

BOOK REVIEWS

Topics in Stereochemistry. Volume 19. Edited by E.L. ELIEL and S.H. WILEN. Wiley-Interscience, 605 Third Avenue, New York, NY 10158. 1989. xi + 424 pp. 15.5 × 23.5 cm. \$100.00. ISBN 0471-50752-0.

The latest volume of *Topics in Stereochemistry* contains several excellent chapters. The first chapter presents an overview of nmr techniques available for molecular structure determination by examining solid samples. While extremely useful to specialists in the field this particular chapter is probably a bit too theoretical for most organic chemists.

The next three chapters deal with biocatalysis and its applications to enantiocontrolled synthesis. The first of these, by Charles Sih, outlines general principles of biocatalysis and the theoretical grounds and strategies for maximum resolution. Provision of examples of kinetic resolution for several alcohols and acids made this chapter an excellent complement to recent reviews on the use of esterases (*Organic Reactions*, Vol. 37). This chapter emphasizes recent examples that are useful in the preparation of chiral synthons. The sections are organized according to functional groups (acyclic alcohols, cyclic alcohols, cyclic allylic alcohols, α , β -unsaturated alcohols, and acids), and in many cases comparative studies of several different enzymes as well as variance of substitution parameters of the substrates are presented in tabular form, along with conversions and enantiomeric ratios. This is especially useful because studies on biocatalytic resolution still lack rational criteria for design of optimum experiments, and exhaustive or competitive studies are often required to find the best system for maximum resolution. Results are given in E (ratio of enantiomers) which is easier to understand than the traditionally utilized percent ee. The last section provides a brief overview of resolutions that are carried out in organic solvents.

The next chapter, by Berner, discusses the specificity of enzymatic reactions in an evolutionary context. The discussion relates types of organisms with enzymatic reactions of similar type in the context of adaptive or non-adaptive evolution. A strong argument is made for evolution of enzymatic systems according to both function and the organism. The authors classify enzymes from various organisms according to stereochemical homogeneity or heterogeneity and attempt to judge whether or not an enzyme is a product of natural evolution. This chapter is very enjoyable to read because it offers some thought-provoking concepts.

The next chapter addresses industrial-scale synthesis of chiral compounds. It is written with emphasis on practicality, an issue that has not been receiving enough attention in the synthetic literature. Examples discussed include Monsanto's synthesis of L-dopa by an ingenious application of both chiral hydrogenation and solubility parameters of products, chiral cyclopropanation involved in the preparation of cilastatin, and disparture preparation by Sharpless enzymatic epoxidation. Other processes discussed include enantioselective olefin isomerization, 2 + 2 cycloaddition reactions, and hydroboration. The chapter is written with a view toward the overall effectiveness of the process, and the details of the industrial processes, wherever known, are supplied.

The last chapter in this volume reviews base-promoted Michael addition reactions. It contains 267 references and provides a very detailed overview of this topic. The organization of the chapter is excellent. It provides a review of basic concepts and facts about the Michael reaction, acquired by years of investigation by the author and others in the field. The discussion is divided according to type first (inter- vs. intramolecular), then according to functional group (e.g., enolate anions of donors). Within each group, the discussion is again divided according to the acceptor species. This provides for an extremely rapid retrieval of any known combination of functionalities participating in the Michael reaction. The discussion is written with the synthetic chemist in mind and focuses on conditions and stereochemical outcome of the condensation. Mechanistic rationale is provided in many cases. The last section discusses tandem or sequential Michael reactions, an area to which the author has also heavily contributed. This chapter is the best written to date on this topic and serves as an invaluable reference source and a teaching tool.

TOMAS HUDLICKY, *Virginia Polytechnic Institute and State University*

Medicinal Plants in China. INSTITUTE OF CHINESE MATERIA MEDICA, CHINA ACADEMY OF TRADITIONAL CHINESE MEDICINE, 1989. World Health Organization, CH-1211, Geneva 27, Switzerland, and 49 Shendan Avenue, Albany, NY 12210. 1989. xv + 327 pp. 14 × 21.5 cm. Softbound. Sw.fr.50. ISBN: 92 9061 102 2. Descriptive information compiled by Xie Zongwan, Zhao Zhaongzhen, and Huang Yiping; color photographs by Cui Haiming and Zhang Muqun.

This book describes 150 species of plants and presents color photographs of them as representative of those most commonly employed in Chinese "herbal medicine." The authors indicate there are more than 7,000 medicinal species in China; the flora of China has perhaps 30,000 + species. Of the selected medicinal species, I estimate that nearly 10% are endemic to China, and another 30% are found only in Asia; however, many are cultivated or naturalized in many parts of the world. Additionally, many of the Asian endemic species belong to genera with related species in North America (e.g., *Angelica*, *Aristolochia*, *Clematis*, *Coptis*, *Cornus*, *Corydalis*, *Croton*, *Cuscuta*, *Dianthus*, *Echinops*, *Ephedra*, etc.).

The authors make some rather disturbing statements in the introduction. For example, they state that "most species of medicinal plants are not toxic and therefore give rise to few if any side effects," although they give notice on a separate page that "self treatment would be dangerous" and "the advice of qualified health workers is always advisable." Moreover, they add "if any side effects do occur, they are much less serious than those caused by chemically synthesized medicines."

Information on each species is presented in a standard format that is reminiscent of Julia Morton's *Folk Remedies of the Low Country* (1974). The species names in Latin always appear at the top of each right-hand page above the text, and at the bottom of the left-hand (facing) page below the color photographs; the sequence is alphabetical by genus/species. The common names of the plants are given in both English and Chinese. Details then follow under the headings of "Parts used," "Description" (of the plant), "Habitat," "Distribution," "Indications," "Dosage," and occasionally "Notes;" photographs usually show (1) the habit of the plant and (2) the part employed in medicine, often referred to as the "crude drug." "Indications" is the heading under which information on the specific medicinal uses of the "crude drug" can be found, but the preparation of the "crude drug," scientific investigations concerning pharmacological activities, and active chemical agents are not discussed. Many Chinese herbs are often employed in combination with other natural products, and it is not clear whether the "crude drugs" are employed alone or in combination with other substances. A bibliography or literature cited is not included.

I compared many of the species depicted in the photographs with descriptions and illustrations in other floras, and I found them to be accurate except for perhaps one—*Achyranthes bidentata* (Amaranthaceae). The *Achyranthes* plant in the photograph appears glabrous (without hairs), whereas in the *Flora of Taiwan* (1976) *Achyranthes bidentata* has been described as being densely covered with white woolly hairs. It is possible, however, that this discrepancy is due to error or difference in taxonomic opinion.

The descriptive information was apparently not carefully edited. For instance, the fruit of *Piper nigrum* is described as a red berry in one paragraph, and as an "entire drupe" in a subsequent paragraph, but fruit terminology has been a problem for taxonomists [e.g., the fruit of *Trigonostemon* (Trigonostemonaceae) in the *Flora Neotropica* is described as a loculicidal capsule in the key and a septicidal capsule in the description of the genus and family, and the fruit of *Kickxia* in D.S. Corell & H.B. Correll, *Aquatic Wetland Plants of the Southwestern United States* (1972), is referred to as a loculicidal capsule in the taxonomic key and description of the genus, and then as a "two-celled capsule," with "each cell circumscissile" in a caption of an illustration]. The detailed description of the crude drug is usually that of the plant part used in medicine, and this probably could have been treated under the heading of parts used—the first heading of the outline that probably belongs at the end. Because some of the botanical terminology may be unfamiliar to scientists in other disciplines, a glossary would have been helpful, e.g., "standard"—a term that refers to one of the petals in a legume (Fabaceae) type of flower.

The geographical distribution described for each species is often incomplete. *Ailanthus altissima*, *Foeniculum vulgare*, *Forsythia suspensa*, *Hyoscyamus niger*, *Impatiens balsamina*, *Lonicera japonica*, *Morus alba*, *Phragmites communis*, *Polygonum bistorta*, *Prunella vulgaris*, *Prunus armeniaca*, *Prunus persica*, and *Pueraria lobata* were reported as occurring only in areas of Eurasia, but these species are also well established in North America. The geographical distribution of *Albizia julibrissin* is described as having become "naturalized in the southeastern United States." While many botanists recognize *Ricinus communis* as pan-tropical and subtropical in distribution, the authors imply that this species occurs only in Japan and China.

The best features of the book are the color plates that might occasionally be consulted by plant taxonomists who routinely identify plants; however, it will likely appeal to others as a secondary reference on medicinal plants in China.

Colour Atlas of Chinese Traditional Drugs Vol. 1. Edited by LOU ZHICEN. Sciences Press, Beijing. Distributed by CRC Press, 2000 Corporate Blvd., Boca Raton, FL 33431. 1987. 300 pp. 23.5 × 29 cm. \$99.50. ISBN 703-001616-5.

This is not just another English text on Chinese medicinal plants. This is truly a color photographic exhibit of Chinese traditional drugs which are prescribed in the "Pharmacopoeia of the People's Republic of China," 1977 edition, accompanied by an English text. This volume is the first of three under preparation, altogether to include the treatment of 500 drugs, to be published with both English and Chinese texts. The three volumes are compiled and written by a team of Chinese scholars, photographers, and translators under the auspices of the Office of the Chinese Pharmacopoeial Committee, Ministry of Public Health, and the Drug Control Institutes of Jiangsu, Jiangxi, Fujian, Shandong, Liaoning, Guangzhou, and Qingdao. Volume 1 (this volume) deals with 150 drugs, of which 138 are of vegetal and 12 of animal origin.

Volume 1 starts with a Preface by the Editorial Committee, followed by a "Notes," which is a one-page synopsis of the contents of the volume; a Table of Contents, which is a numerical listing of the drugs as they appear in the main body; a text-photo exhibit (pp. 1–293), which is the body of the book; an index of the Chinese phonetic name of the crude drugs; and an index of the Latin name of the same (*not* the scientific name of the organism) at the end. No bibliography or research references are provided.

The body of the book consists of entries or monographs of the crude drugs presented numerically from No. 1 through No. 150, based on the number of strokes of the first Chinese character of the drug's name. Thus, Ginseng [*Panax ginseng* C. A. Meyer; *Renshen* in Chinese] is entry No. 1 (pp. 1–6), Jasmin-orange [*Murraya paniculata* (L.) Jacks; *Jiulixiang* in Chinese] entry No. 2 (p. 7), etc., and Agastache [*Agastache rugosus* (Fisch. & Mey.) O. Kuntze; *Huoxiang* in Chinese] entry No. 150 (pp. 292–293). The entry heading is the numbered English name, followed below it by the Chinese name and the Latin crude drug name. The scientific name of the drug (the Latin binomial), the family name, and the part(s) of the plant or animal used are given in the first paragraph of the text in each monograph. In a consistent manner, subsequent paragraphs provide the following information about the drug: (a) a brief but comprehensive taxonomic description with habitat and geographic range observations, (b) season and time of the day to harvest the drug and the manner of preparation, as well as the organoleptic characteristics, (c) a listing of chemical compounds isolated and/or identified (if available), and (d) the therapeutic use(s). Color photographs of different sizes (sometimes full-page) are interspersed between texts, each labeled accordingly.

One should see the book to really appreciate the beauty and accuracy of the photographs, which show both habit of the plant or animal and the close-ups of parts and the drugs, in clear and crisp images. The quality of the photographs is superior and their reproduction is excellent, providing a true color rendition of the original material. No scale is indicated in the photographs, because the size of each object is provided in the text. The compilers claim that the "photographs have been taken with modern photographic techniques to show the natural environment of the plant or animal, the plant colony, and the scene of cultivation" and that the "best known natural habitats or drug plantations and botanical gardens where the plants grow or are cultivated were visited at different seasons of the year in order to take photographs of the plants in their different stages of growth." Accompanying these photographs are sound taxonomic identification and textual description. This is truly a book for pleasure, as well as for science, and serves well for the taxonomic identification of Chinese medicinal plants and crude drugs.

One weakness of the book is that when one wants to find the monograph of a particular plant, but is unfamiliar with the English, Chinese, or Latin plant/drug name, yet knows its scientific name, there is no easy way to locate the plant/drug in this volume. Hence, an index of the scientific name is needed. The compilers promise to provide a complete index in the last of the three volumes; an index to the Latin binomials should be included. Another weakness lies in the sometimes inaccurate description of the plant or in the use of technical terms; this may have been due to erroneous translations. In a future edition, the English version should be edited by a native English speaker. These shortcomings, however, should not detract users from enjoying the beauty and the scientific merit of this volume. For a book with full color illustrations, the costs of preparation and printing are high. Unfortunately, this cost has to be passed on to the consumers; this explains the high cost of the book.

I definitely recommend this book to plant lovers in general, as well as to students and scholars in plant sciences and in pharmacognosy. It will make a valuable addition to any botany, natural sciences, agriculture, horticulture, or pharmacognosy library.

Handbook of Ayurvedic Medicinal Plants. L.D. KAPOOR. CRC Press, 200 Corporate Blvd., N.W., Boca Raton, FL 33431. 416 pp. 18 × 26 cm. \$195.00. ISBN 08493-0559-4.

The famous *Wealth of India* (WOI) (11 vols.) treats many more Ayurvedic medicinal species than the 251 treated in the book under review. Kirtikar and Basu's (K&B) *Indian Medicinal Plants* treats and illustrates over 1000 medicinal species. Kapoor's *Handbook* incorporates many data and illustrations found in the above-named volumes, containing 65 illustrations from K&B, one from another source. The format is followed rigorously: Vernacular Names, Habitat, Parts Used, Morphological Characteristics, Ayurvedic Description, Action and Uses, Chemical Constituents, Pharmacological Action, Medicinal Properties and Uses, and Doses. Of 900 references, most are Indian and pre-1980. That is expected for a book conceived by and dedicated to the late Dr. Durga Prasad Sharma "who was born, lived and died for Ayurveda."

Because of fervent US interest in *Taxus* and taxol today, I turned to the *Taxus* account for critical review. Yew is not listed as the English common name, rather "Himalayan Fir." Both WOI and K&B more appropriately list "yew." Kapoor gives a strange German common name "Eilec," while K&B give "Eibe," "Ibe," "If," "Kantelbaum," "Roteibe," "Taxbaum," "Taxus" and "Ybe" as German colloquial names. WOI and K&B both list more colloquial names than Kapoor. Under Habitat, Kapoor says "temperate Himalayas at altitudes of 6000 to 11,000 ft and in Kasi Hills at altitudes of 5000 ft," close to the information provided by WOI (1976). Under Parts Used, Kapoor says only "Leaf," though under Pharmacological Action, he notes that fruits, as well, are "emmenagogue, sedative, and antispasmodic." His first paragraph under Morphological Characteristics is disconcertingly similar to the K&B verbiage (>50% concordance) while the second pharmacognostic paragraph is not shared with WOI or K&B. Under the Ayurvedic Description, "tikta" means bitter, "laghu" means light, easy to digest, "teekshna" means acute/pungent, while "ushna" and "madhur" were not defined in the Glossary of Ayurvedic Terms. Under Action and Uses, there are many alien words not in the glossary or index. The Chemical Constituents paragraph is weak, not mentioning taxol, today's most promising drug for ovarian cancer. The three references here are 1958 (reprinted 1982), 1969, and 1983 (12th edition). There are more data in WOI, as seems true of the Pharmacological Action and Medicinal Properties and Uses sections. Under Doses there is information not found in K&B or WOI: "Tincture—2 to 5 ml; infusion—14–28 ml; powder—450–900 gr." Though Kapoor does describe taxine as a "vigorously active heart poison," he doesn't indicate the LD₅₀ (4.5 mg/kg) generously provided by WOI. One might be concerned about such dosages, suggesting 450–900 gr of the toxic yew leaf compared with only 0.5–1 gr dandelion root (p. 316).

Kapoor's useful book costs more than half as much as WOI, but doesn't contain nearly half the information. CRC prices will limit the number of potential buyers. Too bad! All students of Ayurvedic medicine and medicinal plants should have a personal copy.

JAMES A. DUKE, *United States Department of Agriculture*

Organic Reactions, Volume 38. LEO A. PAQUETTE, *Editor-in-Chief*. John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1990. xvi + 805 pp. 15.5 × 23.5 cm. \$89.95.

Volume 38 of *Organic Reactions* continues the same general format and comprehensive treatment of selected topics which have been employed since Volume 1 appeared in 1942. The present volume contains three chapters, "The Peterson Olefination Reaction," "Tandem Vicinal Disubstitution," and "The Nef Reaction." It is a commentary on the explosive growth of organic chemistry in the nearly half century since Volume 1 appeared that the number of chapters has decreased from 12 to three, while the number of pages has increased from 391 to 805.

David Ager's chapter on the Peterson Olefination (Sila-Wittig reaction) includes a brief discussion of the mechanism and nearly 70 pages devoted to "Scope and Limitations." Not only are simple examples of this synthetically useful reaction described, but a number of variations are discussed. The usual tabular survey presents 19 tables which include virtually every example of the Peterson Olefination reported through 1986. In addition to this detailed review, there are two previous reviews of this reaction, one in 1977 by T.H. Chan and one by Ager in 1984.

The second chapter, by Marc J. Chapdelaine and Martin Hulce, describes "Tandem Vicinal Difunctionalization: β -Addition to α,β -Unsaturated Carbonyl Substrates Followed by α -Functionalization." This is strictly speaking not a single reaction but a widely used synthetic sequence which usually proceeds by addition of a nucleophile to an α,β -unsaturated carbonyl compound followed by trapping of the derived enolate, or a derivative, with an appropriate electrophile. This type of transformation is very common in modern synthetic chemistry, and there are many diverse examples presented in this lengthy review. The authors have done a nice job of bringing coherence to this topic, which encompasses a considerable number of mechanistically different, but conceptually similar, reactions. The extensive tabular survey

(350 pages) covers the literature from 1959 through 1986. A table in the body of the chapter lists, with references, the synthesis of 53 different natural products which have employed this procedure.

The final chapter, by Harold W. Pinnick, reviews the Nef reaction, which is a useful process for the conversion of a primary or secondary nitroalkane to the corresponding aldehyde or ketone. This is a relatively short chapter, very much in the classical tradition of *Organic Reactions*. There are the usual discussions of mechanism, scope, and limitations, plus a table which attempts to list all examples of the Nef reaction reported through 1988.

In common with all of the other volumes of *Organic Reactions*, there are Experimental Procedures included in all three chapters. These provide selected examples of typical experimental conditions for several variations of each of the title reactions. These procedures serve as a useful guide for one who is considering the use of one of these reactions. The volume also includes cumulative chapter titles for the preceding 37 volumes and cumulative author, chapter, and topic indices for all 38 volumes.

The *Organic Reactions* series has a well-deserved reputation as an indispensable reference for those active in the field of organic chemistry, and selected chapters are frequently required assignments in graduate level courses. The current volume continues to maintain the high standards of its predecessors.

JOHN W. HUFFMAN, *Clemson University*

Carbon Disulphide in Organic Chemistry. A.D. DUNN and W-D. RUDORF. Halstead Press, John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1989. x + 89 pp. 17 × 24 cm. \$89.95. ISBN 0470-21441-4.

After a "General Discussion" and chapters on "Carbon Disulphide as Solvent" and "Reactions with Inorganic Reagents," this book gets down to its major task—the description of the reactions of carbon disulfide with variously functionalized organic compounds and of the wide variety of organic products that are thus made available synthetically. It also interprets many of these reactions in qualitative mechanistic terms. Although the General Introduction gives adequate information on the manufacture, industrial utilization, inflammability, health hazards, purification, and detection of carbon disulfide, it gives only very limited information on its history, structure, and physical properties. The section on physical properties is made remarkable by the absence of any spectroscopic data. If a subtitle, "Its Use in Synthesis," were added one would have a better description of the contents of the book. Viewed in these terms the book is a useful and encyclopedic account of the applications of carbon disulfide in organic synthesis, particularly in the area of sulfur heterocycles.

It is clearly written and commendably free of typographical errors. As in any work of this kind, where the account is largely descriptive, it is difficult to sustain the continuous interest of any reader but a specialist, i.e., the book can be put down. It will, however, serve organic chemistry well both as a reference work for consultation and a source of ideas in synthetic sulfur heterocyclic chemistry for the browser.

PETER YATES, *University of Toronto*

Pharmaceutical Chemicals in Perspective. B.G. REUBEN and H.A. WITTCOFF. Wiley-Interscience, John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1989. xviii + 518 pp. 16 × 24 cm. \$69.95. ISBN 0471-84363-6.

In contrast to the usual scientific fare written in terse scientific language, this 23-chapter book by Reuben and Wittcoff, written in a very informal style, contains an overview of the pharmaceutical industry, much of which could be easily read by anyone with a minimal science background.

However, the authors probably try to accomplish too much. How much detail, for example, can be given on the background of the pharmaceutical industry, essentials of pharmacology, the basics of pathophysiology for a variety of disease states, and the chemical synthesis of the most important prescribed drugs, as well as drugs for tropical diseases, prostaglandins, antiviral, anticancer, and orphan drugs, in a work of such modest size? Surprisingly, this book has more to offer than one might expect.

The first three chapters consider the history and characteristics of the pharmaceutical industry and patterns of illness and health care. Historical data in these chapters include, for example, graphs of maternal mortality and death rates from pneumonia prior to, and after, the introduction of sulfonamides and penicillin. One finds 1986 figures for total world production, consumption, and balance of trade for pharmaceuticals, per capital expenditures on medicines, research costs, profitability, introduction of new drug entities for 1940–1986, etc., all within the first 56 pages of the book. Yet, the book is written in an easy-to-read style, replete with anecdotes and insights (sometimes humorous) that make reading enjoyable.

Obviously, one cannot cover in depth in only 38 pages (chapter 4) receptor theory, agonists, antagonists, absorption, distribution, metabolism, and elimination. However, this lack of depth makes the

book ideal for a chemist or undergraduate chemistry major who wishes to learn something about the pharmaceutical industry with a minimal investment of time and effort.

Part II of the book, chapters 5–17, covers therapeutic agents from the top 100 prescribed drugs, giving a brief background, comments on mechanism of action, and chemical synthesis schemes. While not as detailed as a typical medicinal chemistry text (nor as tedious to read), this material probably could be used for an elective course in an undergraduate chemistry program. Indeed, the authors indicate that the book is suitable for anyone wishing to gain a perspective on the pharmaceutical industry, or for use as a textbook for students with a course in organic chemistry.

Part III, chapters 18–23, covers important but less widely prescribed drugs (e.g., antivirals, orphan drugs), using a similar format for discussion. It concludes with a chapter on "Innovations and Issues" touching on problems in the pharmaceutical industry, the question of excess profits, and drugs of the future.

The book contains minor errors and the occasional typographical error, but these are remarkably few in number. Chemical structures and synthetic schemes are generally reprinted from the original source material. The bibliography and notes section (in Appendix 3) contains a fairly extensive list of information sources: pharmacopeias, texts on medicinal chemistry, pharmacology, and drug synthesis, and popular books. The bibliography, in addition to listing sources, also provides brief commentaries and narrative material. The book is well indexed.

While I doubt that many practicing medicinal chemists will wish to add this book to their personal libraries, most of it is enjoyable reading. The book will be of interest to organic chemists, those in the pharmaceutical industry with some chemistry background, and chemistry or medicinal chemistry graduate students.

DAVID E. NICHOLS, *Purdue University*

The Healing Forest. RICHARD E. SCHULTES and ROBERT F. RAFFAUF. Dioscorides Press, 9999 S.W. Wilshire, Portland, OR 97225-9962. 484 pp. 18.5 × 26 cm. \$59.95. ISBN 0-931146-14-3.

Covering, by their count, 1516 species in 594 genera of 145 families, the authors provide some tightly packed new information on their generously illustrated 484 pages. Surveying the chemical literature from 1967 through 1984 for biodynamic activities of the species covered, they state that "at least 50% have had little investigation or none at all"

There is little of the usual "bibliographic echo" found in so many medicinal floras. Voucher specimens are cited for almost all the plants, and uses are mentioned. Many species are mentioned as medicinals here for the first time in the scientific literature. There are indices to scientific names and bioactivity. There are many new data about many "new" medicinal species, with their ethnic names (the latter unfortunately not indexed). With no index to common names, English, Portuguese, Spanish, or ethnic, the amateur cannot get to his plant without knowledge of the generic or family name.

It is interesting to see what this book says of coca (beleaguered source of cocaine) and its relatives. Without the scientific name for coca, one must thumb through the book to find Erythroxylaceae, the coca family (p. 166). There are interesting data for *Erythroxylum cataractarum* ("can be eaten"), *E. coca* var. *ipadu*, *E. fimbriatum* (substituted for ipadu), *E. gracilipes* (considered a stimulant), *E. macrophyllum* (substituted for ipadu), *E. sp.* indet. (used like coca but only by Andoke medicine men), and *E. ulei* (used for body aches, headache, sore throat, stomachache, toothache, and bloody diarrhea). Some coca scholars assume no harm is done the Indians by their coca-chewing habit. This book hints that harm may be done:

From p. 166 et seq. "Coca is employed as a stimulant and daily narcotic by most tribes in the north-west Amazon . . . it is employed hedonistically in daily life . . . amongst the Yukunas of the Rio Miritiparana, where it was not uncommon to find men who daily took up to one pound of the powder."

From p. 172 (quoting Richard Spruce): "in Peru its excessive use is said to seriously injure the coats of the stomach."

From p. 172 (quoting T. Koch-Grunberg): "When used excessively, coca may be harmful to the nervous system."

From p. 388: "A hot tea of the leaves and bark is recommended for aged men who, *probably because of long and excessive use of coca*, suffer from stomach or intestinal bleeding" (italics mine).

This superb book, with few typos, contains many fine line drawings, some of which I have seen elsewhere. A splendid job, by giants in their field, this reasonably priced book offers the accumulated wisdom of nearly 50 years' field work and research by the Dean of Ethnobotanists, skillfully and concisely punctuated with phytochemical data by the Emeritus Professor of Pharmacognosy and Medicinal Chemistry. Hats off to Dioscorides for offering this treasure at reasonable price.

JAMES A. DUKE, *United States Department of Agriculture*

Diemes in the Diels-Alder Reaction. F. FRINGUELLI and A. TATICCHI. Wiley-Interscience, John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1990. xx + 348 pp. 15.5 × 24.5 cm. \$69.95. ISBN 0471-85549-9.

With the number of excellent reviews that have appeared on the subject in recent years, one might have groaned at the prospect of yet another review on some aspect of the Diels-Alder reaction. A mistake! Despite its somewhat misleading title, this excellent book provides a modern and thorough look at all facets of the Diels-Alder reaction, with literature coverage through 1987, including a few 1988 citations, and with emphasis on the period 1978–1987.

Chapter 1 is a truly superb introduction to the field, in which the mechanism of the Diels-Alder reaction is covered in commendable detail. This includes the application of Frontier Molecular Orbital Theory to reactivity and selectivity, and a clear discussion of the distinction between "normal," "inverse electron demand," and "neutral" Diels-Alder reactions. Separate sections in this 40-page introduction cover regioselectivity, stereoselectivity, the effects of catalysis, pressure, solvent, and solid supports, asymmetric Diels-Alder reactions (chiral dienophiles, dienes, and catalysts), intramolecular Diels-Alder reactions, multiple Diels-Alder reactions ("domino," "timed," "tandem," and "diene transmissive"), and retro-Diels-Alder reactions. This cogent yet concise picture of one of the most important reactions in organic chemistry is the best that this reviewer has encountered and it would be an excellent study guide as well as a source of information for beginning graduate students and other with little or no prior experience in this area. This chapter—like the entire book—is amply illustrated with equations, transition state and energy level diagrams, and tables.

Preceding this introductory chapter are a listing of the abbreviations used in the book and a guide to the authors' classification of dienophiles into ten principal groups (and nearly as many subgroups) on the basis of the atoms and their substituents which constitute the dienophilic center. This classification system as well as the abbreviations adopted for the eighteen most commonly used dienophiles take some getting used to: "DMF" = dimethyl fumarate, "MTA" = methacrolein, and "MP" = methyl propiolate. However, both systems do make it easier to search the Tables for a particular kind of Diels-Alder reaction.

The remaining five chapters are devoted to in-depth presentations of the Diels-Alder reaction according to diene type: "open-chain" (e.g., 1,3-butadiene), "outer-ring" (e.g., *o*-carbodimethylenes), "inner-outer ring" (e.g., 1-vinylcyclohexene), "across-ring" (e.g., 1,1'-bicyclohexenyl), and "inner-ring" (e.g., cyclopentadiene, furan). The two longest chapters, "open-chain dienes" (79 pages) and "inner-ring dienes" (166 pages), are further divided into subchapters, according to diene type. For example, the "inner-ring diene" chapter is divided into carbocyclic, aromatic, and heterocyclic dienes, each of which is further subdivided by ring size. Each subchapter has separate tables and references. Although this may sound confusing, the organization of the material is handled very well by the authors. Each chapter or subchapter begins with a concise and clear explanation of that particular Diels-Alder reaction type. This is followed by a Table listing examples, similar to the style of *Organic Reactions*. Thus, the diene and dienophile are listed, along with the classification type, the yield, and the reference. The diene is usually depicted by a structural formula, but the dienophile is cited by its abbreviation or name. The authors appear to have done a comprehensive literature search in preparing these tables, the meat and potatoes of the book. For example, Chapter 2, "open-chain dienes," contains 26 separate tables according to 1,3-butadiene type and 4 tables according to hetero-1,3-butadiene type, and cites 500 papers.

Perhaps reflecting a translation of Italian into English by a nonchemist, there are a few spelling errors that would have been caught by an unsleeping chemist: "attacked" (pp. 29, 30 for "attached"), "alcoxy-" (p. 40), "dihydropirans" (p. 99), "diethylacetilenedicarboxylate" (p. 126), "synthetize" (p. 212), "dialkil-" (p. 213), "tripticene" (p. 263), "tetraazines," and "disilabarralenes" (p. 310). In addition, there are a few errors in structural formulas: missing "O" (p. 99, formula 66), missing double bond and "HClO" (p. 130, Scheme 3.2), and incorrect formula 48 (p. 298). However, in general the book is remarkably error-free and the drawings are clear and correct. The writing is very good and, for example, only one subject-verb disagreement was found (p. 183). This reviewer's biggest complaint is with the three-dimensional structural drawings, parts of which appear to have been hand-drawn and/or have had the ink smudged at some stage. This is particularly true for the bicyclic structures (e.g., pp. 23, 27, 38, 63, 178, 216, 234, 235).

There is an excellent Table of Contents and a reasonably complete subject index, but no author index, which would have been useful. Also lacking is a concluding or summary section or chapter. The authors might have attempted to evaluate the future role of the Diels-Alder reaction in the advancement of organic chemistry and its synthetic applications, and might have commented on the present short-comings of this reaction (if any!) and on the areas to be pursued in the future. Nevertheless, this book is to be highly recommended to those chemists interested in the Diels-Alder reaction, and it would seem to be obligatory reading for those chemists who actually run Diels-Alder reactions!