Book Reviews

Polysaccharides in Medicinal Applications. Edited by Severian Dumitriu, University of Sherbrooke, Canada. Marcel Dekker, Inc., Monticello, NY. 1996. viii + 794. 17.5 × 25 cm. $195.00. ISBN 0-8247-9540-7.

This book contains an abundant amount of information on a number of polysaccharides and medical applications on some of them. The intended emphasis is on medical applications rather than on industrial applications often seen in other books on polysaccharides. The longest chapters in the volume are "Hydrogels Based on Polysaccharides (119 pp)", "Oligosaccharide Antibiotics (73 pp)", and "Hydrogels as Support for Drug Delivery Systems (61 pp)". These three chapters alone occupy 233 pages (26%) of the total of 816 pages and 26 chapters.

The organization of the book is somewhat puzzling. Some chapters in Part I appear to have little medical application (e.g., chapters on curdlan and succinoglycan, and pulklulan), while glycosaminoglycans (commonly known as GAG) are not treated at all or are only peripherally mentioned (they do not even appear in the index). GAGs are perhaps the most important polysaccharides in medical application and should have been treated in depth, at least more than curdlan (which also does not appear in the index) and succinoglycan.

One can surmise that the book title of *Polysaccharides in Medicinal Applications* is somewhat misleading. Judging from the content, the title of the book should have been *Some Polysaccharides and Some of Their Medical Applications*. The definition of polysaccharides also seems to be blurred in this book, as is evidenced by the presence of some chapters on glycoproteins. This is not at all negative, especially when the book is trying to link polysaccharides to the general aspects of glycobiology (for example, in the chapter by Montruil). One wonders, however, why glycolipids are not included in the book at all, since some glycolipids are as complex and as important as glycoproteins.

In summary, this book contains much good material, but is not a comprehensive overview of the medical applications of polysaccharides.

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Alkaloids: Chemical & Biological Perspectives, Vol. 11. Edited by S. William Pelletier (University of Georgia). Elsevier Science, New York, NY. 1996. xvii + 393 pp. 15 × 22.5 cm. $190.00. ISBN: 0-08-042797-9.

This is the eleventh in the series of volumes initiated in 1983 to complement *The Alkaloids: Chemistry and Pharmacology* series of Academic Press. This particular volume brings together five chapters, one major contribution from Paul Schiff and four shorter contributions from a distinguished group of authors, which collectively maintain the quality of the series.

Schiffs' marvelous tour-de-force demonstrates his preeminent knowledge of the alkaloids of *Thalictrum* species, and it is both refreshing and inspiring to see the wealth of data on these diverse alkaloid groups presented in such a lucid and well-organized manner. This chapter of 236 pages, (almost a volume in itself!), covers the isolation and reisolation of the numerous alkaloid types, from aporphines and pavines through to the many types of bisbenzylisoquinoline alkaloids, such as the aporphine−benzylisoquinolines, the aporphine-pavines, and the many linkages represented within the bisbenzylisoquinoline alkaloids. There is a detailed discussion of the structure elucidation of the newer members of the alkaloid series, followed by a presentation of the analysis of these alkaloids, their biosynthesis, and, most interestingly, the vast amount of studies that have recently been conducted on the biological activities of about 60 of these alkaloids. The chapter closes with very useful tables of botanical sources and their contained alkaloids, the alkaloids and their botanical origins, and a compilation of the molecular weights of the alkaloids, similar to the table at the end of the legendary Hesse volumes *Indolalkaloide in Tabellen*.

The chapter on taxines focuses on the alkaloidal taxoids and presents the history of the poisonous yew, whose properties were first placed under investigation in 1856. Years of confusion regarding these alkaloids are considered in the perspective of hindsight given our present ability to determine structures following the intense efforts that have ensued the discovery of Taxol (paclitaxel). Appendino takes the reader through a discussion of the isolation techniques, a classification of the 37 taxines based on their diterpenoid core and their oxygenation pattern, a detailed presentation of the spectral characteristics, and closes with a brief summary of the pharmacology of the isolates.

Chapter three is written by Menachery and brings chemotaxonomic attention to the isoquinoline alkaloids isolated to date from the plants of the family Menispermaceae native to South America. Of the 17 genera of the New World Menispermaceae representing some 142 species, only 28 species have been subjected to quite limited phytochemical and biological investigation. The alkaloids characterized to date represent a broad range of the characteristic isoquinoline structure types (aporphines, oxoaporphines, protoberberines, and bisbenzylisoquinolines) together with some more unusual structures, such as the azafluoranthenes and the tropoloisoquinolines. The chapter concludes with a presentation of some of the biological data that have been derived

for both extracts of the plants under review and their isolated alkaloids.

The fourth chapter, by Molyneux, Nash, and Asano, discusses a rapidly burgeoning group of polyhydroxynortropane alkaloids, the calystegines, one of whose functions is apparently to provide sustenance to the bacterium *Rhizobium meliloti* 41. Since this initial discovery in 1988, a number of these water-soluble alkaloids have been isolated and characterized both from the original source in the Convolvulaceae as well as from the Moraceae and Solanaceae plant families. The chapter presents the procedures for isolation, the detailed structure elucidation of the nine members of the series, and the use of GC−MS for analysis. A brief discussion of their biogenesis is followed by a review of the work to date on the racemic and enantioselective synthesis of the calystegines and the biological activities of members of the series. These activities include glycosidase inhibition, rhizobial interactions, and mammalian toxicities.

The final chapter, by Nash, Asano, and Watson, complements the previous chapter in that it details much of the work that has been conducted on the various polyhydroxylated alkaloids which inhibit glycosidases. These alkaloids, which come from the pyrrolidine, piperidine, octahydroindolizine, pyrrolizidine, and nortropane classes, are reviewed from the perspective of their distribution, biological reactions, and, to a lesser extent, their synthesis and biosynthesis. The volume closes with detailed indices of compounds and organisms cited in the text.

Overall, this volume is strongly recommended for university and corporate libraries where there is any effort at natural product chemistry or biology. Unfortunately, its price will undoubtedly deter the private collector attempting to build a natural product library.

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Zulu Medicinal Plants: An Inventory. By A. Hutchings with A. H. Scott, G. Lewis, and A. B. Cunningham (University of Zululand). University of Natal Press, Pietermaritzburg. 1996. xiv + 450 pp. 21 × 29.5 cm. $133.00. ISBN 0-86980-893-1.

This volume is an encyclopedia with entries for 1032 species of plants used in Zulu traditional medicine arranged in the taxonomic sequence of Arnold and de Wet's 1993 *Plants of Southern Africa: Names and Distribution*. An introduction is provided for each family with the numbers of genera and subgeneric taxa worldwide, present in southern Africa, and reported in the Zulu pharmacopoeia. This is followed by a brief morphological description and a carefully referenced synopsis of literature reports on the chemistry of the family. A synopsis of each genus provides the numbers of species worldwide, overall distribution, the number of subgeneric taxa known to occur in South Africa and Kwa-Zulu-Natal, and those reported to have Zulu medicinal uses. This is followed by a brief morphological description and general information on the known chemistry of the genus. The entries for each species include the accepted botanical name, common names, Zulu names, Zulu medicinal uses, other reported medicinal uses, physiological effects, and chemical constituents and biological properties. The main body of the book is then followed by a tabular summary of reported Zulu plant uses, an extensive list of references, and indices to common (both English and Afrikaans), Zulu, and scientific plant names.

Overall, the format of the book makes it relatively easy to access a variety of types of information. Providing the reader with the number of subgeneric taxa, defined as the total number of species, subspecies, and varieties, rather than the number of species seems unconventional and prevents comparison with the numbers presented for the rest of the world, which are clearly numbers of species. The information provided in the medicinal use sections includes the therapeutic uses of the plants, indication of the plant parts used, and often a general indication of how remedies are prepared and applied. However, specific information on preparation, application, and dosage are not included. The physiological effects reported are usually referenced cases of poisoning to humans or animals, but occasionally include other uses as poisons or herbal remedies.

Altogether, the volume is an excellent compilation of information on Zulu medicinal plants, providing the most comprehensive list of species ever assembled for the region. It will therefore be very useful to anyone interested in medicinal plants of southern Africa. However, the general utility of the book is much greater because of the extensive literature reports summarizing medicinal uses from other regions and chemical constituents. While certainly not exhaustive, this does provide a window into the literature on the use and chemistry of the included species over a much greater geographical area. Ethnobotanists, other botanical researchers, pharmacologists, and others interested in the use of South African plants should all find this book useful, although they may be reluctant to purchase it at the relatively high cost of $133 for the paperback and $159 for the hardcover edition.

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Reductions in Organic Synthesis—Recent Advances and Practical Applications. Edited by Ahmed F. Abdel-Magid (R. W. Johnson Pharmaceutical Research Institute). American Chemical Society, Washington, DC. 1996. x + 228 pp. 15 cm × 22.5 cm. $89.95. ISBN 0-8412-3381-0.

Reductions in Organic Synthesis, edited by Ahmed F. Abdel-Magid, is part of the ACS Symposium series, and it contains 12 lectures presented during a division of Organic Chemistry Symposium at the 210th National

Meeting of the American Chemical Society. Each lecture discusses a reagent or a class of reactions with the theme of asymmetric reduction in organic chemistry.

The first lecture is a review of hydride reduction over the last 60 years, presented by H. C. Brown. There is a historical perspective, but the development and applications of each reagent are the main focus. The second lecture discusses the use of chiral rhodium(II) catalysts in asymmetric catalytic hydrogenation. The role of various ligands is discussed, and several simple synthetic applications are shown. The third lecture discusses tartrate ligands used in the enantioselective $LiAlH_4$ reduction of ketones. The influence of various ligands when complexed with $LiAlH_4$ is discussed and some mechanistic insights are offered. The fourth lecture discusses electrophilic assistance in the reduction of six-membered ring ketones. There is a discussion of regioselectivity in the reduction of α-enones, in which the influence of various additives is presented. The competition of conjugated ketones vs saturated ketones for various reagents is discussed, along with the stereoselectivity of each reduction. The fifth lecture discusses asymmetric reductions possible with *B*-chlorodiisopinocampheylborane, focusing on details of its use for the reduction of various classes of ketones, particularly functionalized ketones. The sixth lecture discusses practical methods for the enantioselective reduction of prochiral ketones, primarily with *B*-chlorodiisopinocampheylborane, but generally with chiral oxazaborolidines. There is a limited discussion of applications to synthesis. The seventh lecture discusses the use of diphenyloxazaborolidines for the enantioselective reduction of ketones. There is a structure−activity profile for various oxazaborolidines when they are used to reduce ketones and diketones. There is a brief presentation of sources of the selectivity. The eighth lecture focuses on the hydride reduction of ketone phosphorylimines using L-Selectride and $NaBH_4$. A rationale for the observed selectivity is presented along with a brief introduction to the synthetic utility of these compounds. The ninth lecture discusses the remote acyclic diastereocontrol possible in hydride reductions of 1,*n*-hydroxy ketones. This includes the reaction of various reducing agents with ketones containing remote hydroxyl groups and their influence on stereoselectivity. The tenth lecture discusses the synthetic utility of lithium aminborohydride and its preparation and properties. There is an extensive discussion of the reduction of various functional groups with this reagent. The eleventh lecture discusses the reduction of indoles and the N-alkylation of amines with reagents formed from $NaBH_4$ and carboxylic acids. The reduction of quinolines, heterocycles, and lactams is also discussed, along with the reduction of several monofunctional compounds. The last lecture discusses the use of sodium triacetoxyborohydride for the reductive amination of ketones and aldehydes. There is a discussion of the reagent and its various reactions.

This book is an up-to-date review of many reagents and methods used for asymmetric reduction. Those searching for "the reagent" in a synthesis, for a selective reagent to use with a multifunctional molecule, or just for a better understanding of the sources of diastereoselectivity and enantioselectivity in reductions will find this book useful.

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The Organic Chemistry of Drug Synthesis, Vol. 5. By Daniel Lednicer (National Cancer Institute). John Wiley & Sons, Inc. Publishers, New York, NY. 1994. xiv + 228 pp. 15 × 23 cm. $69.96. ISBN 0-471-58959-4.

Practitioners of organic and medicinal chemistry, from beginning graduate student to seasoned veteran, owe Dan Lednicer a debt of gratitude for initiating this series of crisply written, succinct, and eminently useful monographs in 1976 with the publication of Volume 1 of *The Organic Chemistry of Drug Synthesis*. Now, some 20 years later, Volume 5 has appeared with a discussion of the synthesis, medicinal applications, and in many cases, the mechanism of action of drugs and drug candidates that have reached the point of being assigned generic names during the period 1988−1993.

As in all four of the previous volumes, compounds are presented and discussed according to structural type rather than pharmacological activity. This organization works quite well because of the emphasis on synthesis of prototypes and analogs of molecules with related structures, but not necessarily related bioactivity. An excellent Cross Index of Drugs near the end of the volume allows the reader to easily locate compounds according to their medicinal application.

The 11 chapters are presented under the following titles and subsections: Chapter 1, "Acylic and Alicyclic Compounds", includes a diverse array of compounds ranging from ACE inhibitors to estrogen antagonists. Chapter 2, "Monocyclic Aromatic Compounds", is divided into six subsections devoted to phenylethanolamines, phenoxypropanolamines, benzoic acid derviatives, sulfonamides and sulfonylanilides, arylakylamines, and miscellaneous monocyclic aromatic compounds. More complex aromatics are discussed in Chapter 3, "Polycyclic Aromatic and Hydroaromatic Compounds", while Chapter 4 is devoted to "Steroids". Discussion of heterocyclic compounds as new medicinal agents begins with Chapter 5, Five-Membered Heterocycles", which is subdivided into sections on the synthesis of compounds containing one, two, and three heteroatoms, respectively. A similar organization with respect to heteroatom content is employed in Chapter 6, "Six-Membered Heterocycles". Chapter 7, "Five-Membered Benzoheterocycles", contains a short subsection dealing with molecules possessing a benzene ring fused to rings containing two heteroatoms. "Six- and Seven-Membered Benzoheterocycles" are treated together in Chapter 8, which consists of separate subsections dealing with six-membered benzoheterocycles containing one heteratom or two heteroatoms and benzene-fused seven-membered ring heterocycles containing one or two

heteratoms. Chapter 9, "Bicyclic Fused Heterocycles", consists of five topic areas including five-membered heterocycles fused to pyridines and pyrimidines, thienothiopyrans, pyridopyridines, and miscellaneous bicyclic fused heterocycles. Chapter 10, "Beta Lactams", is used to single out for special attention this still important but shrinking class of antibiotics and to emphasize the shift in interest from beta lactams to the new quinolone antimicrobial agents described in Chapter 8. Chapter 11, "Miscellaneous Fused Heterocycles", serves to end this volume in fine fashion with subsections dealing with linear tricyclic compounds, angular tricycles, and compounds with four or more fused heterocyclic rings.

Within the framework of the foregoing chapters, the author has done a masterful job of presenting synthetic strategy and operational detail, biological efficacy, and in most instances, a description of the mechanism of action of early 200 generic compounds covering over 70 different areas of pharmacological activity ranging from angtiotension converting enzyme (ACE) inhibitors to uricosoric agents, and all within less than 2009 pages. This book should be viewed as a prime example of how to write about an exciting and always timely area of applied organic chemistry in a way that captures the interest of both experts and neophytes.

This excellent book is diminished slightly by a few typographical errors and, as are the other four volumes in this series, by structural formulas that do not meet the standards of quality that the author or publisher should be satisfied with. However, this is a minor issue considering the wealth of information packed into this well-organized scientifically rigorous and readable monograph.

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Handbook of Plant and Fungal Toxicants. Edited by J. P. Felix D'Mello (Scottish Agricultural College, Edinburgh, Scotland). CRC Press, Boca Raton, FL. 1997. xii + 356 pp. 17.5 × 25 cm. $89.95. ISBN 0-8493-8551-2.

This volume consists of 22 chapters describing various aspects of the chemistry and toxicology of natural products. Although not specifically divided in such a way, the book falls naturally into three sections. The major portion consists of the first 14 chapters, dealing with plant toxins, including the following: indolizidine, *Erythrina*, steroidal glycoside and endophytic alkaloids; the bracken fern toxin, ptaquiloside; polyphenolics, encompassing proanthocyanins, flavones, isoflavonoids and gossypol; pyrimidine glycosides such as vicine and convicine; protein and glycoprotein allergens in fruits and vegetables; furanocoumarins and other primary and secondary photosensitizers; and nitrates and oxalates. These are followed by four chapters that discuss the effects of toxicants on animals, consisting of premature parturition induced by *Pinus ponderosa*, feeding behavior, modeling of animal responses, and medicinal applications of plant toxins. The book concludes with four chapters that review major groups of fungal metabolites, namely aflatoxins, and *Fusarium*, *Penicillium*, and *Alternaria* mycotoxins.

It is inevitable in a volume of limited size with so many contributions that the value of individual chapters resides in the ability of the authors to balance an original approach to the topic with a supporting comprehensive bibliography. Unfortunately, only a few of the contributors manage to achieve this goal. The chapter on *Bioactive Indolizidine Alkaloids* by S. M. Colegate and P. R. Dorling takes a broad view of the class by discussing all alkaloids that contain the indolizidine moiety and thus enlarges significantly upon earlier reviews that have only dealt with the polyhydroxyindolizidine glycosidase inhibitors. The fascinating problem of *The Toxicity of Bracken Fern* (*genus Pteridium*) *to Animals and its Relevance to Man* is discussed in an excellent chapter by the expert on this topic, B. L. Smith. There is a well-balanced presentation of estrogenic *Isoflavonoids* (P. L. Whitten, S. Kudo, and K. K. Okubo), and the problem of *Photosensitization Disorders* is covered in breadth by A. Flåøyen and A. Frøslie. Among the chapters dealing with animal responses, F. D. Provenza (*Feeding Behaviour of Herbivores in Response to Plant Toxicants*) provides useful insight into the reasons why animals seek out or avoid poisonous plants, and the rationale for studying natural toxins is persuasively documented in *Medicinal Applications of Plant Toxicants* (A. D. Kinghorn and E. J. Kennelly), which identifies the many drugs in current use that have thus been revealed. The chapter on *Toxicants of the Genus Penicillium* by D. Abramson is an excellent presentation of the diversity of natural toxins elaborated by this group of microorganisms. In contrast to these chapters, many of the other contributions are extremely limited in scope and sometimes misleading in their failure to provide current information as to the status of the problem under discussion.

Multiauthor volumes of this type have much in common with anthologies of poetry, of which Robert Graves has written: "A well-chosen anthology is a complete dispensary of medicine for the more common mental disorders, and may be used as much for prevention as cure". If one extrapolates this definition to the book under review it fails to meet the criteria of appropriate selection or completeness, either for prevention or treatment of toxicity episodes due to natural products. Major groups of natural toxins, such as pyrrolidizine, quinolizidine, and diterpenoid alkaloids are entirely ignored, while there is duplication in the selection of three chapters that deal with flavonoid compounds and two that focus upon photosensitization. A particularly egregious failure resides in the number of chapters, including those dealing with glycoalkaloids, endophyte alkaloids, proanthocyanidins, gossypol, *Pinus ponderosa* toxicity, and *Fusarium* and *Alternaria* mycotoxins, which are entirely lacking in either general or specific structures, leaving the reader to speculate as to the chemical nature of the compounds under discussion. Since bioactivity, including toxicity, is an essential consequence of subtle structural recognition by biological systems, these chapters add very little to the stated objective of the compilation. The editor's preface presents the book as a "comprehensive and authoritative

resource" for final year undergraduates and those engaged in research but it fails to achieve these aims, and by no stretch of the imagination can it be defined as a Handbook. Despite the excellent production quality and very reasonable price, this book can only be recommended to those interested in the specific topics that have been identified above as having been treated in an original or comprehensive manner.

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Biochemical Aspects of Marine Pharmacology. Edited by Philip Lazarovici, Micha E. Spira, and Eliahu Zlotkin (The Hebrew University of Jerusalem). Alaken, Inc., Fort Collins, CO. 1996. xi + 227. 15 × 22.5 cm. $84.00. ISBN 1-880293-07-2.

This book is essentially a collection of contributed papers at a meeting held at the Interuniversity Institute for Marine Science, Eliat, Israel. Of the total of 15 papers, 12 are on bioactive peptides and only two are on secondary metabolites in the traditional sense, which seems to reflect the meeting organizers' research interest. If one assumed from the title of the book that the book is a comprehensive treatise of marine biochemistry and pharmacology, he or she would be grossly wrong. This is not a book where you can find all information about the pharmacology of marine natural products. On the other hand, it is a good book for general reading. In the first chapter, one of the pioneers of marine natural product chemistry, Professor Paul J. Scheuer, reflects on the history of bioactive marine natural products research and sheds some light on its future. Several chapters on the toxins from cone snails and sea snakes give an idea how these compounds helped the understanding of various receptors. Two chapters are understandably devoted to pardaxin, which was isolated from the Red Sea flatfish, commonly called Moses' Sole; the discovery of this compound is a well-known story in marine research, and it took place close to the conference location. The chapters provide information on recent progress on the pharmacology of this compound.

Each chapter in this book is short, concise and easy to read, and the book is also light and easy to hold. This is the kind of book, even for those outside of the special field, to slip in a bag and read on a trip.

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