

BOOK REVIEWS

Handbook of African Medicinal Plants. MAURICE M. IWU. CRC Press, Inc., 2000 Corporate Boulevard N.W., Boca Raton, FL 33431. 1993. xii+448 pp. 15.5×23.5 cm. \$99.95, ISBN 0-8493-4266-x.

As implied by the title, *Handbook of African Medicinal Plants* presents a very good view of the medicinal plant heritage of the continent. It lists the botanical names, synonyms, common names, African names, description, habitat, distribution, medicinal uses, constituents, pharmacological studies, clinical properties, and toxicity of some of the medicinal plants of Africa. In addition, it gives pharmacognostical profiles of selected medicinal plants. It also touches on healing and African culture, the African medicine man, and traditional healing methods.

There are some errors that need to be corrected in future editions. *Parinari excelsa* (p. 58) is classified under Rosaceae but should be Chrysobalanaceae. The genus *Kaempferia* is placed under both the Zingiberaceae and Zygophyllaceae families (pp. 70–71); it should be in the former. *Balanites* (p. 71) is classified under the Zygophyllaceae but should be in the Balanitaceae. *Olinia usambarensis* (p. 67) is classified in the Thymelaeaceae but should be in the family Oliniaceae. There is also some inconsistency in the use of the terms Fabaceae, Leguminosae, and Mimosaceae. *Warburgia ugandensis* (p. 258) does not occur in South Africa, only *W. salutaris* does.

There are also contradictions with some of the cited sources. For instance, the author (p. 66) states that *Taxus baccata* is used as a medicinal plant in South Africa, using as reference the well-known book by J.M. Watt and M.G. Breyer-Brandwijk, *Medicinal and Poisonous Plants of Southern and Eastern Africa* (1962), in which it is stated (p. 1019) that "there is no record either of the medicinal use or of cases of poisoning in S. Africa by the introduced ornamental tree *Taxus baccata* L." Furthermore, Iwu states that *Alepidea longifolia* (p. 67) is an antipyretic, also citing the above book. However, the source book (p. 1033) states that the Zulus take a decoction of the roots of *Alepidea longifolia* E. May for coughs and eat the boiled leaves as a vegetable, but it does not mention antipyretic activity.

In the case of *Olea europaea* L. (p. 217) the subspecies *africana* for Africa should be indicated. The plant cultivated in the Mediterranean region is the subspecies *europaea*. The author states that *Centella asiatica* is native to Asia, but should also include Africa as it occurs widely in Madagascar, in particular. On p. 359, the Cape and northwest Africa are depicted to be the same, although one is inclined to believe the Cape to be unique.

Some of the illustrations (pp. 269, 287, 293, 295, 299) and photographs of herbarium specimens (e.g., *Barteria nigritiana*, p. 75; *Brilliantaisia oweriensis*, p. 76; *Cochlospermum tinctorium*, p. 78; *Hypericum aethiopicum*, p. 86; *Nauclea dederingii*, p. 91; *Vitex simplicifolia*, p. 100) are of inferior quality and should not have been included in the book.

In spite of the errors noted above, the materials presented in this book certainly provide the reader with a good working knowledge of African medicinal plants.

ERMIAS DAGNE, Addis Ababa University

Nitroalkenes: Conjugated Nitro Compounds. V. PEREKALIN, S. LIPINA, V.M. BERESTOVITSKAYA, and D.A. EFREMOV. John Wiley & Sons, 605 Third Avenue, New York, NY 10158. 1994. xiv+262 pp. 15×23.5 cm. \$95.00. ISBN 0-471943185.

The chemistry of nitro organic compounds has experienced more than one renaissance already in the past 50 years, as evidenced by the periodic arrival of review volumes, monographs, or even dedicated series. The most recent of these is the VCH Series *Organic Nitro Chemistry*, edited by Henry Feuer.

Among the most important classes of nitro organic compounds are the nitroalkenes, which have been the subject of numerous excellent reviews, and for which a comprehensive treatise would constitute a most valuable addition to this field. Unfortunately, the book currently under review, *Nitroalkenes: Conjugated Nitro Compounds*, falls considerably short of filling that description.

Insofar as content and coverage are concerned, the book does well. Most of the important types of nitroalkenes are included with a fairly thorough presentation of the important methods of synthesis and subsequent chemical transformations. With the exception of the section on nitroamines, however, the treatment of structure is inadequate. Given the availability of most of the important information, the major problems with the book are its organization and substandard editing.

The book is divided into three basic sections covering "Synthesis of Unsaturated Nitro Compounds" (Chapter 1), "Chemical Transformations of Unsaturated Nitro Compounds" (Chapter 2), and "Functionalized Derivatives of Unsaturated Nitro Compounds" (Chapter 3). While this constitutes a reasonable organization, there is considerably less logic in the organization of material within these divisions. Chapter 1 is

organized by nitroalkene structure in increasing unsaturation and increasing number of nitro groups. It would have been very helpful to have made clear at the outset how each product class was to be presented. As it stands, each structure class is handled independently, which makes trends and families difficult to discern.

In the second chapter, the organization again changes among subheadings. For example, the section on reduction should have been broken down into subunits on the basis of the products obtained. On the other hand, the remaining sections on reactions of oxygen, nitrogen, and sulfur nucleophiles have no order, while the section on carbon nucleophiles is arbitrarily broken into sections on the basis of both nucleophile and nitroalkene. There is no clear reason why enamines and enol silanes are not included with carbon nucleophiles. Finally, the section on the Diels Alder reaction is redundant, having been described partly in the heterodiene sense in the previous section.

Chapter 3 provides a presentation of the synthesis and chemistry of functionalized nitroalkenes bearing halogen, oxygen, nitrogen, and sulfur functional groups. This is the most suitably organized chapter, though it is remarkable that the chapter subheadings are all of different styles, e.g., 3.1 Halonitroalkenes, 3.2 Alkoxy(Hydroxy)Nitroethenes, 3.3 Alkenes containing Thio and Nitro Groups. This appears to be a result of sections written by individual authors without much editorial oversight.

If one forgives the less than ideal organization, then the more serious problem of a myriad of chemical, linguistic, and typographical errors cannot be overlooked. The chemical errors range from missing bonds (p. 13, eq. 30) to pentavalent carbons (p. 64, eq. 28), to missing reagents (p. 185, Scheme 9). Linguistic errors abound and are clearly the result of either the lack of copy editing or a copy editor unfamiliar with chemistry—for example, phrases are included such as “complex experimental facilities” (p. 15), “fatty aromatic unsaturated nitroketones” (p. 23), “sterically overloaded CH acids” (p. 104) “carbonic acids” (instead of carboxylic, p. 110), “thermic reaction conditions” (p. 151), “heliotropic” (instead of cheliotropic, p. 237), and “forecasting the direction of nucleophilic addition” (p. 240), to name just a few. Finally, the number of typographical errors in the text and schemes is astonishing as is the rather awkward presentation of many of the chemical structures.

Overall, the book can be recommended to active researchers involved in nitroalkene chemistry who only need to have references provided and do not expect to learn much by reading the text. However, for those chemists interested in learning about nitroalkene chemistry at any other level, this book will provide a gross structure to find information and the pertinent existing reviews from which text has been derived, but lamentably not much more. This is unfortunate since the authors, all knowledgeable and active in the field, have put a good deal of effort into compiling this work. The disappointment is in the organization, unification, standardization, and presentation of their efforts.

SCOTT E. DENMARK, *University of Illinois, Urbana-Champaign*

Organometallics in Synthesis: A Manual. M. SCHLOSSER. John Wiley & Sons Ltd., Baffins Lane, Chichester, West Sussex, PO19 1UD, England. 1994. xii + 608 pp. 18.5 × 24.5 cm. \$100.00. ISBN 0-471-93637-5.

This book is intended to be a manual for the dissemination of “useful hints, rules of thumb,” empirical trends, qualitative theoretical guidelines, and trustworthy experimental procedures necessary for the effective and creative use of organometallic reagents in organic synthesis. Organoalkali, lithium, titanium, copper, palladium, boron, aluminum, and tin reagents are presented in eight chapters covering the organometallic reagents most frequently employed in organic synthesis. The treatments are not exhaustive. The chapters tend to provide a general survey for each metal focusing on the most powerful synthetic applications. Detailed experimental procedures are provided that are similar in content and style to those appearing in the journal *Synthesis*. Although the experimental procedures do not have the footnoted detail found in *Organic Synthesis*, crucial hints and observations are often provided. The most detailed procedures are found in the organocopper chapter, appropriate for the fickle reputation of these reagents. While the literature citations are up to date and often include the seminal papers, they are not exhaustive.

Schlosser (Chapter 1, 166 pages) provides a description of structures, reactivity/selectivity patterns, preparation, and handling of organoalkali reagents. The carbon metal bond is viewed as an electron-deficient bond whereby reactivity and selectivity patterns are rationalized by consideration of both carbanion basicities and metal electropositivities. The simplicity and power of this conceptual approach are often mocked by the complexity and subtlety of the actual examples. The chapter is richly referenced (in excess of 793 citations) providing an excellent access to the literature. Totter and Rittmeyer (Chapter 2, 28 pages) present a general survey of the industrial preparation and handling of organolithium reagents. A brief sketch of the industrial synthesis of fine chemicals employing organolithium reagents is provided. This chapter lacks experimental procedures but does contain important information on and references to the thermal and chemical stability of commercial alkyllithium reagents. Reetz (Chapter 3, 88 pages) provides an account of the aldol, Michael, olefin-forming, and substitution reactions of organotitanium reagents along with a brief

survey of chiral titanium catalysts used in various asymmetric reactions (e.g., the Sharpless epoxidation). A major emphasis is placed on the stereoselective Grignard and aldol addition reactions. The general scope and limitations of organotitanium reagents are superbly described and references to numerous examples are provided. Lipshutz (Chapter 4, 102 pages) surveys the vast field of organocopper reagents. Experimental procedures for characteristic organocopper transformations involving conjugate addition, carbocupration, and substitution at saturated (e.g., tosylates, epoxides, aziridines), unsaturated (e.g., vinyl halides, vinyl triflates), and allylic centers are presented for Gilman, mixed cuprates, cuprates of higher order stoichiometry, and RCu reagents. Examples are also provided where additives such as Lewis acids or trialkylchlorosilanes facilitate the reaction. The examples are judiciously chosen to illustrate particular reagents, reaction conditions, difficulties, and opportunities. This chapter offers perhaps the finest collection of helpful hints, insights, and detailed experimental procedures available for organocopper chemistry which can often be difficult and capricious even for skilled experimentalists. Hegedus (Chapter 5, 77 pages) provides an insightful survey of Pd(II) and Pd(0) chemistry choosing examples that illustrate synthetic power in the context of natural products synthesis. Major focus centers on nucleophilic attack on Pd(II) complexes, Pd(II) catalyzed rearrangements, and Pd(0) chemistry involving oxidative addition-transmetalation, insertion, and allylic substitution reactions. This chapter is exceptionally well written and gives an excellent perspective on the power, mechanistic considerations, pitfalls, and limitations of palladium chemistry. Smith (Chapter 6, 73 pages) covers the basic topics (e.g., preparation of mono-, di-, tri-, and mixed organylboranes; replacement of boron by heteroatom functional groups; α -alkylation of carbonyl compounds; preparation of ketones and alcohols from organylboranes by reaction with acyl anion equivalents or haloform anions, carbonylation, or from cyanoborates; stereospecific preparation of alkenes via alkenylborates or palladium-catalyzed cross-coupling; and reductions with trialkylhydroborates) of organoboron chemistry. Each area is very briefly covered in a general way and a single example with a detailed experimental procedure is provided. Yamamoto (Chapter 7, 25 pages) offers a very brief overview of organoaluminum chemistry focusing on the coordinating and oxygenophilicity of these reagents. Only a few experimental procedures are provided and the sparse literature citations (52+) leave the impression that organoaluminum reagents have yet to make a major impact on organic synthesis. Nozaki (Chapter 8, 44 pages) briefly sketches organotin chemistry involving tin hydrides, tin-metal bonds (Al, Si, Sn, Mg, Cu, Zn), allylstannanes, and transmetalation of organostannanes as well as the chemistry of tin(II) salts and tin heteroatom compounds. Few experimental procedures are provided and the chapter functions primarily as an extended outline of organotin chemistry of current interest.

The book provides an excellent collection of experimental procedures, literature citations, and general surveys of the transformations of the most commonly used organometallics in organic synthesis. Most synthetic chemists would find this a useful manual and resource guide that could save much time in both the library and the laboratory. The helpful hints and cautions alone, which are next to impossible to find quickly in the primary literature, could catalyze the rapid and successful application of this chemistry to a particular synthetic problem. There is not sufficient explanatory detail for the book to serve as a text in a basic course in organometallic chemistry, although it could perhaps be used in a special topics course. This is a worthwhile investment for any synthetic chemist who expects to run these types of reactions in the course of his laboratory work.

R. KARL DIETER, *Clemson University*

Bioactive Natural Products: Detection, Isolation and Structural Determination. Edited by STEVEN M. COLEGATE and RUSSELL J. MOLYNEUX, CRC Press, Inc., 2000 Corporate Blvd. N.W., Boca Raton, FL 33431. 1993. xiii + 528 pp. 17.5 × 25.5 cm. \$169.95. ISBN 0-8493-4372-0.

Detection, isolation, and structure determination of bioactive natural products are becoming increasingly important in the discovery of new drugs and environmentally safe insecticides, pesticides, and herbicides. In the recent past a number of textbooks dealing with bioactive natural products have appeared. Unlike many of these, the book under review maintains a good balance between varying classes of bioactive natural products and methodologies involved in their detection, isolation, and structure elucidation.

The book contains twenty-one chapters. In the first chapter, the editors (Colegate and Molyneux) provide an excellent introduction to and overview of the subject. The remaining twenty chapters, authored by an internationally selected group of experts deal with: (i) methods of detection, isolation and structure elucidation of bioactive natural products, and (ii) some specific case studies. Included in the first category are the chapters on detection and isolation of bioactive natural products (Ghisalberti), water-soluble alkaloids (Molyneux), strategies for structural determination by nmr spectroscopy (Byrne), mass spectrometry (Bloor and Porter), determination of 3D structure and configuration of bioactive natural compounds by X-ray crystallography (Wong and Gaffield), and determination of the absolute configuration of bioactive natural compounds utilizing exciton chirality circular dichroism (Gaffield). Specific case studies presented

include acquisition and screening of natural products as potential anticancer and AIDS antiviral agents (Lednicer and Narayanan), potent sweet compounds from plants (Kinghorn and Kim), separation, structure elucidation, and bioassay of cytotoxic natural products (Cordell, Kinghorn, and Pezzuto), cytotoxic compounds from higher plants (Marston, Décosterd, and Hostettmann), insect behavior modifiers (Takahashi), assessment of anti-inflammatory activity of natural products (Croft), immunomodulatory compounds (Labadie), biologically active terpenoids and aromatic compounds from liverworts and the inedible mushroom *Cryptopus volvatus* (Asakawa), a general strategy for the structure determination of saponins (Chen and Snyder), antiviral agents from higher plants and an example of the structure-activity relationship of 3-methoxyflavones (Berghe, Haemers, and Vlietinck), toxicity testing using the brine shrimp *Artemia salina* (Sam), in vitro neurotoxicity bioassay and neurotoxicity of sesquiterpene lactones (Riopelle and Stevens), ultrasound imaging as a bioassay technique to monitor fetotoxicity of natural toxicants and teratogens (Panter), and an approach to toxin isolation from plants affecting livestock (Dorling, Colegate, and Huxtable). In addition, the book contains a 21-page index which is extensively cross-referenced with numerous entries and sub-entries.

I found that all the chapters are generally well written and address issues useful for the novice as well as for the experienced natural products researcher. The main strength of this book is in the attention paid to various techniques of extraction, bioassay, isolation, and structural determination of natural products. Overlap, which is unavoidable in a multiauthored book, was evident, but this should be considered a minor drawback. Although the chapter on potentially sweet compounds from plants appears to be out of place among bioactive natural products, it provides a useful discussion of isolation and structure elucidation procedures.

Overall, the book is well-produced with written material free of any obvious errors. The diagrams and spectra are quite legible as they are of a good size. Although the price may seem a bit excessive, it would certainly be worthwhile for those who are actively engaged in detection, isolation, and structure determination of bioactive natural products to acquire this book.

A.A. LESLIE GUNATILAKA, *Virginia Polytechnic Institute and State University*

Two-Dimensional NMR Spectroscopy: Applications for Chemists and Biochemists. Second Edition. Edited by W.R. CROASMUN and ROBERT M.K. CARLSON. VCH Publishers, Inc., 220 East 23rd Street, New York, N.Y. 10010. 1994. xxii+964 pp. 15.5×23 cm. \$125.00. ISBN 1-56081-664-3.

This 964-page second edition volume has incorporated many recent advances in the field into its first edition material by extensive rewriting of existing chapters and by the inclusion of three new chapters on indirect-detected heteronuclear and multidimensional nmr methods, computer-assisted analysis of 2D and multidimensional nmr spectra, and applications of 2D and higher-dimensional nmr in structural studies of proteins. Even though the same title—*Two-Dimensional NMR Spectroscopy: Applications for Chemists and Biochemists*—used in the first edition is retained, the scope of many of the chapters has been extended to include multi-dimensional nmr spectroscopy.

This book contains eleven chapters. In the first chapter, G.A. Gray provides a detailed introduction to multi-dimensional nmr methods. The majority of sections in this chapter are written in the question-answer format, making it interesting to read and easy to understand. Chapter 2 by W.E. Hull, which is the longest chapter, consisting of 389 pages and 1,059 references, deals with experimental aspects of 2D nmr. This chapter covers a multitude of techniques ranging from sample preparation, spectrometer calibration, to data acquisition and processing. In Chapter 3, C. Griesinger, H. Schwalbe, J. Schleucher, and M. Sattler describe many facets of proton-detected heteronuclear and multi-dimensional nmr such as HMQC, HMBC, HSQC (Heteronuclear Single-quantum Correlation), and double INEPT. Chapter 4, by H.R. Kalbitzer, discusses computer-aided analysis of multi-dimensional nmr spectra; some topics covered include enhancement of spectral quality, peak and multiplet recognition, recognition of spin-systems and sequential assignment of resonance lines. The remaining seven chapters deal with the application of multi-dimensional nmr techniques in solving structural problems associated with peptides (H. Kessler and S. Seip), proteins (H.J. Dyson and P.E. Wright), nucleic acids (I. Goljer and P.H. Bolton), oligosaccharides and polysaccharides (J. Dabrowski), steroids (W.R. Croasmun and R.M.K. Carlson), synthetic organic materials (P.L. Rinaldi), and natural products and pharmaceuticals (G.G. Martin and R.C. Crouch). In these seven chapters, the authors discuss very vividly the application of techniques such as nOe, NOESY, ROESY, TOCSY, HOESY (Heteronuclear Overhauser Enhancement Spectroscopy), COLOC, SIMBA, HMQC-COSY, HMQC-TOCSY, DEPT-HMQC, DEPT-HMQC-TOCSY, etc., in the structural determination of complex organic molecules. Of particular interest are the comparison of X-ray and nmr structures of proteins and curved DNA, and the use of microprobes in heteronuclear 2D nmr determination of natural products.

The book is well produced. All the chapters are well written and extensively subdivided, making them easy to read. Each chapter is fully referenced and the book carries a thorough index and a glossary containing

definitions of most of the acronyms used in the book. In some instances, literature references to acronyms are also provided. Considering the quality and the coverage, this book offers good value for money. It is a must for those concerned with theory and applications of multidimensional nmr in solving complex structural problems.

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Organic Reactions. Vol. 46. LEO A. PAQUETTE. John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1994. xiv + 404 pp. 15.5 × 23 cm. \$89.95 ISBN 0-471-086-193.

This volume of *Organic Reactions* is made up of three chapters, each dealing with an important reaction written by people who are experts in the field. The chapters are organized along similar lines, each starting with mechanistic considerations of the particular reaction followed by a discussion of the scope and limitations. Comparison is then made with other potentially equivalent methods. Each chapter ends with typical experimental procedures followed by an exhaustive table of published reactions.

The first chapter, written by Teruyaki Mukayama and Shu Kobayashi, deals with tin(II) enolate mediated aldol-, Michael-, and related miscellaneous condensation reactions. It begins with an overview of the various methods employed for the preparation of tin(II) enolates and this is followed by a thorough discussion of the action of these enolates in aldol-type reactions. The advantages of Reformatsky-type tin(II) enolate condensations over the Li or boron enolate techniques are highlighted. The reaction is exemplified by the preparation of α,β -epoxy aldehydes or ketones via modified Darzens procedures. A substantial part of the review deals with the Michael-type of conjugate addition reactions to unsaturated ketones and aldehydes in the presence of TMSCl. A thorough treatment is given to the asymmetric variants of these reactions wherein chirality is introduced by: a chiral base, chiral auxiliary, or by transmission of chirality residing in the aldehyde. The section comparing the application of tin(II) enolates with other metal enolates is rather short, in the opinion of this reviewer, but it does point out the different selectivities achievable with tin, boron, lithium, and titanium enolates. At the end, 14 experimental procedures exemplify the different major reactions and these are followed by a fairly extensive tabular survey.

The second chapter, by Takeshi Nakai and Koichi Mikami, deals with the [3.2] Wittig rearrangement. The main sections of the chapter review the mechanism, scope, stereocontrol, and applications of the reaction. The acyclic and the cyclic cases are discussed separately and the treatment of the cyclic substrates is divided into twelve subclasses depending on the attachment of the nascent carbanionic moiety to the pericyclic array based on the Ziegler classification of [3.3] pericyclic Claisen reactions. The stereoselectivity issues of the rearrangement are discussed with the aid of a transition state model which relates the stereorelationship of the newly created chiral centers to the geometry of the initial olefinic bond. Four asymmetric variants of the rearrangement are presented, differentiated by the origin of the chirality in the substrates undergoing the rearrangement. The section dealing with the synthetic applications, drawing examples from such varied fields as the syntheses of acyclic compounds, steroidal side-chains and cyclic germacranolides or cembranoids, clearly exemplifies the tremendous power of the [3.2] Wittig rearrangement in synthesis. The synthetic discussion closes with an application of tandem [3.2] Wittig and [3.3] Claisen sigmatropic rearrangements for the convenient generation of chain extended molecules. Nine experimental procedures representing the most frequently employed methods and an extensive tabular survey of several hundred reactions from the literature close the chapter, which is well organized and should be particularly useful for researchers in the field.

The third chapter deals with "Reductions with SmI_2 ," and is written by Gary A. Molander. After an introduction to the history of and various methods available for the preparation of SmI_2 , a thorough review is presented focusing on the reduction of various functional groups. The reductions of alkyl halides, sulfonates, aldehydes and ketones, oximes, nitriles, carboxylic acids, and epoxides are all dealt with under separate headings. The discussion offers a great deal of mechanistic rationale and the author has been able cleverly to place most of these reactions on similar mechanistic grounds proceeding via organosamarium intermediates from initial radical formation. The review also extensively deals with various SmI_2 initiated and radically induced fragmentation reactions. The second part of the chapter discusses the scope and limitations of the method. Here again the treatment tends to be focused on functional group behavior but since these have been dealt with previously, this reviewer felt that the data were somewhat repetitious. Nevertheless, there is a large amount of new and very useful information given in this section, for example, the discussion of the reductive cleavages of several classes of α -heterocarbonyls together with several relevant examples is very useful from the point of view of synthesis. The last part of the chapter deals with a comparative evaluation of the SmI_2 -mediated reductive method with other methods available. This very

well-written and readable chapter closes with 22 experimental procedures, an extensive tabular survey of SmI_2 -effected reactions, and 129 references. Thus, Volume 46 of *Organic Reactions* is an appropriate addition to a most useful series of monographs.

IVAN LANTOS, *SmithKline Beecham Pharmaceuticals*

The Pyrimidines. The Chemistry of Heterocyclic Compounds. Volume 52. D.J. BROWN (AUSTRALIAN NATIONAL UNIVERSITY, CANBERRA), with a Chapter by R.F. EVANS (UNIVERSITY OF QUEENSLAND, BRISBANE), and Sections by W.B. COWDEN (AUSTRALIAN NATIONAL UNIVERSITY, CANBERRA) and M.D. FENN (NORTHERN TERRITORY UNIVERSITY, DARWIN). John Wiley & Sons, 605 Third Avenue, New York, NY 10158. 1994. xxx + 1516 pp. \$595.00. ISBN 0-471506567.

This book entitled *The Pyrimidines* represents Volume 52 in the Series "The Chemistry of Heterocyclic Compounds" and is the second edition of earlier volumes dealing with this heterocyclic group. It contains still relevant information from the prior works and information that has appeared in the literature since 1983. Reduction of such a vast body of literature to a one-volume format has been no mean feat and the authors have been able to accomplish this without major omissions and without making the contents unintelligible to the reader. The use of an IUPAC/*Chemical Abstracts* systematic nomenclature for substituted pyrimidines has greatly clarified the usually complex compound identification, despite some of the devices adopted to name more complexly substituted compounds as pyrimidines. Ten chapters cover the chemistry of pyrimidines, one describes the chemistry of reduced pyrimidines, and a final chapter on the ionization and spectra of pyrimidines supplements these sections in the earlier volumes and includes a brief discussion of nmr characteristics. A comprehensive list of simple pyrimidines (i.e., pyrimidines are excluded that are part of a fused-ring system, contain a cyclic substituent or a substituent with more than three carbon atoms, have two substituents at any position, or two or more independent functional groups on a single substituent) describes those reported in the literature through 1991. This list fills 307 pages and, backed up by 7,036 references and a comprehensive Subject Index, enables the reader to find quickly whether a particular pyrimidine of interest has been prepared. The absence of an Author Index does, however, remove some of the human interest from this vibrant area of organic chemistry.

Functional group interconversions, the modification of preformed heterocycles, and heterocyclic interconversions play an important role in the strategy behind the synthesis of a desired heterocycle. The importance of these approaches in pyrimidine chemistry is emphasized with ample examples of reactions at the pyrimidine ring, reactions at substituents on the pyrimidine ring, and ring interconversions. References to additional examples are especially welcome. The major portion of the synthetic chemistry, however, describes the numerous ways in which the pyrimidine ring, usually encumbered with functional groups or ring functionality, has been assembled from a wide variety of synthons. To arrive at a comprehensive and rational way of describing the various types of organic reactions utilized to effect the synthesis of a pyrimidine is a formidable task. The authors have chosen to use the synthon approach where the atoms in the synthons contribute a certain number of atoms to the final ring structure and provide for a classification system. The number and functional characteristics of the substrates that enable the incorporation of desired functionality in the final pyrimidine show clearly the strategies needed to construct such molecules. The close association of the authors with this subject area is evident from the detailed discussion of these reactions, which are presented in such a manner that those not familiar with the field will have little trouble finding their way in a very complex area of heterocyclic chemistry.

The presentation of Volume 52 is consistent with earlier volumes in the "Chemistry of Heterocyclic Compounds" series and it is difficult to see how any group dealing with heterocyclic chemistry can not include it in their acquisitions, despite the extremely high price.

KEVIN T. POTTS, *Rensselaer Polytechnic Institute*

Traditional Medicine. Edited by BISWAPATI MUKHERJEE (Editor-in-Chief), AMARENDRA PATRA, SANTANU KUMAR TRIPATHI, SWAPAN KUMAR BHUNIA, and BISWAJIT MUKHERJEE. International Science Publishers, 2840 Broadway, New York, NY 10025. 1993. xvi + 403 pp. 15 × 23.3 cm. \$45.00. ISBN 1-881570-32-0.

This book represents a compilation of plenary lectures, invited lectures, and poster presentations given at a seminar entitled "Traditional Medicine: A Challenge of the Twenty-First Century" which was held in Calcutta, November 7–9, 1992. A wide range of topics is covered including the historical developments of, as well as social and cultural research on, traditional medicine and its role in primary health care. Many papers deal with the use of traditional medicine drugs as leads for therapeutic agents for use in modern medicine.

Some lectures address aspects of traditional medicine in India, Turkey, Bangladesh, Tibet, and Sri Lanka, and the classical traditional medicine systems of Ayurveda, Unani, and Siddha are also included.

Off-set printing of original manuscripts was used in compiling this volume. As a consequence, there are numerous typos and spelling errors, and the general appearance is sloppy and of poor quality. A major problem with the book is the absence of a Subject Index, making it difficult to search for information on one's interests.

This volume is truly a mixed bag, with papers ranging from one concerned with the chemistry of enzymic transglycosylation of steviol glycosides to one discussing the origin and significance of "shilajit," an ayurvedic drug that is actually humus admixed with plant and microbial metabolites occurring in the rock rhizosphere of its natural habitat. I can only comment that standardization of such a product must offer an impossible challenge. By and large, because many of the papers in this volume fall into the "shilajit" category, there is little to recommend it to natural product chemists and pharmacognosists. Those schooled in the traditional systems of medicine such as Ayurveda may find it of more interest.

JAMES E. ROBBERS, *Purdue University*

Organic Synthesis. MICHAEL B. SMITH. McGraw-Hill, Inc., Princeton Road, Hightstown, NJ 08520. 1994. xxx+1604 pp. 18.5×23 cm. \$75.63. ISBN 0-07-048716-2.

Student's Solutions Manual to Accompany Organic Synthesis. MICHAEL B. SMITH. McGraw-Hill, Inc., Princeton Road, Hightstown, NJ 08520. 1994. viii+166 pp. 21.5×27.5 cm. \$16. ISBN 0-07-059234-9.

Organic synthesis is taught to both graduate and undergraduate students, often with dissimilar backgrounds. The ideal textbook would present the subject in a single volume, offering enough background material to allow all of the students to advance. No generally acceptable text has been available, and Michael Smith has sought to fill the void. The result is a hefty treatise that, in large part, fulfills these objectives.

The first chapter introduces the fundamental concepts of organic synthesis (targets, starting material, disconnections, retrosynthetic analysis), stereochemistry and conformation. This chapter, and those that follow, have both breadth and depth. For example, discussion of ring conformations begins with small rings and then quickly moves on to the energetics of medium and large rings, diamond-lattice conformations, polar mapping, estimation of conformational populations, A-, G-, and U-strain, the influence of conformation on reactivity, and the conformations of polycyclic molecules.

Most of the basic undergraduate transformations are found in Chapter 2, and Chapters 3–9 are devoted to oxidation, reduction, hydroboration, stereocontrol, protecting groups, nucleophilic organometallic reagents, and enolate chemistry. Chapters 11–13 describe pericyclic reactions, electrophilic reactions, and the chemistry of radicals and carbenes.

All of Chapter 10 (120 pages) is devoted to synthetic strategy: the disconnection approach, strategic bond disconnections, and computational efforts in synthetic analysis. The fourteenth chapter is devoted to the presentation and critique of three synthesis proposals prepared by students in the author's course, illustrating excellence as well as common mistakes.

A large and well cross-referenced Subject Index is followed by three shorter indexes: the Named Reactions, Reagents, and Processes Index, the Synthetic Targets Index, and the Disconnections and Functional Group Transformations Index. The last is where one can find how to make a ketone, for example. The seventy-nine entries under the heading "ketone" lead to starting materials ("from alcohols") and to specific types of ketones (α -aryl, conjugated, cyclic). This will be a very useful index for students devising a synthesis.

Overall, this is a unique and carefully thought out text. One of the notable aspects is the liberal use of cross-references throughout. Thus, a reader can open to any page and find notations for background material or other relevant topics by chapter and section. This will immediately help students with limited backgrounds, and allow the instructor to jump right into advanced material. The text also serves as a good entry into the primary literature. The nearly four thousand references generally include the original work, as well as reviews and recent examples. They are reasonably up to date, with nearly all chapters including citations after 1990 and some as late as 1993.

Each chapter has a good set of homework problems, generally 10–20 in number. The answers to most of these can be found in the Solutions Manual. In this manual, some of the problems are worked out in detail, and many of the answers have an accompanying literature reference.

As with any text, it is easy to find fault. The rendering of axial and equatorial bonds on chair cyclohexanes is frequently sloppy. Chiral auxiliaries are discussed for asymmetric alkylation reactions, but are barely mentioned for aldol chemistry. The most frustrating part of the text, however, is the large number of minor errors. While many were corrected for the second printing, many remain. Most of the text is clearly written, however there are occasional paragraphs that are confusing.

Despite these problems, there is much to like about this text. It provides a foundation for a course in synthetic organic chemistry that is unparalleled. It should also prove to be a valuable reference after the course is over.

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Reagents for Organic Synthesis, Volume 17. MARY FIESER. John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10158. 1994. xiv+446 pp. 15.5×22.5 cm. \$54.95. ISBN 0-471-000-744.

Volume 17 of *Reagents for Organic Synthesis* by Mary Fieser continues the outstanding series that is one of the most useful in the library of any synthetic organic chemist. Volume 17 lists reagents alphabetically, with examples of their reactions. As with later volumes of this series, the term "reagent" includes generic reagents such as enzymes or organo(metal) reagents. Some molecules listed are substrates rather than formal reagents, and illustrate useful synthetic transformations. Examples are reactions of 5-hexen-1-ylolithiums and pyran-2-ones.

Early volumes of this series placed more emphasis on the properties of reagents than does Volume 17, but some material is included, as for the Dess-Martin periodinane. In general, naming of reagents is cogent and "user friendly." In some cases, the Subject Index is the only way to find a reagent, despite the alphabetical organization of the book. This occasionally leads to some difficulty both in finding and evaluating the synthetic utility of a reagent. Diethyl zinc, for example, is not listed as a reagent although it appears six times in the book with other reagents such as arene(tricarbonyl)chromium complexes or (1R,2R-1,2-N,N'-bis(trifluoromethanesulfonylamino)cyclohexane-titanium(IV) isopropoxide. The titanium(IV) isopropoxide just mentioned is listed as an independent reagent, with a single citation. It appears five times in conjunction with other reagents. Some "old" reagents are not listed as independent reagents, but new variations are reported. Sodium borohydride itself and some of its applications (such as solid state reductions) are not listed, but NaBH₄-CeCl₃ and NaBH₄-I₂ are listed. Sodium borohydride is also listed as a co-reagent with 1-methyl-9,10-dihydroacridene (listed under M). The emphasis on new reagents rather than on repetition of well-known processes is a strength since it brings attention to reagents that might otherwise be missed.

The main strength of this book is its collection of literature citations and specific examples selected for their utility in organic synthesis. If one is considering using a reagent, this series is probably the first place to look. This book also offers the option of browsing reagents alphabetically to discover new reagents that reasonable literature searches would otherwise overlook. This is essential in planning a synthesis or when attempting to develop a new synthetic method. The alphabetical listing of reagents makes them generally easy to find, even if the name of that reagent is not well known. The Subject Index is reasonably complete and easy to use. One assumes that standard ACS abbreviations are used, but inclusion of a list of abbreviations would be helpful. In conclusion, Volume 17 is highly recommended to the synthetic community as a book that should be added to the laboratory shelf, alongside earlier volumes. It is a convenient and highly useful source of information concerning new reagents and some new uses of standard reagents.

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Intermediate Organic Chemistry, Second Edition. JOHN C. STOWELL. John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1994. xv+334 pp. 15.5 cm×23.5 cm. \$49.95. ISBN 0-471-157456-2.

This textbook is intended for use in the second (undergraduate) organic chemistry course. It includes chapters on nomenclature, searching the literature, stereochemistry, synthesis, reaction mechanisms and their determination, molecular orbitals and pericyclic reactions, physical influences (temperature, pressure, medium, etc.) on reactions, and nmr spectroscopy. Problems are provided following the respective chapters, and references to the primary and secondary literature are cited in the text and for the problems. The chapters with a physical organic orientation assume that students have taken the first course in physical chemistry.

There is much less consensus among organic chemists about what best constitutes a second or "advanced" course in organic chemistry than exists regarding the first course. The author of this textbook aims to provide coverage of a range of topics that many instructors would deem appropriate for a second organic chemistry course. In the preface, the author states the premise that establishes the style of *Intermediate Organic Chemistry*, i.e., that introductory organic chemistry courses are long on "theory, vocabulary, and symbolism" and short on descriptive material, and therefore produce students who find "the real world of the practicing chemist to be mostly out of reach" because they lack extensive knowledge of the facts and observations on which organic chemistry is based. The author has been true to this premise, producing a text that provides scant penetrating mechanistic and theoretical insight to illuminate the observations and trends described, and therefore is indeed "intermediate"—not "advanced"—in sophistication.

This text possesses many commendable features. Instructors will appreciate the problems, which

evidently are more numerous than in the first edition, and the device of providing references for the problems rather than answers, which will accustom students to consultation of the literature. There is good, practical advice on searching *Chemical Abstracts* for specific compounds. The surveys of stereochemistry and resolution methods are treated well through the author's descriptive style, as is the interesting chapter on physical influences on reactions. The discussions of the preparation of 1,*n*-bifunctional compounds and the preparative utility of the Diels-Alder reaction and the Claisen rearrangement are instructive.

However, *Intermediate Organic Chemistry* possesses significant shortcomings that will limit its attractiveness as a teaching tool. The two initial chapters on nomenclature and searching the literature, while perhaps logically placed from the perspective of an instructor, are likely to start a course on a rather dry note. They would be better offered in appendices to be assigned for self-study, but this is a minor complaint since the instructor may alter the order of topics. The frequency of errors appears to be low, but not zero. For example, on pages 50 and 51, the author gives the impression that the formation of a carbanion invariably "allows a planar or rapidly inverting pyramidal structure to exist at that atom," and ligands *a* in a simple *Caabc* structure are not diastereotopic, as indicated in page 59. A few items one might have expected to see are absent: homochirality; the terms atropisomer, prochiral, and prostereogenic; time-averaged achirality for rapidly interconverting enantiomeric conformations (e.g., *cis*-1,2-di-X-cyclohexane); the Lindlar reduction in the section on the synthesis of *cis*-alkenes from acetylenes; an explicit discussion of the regioselective generation of enolates through kinetically and thermodynamically controlled deprotonations of unsymmetrical ketones; and the kinetically controlled stereoselective aldol reaction. Some difficult subjects are mentioned so briefly, incompletely, or without graphical illustration that confusion is bound to result: the interaction of optically active materials with circularly polarized light; the relevance of Li^+ , "Schlosser conditions," and 1,2-oxaphosphatanes to the Wittig reaction; the relationship between the stereochemistry of the Diels-Alder reaction and its transition structure; and the term "Slater orbital." Some whole passages are inadequate: the paragraph on carbon-carbon single bond formation on page 109 presented completely without context; the much too abbreviated introductory material for pericyclic reactions; the sections on the Hammond Postulate and the reactivity-selectivity principle that seem to suggest they apply without exception; and the opaque explanation of the COSY experiment. In several instances, the author's prose is perhaps not inaccurate, but is simplistic and imprecise, as in the following statement on page 109: "Basic solutions generally have excess electron pairs available for coordination."

However, the greatest shortcoming of this text arises from the author's stated approach, which is too superficial, descriptive, and devoid of analysis. Indeed, *Intermediate Organic Chemistry* reads like an uninspiring list of things to know in many chapters. This impression is exacerbated by the broad range of topics and relatively large number of reactions and facts condensed into a limited number of pages. The chapters on synthesis, for example, are dense with information, but do no justice to the interplay between mechanism and methodology that underlies our ability to construct impressively complex molecules and has contributed much to the science of organic chemistry generally. Students are unlikely to find in this textbook the seeds of the intellectual excitement organic chemists experience in the pursuit of their work.

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Studies in Natural Products Chemistry. Volume 10: Stereoselective Synthesis (Part F). Edited by ATTA-UR-RAHMAN. Elsevier Science Publishing, P.O. Box 882, Madison Square Station, NY 10159. 1992. xii + 717 pp. 15.5 × 23.5 cm. \$297.00. ISBN 0-444-89558-2.

This tenth volume in the series *Studies in Natural Products Chemistry* continues an outstanding series and details advances in stereoselective synthesis in natural product chemistry. This volume contains fourteen chapters covering a diverse range of topics which provide insight into the synthetic challenges presented in the development of stereoselective methodologies and the stereoselective total synthesis of a wide range of natural products. Each chapter provides a review of the authors' specialty fields. Most chapters (*vide infra*) illustrate the syntheses of a particular molecule or an important class of molecules. The remaining chapters highlight developing stereoselective methods, and, as such, define opportunities for novel stereoselective natural product syntheses, since new synthetic methodology leads to new synthetic strategy.

Marshall (Chapter 1) provides a detailed review of the procedures utilized in the synthesis of cembranes (diterpenes). The stereoselective synthesis of vitamin D is comprehensively reviewed by Wilson and Yasmin (Chapter 2) with a primary focus on synthetic procedures developed during the 1980s. Kubo and Saito (Chapter 3) describe methods described in the literature since 1982 for the partial and total syntheses of isoquinolinequinone antibiotics. Hulce (Chapter 4) reviews the methodology of extended conjugated addition reactions to polyunsaturated carbonyl compounds. Methods of construction of medium ring ethers developed largely during the 1980s are reviewed by Moody and Davies (Chapter 5). This chapter illustrates, although not exhaustively, a number of attractive protocols for the formation of this class of compounds. The

biological properties, chemistry, and total synthesis of the didemnin marine natural products are discussed by Li and Joullie in Chapter 6 with a significant section covering biological activity and structural elucidation. Sakai and Suemine (Chapter 7) report on the application of aldol condensation-retroaldol reactions for novel ring transformations. Herscovici and Antonakis (Chapter 8) review the literature on the synthetic strategies used for the preparation of C-glycosides. Tadano (Chapter 9) surveys the recent utilization of carbohydrate-based Claisen rearrangement methodology for natural product synthesis. Veyrieres (Chapter 10) reviews the synthesis of blood oligosaccharides. Nishimura (Chapter 11) describes progress in the chemistry, biochemistry, and pharmacology of inhibitors of glycosidase and glycosyltransferase during the period 1970 through 1990. Niitsuma, Ichikawa and Takita (Chapter 12) give an overview of the various procedures to obtain the antiviral agents of the oxetanocin class and provide a comparison of their antiviral activity. Yamamura and Nishiyama (Chapter 13) describe the total synthesis of macrocyclic oligopeptides OF 4949-III and K-13. In addition, a discussion of the synthesis of the active center of vancomycin is presented. Pyne (Chapter 14) presents a review of successful asymmetric syntheses of chiral alkaloids using chiral sulfur reagents.

Each chapter is well written, easy to read, and extensively referenced. The volume contains a thorough Subject Index, making the finding of a particular reaction and/or natural product simple. Despite the differences in text font and structural representations in the various chapters, an aspect that detracts somewhat from the overall high quality presentation of this treatise, the reader will gain an appreciation of the challenges facing synthetic chemists in their quest to prepare a wide variety of natural products. This volume would be a valuable addition to personal as well as research libraries.

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