

## Book Reviews

**Organic Reactions, Volume 47.** Edited by Leo A. Paquette (Ohio State University, Columbus, OH). John Wiley & Sons, Inc., New York. 1995. xii + 582 pp. 15 × 22.5 cm. \$95.00. ISBN 0-471-11737-4.

This volume of the well-known series consists of one chapter by R. D. Clark and A. Jahangir entitled "Lateral Lithiation Reactions Promoted by Heteroatomic Substituents." The seminal report by P. L. Creger at Parke-Davis in 1970 that *o*-toluic acid, when treated with LDA, leads to a tolyl carboxylate dianion allowed synthetic chemists to contemplate both chain extension on and carbo- and heteroatom annelation to benzoic acid derivatives. In the ensuing years, this reaction has been used ingeniously and adapted extensively by numerous chemists, among which the authors of this chapter stand out for their significant contributions. The review is timely and especially valuable in that it links the lateral metalation (LatMet) tactic to the increasingly useful directed ortho metalation strategy (DoM) (cf. Gschwend, H. W.; Rodriguez, H. R. *Org. React.* **1979**, *26*, 1; Snieckus, V. *Chem. Rev.* **1990**, *90*, 879). Extent of coverage is defined as only including *o*-tolyl systems without  $\alpha$ -substituents; *m*- and *p*-tolyl (directed metalation group) aromatics, although also activated to deprotonation, are excluded.

The present volume follows the standard practice expected of this Series in the comprehensive survey of the different heteroatom substituents that promote LatMet and systematic discussion of the methods of generation, stability, reactivity, and synthetic utility of the *o*-tolyl anions. Both aromatics and heteroaromatics are covered. The various electrophiles that undergo reaction with these species are catalogued, and the influence and compatibility of ring substituents in LatMet processes are delineated. Also as expected, mechanistic discussion is provided in order to facilitate conceptualization for synthesis. Particularly useful is the comparison and complementarity between LatMet and DoM. Over 200 pages of tables and 340 references up to 1994 are provided. The well-illustrated synthetic utility section presents application of LatMet to the construction of over 30 natural products.

The authors have made a major contribution by the review of a widely scattered and difficult to search subject. The writing is clear and the organization is superb. The volume will take its place in the venerable *Organic Reactions* series and receive broad use by both academic and industrial synthetic chemists.

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**The Alkaloids: Chemistry and Pharmacology, Volume 50, The Alkaloids: Chemistry and Biology.** Edited by Geoffrey A. Cordell (University of Illinois at Chicago). Aca-

demie Press, San Diego, CA. 1998. xvi + 590 pp. 15 × 22.5 cm. \$125.00. ISBN 0-12-469550-7.

This volume is the fiftieth in a series covering special topics in the chemistry and biology of alkaloids. Like earlier volumes in the series, this book consists of in-depth reviews of various topics by experts in relevant aspects of alkaloid chemistry. However, as one might expect for a fiftieth edition, this volume is especially rich in chapters that present interesting historical perspectives from a number of internationally known senior investigators in the field. There are 14 chapters ranging from 26 to 59 pages in length. Most of these are extensively referenced, with several citing well over 100 references. The volume begins with a fascinating biographical chapter summarizing the career of the Founding Editor of the series, Canadian alkaloid chemistry pioneer R. H. F. Manske (authored by D. B. MacLean and V. Snieckus). This chapter alone offers a strong case for seeking out this volume. It includes selected quotations, pictures, and even copies of several pages from Manske's M.S. and Ph.D. theses. Other chapters that could be described as having a special, long-term historical flavor include entries on the nature and origin of amphibian alkaloids (J. W. Daly), the biochemistry of ergot alkaloids (D. Gröger and H. G. Floss), and the history and future prospects of camptothecin and taxol (M. E. Wall and M. C. Wani). The remaining chapters cover other general aspects of alkaloid chemistry, and many of these also offer interesting philosophical or historical insights. Several of the entries place an emphasis on biological, biochemical, and biotechnological aspects of alkaloid chemistry. These include reviews of alkaloid chemosystematics (P. G. Waterman), molecular genetics of plant alkaloid biosynthesis (T. M. Kutchan), bioactivity of unnatural alkaloid enantiomers (A. Brossi and X.-F. Pei), prospects for metabolic engineering in the production of alkaloids (R. Verpoorte, R. van der Heijden, and J. Memelink), and chemistry and biology of steroidal alkaloids (A.-ur-Rahman and M. I. Choudhary). The remaining chapters place more emphasis on synthetic chemistry. Aside from one chapter describing miscellaneous synthetic studies in alkaloid chemistry (C. Szántay), these are dedicated to specific compound classes and include reviews of the synthesis of *Aspidosperma* alkaloids (J. E. Saxton), biomimetic synthesis of monoterpenoid indole alkaloids (H. Takayama and S.-I. Sakai), structure, synthesis, and pharmacology of the pseudodistomins (I. Ninomiya, T. Kiguchi, and T. Naito), and recent aspects of the isolation, structure elucidation, and synthesis of natural polyamine derivatives (A. Guggisberg and M. Hesse).

All of the chapters in this volume are neat, well-proofed, and attractively illustrated, with a uniform format differing from one chapter to the next only in the structure drawing style. Although the cost of this book is in line with other volumes of its type, such costs make it difficult to suggest that individuals should purchase their own personal copy. However, this volume is a particularly valuable entry in

the series, and departmental libraries should make every effort to acquire it.

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**Chemistry of the Amazon: Biodiversity, Natural Products, and Environmental Issues.** Edited by Peter Rudolph Seidl, Otto Richard Gottlieb, and Maria Auxiliadora Coelho Kaplan. American Chemical Society Symposium Series 588, Washington, DC. 1995. xii + 315 pp. 15 × 22.5 cm. \$89.95. ISBN 0-9412-3159-1.

In November 1993, shortly after the Rio Summit of 1992, the First International Symposium on Chemistry of the Amazon was held in Manaus, Brazil, under the joint sponsorship of the Associação Brasileira de Química, the American Chemical Society, the Centro de Tecnologia Mineral, and the Instituto Nacional de Pesquisas da Amazonia. *Chemistry of the Amazon: Biodiversity, Natural Products, and Environmental Issues*, provides an account of this Symposium.

Since the Brazilian Amazon accounts for just over 30% of the earth's tropical rainforests, this region is a uniquely important biological resource. Unfortunately, it is also a resource under enormous external pressure. Estimates of losses of the Amazonian tropical forest due to deforestation range from a very conservative 8% (40 million ha) to upwards of 12%. One important purpose of the International Symposium was to develop an understanding of how chemistry might contribute to the preservation of Amazonian biodiversity.

The range of subjects included in this multiauthored, 300-page volume is enormous. Included in its 22 chapters are thoughtful overviews of the potential for the discovery, among Amazonian natural products, of new drugs and agrochemicals, somewhat less exciting discussions of chemotaxonomy, detailed accounts of various specialized areas of natural products chemistry (ranging from terpenes to lignans and proteins), and discussions of some extremely serious environmental problems. There are clear expositions of the devastation resulting from slash-and-burn agriculture and from the aggressive expansion of the lucrative timber industry. One chapter is devoted to a careful description of the disastrous consequences of unregulated gold mining activities. This uncontrolled and highly decentralized mining activity is responsible for discharging over 100 tons of mercury into the environment annually!

It is as difficult to summarize the contents of this brief symposium volume as it would be to describe the Amazonian area itself in a few words. However, any chemist with even a casual interest in the opportunities and the problems that are connected with studying and learning from the world's largest biodiversity resource would do well to

read this very important account of the many ways that chemistry plays a crucial role in Amazonia.

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**Potions, Poisons, and Panaceas: An Ethnobotanical Study of Montserrat.** By David Eric Brussell (Southern Illinois University). Southern Illinois University Press, Carbondale, IL. 1998. xvi + 176 pp. 22.5 × 17.5 cm. \$69.95. ISBN: 0-8093-1552-1.

Should I ever visit the small island of Montserrat, I will surely take this small book with me. It is a concise catalog of 282 ethnobotanically important plants from the island, estimated population ca. 12 000 people. Of the species covered in the book, 207 (73%) are medicinal, 123 (44%) are used for food, 49 (17%) are poisonous, 41 (15%) are a source of wood, 27 (10%) are associated with voodoo and folklore, 14 (5%) are sources of fiber, 9 (3%) are utilized for production of dyes, 8 (3%) are employed as aphrodisiacs, and 32 (11%) have various, miscellaneous uses that include use as hallucinogens, aromatics, insect repellents, ornaments, brooms, and teeth-cleaning agents. Kapok from the silkcotton tree, *Ceiba pentandra*, for example, is used locally to stuff voodoo dolls and placed over the front door as a protective charm when the occupants leave. The wood is used to make dugouts. Some of the nonuseful species are tabulated in the appendix where the author lists the dates and places of collection for his 378 collections on the island.

In Hawaii, fruits of the pantropical shrub known as Noni (*Morinda citrifolia*) are being harvested for a developing commercial medicinal market in the U.S. The *Morinda* account is thus included below to show typical coverage for a species:

***Morinda citrifolia* L.; Hog Apple, Painkiller, Chiddle Grape.** This small tree has opposite elliptic leaves, white tubular flowers in balls, and large whitish-green multiple fruits that have an odor similar to limburger cheese. It is native to India. Specimens were collected on St. George's Hill and at Blackburn Airport near Trants. Brussell C-269, C-311. The crushed or heat-wilted leaves are used topically to relieve pain and as poultices for boils, bruises, and wounds. The immature macerated fruits are mixed with salt, and the resulting paste is applied topically to areas around broken bones. Juice from the root is applied externally to treat skin eruptions. Tea made from the leaves and bark is drunk as a tonic. The odoriferous fruits are edible.

While I appreciate the hard copy of the book, I think that a smaller pocket-sized edition would have been more practical, at least for those lucky enough to visit the island. There are 52 photographs, 24 in color, the remainder black

and white. It is not always clear that all the ethnobotanical information is derived from the island, but I assume so.

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**Monosaccharide Sugars: Chemical Synthesis by Chain Elongation, Degradation and Epimerization.** By Z. Györgydeák and I. F. Pelyvás. (Lajos Kossuth University, Debrecen, Hungary). Academic Press, San Diego, CA. 1998. xviii + 508 pp. 15 × 22.5 cm. \$89.95. ISBN 0-12-550360-1.

*Monosaccharide Sugars* in an extensive compilation of new developments in the growing field of modern synthetic monosaccharide chemistry drawn together in the form of a textbook and offering a summary of the synthetic manipulation of monosaccharides in all three categories: elongation, degradation, and epimerization. The novelty of this book is that it is written from the perspective of a synthetic organic chemist using naturally occurring, inexpensive starting materials in organic synthesis, and it covers all three title transformations. The volume emphasizes experimental details for all published literature, including that from non-English-speaking countries, which is difficult to obtain for many carbohydrate chemists.

The Foreword, written by the late Professor Sir Derek H. R. Barton, introduces the reader to the importance of modern aspects of synthetic carbohydrate chemistry. Specific reference is also given to "chiral synthons" and their usefulness in synthetic carbohydrate chemistry. The short, two-page Introduction outlines the purpose and goals of the volume and justifies the selection of all three areas of synthetic manipulation. The first chapter deals with "Ascending Synthesis of Monosaccharides" and is broken into two subchapters, "Buildup with Total Synthesis" and "Buildup of Sugars with Ascending Synthesis", which are discussed in seven sections. The first subchapter concentrates on cyanohydrin synthesis (Kiliani-Fischer synthesis) and offers an excellent tabular summary of starting saccharides and reaction products. It concludes with 119 important references. The second subchapter discusses "Miscellaneous Methods for Extension of the Monosaccharide Chain" and is divided into 12 sections. Grignard reagents and organolithium, organotin, organoboron, and organosilicon reagents are discussed there. The aldol condensation, hydroformylation of glycals, chain extension of aldehyde sugars with thiazole, furan, pyrrole, and the Reformatsky reaction are also covered in detail in these sections. Additionally, ascending syntheses with aldehyde saccharides, sulfonic acid esters, and nitrogen-containing saccharides are reported. Each section extensively discusses all the methods, concluding with broad, up-to-date references (470). Additionally, selected experimental procedures are included in each section, beginning in the first subchapter. This particular innovation enhances the usefulness of the book as a laboratory handbook and as a quick reference.

Chapter 2 describes "Descending Syntheses of Monosaccharides" and is divided into four subchapters. The first subchapter, entitled "Disulfone Degradation", describes the well-known methodology of dithioacetal oxidation to sulfones followed by descent with a base into an aldose with

a chain shorter by one carbon atom. This subchapter concludes with 31 references. The last subchapter is entitled "Degradation of Saccharides with Oxidative Methods" and consists of six sections. All the oxidative methods including periodate, hypochlorite, peroxide, and lead tetraacetate reactions are discussed here. The last notable section, entitled "Chain Shortening of Saccharides by Means of Photochemical Methods", illustrates the photochemical degradation of sugars, which are divided into two groups: "Light-exposure-induced" and "Metal-ion-catalyzed reactions". References for each section are most recent and up to date.

Chapter 3, entitled "Preparation of Sugars with Isomerization", consists of three informative subchapters. The first subchapter, "Epimerization of Saccharides in Alkaline Media", presents four types of transformation, anomerization, aldose-ketose isomerization, reversible aldol reaction, and  $\beta$ -elimination and concludes with 56 references. The second, short subchapter, entitled "Epimerization of Sugars with Molybdate Ions", provides experimental procedures for the above methodology for the preparation of important monosaccharides such as gulose, talose, lyxose, and ribose. The last subchapter, "Epimerization of Saccharides with Amine Complexes of Transition and Alkaline Earth Metals", provides a general experimental procedure for these transformations and concludes with 24 references.

The Appendix, "Notes Added in Proof", summarizes the most important recent results on monosaccharide synthesis. It covers the literature roughly through June 1997 and is organized according to the respective previous chapter/section numbers. The book concludes with an extensive, 9-page subject index. The organization, unification, and presentation of the material is highly commendable. The book is well-produced, and the written material is free of any obvious errors.

This textbook provides the foundation for a course in synthetic carbohydrate chemistry or in a special topics course, for it introduces students to the newest developments. Thus, the volume is an indispensable reference for lecturers, especially in the emerging new field of modern synthetic carbohydrate chemistry. It should be an essential addition to any institutional library. In addition, the attractive price of the book should convince all scientists and graduate students engaged in research on the chemistry of carbohydrates to purchase it for their personal library.

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**Enzymatic Reactions in Organic Media.** By A. M. P. Koskinen (University of Oulu) and A. M. Klivanov (Massachusetts Institute of Technology). Blackie Academic & Professional, Glasgow, U.K. 1996. xiii + 314 pp. 15.5 × 23 cm. \$119.00. ISBN 0-7514-0259-1.

Most pharmaceuticals and agrochemicals are more efficient when presented as the enantiomerically correct isomer. During the last decade, dramatic advances have been made in the use of enzymes in nonaqueous media to produce these important biologicals.

This book has assembled significant contributors in the field of nonaqueous enzymology. Each provides an au-

thoritative account of a key area comprehensively covering both theory and practice of enzymatic transformations in nonaqueous media.

Each chapter draws on the minimum of significant work to bring the reader to the current state of the art. A valuable feature of each chapter is the concluding remarks wherein authors outline key areas of research that need further development.

The first chapter sets the stage for the remaining chapters by providing key industrial examples and an analysis of the commercial demand for enantioselective reactions. The second chapter presents and interprets models for selection of nonaqueous solvents and solid supports used in enzymatic transformations. This is followed by chapters describing the effect of nonaqueous media on enzyme conformation and mechanism.

Sih and co-authors provide an excellent review of enantioselective enzymatic hydrolysis and transesterification in nonaqueous media. Particularly interesting is their review of changes in lipase specificity after chemical treatment.

The unique ability of lipases and hydrolases to specifically derivatize one hydroxyl of monosaccharides is discussed. Advances in this field have rendered practical heretofore impractical synthetic procedures producing pre-selected polysaccharides.

The concluding chapters on enzymatic transformation of synthetic interest and peptide synthesis provide both wide-ranging examples and interpretations that will aid the practitioner in selection of a system to meet their needs.

Final chapters deal with the theory and practice of enzymatic transformations on a large scale.

The true value of a book of this thrust is in its potential to aid the student and research scientist in understanding and using the systems discussed. In both regards, the organization and content of this book are right on target.

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**Second Supplement to the 2nd Edition of Rodd's Chemistry of Carbon Compounds, Vol. IV, Heterocyclic compounds, Part E.** Edited by M. Sainsbury (University of Bath, England). Elsevier Science Limited, Oxford, England. 1997. xiv + 692 pp. 15 × 22.5 cm. \$447.75. ISBN 0-444-827536.

The advertisement for this book promises that it will provide "easy access to a vast amount of data, presented in a concise yet readable form...a detailed index allowing rapid location of reaction types, synthetic procedures or individual compounds". In this reviewer's opinion, comprehensive reviews of the chemical literature should more or less report, summarize, correct, analyze, reinterpret, and extend published research. Reviews that do the latter

three of these are rare and generally found in new and rapidly emerging fields. On the other hand, "reviews" that only report and summarize published research are increasingly more common, and probably unnecessary, due to their ease of compilation from *Chemical Abstracts* by computer search. Structure-, subject-, or compound-driven searches can in a few minutes provide the abstracts and bibliography ready for organization and editing into a review manuscript. Unless the review author critically reads each reference, errors in the original paper may go undetected and any reinterpretation, analysis, and extension of a research field in the review is unlikely.

So what kind of review is this one? Factually it covers six-membered monoheterocyclic compounds containing heteroatoms from Groups IV (Si, Ge, Sn) and VI (O, S, Se, Te) divided into Chapter 20 dealing with oxygen compounds and Chapter 21, which discusses the remaining heteroatoms. This parallels the organization of the original 2nd Edition published in 1977 and the First Supplement published in 1989 except that neither lead nor iodine heterocycles are included (in spite of a subtitle stating that heteroatoms from Group VII are included). The author of these chapters, Professor R. Livingstone, is the same as in the original 2nd Edition and First Supplement. The time period covered by the book is not explicitly stated but references as early as 1982 were noted with most between 1987 and 1994 consistent with a two year publication lag in this series. The preface was written in January 1997.

The book is a collection of one-to-two sentence abstracts, with literature citation, of articles on compounds that fit the organizational scheme, which is solely by structure. The emphasis on synthesis, reactions, or properties varies depending on the point of the original reference (or abstract). Thus, if a series of compounds was prepared for evaluation of their bioactivity, the specific structures are given, but not the method of synthesis.

The index of over 2000 items also is almost solely organized by structure with less than a dozen references to reaction types, procedures, or properties. In contrast to the original Edition, no citations to natural sources were found, although they are promised in the index guide. Neither an author index nor a compiled bibliography is included.

In summary, "easy access" is possible only for specific compounds or classes, and the information provided is exactly that which is easily obtained by computer search of *Chemical Abstracts*. Coverage is limited, but undefined, so a complete literature search will require additional sources. Considering limited library budgets and the hefty price of this book, I could not recommend it to our librarian for purchase.

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