Journal of Natural Products
Vol. 49, No. 5, pp. 951-956, Sep-Oct 1986

BOOK REVIEWS

Amino Acids and Peptides. Edited by J.S. DAVIES. Chapman and Hall Ltd., New York, and London, 1985, ix+430 pp., 21×27.5 cm., $69.95 (paper).

The fifth edition of the Dictionary of Organic Compounds, published in 1982, is a comprehensive multivolume work listing key information about a wide variety of organic compounds. Although it is not a substitute for a thorough literature search, this reviewer has made frequent use of the copy in the University Library as a means of obtaining a quick survey of key information on a compound of interest. The cost of the Dictionary, however, puts a personal copy beyond the reach of all but the most affluent individuals. It is thus a welcome concept on the part of the publishers to produce individual volumes on specialized groups of compounds from the Dictionary. The volume in hand contains the entries of all the amino acids and peptides from the 1982 work but has also been updated to include more recent references (several 1983 references were noted). The definition of the title compounds is a catholic one and includes peptide alkaloids, peptide antibiotics, and the β-lactam antibiotics. The volume will thus be of real value to a large number of researchers working in the general area of amino acids and peptides, and its relatively modest price by today's standards ensures that many will be able to own their personal copy.

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

Tables of Spectral Data for Structure Determination of Organic Compounds. E. PRETSCH, J. SEIBL, W. SIMON, and T. CLERC. Translated by: K. BIEMAN. Springer-Verlag, New York, NY, 1983. Paginated irregularly, 16.5×24 cm., $14.40.

This book presents a collection of spectral data used in the authors' courses at the Swiss Federal Institute of Technology, and translated, significantly, by an eminent practitioner of spectroscopy. The contents are almost exclusively tables, organized in six groups.

The first section presents four charts of spectral absorption ranges—proton and carbon-13 chemical shifts, ultraviolet and infrared frequencies—with associated structural types. These are followed by tables in the inverse form, grouped by various structural types with broad outlines of their spectral characteristics and references to more specific tables. The paired grouping allows the user to make preliminary guesses from a spectrum using the first set of tables, then consult the second for information on complementary spectra and specific references to the more detailed tables which follow.

The following five sections present detailed tabulation of proton and carbon-13 chemical shifts, coupling constants, infrared and ultraviolet absorption frequencies, and mass spectral fragmentation patterns. Tables of additivity increments are accompanied by examples of their use in estimating chemical shifts. Spectra of common solvents and frequently encountered contaminants provide further aid in interpreting spectra. There is an adequate index.

This volume will greatly aid the student working through exercises in identifying unknowns and will remain at the bench as a valued reference as he continues research. Its value as a reference would be enhanced if the bibliography of nineteen references were much expanded and annotated, but its wide utility and the very reasonable price assure that it will be at hand at many benches.

ROBERT J. HIGHET, *National Institutes of Health*

Carbon-Carbon and Carbon-Proton NMR Coupling. JAMES L. MARSHALL. Verlag Chemie International, Deerfield Beach, Florida, 1983. 241 pp., 16×24 cm., $49.95.

In the past five years, several very powerful techniques for measuring $^{13}C,H$ and $^{13}C,^{13}C$ coupling constants have been developed. This, together with the now common practice of using ^{13}C-labeled intermediates for studies of biosynthetic pathways, has stimulated considerable interest in the use of these parameters in structural analysis and, particularly, in stereochemical and conformational analysis. The appearance of this monograph is, therefore, quite timely.

The audience which this book addresses consists of mainstream organic chemists, such as natural product chemists, and the author has, therefore, correctly chosen to approach the subject matter in a purely empirical fashion, e.g., extensive tables of data which appear to be comprehensive at the date of publication are presented.

Since most practicing organic chemists are much more familiar with the theories of $^{1}H,^{1}H$ coupling constants, Marshall begins his treatment of $^{13}C,H$ coupling with a comparison of the two interactions. The organic chemist will be encouraged to learn that old friends such as the Karplus relation re-emerge virtualy unscathed. The used of $J^{13}C,H$ in conformational and stereochemical analysis are then liberally illustrated by examples.

$^{13}C^{13}C$ coupling is covered in two chapters, aliphatic and π systems being covered separately. Although fewer data are available for these vicinal coupling constants, the Karplus type dependence of ^{3}J on dihedral angles is established for a variety of systems. The section on π systems has comparatively little to do with conformational and stereochemical analysis. Nevertheless, the natural product chemist will find this chapter particularly valuable as a source of data for geminal, vicinal, and long range interactions in aromatic systems.

Chapter 5 is mainly of interest to the nmr spectroscopist, since it deals with signs of couplings which are generally only extracted from spectra by analysis of second order systems or by selective double irradiation experiments. At the end of this chapter, the author returns to the correlation between H,H; C,H; and C,C coupling constants.

The last chapter illustrates the role of $^{13}C,^{13}C$ coupling constants in biosynthetic studies using ^{13}C labelled precursors.

The entire book is very clearly written, well referenced, and well indexed. One might think that a work which is clearly packed with many data would simply be a reference source. One can, however, commend the text to organic chemists, particularly natural product chemists. After working through the discussion and examples, many readers will recognize situations in which they can profitably apply the principles presented. Anyone who makes extensive, empirical use of nmr in organic chemistry will find it useful to have this book in his private library.

LLOYD M. JACKMAN, *The Pennsylvania State University*

Progress in Flavour Research 1984. J ADDA, Editor. Elsevier Science Publishers, P.O. Box 330, 1000 AH Amsterdam, The Netherlands, 1985. xiv+634 pp., 17×25 cm., $126.

This book contains 52 research/review papers and a summarizing paper, the Proceedings of the 4th Weurman Flavor Research Symposium, Dourdan, France, May 9-11, 1984. Overall, the book contains relatively little of interest to the natural products chemist. About one-third of the papers describe the design and application of "sensory analysis" techniques for measuring and interpreting the responses of human subjects to flavor stimuli. A few papers deal with special laboratory techniques such as dynamic headspace analysis of chemical ionization mass spectrometry. Most of the remaining papers describe attempts to correlate sensory and chemical data in a variety of fresh and processed foods, with goals such as defining acceptability of or identifying chemical components responsible for the characteristic flavor or for off-odors. Extensive data on the qualitative and quantitative composition of the volatile components of the foods were obtained as part of these correlation studies. The techniques employed and the information on chemical composition of particular food materials could be of interest to the natural product chemist. For example, there are many descriptions of separations, including separations of stereoisomers, via gas chromatography on the newer fused silica, bonded-phase columns. Also, recent developments in identification methods are well described, especially the expanding use of chemical ionization mass spectrometry and the greatly expanded use of computer technology to expedite identification. The volume contains extensive data on the volatile constituents of a variety of unprocessed foods: mushrooms, tropical fruits (cherimoya, passion fruit, guava, litchi, mango, star fruit, and papaya), edible algae, *Vaccinum* and *Rubus* berries, lemon balm (*Melissa officinalis* L.), grapes, capsicum, and black pepper.

The book concludes with a lengthy summarizing chapter by D.G. Land. Land does an excellent job of summing up the state of the art in flavor research, with special reference to the research described in this book. Land's comments can be used (in lieu of an index) to locate papers which discuss particular aspects of interest, such as isolation, separation, or identification.

JAMES K. PALMER, *Virginia Polytechnic Institute and State University*

Pakistan Encyclopaedia Planta Medica. Volume 1. HAMDARD FOUNDATION PAKISTAN and H.E.J. RESEARCH INSTITUTE OF CHEMISTRY. Hamdard Foundation Press, Karachi, Pakistan, 1986. v+373 pp., 25×18½ cm., $50.

This compendium is the fruit of a joint effort by the H.E.J. Research Institute of Chemistry in Karachi, as represented by Professors Atta-ur-Rahman and Viqar Uddin Ahmad, as well as several of their professional colleagues, and Dr. Hakim Mohammed Said of the Hamdard Foundation. A massive effort has been made to compile the pharmacological data relating to the Pakistani flora. The work is arranged in alphabetical order on the basis of plant names (genus and species). Each plant is cited by its full botanical name, and its local or common name and geographical occurrence are given. A very detailed listing of its chemical constituents follows. This is supplemented by a thorough cataloging of pharmacological activity and uses in indigenous medicine. The whole is then complemented by an exhaustive set of references.

The scope of the work is so encyclopedic that the present Volume I covers only 94 of the 217 medicinal plants of Pakistan whose names start with the letter A. Some 5,000 references to the original literature have been quoted. Work on the remaining plants of the A series has apparently also been completed, and the volumes relating to them are scheduled to appear within the next few months.

There is no doubt that this series of volumes will greatly stimulate work on the biologically active plants of Pakistan. Natural product chemists and pharmacologists will now have a single work to which they can refere to obtain all the necessary information relating to the Pakistani flora in terms of plant location, chemical content, pharmacological activity, and uses in native medicine.

It is only to be hoped that the authors will continue to find the diligence and dedication which will be abundantly required to bring this large undertaking to complete fruition. It would also be desirable, in view of the herculean effort expended, that once the series is completed, arrangements be made for the publication of addenda at regular intervals to keep the data complete and up to date.

MAURICE SHAMMA, *The Pennsylvania State University*

Organic Synthesis: Concepts, Methods, Starting Materials. JÜRGEN FUHRHOP and GUSTAV PENZLIN. Verlag Chemie GmbH, D-9640 Weinheim, 1983. xi+355 pp., 17.5×24.5 cm., $39.

This book is aimed at the "advanced chemistry student" and the "research chemist." It proposes to teach organic synthesis and contains a wealth of information under the headings: (1) synthons in the synthesis of carbon chains and carbocycles, (2) selective functional group interconversions (FGIs), (3) retrosynthetic analysis of simple organic molecules, and (4) methods in the construction of complex molecules. I found it an interesting resource book but difficult to read as it is made up of so many weakly connected fragments with a tendency for reasoned analysis to deteriorate into lists of facts.

The first chapter starts promisingly with reagents for d^1 to d^6 synthons, but later parts (synthesis of alkenes, alcohols, and carbohydrates) do not use these concepts. The second chapter catalogs reductions, oxidations, and the formation of carbon-heteroatom bonds. There is a helpful emphasis on the selectivity of each reaction and some useful tables, but the ideas are not developed: e.g., FGIs are not distinguished from synthetic operations which form new bonds, and FGIs which may cause umpolung are not described in synthon terms.

The third chapter starts with 20 pages of lists of available starting materials classified by functionality—a unique feature which will endear this book to many students. A few examples of disconnections ("antithesis") follow in a rather anecdotal fashion, but this is the part with the best flow. Unfortunately, some of the examples of "complex" molecules chosen for the last chapter (oligonucleotides, peptides, porphyrins) are specialized in that the starting materials are known (nucleotides, amino acids, pyrroles). Other more conceptually demanding classes (PGs, alkaloids) follow, but even here the synthon approach is not followed, each synthesis being described without any retrosynthetic analysis.

This is a book packed with information, and almost every page contains some interesting chemistry. The tables are very valuable. My reservations are based on the formal approach with insight being replaced by definition and a lack of conviction in that concepts are introduced and then not used. The reader is left with a lot of work to do. If you are prepared to make the effort, you will find this a useful volume.

STUART WARREN, *University of Cambridge, England*

The Alkaloids, Volume 26. Edited by ARNOLD BROSSI. Academic Press Inc., Orlando, Florida 32887, 1985. xi+401 pp., 23.5×16 cm., $95.

Universally recognized by natural product chemists as the most authoritative treatise on alkaloids, this series, started by the late Profesor R.H.F. Manske in 1950, continues to flourish under the dynamic editorial leadership of Arnold Brossi.

Volume 26 in the series meets or exceeds all the previous standards established for this series, containing as it does seven chapters by outstanding authors on a diverse array of alkaloid structure types. Dr. H.P. Husson of CNRS, Gif-sur-Yvette, discusses the simple indole alkaloids, including those containing the β-carboline and carbazole nuclei. Dr. J. Wróbel of the University of Warsaw discusses the sulfur containing alkaloids. In this group it is gratifying to see the inclusion of the many fungal derived alkaloids which contain sulfur, such as the gliotoxins, the chaetocins, and the sporidesmins. Dr. G.M. Struntz and Dr. J.A. Findlay from the University of New Brunswick and the Canadian Forestry Service discuss pyridine and piperidine alkaloids. This is a particularly diverse group biosynthetically with origins from acetate, amino acids, mevalonic acid, and nicotinic acid all possible, and, indeed, this is the longest chapter in the volume. Dr. V. Šimánek from Palacký University, Czechoslovakia, has reviewed the benzophenanthridine alkaloids, an area of recent substantial synthetic interest, and Dr. D.B. MacLean from McMaster University, Canada, has reviewed those most complex of the saturated polycyclic alkaloids, those of *Lycopodium* species.

Many alkaloids are derived from amino acids, and there is, perhaps not surprisingly, a substantial, chemotaxonomically and chemically, interesting group of peptide alkaloids which is receiving increasing attention. These are reviewed by Dr. U. Schmidt and Dr. A. Lieberknecht of the University of Stuttgart and E. Haslinger of the University of Vienna. Finally, Dr. J. Wróbel has undertaken to review the pyrrolizidine alkaloids, including their structure elucidation, synthesis, and toxicity.

High costs apparently prohibit the publisher from typesetting the structures, and so these are provided by the authors. However, there is good quality control, and even though they are stylistically different, each series of diagrams is extremely readable. Coverage in each subject area is typically to 1984 with a few references into 1985. Since many of these areas have not been reviwed in this series for ten years or more, these chapters are most welcome.

Two new features in this volume of *The Alkaloids* are a cumulative author index and, more importantly, a cumulative alkaloid type index. The latter is especially useful when trying to research the history of particular alkaloid groups and should prove attractive to devotees.

Anyone who has started collecting *The Alkaloids*, and that includes libraries and individual natural product chemists, does not need to be persuaded about the virtues of the series. They are already "hooked" on these, the most important, detailed resource books on alkaloids available. For anyone who is on the verge of becoming an alkaloid chemist, or who wishes to begin to understand the fascination and vibrancy of this field, this is a great place to get your feet wet. The authors and the editor are to be roundly commended for their efforts in continuing to maintain the standards set previously for detailed coverage of "Alkaloids" according to the most liberal definition.

GEOFFREY A. CORDELL, *University of Illinois at Chicago*

Practical Organic Mass Spectrometry. J.R. CHAPMAN. Wiley Interscience, John Wiley and Sons, Inc., 605 Third Avenue, New York, NY 10158, 1985. xi+197 pp., 23×15.5 cm., $34.95.

Introductory texts on mass spectrometry appear in cycles of about five years duration, and this book by Chapman appears in concert with those by J.T. Watson and G.M. Message, following the previous series of texts by K. Levsen, Howe, Williams, and Bowen, and B.J. Millard. One advantage of the latest cycle, and of this text, is the treatment of ionization methods available to the mass spectroscopist. Rather than yet another review of electron and chemical ionization, and a short addendum about the "other" techniques, the processes of desorption ionization (fast atom bombardment, laser desorption, plasma desorption, and secondary ion mass spectrometry) are afforded equal stature in description and explanation. Unfortunately, the various techniques of nebulization ionization (electrohydrodynamic ionization, liquid ionization, and thermospray ionization mass spectrometry) have not been provided an equivalent treatment, as the sparse description provided is relegated to a subsection of liquid chromatography/mass spectrometry. In reality, the application of these methods for discrete sample introduction is among the most interesting recent work. Chapman has incorporated a lengthy discussion of field desorption, although in the preface he describes it as no longer a preeminent technique, because the discussion of FD mechanisms provides valuable background material for the other desoprtion ionization techniques. While fundamentally true, this extensive treatment of FD is somewhat at odds with the stated aim of a "practical guide" to the use and utility of ionization and operating techniques. It may have been more generally useful to expand upon the mechanisms of energy deposition in solids and liquids which underlie all of these methods. The inclusion of

the Beuhler/Friedman plot for competitive decomposition and vaporization processes is commendable and would have made an excellent starting point for such a discussion.

Chapters 1 deals with the instrumentation of organic mass spectrometry in a straightforward manner, stepping through the generic electron ionization source, magnetic sectors, double-focussing mass spectrometers, and the quadrupole mass analyzer. Conspicuous by its absence is a discussion of the time-of-flight mass analyzer, the exclusive mass analyzer for plasma desorption, and the dominant analyzer for laser desorption mass spectrometry. Fourier transform mass spectrometry also receives no coverage despite the growing success of this instrument for general analytical purposes. Similarly, the subject of sample introduction is covered moderately well, concentrating on chromatographic systems rather than the direct insertion probe systems. A few pages are spent summarizing EPA protocols for general purpose tests of instrument performance. While useful, their description in a general introductory text seems out of place.

Chapters 3 and 4 provide the best descriptions of positive and negative ion chemical ionization to be found in any introductory text; these chapters occupy a full 30% of the text. Unfortunately, the chapter on negative ionization continues the general practice of grouping electron capture mechanisms with true reagent ion/molecule collision processes. This lack of a strong distinction has led to much confusion in the past and will undoubtedly do so in the future. The result is the failure to realize the parallels in mechanisms and response between the electron capture source in mass spectrometry and the electron capture detector used in gas chromatography. Electrophoric derivatization is thus a technique that transfers directly to mass spectrometry, and many research groups use these procedures to advantage. The summary of applications, which is excellent for positive chemical ionization, is somewhat truncated for negative ion work as none of this work is included.

Considering the rapidly growing area of mass spectrometry/mass spectrometry, the coverage offered here is not sufficient. Strangely, neither "ms/ms" nor "tandem mass spectrometry" appear as terms in text or index, although these would surely be the starting points of a search by a novice mass spectrometrist. The discussion centers on the reactions of metastable ions, continuing such through the descriptions of instrumentation, experiments, and applications. Collision induced dissociation, although in predominant use, is introduced as an aside rather than as the central process which anchors the analytical uses. Those seeking a more up-to-date approach must refer to McLafferty's recent text or several other forthcoming texts.

This book is remarkably free of typographical errors but is not as polished as might be desired. An editor might have spared us mass spectra that "vary very much" (p. 40) or compounds that are "chromatographcally easy" (p. 30). Finishing touches might have standardized the appearance of the mass spectra which are either unlabelled on the X-axis, or labelled as mass, m/e, m/z, M/Z, mass number, M/E, or mass (amu). At least, the Y-axis varies only between nothing at all, relative intensity, and relative abundance. More importantly, in a book published in 1985, the purchaser has the right to expect up-to-date references. More than anything else, this fact alone may limit the suitability of this book as a text for introductory courses. In the chapter references (a total of 476 references), three (!) are from early 1984, and only 30 from 1983. Up-to-date coverage of the literature would be a necessary supplement to the use of this text in a mass spectrometry laboratory or course. The extent of coverage is sufficiently broad for such use, and other texts in interpretation, quantitation, or ms/ms can bridge the gaps in depth.

KENNETH L. BUSCH, *Indiana University*

Methods of Vitamin Assay, 4th Edition. J. AUGUSTIN, B.P. KLEIN, and P.B. VENUGOPAL. John Wiley and Sons, Inc., 1 Wiley Dr., Somerset, NJ 08873, 1985. ix+590 pp., 16×24 cm ., $97.50.

The Association of Vitamin Chemists, the editors, and contributors have provided a timely and valuable service by publishing the 4th edition of this classic reference on methods of vitamin analysis. The new edition has been revised and expanded to cover the application of modern analytical techniques, such as high performance liquid chromatography, radioassay, and automated analysis systems in vitamin analysis. The book is well organized and provides a wealth of information required for the analysis of such diverse molecules classified as vitamins.

The first chapter outlines a very valuable and balanced discussion of problems, factors, strategies, and approaches to be considered in selection or development of analytical methods, as well as in evaluation and validation of such methods. Chapters 2-6 are general in nature and cover in detail the principles and different aspects of biological assays, microbiological assays, chromatographic assays, automated analysis, and sampling. These chapters are comprehensive, well written, and reasonably up to date. The rest of the book (chapters 7-22) is arranged in a traditional manner with a separate chapter provided for each vitamin.

A uniform format is used in the discussion of each vitamin and is presented under three main headings which vary in length and content as deemed necessary by individual contributors. The heading on general considerations covers the various aspects related to the vitamin structure, forms, isomers, sources, and stability. In some cases the metabolism, metabolic functions, nutrition, and other technical aspects are discussed. Under the heading on methods available, almost all the methods and procedures in current use are discussed, as well as their limitations and applicability to analyze various types of products, such as feeds, foods, pharmaceuticals, and biological specimens. The heading on analytical methodology provides detailed, step-by-step descriptions of one or more procedures that can be followed easily. Plenty of references are provided at the end of each chapter to allow any reader to pursue in depth any specific area of interest.

In summary, this specialized book on methods of vitamin assay is much more than a collection of recipes. It provides a wealth of background and pertinent information, and, in many instances, offers the analyst alternative methods that include many of the most recent analytical techniques. It is clearly written, well produced, and easy to read, as well as a remarkably good value for the money. This book is a must for those working in the field of vitamin analysis.

ABDEL M. SOLIMAN, *Atlanta Center for Nutrient Analysis, FDA*

Biotechnology of Marine Polysaccharides. RITA A. COLWELL, E.R. RARISER, and ANTHONY J. SINSKEY. Hemipshere Publishing Corporation, 79 Madison Avenue, New York, NY 10016, 1984. XI+559 pp., 24×15.5 cm., $79.95.

This book contains some chapters that are, in essence, reports on funded projects. There is much overlapping of subject matter, and a rather unorganized or disjointed treatment of subject matter, some in a superficial manner. There is much discussion of non-marine polysaccharides, which does not appear pertinent. In some chapters marine polysaccharides are hardly touched upon.

The general structures of carrageenan polysaccharides are well developed. Adhesion of polysaccharides and of glycoproteins to solid structures is discussed, and the effect of polymers on ship drag has extensive treatment, covering five chapters. A short discussion of enhanced oil recovery is present, but no marine polysaccharides are used in this application; therefore, non-marine polysaccharides are described briefly in two chapters. Heparin is obtainable from fish and, as a possible marine product, is discussed in several short chapters.

The book is useful for a quick review of carbohydrate-containing polymers from various marine sources and a view of some of their properties.

ROY L. WHISTLER, *Purdue University*

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BRIEF REPORTS