

## BOOK REVIEWS

*One and Two Dimensional NMR Spectroscopy*. ATTA-UR-RAHMAN. Elsevier Science Publishers, P.O. Box 882, Madison Square Station, New York, NY 10159. 1989. xx + 578 pp. 17 × 24.5 cm. \$186.75. ISBN 0-444-87316-3.

For something more than ten years at meetings such as ENC the masters of spin physics have been impressing their peers and the awed onlookers with artfully crafted pulse sequences which reveal specific characteristics of selected nuclei. From the hundreds of sequences so generated have arisen a whole lexicon of contrived acronyms and a handful of extremely powerful structural tools. A few of these, such as APT, DEPT, COSY, NOESY, and HETCOR, are now routinely used in structural investigations with great profit.

The masters have been less successful in producing texts which explain these wonders to those of us who do not think in matrices and eigenvalues. This book by Rahman does much to fill that need. Here the major experiments are examined in great detail, with comments on their capabilities and limitations and on the typical quantities required. The effects of the pulses are explained in terms of magnetic vectors almost exclusively, which is surely a good choice, although it does make explanation of correlation spectra and multiple quantum experiments somewhat tenuous.

An opening chapter describes the fundamental characteristics of modern Fourier transform nmr spectroscopy, leading to a second which deals with spin echos, APT and DEPT. There follow chapters about INADEQUATE, *J*-resolved and correlated spectra and the nuclear Overhauser effect by difference methods and by 2-D. Finally, the author describes polarization transfer in the rotating frame and multiple quantum methods, which will become increasingly useful as instruments capable of performing them become common. Major methods are illustrated by examples that amply demonstrate the chemical information available from the experiment. Each is explained by detailed vector diagrams and illustrated by typical spectra. Minor variations are treated somewhat more briefly. At the ends of the chapters problems are provided to allow the reader to work through the interpretation of these major methods.

Of course there are things to complain about. There are relatively few references after 1985, although, indeed, most of these experiments were first described before then. The problems often require the reader to assign chemical shifts to a dozen points crowded into a square inch, which a more imaginative format might have avoided. There are dozens of trivial typos (many because the printers had great trouble putting Greek letters into the text) in spite of the price. The price is surely the most important complaint: \$187, or 32¢/page. Such a price effectively restricts the book to libraries, when it belongs in the hands of many students; let us hope that a paperback version appears soon.

ROBERT J. HIGHET, *National Institutes of Health*

*Fusarium Mycotoxins, Taxonomy and Pathogenicity (Topics in Secondary Metabolism 2)*. Edited by J. CHETKOWSKI. Elsevier Science Publishing, 655 Avenue of the Americas, New York, NY 10010. 1989. xiv + 492 pp. 16.5 × 24.5 cm. \$171.00. ISBN 0-444-87468-2.

This book was derived from the proceedings of a meeting, "Fusarium Mycotoxins, Taxonomy, Pathogenicity," held in Poland in 1987. The book represents the efforts of 30 contributors from widely diverse disciplines. The significance of *Fusarium* toxins in human and animal health has increased dramatically with the discovery and potential implications of the fumonisins from *Fusarium moniliforme*.

The first chapter presents a comprehensive list of the various known metabolites of the genus *Fusarium* along with their chemical structures and some related information such as melting point and molecular weight and uv spectral data. Chapter 2 presents a comprehensive review of the literature for fusarin C. In general, several chapters (3-5, 10, 16-19, 24-26) are organized and presented along very similar lines but differ either in the host, i.e., corn, potatoes, wheat, etc., or the part of the world. Perhaps some of these could have been combined to reduce the total number of chapters, reduce possible redundancy, and also keep similar topics in one section of the book. The reviewer had difficulty, at times, in understanding the organization of the book, especially because the book deals with a very wide array of topics: metabolites, metabolism, pathogenicity, toxicology, taxonomy, etc. Chapter 6 discusses the advantages of using the relatively simple and inexpensive brine shrimp assay for *Fusarium* toxins. The author points out one of the

problems with the assay, particularly as it relates to interlaboratory studies. Chapter 8 was concerned with metabolism of the trichothecenes T-2 toxin, diacetoxyscoperenol, and deoxynivalenol by various farm animals.

Chapters 8 and 9 present a review of the metabolism of T-2 toxin, DAS, DON, and zearalenone in farm animals. Chapter 11 consists of a very short chapter on the taxonomy and nomenclature of *Fusarium nivale*. Chapter 12 discusses the very comprehensive metabolite profiles of various *Fusarium* species, including species identification according to various taxonomic systems. This chapter updates the previous profile published by Marasas *et al.*, 1984. Chapter 13 is concerned with the significance of plant growth regulators produced by *Fusarium* as they relate to fungal growth, sporulation, and pathogenicity. Chapter 14 discusses the role of cutinase and plant cell wall degrading enzymes produced by *Fusaria* during pathogenesis. Chapter 15 deals with the phytotoxicity of *Fusarium* metabolites relative to pathogenicity. Chapters are presented that deal with breeding resistant varieties (Chapter 21), use of *Fusaria* as hyperparasites of *Claviceps* spp., *Fusarium*, or pathogenicity of cereal seedlings (Chapter 20), and the fate of mycotoxins during food processing and methods of detoxification.

Chapters 7, 12, and Chapter 23 were particularly interesting and appropriate. The book should provide a valuable resource to the *Fusarium* literature.

RICHARD J. COLE, *Natural Peanut Research Laboratory*

*Analysis of Sterols and Other Biologically Significant Steroids*. Edited by W.D. NES and E.J. PARISH. Academic Press, San Diego, CA 92101. 1989. xv + 341 pp. 15.5 × 23.5 cm. \$69.00. ISBN 0-12-515445-3.

This book consists of sixteen chapters of varying quality and usefulness, dealing not only with analysis of steroids, but also with isolation, separation, biosynthesis, biological roles, etc. Each of the first nine chapters concentrates on a specific steroid type or group, such as the sterols, steryl esters, steryl glycosides, brassinosteroids, antheridiol, oogoniols, ecdysteroids, spirostans, spirostanes, solanidines, sapogenins, oxysterols, and lipoproteins. These contain a great deal of information on various separatory methods, especially chromatography, and varying amounts of discussion of analytical methods such as nmr, ms, ir, etc. In contrast, the last six chapters focus on the analytical techniques: ir, uv, <sup>1</sup>H- and <sup>13</sup>C-nmr and Raman spectroscopy, mass spectrometry, X-ray crystallography, and fluorescence.

One assumes that the book was written for the benefit of the researcher in the laboratory, who requires details of experimental methodology, and it does indeed provide a wealth of such information. It is therefore difficult to understand why so much space is wasted on describing mundane things, such as Hooke's law in ir and the Beer-Lambert law in uv. These are readily available in any sophomore text and are almost certainly understood by all those to whom this book is directed.

Another disturbing feature is the amount of repetition. This is presumably the result of giving the various contributors carte blanche to write whatever they pleased and also in some cases to a poor choice of chapter topics. For example, chapter 6 dealing with spirostans, spirostanes, and solanidines is followed by chapter 7 on sapogenins, most of which are spirostans. An attempt should have been made to limit a chapter on a specific steroid type to the material specific to that type.

The inclusion of a chapter on Raman spectroscopy was presumably determined by a desire for completeness, but this technique is of such limited use that it really does not merit coverage. In a similar vein, it is difficult to justify a chapter on uv and ir spectroscopy, because the information provided by these techniques is of such a non-specific type and is readily available from other sources. On the other hand, a chapter on 2D methods in nmr spectroscopy as applied to steroids would have been useful and timely.

On the positive side, chapter 4 on "Analysis of Brassinosteroids, Antheridiol and Oogoniols" has an interesting account on their isolation and on the reproductive process in *Achlya*, although there is not very much on analysis. Chapter 5 is a well written account of the separation and purification of ecdysteroids with an informative section on high field nmr and on mass spectrometry. The largest chapter (51 pages), devoted to the separation and analysis of lipoproteins, should certainly be of interest to people in this important area, although again there is a repetitive nature to the accounts of analyses. Chapter 12 on <sup>13</sup>C-nmr spectroscopy is one of the best, being comprehensive and well written.

In summary, this book is a very mixed bag. The price is not excessive and for people in the steroid area it might be worth acquiring it for the several well written chapters and the abundance of experimental information, especially on separatory methods.

BRIAN GREEN, *University of Maine*

*Organic Reactions, Volume 37.* A.E. KENDE, Editor-in-Chief. John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1989. xvii + 588 pp. 15.5 × 23.5 cm. \$75.00. ISBN 0471-50169-7.

*Organic Reactions, Volume 37* contains two excellent chapters, both covering topics that have risen to prominence within the last 15 years or so. The first chapter reviews the applications of pig liver esterase to the preparation of enantiomerically pure compounds, either ester-acids or alcohols, depending on the desired "business part" of the ester to be retained by the hydrolysis. The discussion is organized according to substrate types (prochiral diesters, meso diesters, cyclic diesters, resolution of racemates). It contains also a section on the hydrolysis of sensitive compounds by this method, not necessarily leading to optically pure materials. Discussion of the types of enzymatic methods is categorized by type of reaction medium, and the general discussion of the active site hypothesis introduces the novice in this field to a rapid overview of biorganic methodology. Synthetic applications to complex molecules are reviewed towards the end of the chapter, and a comparison with nonenzymatic methods is made. The experimental section begins with the preparation and the assay of the enzyme. A tabular survey follows the discussion in the text and provides extensive documentation of examples. The review contains 158 references, is written with the nonspecialist in mind, and is an excellent starting point for a venture into enzymatic hydrolysis/resolution methods by a previously uninitiated synthetic organic chemist.

The second chapter surveys the synthetic utility of allyl- and vinylsilanes. A brief historical section is followed by a discussion of the mechanism of electrophilic substitution. The discussions concerning allyl and vinyl species are carried out in parallel, which is especially useful from the point of view of synthetic applications. Stereochemistry, electronic and substituent effects, and regioselectivity of substitution are discussed extensively. The Scope and Limitations part of the chapter is organized according to the electrophile, and in each case a parallel discussion of reactive tendencies is offered for allyl and vinylsilanes. The discussion closes with a review of non-carbon electrophiles (P, S, Se, halogens, metals). There are scattered examples of applications to total synthesis, but a section on this topic is not included. In view of a recently published review by Majetich, who emphasized this topic (JAI Press, 1989), this is probably not necessary. The experimental examples are illustrative of the methodology, and the tabular survey, which covers the literature to 1986 (with a few entries from 1987 to 1988), also presents a parallel view of allyl- and vinylsilane reactions with electrophiles, as discussed in the text. The tables take up 359 pages (!) and the chapter contains 965 references (!). It is indeed an excellent and an impressive comprehensive review which offers an up-to-date summary of the state of the field.

In conclusion, Volume 37 is an excellent addition to an already very useful series.

T. HUDLICKY, *Virginia Polytechnic Institute and State University*

*Carbon-13 NMR of Flavonoids.* Edited by P.K. AGRAWAL. Elsevier Science Publishing Company, P.O. Box 882, Madison Square Station, New York, NY 10159. xvi + 564 pp. 16.5 × 24.5 cm. \$184.25. ISBN 0-444-87449-6.

This text is the thirty-ninth in a series on the subject "Studies in Organic Chemistry" which have been published in the last decade. This series has covered topics in almost every area of organic chemistry ranging from complex hydrides to synthesis of acetylenes. Those familiar with this series will want this latest text for their library if they work with flavonoids in any capacity. This volume on flavonoids contains nine chapters authored by specialists in the area: "Introduction," "Methods for Signal Assignment," "Flavonoids," "Isoflavonoids," "Other Flavonoids," "Flavonoid Glycosides," "Chalconoids," "Flavanoids," and "Flavonoid Structure and Carbon-13 NMR Spectroscopy." The strength of this book is the numerous <sup>13</sup>C-nmr chemical shift correlation tables for more than 1700 flavonoids. In addition, the book contains an introductory chapter which describes various nmr techniques which can be applied to flavonoids. This book is a must resource for plant biochemists, natural product chemists, and phytochemists who are involved in the structure elucidation of flavonoids. The high price may preclude the purchase by some scientists; however, the book should be a part of every academic, pharmaceutical, and governmental library.

D. HOWARD MILES, *University of Central Florida*

*Mycotoxins and Phycotoxins*. Edited by S. NATORI, K. HASHIMOTO, and Y. UENO. Elsevier Science Publishing Co., P.O. Box 882, Madison Square Station, New York, NY 10159. 1989. 496 pp. 16.5 × 24.5 cm. \$168.50. ISBN 0-444-88028-3.

Every bowl of peanuts, every piece of fish, and every partaking of cooked and uncooked shellfish I approach quizzically; food safety is of paramount importance to us all. Consequently, I was delighted to have the opportunity to review this book which covers the most recent advances in mycotoxins and phycotoxins.

The book, the tenth volume in the series *Bioactive Molecules*, is a compilation of invited papers presented at the 7th IUPAC International Symposium on Mycotoxins and Phycotoxins, Tokyo, 1988, and has been divided in two approximately equal parts. From the beginning, there are two major obstacles that will frustrate the reader. First, there is no subject index, so that if specific pieces of information are sought the reader must either compile a private index or liberally use colored magic markers (different for each topic). However, this does ensure that the book must be read entirely. Second, the chapters are not numbered (there are 31 in Mycotoxins and 26 in Phycotoxins), so that numerical references are hard to remember. Also, in certain chapters, critical structures have not been illustrated.

As with most symposium books there are some excellent chapters, and there is enough information to satisfy the most avid scientific reader. In the Mycotoxins section, I particularly enjoyed those chapters found on page 21 (chapter 4), page 185 (chapter 23) and, especially, page 197 (chapter 24). The latter reads like a mystery novel and contains all the ingredients necessary to challenge the logical mind: so much so that it should be required reading for graduate students who plan to enter the field of natural products and mycotoxins. The chapters on page 205 (chapter 24), 213 (chapter 26), 223 (chapter 27), and 249 (chapter 30) are also laudable. In the Phycotoxins section, the introductory chapter gave a concise overview of ciguatera poisoning and the antidote, intravenous infusion of D-mannitol. Chapter 36 (page 303) yielded useful techniques for the monoclonal antibody detection of ciguatoxin, and chapters 36–38 (pages 311–334) covered recent developments in the detection of paralytic and diarrhetic shellfish toxins by hplc. A chapter covering the toxins and pteridines in cultures of the blue-green alga, *Aphanizomenon flosaquae*, will be of interest to those who like to gaze at natural product structures that are reminiscent of those seen in other biological systems.

In spite of the ups and downs and the fact that chapters appeared to be out of order (printed, probably, in the sequence in which they were verbally presented), there are valuable pieces of information and ideas to be gleaned. The price is hefty, and two chapters were particularly difficult to read, even for one proficient in reading English, because of poor print. At these prices one expects perfection. One point is painfully clear as a result of this publication: an international set of standards must be established for sampling and acceptable mycotoxin levels in food.

HORACE G. CUTLER,

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*Supplements to the 2nd Edition of Rodd's Chemistry of Carbon Compounds. Volume IV. Heterocyclic Compounds Part K*. Edited by MARTIN F. ANSELL. Elsevier Science Publishing, 655 Avenue of the Americas, New York, NY 10010. 1989. xxii + 626 pp. 16 × 23 cm. \$294.75. ISBN 0-444-87399-6.

As editor M.F. Ansell freely admits, this volume covers a "heterogeneous collection of heterocycles," from six-membered rings containing nitrogen and germanium to the crown ethers, cryptands, and macrolides. This tremendous diversity of heterocyclic chemistry accompanied by the mammoth pricetag would seem to militate against any individual chemist's purchasing this book.

The nine authors of this volume, which supplements Volume IV part K of the second edition (1979), have done a splendid job of updating their assigned material to 1985 and, in some instances, to 1986 and 1987. The coverage in one chapter stops at 1984, undoubtedly reflecting the conscientiousness of this particular author in adhering to the submission deadline! There is an excellent Table of Contents and an equally comprehensive Index, but, like the series as a whole, there is no author index. References to the original literature are cited in the text and are limited to a maximum of two or three authors. A particularly objectionable abuse of this style—apparently common to the whole series—is the use of "loc. cit.," which makes it very tedious, in one chapter at least, to locate the original reference! This practice must be condemned. Although the direct reproduction format is uneven and inevitably leads to a range of presentations and styles, the volume is reasonably easy to read (but not as pleasurable as the parent volume). A general criticism is that there would seem to be a relative paucity of structural drawings and equations in most of the chapters.

In the opening chapter, P.D. Lickiss summarizes six-membered heterocyclic compounds possessing two or more unusual hetero-atoms (B, Si, Ge, Sn, P, As, Bi, Sb) (29 pages), and D.W. Allen, in a related chapter (48 pages), covers six-membered heterocyclic compounds containing one or more unusual hetero-atoms (B, Si, P, Ge, Sn, Pb, As) together with nitrogen or elements of group VI (O, S). In two chapters, J.T. Sharp explores the recent chemistry of seven-membered heterocycles containing oxygen (e.g., oxepins, dioxepins) and sulfur (e.g., thiepins, dithiepins) (49 pages) and seven-membered heterocycles containing nitrogen in the ring (e.g., azepines, diazepines, triazepines, tetrazepines) (95 pages). In a chapter that is particularly rich in reaction equations and mechanistic detail, C.D. Gabbutt and J.D. Hepworth present the syntheses and reactions of seven-membered ring compounds with two or more different atoms in the ring (149 pages—but the only double-spaced chapter in the volume). Included are compounds containing O, N, S, Se, and Te in various combinations and connections. In the shortest chapter (16 pages), yet one chock-full of interesting compounds, T.J. Mason reports on new developments with seven-membered and larger rings containing one or more unusual atoms (Mg, Hg, B, Sn, Si, Ge, Pb, As, P). K.M. Johnson discusses seven-membered and larger ring compounds containing one or more unusual atoms (Al, B, Si, Ge, Sn, Pb, P, As, Sb, Bi) together with nitrogen or elements of group VI (O, S) (40 pages). In the final two chapters, J.A.H. MacBride discusses heterocyclic compounds with eight-membered rings (N, O, P, S) (35 pages) and heterocyclic compounds with rings of more than eight atoms (O, S, N, P) (118 pages). This latter chapter includes coverage of crown ethers, cryptands, cage tertiary amines, conjugated macroheterocyclic compounds, macrocyclic esters, macrolides, and several appropriate classes of marine natural products, such as the brevetoxins, cyclic peroxides, and the newly discovered ulapualides (cyclic polyoxazoles). As MacBride recognizes, the myriad of topics in this last chapter precludes all but a superficial examination of this chemistry, and chemists are better advised to seek more specialized reviews as warranted.

Although a meticulous search was not done, this volume seems to be relatively free from errors. Only a few misspellings were noted ("McMurry", p. 531; "Overman", p. 572; "compounds", p. 594). The reaction shown on p. 271 should involve formic acid and not acetic acid; the latter reagent would give rise to the corresponding *N*-ethyl compound.

In conclusion, this volume provides a valuable resource of information about several "offbeat" heterocyclic ring systems covering the decade of 1976–1986, and, as such, would be an important addition to chemistry libraries.

GORDON W. GRIBBLE, *Dartmouth College*

*Advances in Photochemistry, Volume 15.* Edited by D.H. VOLMAN, G.S. HAMMOND, and K. GOLLNICK. Wiley-Interscience, John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1990. ix + 390 pp. 15.5 × 23.5 cm. \$95.00. ISBN 0471-63289-9.

This volume in the respected series *Advances in Photochemistry* consists of five chapters: Ultrafast Photochemical Intramolecular Charge Transfer and Excited State Solvation (Paul F. Barbara and Włodzimierz Jarzeba), Atmospheric Reactions Involving Hydrocarbons: FTIR Studies (Hiromi Niki and Paul D. Maker), Excited State Reactivity and Molecular Topology Relationships in Chromophorically Substituted Anthracenes (Hans-Dieter Backer), Photophysics and Photochemistry of Phytochrome (Kurt Schaffner, Silvia E. Braslavsky, and Alfred R. Holzwarth), and Photochemical Mechanism in Single Crystals: FTIR Studies of Diacyl Peroxides (Mark D. Hollingsworth and J. Michael McBride).

The only chapter likely to be of direct interest to readers of this journal is the fourth one, in which the authors discuss the photochemistry and photophysics of phytochrome, the best known light receptor in higher green plants and certain other organisms. Phytochrome is a protein which carries a red-light absorbing chromophore attached to a cysteine residue; the structure of the chromophore and of the protein is discussed, but most of the chapter is concerned with a detailed discussion of the photochemical and photophysical processes involved in light absorption.

This volume will primarily be of interest to photochemists and workers in closely related areas.

DAVID G.I. KINGSTON,  
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*Studies in Natural Products Chemistry, Volume 6: Stereoselective Synthesis (Part D)*. Edited by ATTA-UR-RAMAN. Elsevier Science Publishing Company, P.O. Box 882, Madison Square Station, New York, NY 10159. 1990. x + 606 pp. 16.5 × 24.5 cm. \$189.75. ISBN 0-444-88566-8.

This book is the fourth in a series bearing the "Stereoselective Synthesis" subtitle within the larger connotation of Natural Products Chemistry, and the general format and content interest established in the earlier volumes are fully maintained. It contains thirteen essay reviews, the first of which occupies over 100 pages; the others are in the 25–50 page range. Exhaustive coverage of any of the topics could not, of course, be achieved within this limitation, and no such claim is made.

The breadth of coverage is apparent from the abbreviated content titles: Polycarbocyclic Marine Terpenoids (J.D. Martin); Metabolites from Marine Sponge Organisms (T. Nakano); Allenic and Acetylenic Carotenoids (S. Liaaen-Jensen); Gibberellins and Antheridiogens (L.N. Mander); Secondary Metabolites from *Fusarium* Species (M.E. Savard, R. Greenhalgh, and J.W. Apsimon); Amphotericin B (O.S. Chizhov); Dithioacetal S-Oxides and S,S-Dioxides as Synthetic Reagents (K. Ogura); Sugar Analogs Containing C-P Bonds (H. Yamamoto and T. Hanaya); Sugar-Peptide Structures related to Cell-Wall Peptidoglycan from Bacteria (D. Keglević); Chemical Defense in Ants (J.C. Braekman and D. Dalozé); Isoquinoline-Derived Alkaloids (J.B. Bremner); Alkaloids of *Strychnos dinklagei* (S. Michel, F. Tillequin, and M. Koch), and Chiral Synthesis of Natural Products as Semiochemicals and Bioregulators (T. Kitahara).

Further commentary beyond that made in review of the earlier volumes in the series [*J. Nat. Prod.*, **52**, 668 (1989); **53**, 227, 231 (1990)] would be superfluous. It is noteworthy within the context of multinational authorship that although every chapter is written in English, none emanates from the nominally English-speaking countries of the UK and USA. Might this presage the diminishing research activity in this branch of organic chemistry as a consequence of the perceived under-funding of research in these countries?

Book reviewers have eagerly adopted a mandate to complain of the high cost of technical publications, presumably with the hope, probably forlorn, that the drum beat of criticism might effect price reduction. It was with approval, consequently, that it was noted that this volume was some fifty dollars less expensive than the predecessor. Further research (not overly intensive) revealed, however, that it also contained fewer pages; this may suggest that the arcane principles governing publication price more resemble the selling of meat than of art. In both volumes, the scales tilt at about 31.2 cents per page.

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