Journal of Natural Products
Vol. 50, No. 4, pp. 777-780, Jul-Aug 1987

BOOK REVIEWS

Modern Methods in the Analysis and Structural Elucidation of Mycotoxins. Edited by RICHARD J. COLE. Academic Press Inc., Orlando, FL 32887, 1987, xii+471 pp., 15.5×23.5 cm., $75.

Although the modern era of mycotoxin research in the West began in 1960, with the British report of the so-called turkey "X" syndrome, scientists in Eastern Europe and the Far East were familiar with hazards associated with moldy agricultural products long before this time. Even in the West, maladies such as ergotism were known in ancient times, but interest in mycotoxicology as a dicipline did not become established until that massive loss of British poultry in 1960, brought about by their feeding on peanut meal contaminated by *Aspergillus flavus*. Cultures of this fungus yielded the highly toxic and, more importantly, carcinogenic aflatoxins, although a recent retrospective analysis [*Mycotoxin Res.*, **2**, 3 (1986)] has suggested that another mycotoxin, cyclopiazonic acid, may have been the principal agent responsible for the turkey "X" disease syndrome.

The authors of the fifteen chapters of this book were faced with a formidable task since mycotoxins do not fall into a single chemical class but virtually span the entire spectrum of natural products from moniliformin (3-hydroxycyclobut-3-ene-1,2-dione) to complex polypeptides. All the modern tools of structure elucidation (ir, nmr, uv, ms, and X-ray diffraction) and compound isolation techniques (tlc, hplc, and gc) are introduced and applied to this broad spectrum of chemical types. The chapters fall into two broad classes: those concerned with the detection and quantitation of known mycotoxins and those concerned with detecting, isolating, and proving the structures of new fungal toxins. The focus of the former group of chapters is the monitoring for levels of mycotoxins in various environmental matrices and thus are concerned with sampling techniques (chapter 2), chromatographic (tlc, chapter 9; gc, chapter 10; hplc, chapter 11; gc/ms, chapter 12; ms-ms, chapter 14), chemical (chapter 3), immunological (chapter 8), and taxonomic (chapter 15) methods of analysis. Such researchers are often connected with agriculture and are most interested in developing rapid, reliable, and sensitive methods of analysis for known mycotoxins (e.g., aflatoxins and trichothecenes). All the chapters present an up to date picture of the powerful analytical methods employed today in the analyses for mycotoxins.

The second area, which deals with isolation and structure elucidation, is one that can be appreciated by most natural products chemists. Chapter 1 by Cole, Cutler, and Dorner is particularly welcome because it outlines and critically reviews the various biological screening methods employed for detecting mycotoxins. Chapter 5 by Cox and chapter 7 by Steyn and Vleggaar discuss the powerful techniques of nmr spectroscopy and biosynthetic studies, respectively, as they apply to structure elucidation of mycotoxins. In both cases, one certainly is going to have to consult a modern text (e.g., "Modern NMR Techniques for Chemical Research" by A.E. Derome) to gain full appreciation of the details of the modern pulsed nmr experiments alluded to in these chapters. Although uv and ir spectroscopy are relied on for this type of structure work much less today, chapter 4 brings together in tabular form a great deal of previously reported ir data for 64 of the most common and important mycotoxins. Chapter 6 presents a brief description of the use of X-ray diffraction analysis, and chapter 13 presents a detailed analysis of the mass spectra of the simple trichothecenes.

Most of the chapters are heavily referenced through 1983, with some having references into 1984 and 1985, and two even into 1986, where the authors are citing their own work. The book is quite free of typographical errors. Those actively involved in mycotoxin research will want this book on their shelf if they can only handle the steep price.

BRUCE B. JARVIS, *University of Maryland*

The Phytochemistry of the Flora of Qatar. A.M. RIZK. The Scientific and Applied Research Centre, University of Qatar, P.O. Box 2713, Doha, Qatar, 1986, xii+582 pp., 17.5×24.5 cm., $50.

This book represents the second stage of a long-range project by the Scientific and Applied Research Centre, University of Qatar, to conduct a comprehensive study of the Qatar flora. The peninsula of Qatar protrudes from the Arabian Peninsula into the Persian Gulf.

One of the objectives for this work was to review and compile as much general phytochemical information as possible on the families, genera, and species that grow in Qatar. This objective was accomplished successfully in Part One. Chemical reviews are presented for 56 families, more than 200 genera, and 300 species. For the larger, more thoroughly studied families these reviews could only provide examples of the types of compounds that have been previously isolated and identified. Readers interested in greater detail have available more than 4,000 references that span a century of phytochemical literature. This impressive list is refreshingly up-to-date, including some articles from 1985. In addition to lists and structures (1,574) of chemicals from the various taxa, there is also information on the biological, medicinal, and agricultural significance of the plants and their chemical components. Eighty colored photographs help to characterize the flora more vividly.

Part Two discusses the distribution of different phytochemicals that have been isolated from the plants growing in Qatar. Most of the information is presented in tabular form by chemical class. In addition, there is a short glossary of medical terms used in the text, an index of botanical names, and a subject index.

A major weakness in this book is its failure to present clearly and thoroughly the phytochemistry of the Qatar flora. Although Part Two is dedicated exclusively to plants of Qatar, the information presented is too brief. Unlike the well-referenced Part One there are no citations in the tables or text, so the reader is left without direction to follow the literature. Some of the Qatar phytochemistry is discussed in Part One, but, except for the results of general survey studies, it is not easily identifiable among all of the other information. Errors and misprints were probably average for a book of this nature. It would have been convenient for the reader to have photograph captions list the page of text where each taxon is discussed, and photographs should have been cited in the text. The title fails to describe clearly the contents of this book. Consequently, potential readers searching for phytochemical reviews may pass it by.

For most scientists interested in plant chemistry, this book has value as a good reference for rapid and easy access to phytochemical data and literature for a large number of taxa. Although it would be useful in a personal phytochemical library, it is not a necessity. A copy in the libraries of academic institutions and pharmaceutical companies should be adequate.

RICK G. KELSEY, *Oregon State University*

Proceedings of International Symposium on Medicinal and Aromatic Plants. Edited by R.S. THAKUR, AKHTAR HUSAIN, O.P. VIRMANI, RAKESH TEWARI. Central Institute of Medicinal and Aromatic Plants, Lucknow, India, 1983, 213 pp., 16.5×23.5 cm., $15 (paper).

This recently published but undated paperback volume gives the text of the invited lectures at an International Symposium on Medicinal and Aromatic Plants held in Lucknow, India, December 26-28, 1983. The proceedings consisted of 18 lectures primarily on the isolation of new natural products but with some coverage of synthesis and biosynthesis of natural products. The majority of the authors were from India; other countries represented include Hong Kong, Australia, South Korea, Japan, West Germany, and Pakistan.

Modern NMR Techniques for Chemistry Research. ANDREW E. DEROME. Pergamon Press, Maxwell House, Fairview Park, Elmsford, NY 10523, 1987, vii+280 pp., 21×29.5 cm., $35 (flexicover), $70 (hardcover).

This volume is directed to the student or mature chemist who wishes to acquire a practical working background in modern pulse nmr FT spectroscopy. Chapter One covers briefly the scope of the text and a description of the spectrometer. Chapter Two gets more deeply into conventional 1-D nmr with a nonmathematical description of instrument and computer variables important in spectral acquistion. Chapter Three covers basic experimental methods, while Four describes the behavior of spin systems during the pulse sequence. Chapter Five is on spin relaxation and the nuclear Overhauser effect. Chapter Six lays the

background for what is to come with a discussion of polarization transfer and spectral editing. The final four chapters continue into the subject of 2-D nmr with most of the latest techniques mentioned, if not discussed in detail.

Throughout the book the prose style is that of a lecture. The behavior of spin systems in the rotating frame are verbally described with the aid of vector diagrams. Very few equations appear. Various techniques are often illustrated with real examples. The spectra used in these illustrations are excellently reproduced on a suitably large scale. There is a lot of "How to do it and what you get as a result" in this volume.

This text does not treat the subjects of spectral analysis nor the correlations of nmr parameters with molecular structure, but these are subjects well covered elsewhere. For the person who is starting to learn how to do nmr or who must converse intelligently with technicians who will perform the experiments, this book is a real boon. I feel that any natural product chemist who presently might be limited to only one book on modern nmr could do no better than what is offered here.

WILLIAM B. SMITH, *Texas Christian University*

Herbs, Spices, and Medicinal Plants: Recent Advances in Botany, Horticulture, and Pharmacology, Volume 2. Edited by L.E. CRAKER and J.E. SIMON. Oryx Press, 2214 North Central at Encanto, Phoenix, AZ 85004, 1987, xii+255 pp., 15.5×23.5 cm., $65.

This book represents the second volume of a new annual review series. It has maintained the quality and diversity of the initial volume, although the individual articles still vary considerably in depth and focus.

The volume consists of six articles entitled: "Pharmacologically Active Substances of Chinese Traditional and Herbal Medicines", "The Alkaloids of the *Papaver* Section *Oxytona* Bernh.", "Botanical Characteristics of Ginseng", "Synergism and Antagonism in the Pharmacology of Alkaloidal Plants", "Vegetative Propagation of Aromatic Plants of the Mediterranean Region", and "Botanical Nomenclature of Commercial Sources of Essential Oils, Concretes, and Absolutes." The first article, unfortunately, contains many textual errors and a general lack of toxicity data but presents pharmacologic data on over one hundred compounds referenced almost exclusively to Chinese literature. The 241 references cited are not readily available to most Western scientists and constitute a valuable insight into these many interesting compounds. The second article is an excellent, in depth summary, of a very active field of research by authors intimately involved in the area. Theuns, Janssen, and Salemink accurately describe the botany, alkaloid profiles, and current knowledge of alkaloid biogenesis in *Papaver* Section *Oxytona* Bernh. A brief summary of tissue culture work on the section is also included. The contributions on Ginseng and aromatic plants of the Mediterranean region, encompassing about fifty pages, will perhaps be of least interest to most readers. They are quite superficial insofar as chemical, pharmacologic, or toxicologic data is concerned. Perhaps one of the most intriguing articles is that on alkaloid synergism and antagonism. Conceived and prepared originally by Professor Izaddoost of the University of Tehran, the final version was the responsibility of T. Robinson (U. Mass). (Contact with Professor Izaddoost has, unfortunately, been lost). The authors attempt to explain the complexity of the pharmacologic action of crude plant products based on the individual activities of their known compounds. Though general in scope, the seven examples presented provide enough information for many hours of discussion. The final contribution continues the botanical nomenclature list begun in volume one and constitutes a valuable denotation not available elsewhere.

The editors should be commended for their efforts in attempting to bring together such a broad array of information. It is this reviewer's opinion, however, that readers of this series would be better served if the editors would either narrow the focus of each volume or stress one desired area of the series exclusively in separate volumes. This volume can be recommended as a reference for libraries, but its inconsistency of depth and focus, not to mention its price, would make it desirable to few natural products scientists.

ROBERT J. KRUEGER, *Ferris State College*

Mycotoxins and Phycotoxins. Edited by P.S. STEYN and R. VLEGGAAR, Elsevier Science Publishing Co., 52 Vanderbilt Avenue, New York, NY 10017, 1986, 545 pp., 24×16.5 cm., $120.25.

This book, which is designated as volume 1 of a series called Bioactive Molecules, is a compilation of invited papers presented at the Sixth International IUPAC Symposium on Mycotoxins and Phycotoxins, held in Pretoria, Republic of South Africa, July 1985.

The forty-six presented papers commence with the keynote address of C.W. Hesseltine on The Global Importance of Mycotoxins and continue through microbiology, fungal genetics and biosynthesis, structural chemistry, synthesis of toxins, analysis of toxins, their biochemical mechanism of action, and the role of mycotoxins in human and animal health. Biosynthetic papers of interest to the natural product chemist include those of H. Seto (metabolites containing a carbon-phosphorous bond, such as the peptide bialaphos), T.J. Simpson (polyketide chain assembly), J.C. Vederas (use of multiple stable isotope labelling and NMR spectroscopy in biosynthetic studies), and L.O. Zamir (3-acetyldeoxynivalenol). Synthetic aspects of mycotoxin research are represented by the work of N. Isobe (synthesis of okadaic acid), T. Suami (corynetoxin and tunicamycins), and C.W. Holzapfel (cyclopiazonic acids and viridamine). Several contributions in the field of isolation and structural elucidation, including the work of D.P. Botes on the cyanoginosins, R.D. Plattner on mass spectrometry/mass spectrometry as a tool for mycotoxin analysis, and two papers from the Canadian Mycotoxin Program on *Fusarium* metabolites are presented. Chemists may well find some of the papers with a biological emphasis of considerable interest also, such as the paper of A.A. Stark on the molecular aspects of aflatoxin B_1 mutagenesis and carcinogenesis and that of D.P.H. Hsieh on the role of aflatoxin in human cancer. Unfortunately, the lectures by the plenary speakers who included C.H. Tamm, C.A. Townsend, G. Buchi, R. Vleggaar, Y. Shimizu, and R.E. Moore were not included in this volume but were published separately in the January 1986 issue of *Pure and Applied Chemistry*.

The book was assembled from camera-ready manuscripts and, hence, is somewhat uneven in type quality, but, on the whole, the print is easy to read, and the figures and schemes are very legible. It is well worth a browse by those with a particular interest in the mycotoxin area, although the price will discourage most private buyers.

CONSTANCE M. HARRIS and THOMAS M. HARRIS, *Vanderbilt University*

Continued from back cover

BRIEF REPORTS