

Book Reviews

Chemistry of Fragrant Substances. Paul Jose Teisseire. VCH Publishers, Inc., New York, NY. 1994. vi + 458 pp. 155 × 23.5 cm. \$125.00. ISBN 1-56081-610-4.

This book reviews the chemistry of fragrant compounds with major emphasis on the biogenesis and synthesis of the various skeletal types of mono- and sesquiterpenes that are of importance as natural odorants. The first chapter presents highlights of the history of perfumery from the time of ancient civilizations to the modern industrial syntheses of natural terpenoids and other synthetic fragrant materials. The second chapter gives a brief review of the nomenclature of major skeletal types of mono- and sesquiterpenes followed by a series of reactions and mechanisms important in synthetic monoterpene transformations. Chapter 3 summarizes classical and modern synthetic transformations of key monoterpene odorants starting from α - and β -pinene, and Chapter 4 reviews the total syntheses of aliphatic terpenoids, which are principal substrates in the perfumery industry. The following chapter first covers the biogenesis of various skeletal types of sesquiterpenes and concludes with a series of synthetic and biomimetic transformations of selected sesquiterpenes. Chapter 6 is mainly dedicated to medium-ring sesquiterpenes including germacrenes, humulenes, and their major cyclization products. A series of examples on biomimetic transformations are provided to support biogenetic proposals. The data demonstrate the unique position of the germacradienes as key intermediates to a variety of other major skeletal types of sesquiterpenes, including sesquiterpene lactones. It is unfortunate that the author gives key references on sesquiterpene lactones only until 1973; the last major citation is the book by Yoshioka, Mabry, and Timmermann (only the first two authors are cited in the bibliography on page 448). Examples of standard total syntheses including the classic terpene syntheses from Professor Corey's laboratory follow. The chapter concludes by outlining the biogenetic principles and synthetic approaches leading to the 14-membered diterpene cembrene and its derivatives. The main body of the book concludes with a chapter on substances with a musk odor, summarizing the key synthetic approaches in the preparation of macrocycles. Furthermore, a series of aromatic nitro and non-nitro musks are discussed.

The volume contains an Appendix section that includes a short treatment of the concepts of prochirality, mechanistic aspects of the Wittig reaction, the chemistry of enol ethers, the functionalization of unactivated carbon atoms, methods for identification of natural and synthetic organic compounds, and some physicochemical methods used in the analysis of natural odorant products. With the exception of the latter two topics, which are related to the main theme of the book, this is an odd assortment of topics. Why, for example, are the principles of prochirality and the mechanism of the Wittig reaction included?

In spite of much useful information, one is left with the impression that the book lacks structure, organization and most importantly, editorial attention, in particular in the Bibliography. This section is filled with many typographical errors. Just one example: on page 439, the widely known standard reference by Professor Hegnauer is cited under O as "Ohemotaxonomie der Pflanzen", publisher Birkhäuser Verlag. It is very disconcerting to be charged \$125.00 for a product that lacks the quality one would expect for a book of such high cost.

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Encyclopedia of Common Natural Ingredients Used in Food, Drugs, and Cosmetics, Second Edition. By Albert Y. Leung (Consultant, Natural Products) and Steven Foster (Consultant, Medicinal and Aromatic Plants). John Wiley & Sons, New York, NY. 1996. xxxviii + 649 pp. 17.5 × 25 cm. \$150.00. ISBN 0-532-42154-5.

The second edition of this useful reference work is most welcome, having arrived just in time to replace a thoroughly dog-eared copy of the 1980 first edition. Still arranged in monographic fashion, this revision is nevertheless greatly expanded to include detailed information on about 500 herbs and related products. The individual monographs are comprehensive with classifications ranging from nomenclature to biological activity to preparations and uses. A new category "Health Foods/Herbal Teas" is included in each monograph.

An entirely new 21-product section, "Chinese Cosmetic Ingredients", follows the regular monographs. This title is somewhat deceptive because it is used to designate any material used externally for a wide variety of conditions spanning the alphabet from acne to wounds. "Cosmetic" is an inadequate term to describe this usage.

The book often fails to differentiate clearly between proven and unproven biological or therapeutic effects. For example, in mid-monograph damiana "is widely believed to have aphrodisiac properties," but not until the very last line of the writeup does one find that its "claimed efficacy is unproven." A more confusing example occurs with goldenseal. Some 28 indications ranging from dandruff to cancer are designated as traditional uses, but nowhere does one find a definitive statement regarding the validity of employment for any of them.

Dong quai (danggui), or Chinese angelica, a best-selling herb in the United States, is, somewhat surprisingly, not separately monographed. It is briefly mentioned in the angelica monograph where it is said to have a reputation in China second only to ginseng. Because the Western scientific and clinical literature stands nearly mute on dong quai, omission of a review of the Chinese studies of it was disappointing.

Inclusion in the same monograph of both Chinese and Western traditional uses of botanicals seems inappropriate. The principles of Chinese medicine with its reliance on sphygmology and tongue colors for diagnosis and "correspondences," ying-yang dualism, and chi flow to define states of health are so different philosophically from Western medicine as to preclude direct comparison. Then, too, in Chinese practice, herbs are almost never used singly, so evaluation is extremely difficult. Relegation of the Chinese information to an entirely separate section of the book would have overcome this problem.

Although German Commission E conclusions are provided in appropriate cases, lack of a definitive assessment of utility for each of the herbs based on the voluminous literature consulted by the authors is the most serious deficiency of this compilation. Reference books are most useful when they draw conclusions, not just chronicle data. Aside from this omission, the book is a most useful one. It is well-presented by the publisher and sturdily bound. It needs to be, because it will be frequently consulted as a valuable information source in the libraries of all those interested in natural products.

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Taxane Anticancer Agents—Basic Science and Current Status.

Edited by Gunda I. Georg (University of Kansas), Thomas T. Chen (University of Tennessee), Iwao Ojima (State University of New York at Stony Brook), and Dolatrai M. Vyas (Bristol-Myers Squibb). ACS Symposium Series 583. American Chemical Society, Washington, DC. 1995. xiii + 353 pp. 15 × 22.5 cm. \$99.95. ISBN 0-8412-3073-0.

The early years of paclitaxel, more widely known as taxol, are described in this book by authors who were themselves heavily involved with the development of this drug. You will find chapters on its history and early difficulties, its biological sources and biosynthesis, its structure–activity relationships and biochemistry, its synthesis and semisynthesis, and ultimately its clinical successes. The chapters are well written and illustrated by authors with individual styles. It is difficult to criticize the collected efforts of those, who for the most part, are summarizing their own published work; nevertheless, I believe the book could have been strengthened by a few inclusions.

a. In some cases, related information is spread over several chapters, for example, structure–activity relationships and synthetic approaches. An overview summarizing the conclusions of several authors and pointing out the strengths and weaknesses of each study would have been helpful for those who are less versed in this area.

b. More biosynthetic information existed on these compounds than is described, and a more thorough coverage of that topic would have been appropriate.

c. A summary of the purification routes and the methods of structure identification of this class of compounds would have been helpful. In addition, an outline of the various strategies to source paclitaxel would have been valuable.

d. I was disappointed that the contributions of Hauser Chemical Research were overlooked. It was Hauser's raw material sourcing ability and commercial purification skill that provided high purity paclitaxel under contract to both the National Cancer Institute and Bristol-Myers Squibb from 1989 to 1994. Their efforts converted an interesting laboratory curiosity into a hundreds of kilos commercial reality and thoroughly debunked the continuing myth that there is insufficient *Taxus* bark available and that taxol is too difficult to isolate from a natural source.

One soon realizes that this is only an interim report on paclitaxel, and we will have to wait a few more years until the full story can be written. Nevertheless, it is an interesting case study of how numerous governmental agencies, companies, and universities have used an arsenal of modern tools and techniques to bring this important drug to the market in record time. I am unaware of an example where so much detail is in the public literature.

If you do not know about this story or the participants, then this book is an excellent place to start. If you need specific details of this complex story or if you desire an in-depth look at some specific area then this is an excellent reference.

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Organic Reactions: Simplicity & Logic.

Pierre Laszlo (Ecole Polytechnique, Palaiseau, France). John Wiley & Sons, Inc., New York, NY. 1995. xx + 696 pp. 18.5 × 24.5 cm. \$39.95. ISBN 0-471-95278-8.

This text evolved from course notes for an organic chemistry course originally taught at Ecole Polytechnique in France. The author describes Ecole Polytechnique as a cross between West Point and MIT. The course was aimed at constructing a logical and integrated framework of organic chemistry, illustrated by a selection of important reactions, but without the intent of comprehensive coverage.

The current text is a paperback consisting of many structural formulas and diagrams interspersed with

text. A few leading references are given in each section. After a brief review of bonding theory and its relation to chemical thermodynamics, the book is organized in several large sections: carbonyl chemistry; selectivity (chemo, regio, stereo); protecting groups; activation (relating transition state theory to reactivity); ring forming reactions; functional group transformations (substitution, oxidation, reduction, addition elimination, Wittig reactions, rearrangements); and synthons and retrosynthesis. The book also contains occasional interesting anecdotal and historical material that relates to the chemical topic at hand.

Because the diagrams are large and there is a fair amount of open space to keep the text aligned with the diagrams, the amount of text is not as much as the length of the book might suggest. The text is, for the most part, matter-of-fact and didactic but without a great deal of explication, or especially, limitations or exceptions to the generalization being presented. The text typically provides one or two representative specific examples illustrating the topic.

The material as a whole is, in my opinion, more sophisticated than is typically presented in the beginning course in organic chemistry in the U.S. It would serve well as a self-tutorial or review for students at the advanced undergraduate or beginning graduate level. It could, if supplemented by topical reviews, serve as the framework for a one year graduate course in organic chemistry that had knowledge of synthetic concepts and methodology as its chief objective.

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Carbohydrate Building Blocks. By Mikael Bols (Aarhus University). John Wiley & Sons, Inc., New York. 1996. ix + 182 pp. 15 × 23.5 cm. \$39.95. ISBN 0-471-13339-6.

The last two decades have seen the recognition of the more readily available sugars as a rich source of starting materials for the synthesis of enantiomerically pure members of many groups of non-carbohydrate compounds, and hundreds of examples, both straightforward and highly ingenious, have been reported.

For chemists unpractised in the art it must be extraordinarily difficult to assess and access the enormous range of monosaccharide derivatives available for selection as synthetic starting materials; the literature is dispersed and user-unfriendly despite the availability of excellent relevant reviews. Mikael Bols' book aims to set this right with an analysis of the chiral units available from sugars, and it will be of immense value to those aiming to construct compounds with sequences of chiral centers—most notably, of course, but not

exclusively, centers carrying oxygen-bonded substituents.

An indexing system that identifies about 100 acyclic units, each containing from one to seven chiral centers, leads readily to specific carbohydrate derivatives that may be considered potential sources of these units, and a helpful indication of the number of steps required to make these "building blocks" from cheap precursors is provided. At this point a rather severe limitation of the approach stands out: not all the possible chiral units that might be sought are dealt with—which is inevitable given that some of the selected units carry chiral atoms having bonded heteroatoms other than oxygen, and some carbon-bonded substituents, in the case of which branched-chain sugar derivatives are the recommended starting materials. Also, not all of the selected chiral units have their asymmetric centers contiguous, and thus deoxy-sugars become possible source compounds. The range of possible chiral units is thus immense, and the approach is therefore highly selective after the more simple ones have been given systematic treatment.

The approach is not at all inventive since all the building block compounds (of which about 600 are listed helpfully by provision of their formulas) are known. Surely there are potentially routes that have not yet been exploited. How does a newcomer find them? Seemingly also there are significant omissions: the *xylo*-configured unit having a branch point at the central chiral center was not found among several closely related units, and its synthesis must be well established and compounds containing it must be potential synthetic targets. Nevertheless, the "stereochemical index" contains an extensive range of chiral units and suggests for each possible starting materials—sometimes one, sometimes many. The book will be of much value in consequence.

Ahead of the compendium of building block and the stereochemical index come 11 brief chapters entitled "The Raw Materials" and then the important groups of carbohydrate derivatives: "Acetal Derivatives", "1,6-Anhydro-Sugars", etc., which are brief synopses of the main synthetic chemical features of the members of the categories. Within these the syntheses of some of the "building blocks" are outlined, and many useful carbohydrate reactions are identified.

The book inclines away from the conventions of carbohydrate chemistry and uses Mills' projection and zig-zag formulas and Chemical Abstracts nomenclature, and while this laudably assists with the bringing together of the subject with general organic chemistry, it does not do so convincingly. Which should it be, "1,3-dioxolane-4-carboxaldehyde, 5-(hydroxymethyl)-2,2-dimethyl (4*R*-*cis*-)" or "2,3-*O*-isopropylidene-D-erythrose"?

In summary, the book is a most useful compendium and index, but it is necessarily incomplete and does not banish the complexities of structural carbohydrate chemistry; some of the molecular gymnastics to be performed in the courses of retrosynthesis, etc., are still formidable. Fischer projection formulae still have their uses, and they are not so much as mentioned!

A thorough re-read is recommended prior to second printing to remove some errors.

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Palladium Reagents and Catalysts: Innovations in Organic Synthesis. By Jiro Tsuji (Okayama University of Science). John Wiley and Sons, New York, NY. 1995. xiv + 560 pp. 15 × 22.5 cm. \$150.00. ISBN 0-471-95483-7.

The purpose of this book is to summarize the use of palladium in organic synthesis from 1978 to early 1994. The need for such a summary is obvious, with the tremendous increase in the past decade in the number and variety of reactions that depend on palladium. Overall, this review succeeds at categorizing and cataloging the voluminous output of workers in this area.

The organization of this book into large chapters with many sections facilitates its use as a reference text. The author covers the vast majority of palladium-assisted reactions in two chapters, "Oxidative Reactions with Pd(II) Compounds" and "Catalytic Reactions with Pd(0) and Pd(II)". One can find specific topics within these large chapters with a minimum of effort, as the organization of the sections is by reactant (or reactants in the case of coupling reactions). Applications of Pd-catalyzed reactions to carbon-carbon bond formation in the total syntheses of natural products receive well-deserved emphasis. The important issues of enantio- and diastereoselectivity are also adequately covered. Although the focus of the book is on applications, there are short, clear overviews at the beginning of each section that illustrate the mechanisms of the reactions covered therein.

The only negatives associated with this book are the cost and the errors in the text and structures. This text is worth the cost for an institutional library and for individuals with an involvement in this fast-growing area of synthetic chemistry.

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Supercritical Fluid Extraction. By Larry T. Taylor (Virginia Polytechnic Institute and State University). John Wiley & Sons, New York, NY. 1996. xvi + 181 pp. 15 × 22.5 cm. \$49.95. ISBN 0-471-11990-3.

The book is comprised of seven chapters: Introduction, Properties of Supercritical Fluids, Functional Group Solubility in Supercritical Fluids, Supercritical

Fluid Extraction, Collection Efficiency in Off-Line Supercritical Fluid Extraction, Extraction Strategies, Applications of Analytical Supercritical Fluid Extraction, plus a reference list and index.

The greatest strength of this book is its thorough treatment of the practical aspects of analytical supercritical fluid extraction. The author has clearly spent a great deal of time in the laboratory as a practitioner of the technology and does a fair job of presenting the various considerations. Unfortunately, a significant number of errors, primarily but not entirely editorial, detract from the presentation. In addition, some of the material covered should have been handled in greater depth. For example, Chapter 2, on Properties of Supercritical Fluids, would have benefited from a more extensive discussion of mixture critical curves, along with some examples. A compilation of phase data on CO₂-cosolvents, at least for the most commonly used system of CO₂-methanol, would have been of great service (or a reference provided to another such document, if it exists).

In Chapter 5 it is stated that on-line supercritical extraction is outside the scope of the book. In this reader's opinion, this topic falls naturally within the scope of the subject and should have been included. In fact, a few pages in Chapter 7 do give an example using this technique, but a more complete treatment is called for.

The reference list would have been more useful to those pursuing further information if it contained titles; given the relatively short length of the book, adding a few pages to the length of the reference list shouldn't have been a concern.

The book contains numerous specific examples of SFE, which may prove difficult to relocate when the need arises because many of the compounds mentioned in the text, figures, or tables are not included in the index. An application-oriented book such as this should have a comprehensive list of the compounds cited, whether in the index or elsewhere, to enhance practical usage. I consider the book a useful addition to my library, but given a choice would have preferred to spend a bit more to get a more complete treatment.

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Stereoselective Synthesis. By Robert S. Atkinson, University of Leicester. John Wiley & Sons, Inc., New York, NY. 1995. xii + 529 pp. 15 × 23 cm. \$59.95. ISBN 0-471-954195.

This book offers a novel approach for the study of stereoselective transformations in organic synthesis. Traditionally, stereoselective transformations have been characterized according to the reaction types that are involved or through analysis of the tactics used in total synthesis. This book classifies stereoselective transformations into five major groups, Types 0, I, II, III and

IV, according to the number of chiral elements (stereogenic centers) that are created compared to the number present in the starting material. No stereoselectivity is required or obtained in Type 0 reactions. Type I reactions are those that proceed with complete inversion or retention of configuration at an existing chiral center. In Type II reactions, products containing at least two chiral centers are diastereomerically formed from achiral starting materials and reagents, while in Type III reactions, the stereoselective formation of additional stereogenic centers is achieved, due to the influence of existing stereogenic centers either in the starting material, reagent, or both. Type IV reactions involve loss of chiral centers, such as stereoselective elimination reactions, and were not discussed in detail in the book.

The result of this original classification is that the whole topic is presented from a refreshingly different angle compared to traditional texts on stereoselective synthesis. A particular strength of the book is the excellent balance that has been achieved between cataloguing the most important stereoselective transformations and presenting visual mechanistic explanations for the stereoselectivity. Even though the book is interesting reading, the classification system is cumbersome and leads to fragmentation of the material. For example, depending on the specific reaction, a Diels–Alder reaction can be considered as a Type 0, Type II, Type II, III, Type III (substrate controlled), or Type III (catalytic enantioselective), and each type is discussed in different sections of the book. Overall, this book is an excellent refresher for organic students interested in stereoselective transformations who have already gained a solid background in organic reactions.

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Fijian Medicinal Plants. By R. C. Cambie (University of Auckland) and J. Ash (University of the South Pacific). CSIRO Information Services, Melbourne, Australia. 1994. vii + 365pp. 20.5 × 26.5 cm. \$95.00. ISBN 0-643-05404-9.

The islands of Fiji occupy a unique geographical, biological, and cultural position in Oceania. As a small segment of the Gondwanaland breakup, Fiji, unlike neighboring Samoa or Tonga, has the attributes of a continent: gold mines, navigable rivers, and a spectacular flora. The flora of Fiji is, in a word, marvelous. It combines archaic elements such as indigenous conifers, unusual seed plants such as the genus *Gnetum* (whose nearest relatives persist in the Namibian deserts of South Africa), and primitive angiosperms such as *Degeneria*, with the unique floristic elements produced by what George Gaylord Simpson calls “splendid isolation”—such evolutionary oddities as *Elaeocarpus*

storckii, an image of which graces the cover of this important book. Geographically and culturally, Fiji is the point of contact between Melanesia and Polynesia: in the large islands of Viti Levu and Vanua Levu one can find potters still pursuing an art form long since lost by the Lapita ancestors of the Polynesians, while in the Lau archipelago, one meets villagers speaking a dialect of Tongan. It is this remarkable combination of biological and cultural diversity that makes Fiji so interesting to an ethnobotanist.

Yet, despite the recent publication of a superb flora, *Flora Vitiensis Nova*, by A. C. Smith, and an excellent herbarium in Suva, anyone pursuing ethnobotanical studies in Fiji faces a formidable number of challenges. Ethnobotanical information is scattered throughout the literature, much of it (such as Seemann's *Flora Vitiensis*) buried in books now exceptionally rare, or in various scientific journals of strictly local circulation. It is to fill this gap that J. Ash, a competent botanist with years of experience teaching at the University of the South Pacific in Suva and R. C. Cambie, a distinguished natural product chemist in New Zealand, have published a most useful compendium of ethnomedical and phytochemical information on the plants of Fiji.

I like their book for several reasons. The format is very accessible: each plant is listed by Latin binomial and author, plant family, Fijian names, and a botanical description. This is followed by a description of the medical use of each plant together with an analysis of the relevant literature. It is this last feature that I find most useful, and despite a touch of pique that they missed a few of my papers known only to my wife and mother-in-law, I was pleased to see that the authors have published an extensive and exhaustive literature search for each taxon. They are to be complimented for their diligence. Also, for a botanist inured to dubious taxonomy by some of my colleagues in chemistry, I was pleased to see that the authors' taxonomic treatment was spot on. The book is also very attractive: it is illustrated with some fine color photographs, and, for what I believe is the first time, full color reproductions of the exquisite Fitch plates from Seemann's *Flora Vitiensis*, a work that is now most rare, with only one copy having been on the market in the last 20 years.

The collaboration of Ash and Cambie, a botanist and a chemist, seems to have been most productive. I hope that their work spurs more interest in Fijian ethnobotany and serves to expel some of the silliness (a conference tarring ethnobotanists as “biopirates” was recently held in Suva) that has colored recent discussions of ethnobotanical research in Fiji. The fact is that the flora of Fiji is rapidly disappearing. It needs to be surveyed now for biological activity, lest the government of Fiji forever lose the opportunity to reap the benefit of possible pharmaceutical royalties. Blessed with an exquisite flora, friendly and sophisticated local people, a fine herbarium, and an outstanding group of researchers resident at the University of the South Pacific, Fiji needs more, not less, international collaboration and

attention. It is my hope that this most excellent book by Ash and Cambie will catalyze that interaction.

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Solving Problems with NMR Spectroscopy. By Atta-ur-Rahman and Muhammad Iqbal Choudhary (University of Karachi). Academic Press, San Diego, CA. 1996. xvi + 430 pp. 15 × 22.5 cm. \$39.95. ISBN: 0-12-066320-1.

This text uses a unique method to introduce the fundamental concepts of NMR to organic and other chemists in a nonmathematical approach using formal problems, with solutions, throughout the text. This method reinforces the basic concepts of NMR presented in the text by requiring the reader to think about the material just presented. Example problems used in the text include: "What physical changes would you expect in the shape of the NMR signal if the deuterium lock is not applied during data acquisition?", "Describe what is meant by "hard" and "soft" pulses.", or "Apodization is likely to change the relative intensities of signals with broad line widths. Can it also affect the chemical shifts of the signals?" These and similar questions are very insightful to the understanding of NMR and, in my opinion, are an excellent vehicle for the student and the established researcher to use to truly understand NMR. The authors use examples from natural products chemistry to teach interpretation of both homonuclear and heteronuclear two-dimensional techniques. The use of these examples is particularly good for organic chemists.

The text is divided into eight chapters covering the following topics. Chapter one presents a very good nonmathematical discussion of the basics of modern NMR. Chapter two discusses spin-echo and polarization transfer experiments, such as the INEPT and DEPT experiments. The authors make very good use of vectors throughout the text to explain the effect of pulse sequences on magnetization. Chapter three provides an excellent introduction to the second dimension for the novice. The nuclear Overhauser effect is discussed in chapter four. This chapter includes two very good short discussions on factors affecting the NOE and some practical hints that will be very useful to organic and natural products chemists. The most important two-dimensional experiments to organic and natural products chemists are discussed in chapter five. This chapter includes discussion of *J*-resolved spectroscopy, COSY, NOESY, ROESY, HOHAHA, and HMQC experiments among others. Chapters six and seven introduce the third dimension and more advanced one-dimensional and *n*-dimensional experiments. The text concludes with chapter eight, which provides an excellent discussion, with examples, of the logical protocols for the determination of complex organic structures by one- and two-dimensional NMR.

In my opinion, this is an excellent text that can be used as a supplemental text for a senior undergraduate

or graduate course in organic or natural products chemistry. The text would also be an excellent primary text for a senior undergraduate or first year graduate course in NMR spectroscopy. The text is also an excellent resource for the senior researcher who wishes to update his or her expertise in the use of NMR to determine the structure of complex organic molecules.

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Organic Reactions, Volume 48. Leo A. Paquette, Editor-in-Chief. John Wiley and Sons, New York, NY. 1996. vix + 880 pp. 15 × 22.5 cm. \$99.95. ISBN 0-471-14699-4.

Volume 48 of Organic Reactions has two chapters. The first, by Katsuki and Martin, is titled "Asymmetric Epoxidation of Allylic Alcohols: The Katsuki–Sharpless Epoxidation Reaction." The second chapter by Giese, Kopping, Göbel, Dickhaut, Thoma, Kulicke, and Trach, is titled "Radical Cyclization Reactions."

The first chapter covers the literature through April 1992. There are no surprises here. This chapter follows the tradition of thoroughness and high quality which has been established for this series. The wealth of empirical experimental information will be invaluable to the practicing organic chemist. As usual, much of the value of this series lies in the extensive tabular survey of reactions. Approximately 200 pages are devoted to this section in the first chapter, and it would appear that each occurrence of the Sharpless Asymmetric Epoxidation has been listed. Even with the widespread availability of computer-assisted structure searches, the value of being able to visually scan through such volumes of information cannot be overstated.

The discussions of the commonly accepted mechanism and of the kinetic resolution of secondary allylic alcohols are clear and concise. Alternative mechanistic proposals (viz. Corey's) are only given brief mention and not discussed. This reader particularly appreciated the discussion on pp 22–23 of modified catalyst systems, as well as the very thorough and illuminating listing of the various transformations that the reaction products can be subjected to. Although much of this information is likely to be in the files of the practicing organic chemist, it is nonetheless very useful to have it gathered in one place.

The text appeared to be essentially free of typographical errors. I was able to find one typo two lines from the bottom of p 34, and the name of one of the authors in reference 414 has been misspelled. I did have one or two quibbles. Structure 130 on p 63 is really no different than structure 2 on p 6, and it would have been helpful to point this out. At the bottom of p 47 the following sentence appears: "The major limitation of this Payne rearrangement–epoxide-opening strategy is that most organometallic reagents are not compatible

with the aqueous conditions that are *essential* (my emphasis) for the Payne rearrangement." This is misleading; the process is not limited in this way, as one eventually learns by reading the following two pages. These are very minor criticisms and in no way detract from the usefulness of this excellent review.

The second chapter covers the literature from 1964 through the end of 1993. The authors have done an admirable job of bringing together an enormous volume of information covering the many different types of radical cyclizations. That they have also managed to impose some order on the chaos is quite remarkable, given the fact that much of this chemistry still lacks a convincing or unifying rationale for predicting stereochemistry and ring size. Where appropriate, the authors have included kinetic data. The tabular survey of reactions, which covers approximately 460 pages, is very sensibly organized according to ring size, with carbocyclic and heterocyclic systems considered separately. The interested chemist will be tempted to spend an hour or two leafing through this section.

The text is clear, and remarkably error-free. I was able to find one typo in reference 184. The last structure on p 708 has a mistake (one of the oxygen atoms should be a CH₂), and the last structure on p 440 should correctly reflect the absence of a stereochemical issue for the CF₂ group. These are minor criticisms of a very useful review which I thoroughly enjoyed.

It goes without saying that this latest volume of *Organic Reactions* belongs in every research library. At \$99.95, this book is an excellent value, which deserves a place on the shelf of the individual researcher as well.

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The Toxic Action of Marine and Terrestrial Alkaloids. Edited by M. Blum (University of Georgia). Alaken Incorporated, Fort Collins, CO. 1995. vi + 328 pp. 15 × 22.5 cm. \$89.95. ISBN 1-880293-04-8.

This book contains three chapters describing the toxicity of alkaloids of plant, fungal, and microbial origin, one chapter on alkaloids from marine sources, and two additional chapters. Several of the chapters begin by defining the term "alkaloid", but the final word may go to H. G. Cutler, who has quoted Lord Horatio Nelson from *Admirals All* and suggests that we should "turn a blind eye" to a restricted definition of the term!

In this book: E. S. Hayes, L. J. Guppy, and M. J. A. Walker discuss *Toxic Alkaloids from Marine Invertebrates*; J. N. Roitman and K. E. Panter describe *Livestock Poisoning Caused by Plant Alkaloids*; H. G. Cutler surveys *Microbial Alkaloids and Ring-Nitrogen Compounds that Affect Plant Growth and Development*; D. Rasouly, P. Lazarovici, and Y. Matsuda delineate *Biochemical and Pharmacological Properties of K252 Microbial Alkaloids*; K. L. Swanson, M. Alkondon, E. F. R. Pereira, and E. X. Albuquerque describe *The Search for Subtype-Selective Nicotinic Acetylcholine Receptor*

Agonists; and J. L. Schardein and R. G. York detail *Teratogenic Alkaloids in Foods*.

The chapter by Hayes *et al.* focuses upon the mechanism by which marine alkaloid toxins exert their actions, thoroughly describes the zoological sources of marine invertebrate alkaloid toxins, and reviews the importance of these compounds in terms of zoology and disease. Established therapeutic uses and pharmacological actions of marine invertebrate alkaloids are described, including cytotoxicity, antibacterial, antiviral, receptor activation or blockade, channel blockade, antihypertensive actions, and hemolytic activity. There are no chemical structures provided in this chapter, although these would have been helpful in illustrating several statements, e.g., harmaline and methylpyrrolisnopsin "have distinct, structural differences but share a common mechanism of action".

Roitman and Panter extensively cover the major classes of plant alkaloids that are responsible for livestock poisoning: pyrrolizidines, steroidal alkaloids, norditerpene alkaloids, pyridine and piperidine alkaloids, quinolizidines, indolizidines, and tropane alkaloids. The latter class includes the calystegines that have gained significant attention in recent years due to their glycosidase inhibitory properties. This chapter incorporates a critical review of worldwide plant poisonings (Australia, U.S., Europe, South Africa, and China) and provides expert reports of relevant toxicology. Unsolved plant toxicology problems are described in terms of the present state of knowledge. Furthermore, the chapter on livestock poisoning correlates current research on plant poisonings with earlier studies described in the classic texts of Kingsbury (U.S. and Canada) and Everist (Australia).

After noting that with the exception of indole alkaloids there is a paucity of alkaloids in microorganisms, Cutler begins his entertaining chapter by describing the synthesis of indole-3-acetic acid (IAA) in 1904 and then provides an interesting account of how IAA was discovered to possess plant growth regulating activities. His stated goal, which is admirably achieved, is to show the diversity of biologically active natural products that are produced by microbial systems, their potential use as biodegradable agricultural chemicals, and their utility as templates to prepare derivatives. The chapter extends from indoles other than IAA such as acremoauxin A, thienodolin, and the chaetoglobosins to other nitrogen heterocycles such as cytochalasins, porritoxin, cichorine, maculosin, triticones, fruit rot toxins, harzianopyridone, and isoxazole-4-carboxylic acid. Extensive descriptions of plant bioassays are included in this informative chapter, e.g., curling, stunting of shoots and inhibition of root growth, growth inhibition of plant tissues, pollen germination, and inhibition of plant protoplasts.

The K252 family of indolcarbazole alkaloids are microbial or fungal alkaloids that, in general, are potent inhibitors of various protein kinases both *in vitro* and *in vivo* and are compounds widely-used in biological research on the role of kinase in cellular transduction systems. The chapter by Rasouly *et al.* focuses on the biochemical and pharmacological properties of these second-generation kinase inhibitors that make them attractive tools in studies of receptor signal transduction, in neuroscience, and in cancer research. One of

the most prominent of the K252 family is staurosporine, a compound that is discussed in relation to managing Alzheimer's disease. Because of their interesting properties, many derivatives of the basic bisindolylmaleimide structure have been synthesized. The chapter by Gribble and Berthel on the chemistry of the K252 alkaloids (*Studies in Natural Product Chemistry*, Attar-Rahman, Ed.; Elsevier: Dordrecht, 1993; Vol. 12, pp 365–409) would provide a valuable supplement to readers of this chapter.

The term subtype-selective in the chapter by Swanson *et al.* implies that the drug will act preferentially at one type of nicotine acetylcholine receptor and as an agonist rather than as an antagonist. Special attention is given in this very thorough chapter to newer and more complex alkaloids, e.g., anabaseine-related alkaloids, semirigid azabicyclics such as anatoxin, physostigmine, and the eserolines, that appear to possess some advantage for potency and selective stimulation of certain subtypes of neuronal nicotinic receptors. An extensive section is presented on the structure and physiology of nicotinic receptors and the variation in the agonist-binding sites. The chapter contains diagrammatic views of the nicotinic acetyl choline receptor-ion channel and a table of agonist-binding extracellular N-terminal sequences of nicotinic receptor subunits. These authors conclude their chapter with a prospectus on therapeutic treatment for several human pathological conditions, e.g., Alzheimer's disease, drug addiction, and exposure to insecticides and nerve gases.

The chapter by Schardein and York provides a limited review of the teratogenic potential of alkaloids present in foods, particularly caffeine and theobromine, in addition to two nonfood alkaloids, cocaine and nicotine, that are included because of their implications to public health.

The Toxic Action of Marine and Terrestrial Alkaloids is an interesting and informative book that fulfills the Editor's claim of "presenting a broad range of alkaloidal topics that should appeal to investigators with interests in this class of compounds". The chapters on *Livestock Poisoning Caused by Plant Alkaloids* and *The Search for Subtype-Selective Nicotinic Acetylcholine Receptor Agonists* are very up-to-date comprehensive accounts that warrant purchase of this book by scientists interested in these topics. It is regrettable that the book is unindexed; a subject and an organism index are absent and not even a table of contents is provided for each chapter.

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Circular Dichroism: Principles and Applications. K. Nakanishi and N. Berova (Columbia University) and R. W. Woody (Colorado State University). VCH Publishers, Inc., New York, NY. 1994. xvii + 576 pp. 15.5 × 23.5 cm. \$125.00. ISBN 1-56081-618-X.

Perhaps no other spectroscopic technique is as poorly understood as circular dichroism, though the potential

of CD for solving structural problems is enormous. This monograph of 20 chapters, which includes an excellent introductory chapter on basic principles by Gunther Sznatzke completed shortly before his untimely death in 1992, represents a tremendous accomplishment in presenting the theoretical background and the broad range of both electronic and vibrational circular dichroism applications to inorganic, organic, and biochemical problems, thereby taking a major step in demystifying CD spectroscopy.

As a textbook for the practicing chemist, this book is excellent in providing intelligible chapters on the theory underlying the applications of circular dichroism, followed by chapters elucidating the scope and limitations of the applications themselves. For the organic chemist, for example, chapters on the octant rule (D. A. Lightner, Chapter 10), diene chirality (J. K. Gawronski and H. M. Walborsky, Chapter 11), exciton chirality (K. Nakanishi and N. Berova, Chapter 13), and various aromatic chromophores (Chapters 12 and 14–16) including a superb discussion of the benzene sector rule (H. E. Smith, Chapter 15), are extremely useful in detailing the applications and limitations for absolute stereochemical assignments. Lightner's presentation of the historical difficulties in identifying the third nodal surface, and the so-called anti-octant effects often associated with the front octants, is particularly valuable as a guide for the correct application of the octant rule. Other chapters cover applications to inorganic complexes (Chapter 9), oriented molecules (Chapters 4 and 5), luminescence (Chapters 6 and 7), peptides (Chapters 17 and 18), and nucleic acids (Chapter 19). The second chapter by Stephen Mason is notably delightful as it probes the beginnings of molecular chirality in the natural world tracing its origin to the nonconservation of parity. Perhaps no other text covers the field of circular dichroism as well.

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Peptides: Synthesis, Structures, and Applications. Edited by Bernd Gutte (Biochemisches Institut der Universität Zurich). Academic Press, San Diego, CA. 1995. xiv + 511 pp. 15 × 22.5 cm. \$69.95. ISBN 0-12-310920-5.

This book is a well-organized account of the current status of peptide chemistry research. It consists of 12 chapters, each written by a renowned expert in a particular field of peptide research, and those chapters can be grouped, more or less, into the three sections suggested by the "Synthesis, Structures, and Applications" subtitle of the book.

The first chapter of the book, titled "The History of Peptide Chemistry", is a fascinating overview of the field written by a longtime participant in that history, Theodor Wieland of the Max Planck Institute for Medical Research. Chapters two and three cover the "syn-

thesis" aspects of peptide chemistry. Yoshiaki Kiso and Haruaki Yajima of Japan's Kyoto Pharmaceutical University and Niigata College of Pharmacy, respectively, offer a lucid overview of the means used for the amide bond forming steps, the deprotection steps, and the disulfide bond-forming steps utilized during peptide synthesis in chapter two. Chapter three, by Nobel laureate Bruce Merrifield, covers the current status of solid-phase peptide synthesis. Taken together, chapters two and three present a very good primer on peptide synthesis for the novice reader or an update on the practice of peptide synthesis for the experienced reader.

Chapters four, five, and six of the book discuss structural aspects of peptide chemistry. Chapter four, written by J. Martin Scholtz of Texas A & M University and Robert L. Baldwin of Stanford University, could stand alone as a short "textbook" on the methods used to study α -helix formation (many of which were pioneered by the authors) and the various interactions involved in the formation of that important secondary structure. Garland R. Marshall, Denise D. Beusen, and Gregory V. Nikiforovich of Washington University in St. Louis offer a superb discussion of the theoretical and analytical approaches used to define and measure peptide conformations in chapter five. Their discussion includes accounts of actual experimental and computational studies of the conformational stability and dynamics of the peptides gramicidin A, cyclosporin A, somatostatin, and angiotensin II and thus logically sequels into chapter six, by Victor J. Hruby and Dinesh Patel of the University of Arizona, on structure-function studies of peptide hormones, which also offers numerous "case histories" of recent studies of the relationship between the structure of a peptide and its biological function. While Marshall's discussion (chapter five) emphasizes computer-assisted modeling and spectroscopic methods for studying peptide structure, Hruby's discussion (chapter six) emphasizes the use of structural constraints, introduced synthetically, as a means for elucidating the biologically active conformation of a peptide. In addition, chapter six gives the reader a review on peptide hormones; thus, it offers an "application" of peptide chemistry, along with the remaining six chapters of the book.

Following the foundation of information concerning peptide synthesis and structure provided by the first six chapters of Gutte's book, the remaining half of the book offers a fascinating look at cutting-edge research

that involves peptide chemistry. Chapter seven, by Andrzej W. Lipkowski of the Polish Academy of Sciences and Daniel B. Carr of Tufts University School of Medicine, is a review of the subject of neuropeptides and their analogs. In chapter eight, Herbert R. Wenzel and Harald Tschesche of Germany's Universität Bielefeld discuss peptidic inhibitors of serine proteinases. Chapter nine, by the book's editor Bernd Butte and his co-worker Stephan Klausner, offers a stimulating discussion of research aimed at the *de novo* design of peptides "engineered" for specific functions (catalytic, binding, or structural). Richard Houghten of Houghten Pharmaceuticals, a pioneer of the field of combinatorial chemistry, discusses the status of research in the emerging area of soluble combinatorial libraries of peptides in chapter ten. In chapter eleven, Hans Rudolf Bosshard of the Biochemical Institute of the University of Zurich reviews recent work using peptides for mapping epitopes (roughly defined as the portion of an antigen that is actually recognized by an antibody or a cell), an important area of research in immunology. Chapter twelve, by James P. Tam of Vanderbilt University Medical Center, discusses research on the preparation and use of branched peptides that bear, on each "branch," a distinct functional characteristic (such as an antigenic property) for such applications as vaccines, immunoassays, epitope mapping, and inhibition of biochemical processes. It is difficult to read the last six "application" chapters of Gutte's book without becoming excited by the research frontiers presented by them.

This book presents a very clear overview of the basics of peptide chemistry and structure as currently studied, plus stimulating glimpses into "frontier regions" of peptide chemistry. It is well organized and definitely worth the relatively modest purchase price. It could be used as a textbook in a special topics course on peptide chemistry or as an auxiliary text in a medicinal chemistry course. It is recommended as a "must buy" for institutional libraries and is strongly recommended to anyone working in or interested in the field of peptide chemistry.

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