work contains authoritative chapters on Activating and Directive Effects of Silicon (A.R. Bassindale and P.G. Taylor), The Photochemistry of Organosilicon Compounds (A.G. Brook), Trivalent Silyl Ions (J.B. Lambert and W.J. Schulz Jr.), Multiple Bonds to Silicon (G. Raabe and J. Michl), Bioorganosilicon Chemistry (R. Tacke and H. Linoh), Polysilanes (R. West), Hypervalent Silicon Compounds (R.J.P. Corriu and J.C. Young), Siloxane Polymers and Copolymers (T.C. Kendrick, B. Parbhoo, and J.W. White), Organosilicon Derivatives of Phosphorus Arsenic, Antimony and Bismuth (D.A. Armitage), Chemistry of Compounds with Silicon—Sulphur, Silicon—Selenium and Silicon—Tellurium Bonds (D.A. Armitage), Transition-metal Silyl Derivatives (T.D. Tilley), and The Hydrosilylation Reaction (I. Ojima).

So how does one review a book of more than 1600 pages with widely varying subjects written by 18 authors and is Part 2 of a set for which you have never seen Part 1? Of course, you end up buying Part 1 (\$428!) and wonder if you got suckered. Perhaps the publishers should consider asking several thousand chemists to review Part 2. Fortunately, I have no cause to be miffed about all this because I found both parts to be excellent overall and consider them to be indispensable additions to my personal library. The price will force this set to be a library purchase for most, but I doubt that many card-carrying organosilicon chemists can afford to be without their own copy of this unique compilation of current information.

The first chapter sets a very high standard for those which follow, as Bassindale and Taylor have produced a beautiful survey of the qualitative and quantitative aspects of the directive effects of  $R_3Si$  (and  $R_3SiCH_2$ ) on cationic and anionic reactions remote from silicon. This will be extremely important material for the synthetically-minded readers of this Journal.

No less well written is Brook's chapter on photochemistry. Although this reader would have liked more details of the various processes, it is an unfortunate fact that rarely are such things known at this time. An aspiring photochemist looking for an area in which to make his mark would do well to look carefully at this field.

This reviewer was shocked to experience disappointment with the chapter by Lambert and Schulz, without question the world's leading experts on silylenium ions. This seven-page chapter contains nothing on the preparation or reactions of silyl anions—information which readers of this Journal might well be seeking.

The chapter on multiply-bonded silicon is essentially a one-year update of the authoritative review by the same authors [G. Raabe and J. Michl, *Chem. Rev.*, **85**, 419 (1985)]. Readers of synthetic inclinations would do well to peruse this chapter, for the area has reached a maturity that makes these reactive species readily available for synthetic use.

The chapter on bioorganosilicon chemistry is quite complete and ranges from pharmacological (and toxicological) properties to biotransformations to olfactory properties of organosilicon compounds. The reader will find that if major breakthroughs are slated for this field, most are yet to come.

West's review of polysilanes (both linear and cyclic) is just what one would expect from the true pioneer and leader of this topical area. He provides a painless, yet comprehensive, review of a subject in which intense activity currently ranges from theoretical to commercial.

A separate chapter on hypervalent silicon compounds in Part 2 may seem a bit strange to you, because there are chapters on "Dynamic Stereochemistry at Silicon" and "Reaction Mechanisms of Nucleophilic Attack at Silicon" in Part 1 and thus significant overlap. In fact, after reading these three chapters, I tend to agree with you. The material is excellent and timely, but inclusion into the aforementioned chapters would have reduced overlap and produced a more coherent tone.

The review of siloxane polymers, appropriately written by Dow Corning scientists, is an excellent place to get an overview of an area which has been intensely researched for almost 50 years. This is a remarkably complete review of all aspects of siloxanes. A surprisingly high percentage of the 263 references are from the 1980s.

The next two chapters by Armitage on organosilicon derivatives of P, As, Sb, Bi, S, Se, and Te will be of principal interest to inorganic chemists; thus I doubt they will provide inducement to purchase for this Journal's readership. The same is probably also true for Tilley's excellent review of the young but vigorous area of transition-metal silyl compounds. However, this group of readers would be well advised to pay some attention to Ojima's masterful review of the hydrosilylation reaction. After Grignard coupling, this is the most important route to the Si-C bond, and various catalytic additions to alkenes, alkynes, and dienes are discussed. In addition, review of the hydrosilylation of carbonyl compounds and carbon-nitrogen multiple bonds reveals a rich, often overlooked, synthetic potential.

Overall this is an outstanding set of reviews, and I have every intention of reading them someday. If money is no object, buy a copy for your office. On the other hand, if money is no object you probably are not a scientist and therefore have little use for this book. Therefore, I suggest that you demand that your beleaguered library purchase a set. No chemistry library should be without this authoritative survey of an active, important field.

THOMAS J. BARTON, *Iowa State University*

*The Nuclear Overhauser Effect in Conformational Analysis*. D. NEUHAUS and M. WILLIAMSON. VCH Publishers, 220 East 23rd Street, Suite 909, New York, NY 10010. 1989. xxii + 522 pp. 16 × 24 cm. \$95.00. ISBN 0-89573-343-9.

The stated purpose of this text is to "provide readers with sufficient background material to enable them to apply the nOe successfully within their own work and also assess critically other papers in which the nOe is used to solve structural problems." This aim is well met. There is an increasing need for avenues of effective learning for novice nmr users on today's ever-increasing number of sophisticated commercial nmr spectrometers. Now more than ever, the experimentalist seeks highly specific information by using instruments with which he is only casually familiar. An informed spectroscopist is more apt to choose the most appropriate one- or two-dimensional experiment to solve a specific structural problem. Limited amounts of sample, inherent low sensitivity, and available spectrometer time realistically dictate that a spectroscopist make judicious parameter choices to achieve his goal.

Toward these ends, Part I of the text begins with a general introduction of the effect of saturation on energy level populations in a magnetic field. The Solomon equations are then used to describe mathematically the steady-state nOe for two spins. The next several chapters deal in detail with the specific effects of molecular rigidity, internal motion, exchange, and complications from spin-spin coupling. Part II is highly informative and deals with experimental aspects of both nOe difference and NOESY experiments. Solvent suppression and heteronuclear nOe's are also discussed. Finally, Part III presents some literature application examples of structural analysis and conformation of molecules ranging from small, routine organic molecules through middle-sized natural products on up to biopolymers (peptides, proteins, polynucleotides, and oligosaccharides).

This text is a very welcome, informative, readable source of information at all levels. It is unlikely that many readers will peruse this text cover to cover. However, it is quite probable that any nmr experimentalist, whether accomplished or novice, would take great interest in most of the material presented. Whether searching for background reading, attempting to optimize one's experimental results, or seeking interpretative hints and experience, anyone analyzing structures via nmr will find this text worth reading. It would also be quite suitable for use in graduate-level nmr courses.

ALAN J. FREYER, *The Pennsylvania State University*

*Mycotoxins. Chemical, Biological, and Environmental Aspects.* V. BETINA. Elsevier Science Publishing Co., P.O. Box 882, Madison Square Station, New York, NY 10159. 1989. 438 pp. 17.5 × 24 cm. \$155.24. ISBN 0-444-98885-8.

Although it is relatively simple to give an operational definition for mycotoxins, these toxic fungal metabolites are of such varied structure and possess such disparate biological activities that for a single author to attempt to cover the "chemical, biological, and environmental aspects" of mycotoxins is ambitious indeed. Interest in these toxins in the West arose through the discovery of the aflatoxins in 1960, and a number of authoritative reviews on mycotoxins have appeared since 1971. Betina has relied heavily on these publications in this book, but the material has been extensively updated, and references can be found well into 1987.

The book is divided into two parts; Part I (six chapters) deals with general properties (taxonomy, secondary metabolism, biological effects, biochemical mode of action, structure-activity relationships, and environmental intoxications), and Part II (twelve chapters) details the properties of the various chemical classes of mycotoxins. These include compounds related to the aflatoxins, ochratoxins, citrinin, trichothecenes, patulin, zearalenone, cytochalasans, rubratoxins, anthraquinones, tremorgens, and the epipolythiopiperazine-3,6-diones. The last chapter discusses a number of miscellaneous toxins (including cyclopiiazonic acid, PR toxin, fusarin C, secalonic acid, the roquefortines, and moniliformin). For most of the mycotoxins, there are sections giving an overview of their bioproduction, biosynthesis, isolation, physical and chemical properties, biological activities, modes of action, and environmental impact. In general, these discussions are reasonably detailed and up-to-date for the major mycotoxins, though some areas have advanced significantly in the last three years (e.g., aflatoxin biosynthesis and the discovery of the fumonisins, now believed to be responsible for equine leukoencephalomalacia). For the major classes of mycotoxins, tables are given which list many of the mycotoxins' systematic names, molecular formulas, and mp's. For selected compounds, optical rotations, uv, and ir data are included but no nmr data, though such data would, in my opinion, be far more useful. In any event, one interested in such data no doubt would want to consult the original literature, which is cited abundantly in this book. There are two indices: subject (which in effect simply lists the compounds in the text) and a listing of the producing organisms. For the nonbiologist, this latter index is well presented because there is an indication as to whether the organism is a fungus, lichen, higher plant, or invertebrate.

Anyone needing an overview of mycotoxins or leading references into the current literature of fungal toxins will find this book very helpful. It not only provides the reader with an excellent up-to-date account of the major chemical and biological characteristics of these particular antibiotics but also tries to bring out the importance of these substances as environmental toxicants and as novel probes for biochemical studies. Missing from these discussions, however, is a critical evaluation of the role these compounds play in the lives of the producing organisms. Although much remains rather speculative in this area, there are a number of recent papers in this fascinating area of natural products which indicate that fungal secondary metabolites do play interesting roles in the lives of the producing fungi and of organisms that must contend with them in the environment.

Perhaps a more significant criticism is the number of typographical errors in this book; nearly every page has one or more. Although numerous, they tend to be obvious and of a minor nature [e.g., Sn appearing in structures on pp 390 and 397, where (S)<sub>n</sub> is meant]. As is too often the case today, the high price of this book will discourage many individuals from buying this otherwise excellent book.

BRUCE B. JARVIS, *University of Maryland*

*Studies in Natural Products Chemistry, Volume 4: Stereoselective Synthesis (Part C)*. Edited by ATTA-UR-RAHMAN. Elsevier Science Publishing Company, P.O. Box 882, Madison Square Station, New York, NY 10159. 1989. xi + 756 pp. 16.5 × 24.5 cm. \$236.75. ISBN 0-444-88033-X.

This book is the fourth in a series launched in 1988 devoted to topics in natural product chemistry and the third bearing the "Stereoselective Synthesis" subtitle. It contains eighteen essay reviews varying in length between 12 and 74 pages. About two thirds of the chapters review syntheses of specific natural product structure classes, and one third deal with synthetic reagents and/or methodology applied more broadly.

The wide scope of coverage is apparent from the contents listing: A General Strategy for the Synthesis of Alkaloids of the Aizoaceae and Amaryllidaceae Families (S. F. Martin); Recent Developments in the Synthesis of Vindoline and Vindoline-like Compounds (B. Danieli, G. Lesma, and G. Palmisano); Total Synthesis of Cytotoxic Cyclic Peptides of Marine Origin (T. Shioiri and Y. Hamada); From  $\alpha$ -Amino Acids to Amino Sugars (J. Jurczak and A. Golebiowski); Higher Carbon Sugars (J.S. Brimacombe); The Synthesis of the Heptose Region of Gram-Negative Bacterial Core Oligosaccharides (K. Dziewiszek, A. Banaszek, and A. Zamojski); Hexopuranose Nucleosides (K. Antonakis); Synthesis of Oligonucleotides (T. Tanaka and M. Ikehara); Total Synthesis of Enantiomerically Pure Anthracyclines (K. Krohn and V.S. Ekkundi); The Synthesis of Prenylated Phenolic Compounds (M. A. Vela and N.H. Fischer); Highly Efficient Syntheses of Natural Dimeric Sesquiterpenes, (+)-Confertifolin, (+)-Isodrimenin, (+)-Eryfuran, and (-)-Warburganal (T. Nakano); Synthesis of Thienamycin and Related Beta-Lactams from 3-Hydroxybutyric Acid (G.I. Georg); Optically Active Sulfoxides and Low-Valent Titanium in Asymmetric Synthesis of Natural Products (G. Solladie); Benzyne Cyclisation Revisited (S.V. Kessar); Natural Product Synthesis *via* Phosphonium Ylides (H.J. Bestmann); Synthesis of Bioactive Natural Products through the Diels-Alder Reaction (A. Ichihara); Remote Functionalization of Camphor: Synthesis of Chiral Intermediates for Natural Product Synthesis (T. Money); New Chemistry of Vitamin C (G. Fodor and K. Susangkarn).

As a multi-national multi-author work, the book shows all the advantages and disadvantages of this increasingly familiar genre. With such diversity of scope, evaluation of individual chapters will be inherently highly subjective. This reviewer also found both profit and pleasure in browsing through the less familiar chapter topics. Each chapter is produced as camera-ready copy, with a consequent multitude of type and formula formats, all of which however are of acceptable clarity. Although this form of publication was once promoted with an objective of cost containment, this commendable aim now seems fugitive. The Book Review Editor of this Journal, as a service to reviewers, recommends a reading of some "model" reviews dating from 1978. One of these concludes with the anguished plea, "one hopes that the price will not discourage individual purchasers and the less affluent libraries." From a scant decade ago, this refers to a volume of 448 pages from the same publisher with purchase price of \$39!

It is indeed a pity that the price of the present worthy volume will essentially prevent acquisition by a readership most likely to derive benefit. Academics and their even more impecunious students would find this an excellent source for individual study. Our institutional librarians are also now very adept at resisting our earnest blandishments in recommending purchase, particularly when a continuing series is involved. On reflection, it is also apparent that many of the individual chapters of this book could have found publication (at presumably less cost) within existing primary, review, and specialist journals to which our libraries subscribe. For example, the chapter on "Bacterial Core Oligosaccharides" is presented as a typical journal article (with complete experimental section and grant acknowledgment), and the interesting review of "Camphor Remote Functionalization" is an updated version of one already published in *Natural Product Reports*.

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