

## Book Reviews

**Comprehensive Cellulose Chemistry.** Edited by D. Klemm, (University of Jena), B. Philipp (Max Planck Institute Teltow-Seehof), T. Heinze (University of Jena), U. Heinze (University of Jena), and W. Wagenknecht (Max Planck Institute Teltow-Seehof). Wiley-VCH, Weinheim, Germany, 1998. Volume 1, xxii + 260 pp. 16.5 × 24 cm. \$170.00. ISBN 3-527-29413-9. Volume 2, xvi + 390 pp. 16.5 × 24 cm. \$188.00. ISBN 3-527-29489-9.

These two volumes were developed with the intent of presenting a concise and comprehensive monograph on the theoretical background and the experimental state of the art of cellulose, the most abundant organic polymer on earth. The competent team of authors has organized the two volumes into four chapters (not counting the Introduction) plus two appendices. The four sections of the monograph cover general considerations on structure and reactivity, analytical methods, derivatization, and future development. The appendices provide experimental protocols for analysis (Volume 1) and functionalization (Volume 2).

The comprehensive nature of the monograph benefits from a detailed discussion of cellulose in terms of its molecular, supramolecular, and morphological structure and its relationship to such microscopic and macroscopic properties as accessibility, mechanical, and thermal properties. The important topic of swelling and dissolution in traditional and novel solvent systems is systematically highlighted in terms of chemical environments capable of swelling cellulose before a highly readable and well-organized section on the classification of cellulose solvents is presented. Dissolution is logically followed by degradation considerations using both chemical, enzymatic, and radiation means. The extensive experience of the team of authors in the practical aspects of the chemical modification of cellulose is first introduced in terms of its general principles in Chapter 1 before it is dealt with in specific terms in Chapter 4. The hand of the experienced practitioners surfaces again in the chapter on analytical methods which comprehensively covers chemical and molecular weight issues, instrumental methods, DS determination, and characterization in the solid and solution states.

A comprehensive and highly systematic display of cellulose derivatization techniques covering 300 pages of Volume 2 is structured into formation and modification, interaction with basic compounds, complexation with metals, esterification, etherification, and oxidation. The full wealth of the experience of the authors is brought to bear in the many references to practical aspects of cellulose modification, including analytical characterization, and the perspective on multistep routes involving secondary modification reactions. The final chapter on outlook and future developments is justifiably upbeat regarding the potential of cellulose as a raw material for chemical conversions as well as for new cellulosic compounds, new commercial processes, and supramolecular architectures involving cellulose.

The two appendices (one in each volume) provide the most valuable detail regarding the practicality of cellulose analysis in terms of DP, DS, spectroscopy, chromatography, etc., and they provide a unique and comprehensive compilation of experimental procedures for the preparation of

cellulose derivatives of all types. This detailed description of experimental protocols on the basis of systematically presented, theoretical background information promises to make this monograph reach its goal of becoming accepted as a useful textbook by graduate students in all fields of cellulose science and related areas.

*Comprehensive Cellulose Chemistry* is carefully prepared and richly supplemented with useful figures, tables, and practical hints. These books belong on the shelves of all active cellulose researchers, and they promise to provide new impetus for scientists in all areas of organic chemistry, polymer science, materials engineering, and the life sciences to pay renewed attention to this most abundant naturally occurring substance.

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**Brassinosteroids—A New Class of Plant Hormones.** By V. A. Khripach, V. N. Zhabinskii (Institute of Bioorganic Chemistry, Academy of Sciences of Belarus, Minsk, Belarus), and A. E. de Groot (Wageningen Agricultural University, Wageningen, The Netherlands). Academic Press, San Diego, CA. 1999. xiv + 456 pp. 15 × 23.5 cm. \$85.00. ISBN 0-12-406360-8.

Since the discovery of the first brassinolide natural product in 1979, the brassinosteroids have become a well-established class of phytohormones, essential for normal plant growth and development. For a long time ACS Symposium Series No. 474 was the "bible" of brassinosteroid research, but early in 1999 two new publications on this topic appeared essentially simultaneously. One of them is the present edited comprehensive book of Khripach et al., based on an earlier Russian version.

Corresponding to the multidisciplinary character of actual brassinosteroid research, the book is divided into 11 chapters beginning with historical aspects, nomenclature, and the presentation of the structures of the more than 40 known brassinosteroids. A new system for brassinosteroid classification is also proposed in this section, but this will require international acceptance. The third chapter is concerned with the complex processes of isolation and identification characterized by a sequence of bioassay-guided chromatographic procedures with final GC–MS or HPLC analysis of suitable derivatives. Subsequently the spectral properties of brassinosteroids are discussed. In this area the mass spectral fragmentation patterns of methanoboronate derivatives play a key role in the structural elucidation of new compounds, since these are present in plant materials only in very minute amounts. Studies on brassinosteroid biosynthesis laid the foundations for recent breakthroughs in the molecular biology of brassinosteroids, and are presented together with corresponding findings on metabolism in chapter 5. The following three chapters provide a comprehensive review on the synthesis

of brassinosteroids, reflecting the strong points of the Minsk group. They are arranged in subchapters according to basic synthetic methods, synthesis of natural brassinosteroids, and preparation of structural analogs. The multiple physiological actions including a brief treatise on molecular genetic aspects as well as bioassays and structure-activity relationships of brassinosteroids are discussed in chapters 9 and 10, respectively. The last chapter illustrates the practical application of these highly active plant growth promoters in agriculture and horticulture, assisted by an instructive table on selected field experiments and toxicological data. An appendix summarizes the structures, occurrence, and spectral data of the natural brassinosteroids.

This monograph represents an excellent text enriched by a large number of instructive formula schemes, tables, and figures. The authors have utilized nearly 1100 references covering almost completely the brassinosteroid field in 1998, among them many citations available with difficulty in Western scientific libraries. A comprehensive 12-page subject index concludes the monograph. The organization and presentation of the book, which contains hardly any obvious errors, is of a high standard.

Overall the book illustrates in a very impressive way the tremendous progress in brassinosteroid research up to the recent recognition of these plant constituents as a new class of phytohormones. I can highly recommend it as an up-to-date text for academic teachers and researchers not only in natural products chemistry but also for interested scientists in the biological, molecular biological, and agricultural disciplines.

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**The Alkaloids. Chemistry and Biology. Volume. 52.**

Edited by G. A. Cordell (University of Illinois at Chicago). Academic Press, San Diego, CA. 1999. ix + 391 pp. 15 × 22.5 cm. \$135.00. ISBN 0-532-42154-5.

This volume contains five reviews maintaining the high standards expected from this series. They are quite comprehensive in their individual areas. Authors are commended for not just repeating literature data on alkaloids but, in most cases, for critically examining and often correcting literature reports.

Chapter 1, "Alkaloids from Sri Lankan Flora" (A. A. L. Gunatilaka; 101 pp, 137 refs, 217 numbered structures), is, as the title suggests, country-wide rather than alkaloid type focused. Indole alkaloids appear to be the predominant constituents or at least the most heavily investigated. Most of the individual alkaloids are described with empirical formula, optical rotation, and a detailed discussion of NMR

spectral data. Tables of compounds and taxa investigated are presented. Considerable attention is paid to the natural occurrence of alkaloids, but syntheses, biosyntheses, and three pages of bioactivity are included. Although alkaloids have now been found in all spruce trees and many pines (as well as the ephedraceae), the author repeats the no longer valid statement that alkaloids are absent or infrequent in gymnosperms. A nitrogen atom is missing in the structure of vasicine (p. 84). Compound **217** (p. 85) is described as a new alkaloid, but the structure as given as that of the well-known cantleyine.

Chapter 2, "The Sarpagine Group of Indole Alkaloids" (M. Lounasmaa, P. Hanhinen, M. Westersund; 92 pp, 263 refs, 166 numbered structures), is a comprehensive listing and discussion of all known alkaloids of this group. It contains structures and physical properties, and Tables III and IV give spectroscopic data for all known 89 alkaloids, except where data were lacking in the literature. There is a detailed discussion of data, particularly from the authors' own work, which modifies early biogenetic proposals by Van Tamelen. Chapter 3, "Pharmacology of Ibogaine and Ibogaine-related Alkaloids" (P. Popik, P. Skolnick; 34 pp, 202 refs), was apparently instigated by the recent development of ibogaine as an anti-addiction drug, but the review is comprehensive in its discussion of pharmacology. There is no structural chemistry except a description of ibogaine's physical properties.

Chapter 4, "Chemistry and Biology of Steroidal Alkaloids from Marine Organisms" (Atta-ur-Rahman and M. I. Choudhary; 27 pp, 44 refs, 84 structures), focuses particularly on the bis-steroidal pyrazine cephalostatins and ritterazines. There are detailed discussions of structures with physical properties and spectral data, along with descriptions of syntheses and two pages of pharmacology.

Chapter 5, "The Monoterpene Alkaloids" (G. A. Cordell; 115 pp, 248 refs, 405 numbered structures), is extensive in all aspects. It gives tables describing both new and known alkaloids as well as one listing optical rotations and references to NMR spectra. The author does a particularly good job of critically examining structure elucidations of new (and many previously known) alkaloids and is not hesitant in offering opinions about incomplete or incorrect work. Some 40 pages are devoted to syntheses and biological conversions. There is at times an inconsistency in nomenclature with, for example, the spellings of "hydroxyskytanthine", "hydroxy-skytanthine", and hydroxy skytanthine used for the same compound. Similar variations occur in the usage for noractinidine.

This volume is highly recommended to all libraries and also especially to those individuals with specific interests in indole or monoterpene alkaloids.

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