

Book Review

Carbohydrates Structure and Biology. By Jochen Lehmann. Translated by Alan H. Haines. Thieme: Stuttgart 1998, 261 pp + index. \$ 65.00. Paperback ISBN 0865777-795-0.

Only rarely does a book come along which comprehensively draws all the new developments in the fast-growing field of biological recognition of carbohydrates in relation to their synthetic, structural and medicinal aspects together. Professor Lehmann accomplishes this in his new, two-chapter volume in the series entitled, Thieme Organic Chemistry Monograph Series.

The author's foreword highlights the critical significance of molecular biological research in relation to the biological significance of carbohydrates of all types for all living things. He justifies the book by the new developments in the field. The volume's aim is not to reiterate well-known experimental procedures, but to highlight and to refer to primary and secondary literature.

Dr. Lehmann's first chapter offers a general overview of carbohydrates and is broken into four sections, the bulk of which concentrate on the structure of mono- and oligosaccharides. The third section, "Methods for Structural Investigation," concentrates on separation, NMR spectroscopy, mass spectrometry and polarimetry and presents an excellent table summary of selected examples for each topic. The fourth section, "Systematic Nomenclature," provides specific examples of various classes of selected monosaccharides (aminosugars, thiosugars, lactones, acetals, etc.) and only two examples of disaccharides and one of oligosaccharides. It concludes with eighty references, making it valuable to students and lecturers alike.

The second chapter focuses specifically on biological aspects of carbohydrates, including the occurrence, processes, metabolism, and synthesis, well organized into four sections. The first section concentrates on the occurrence of carbohydrates, describing natural, as well as synthetic carbohydrates. Perhaps one of the most important contributions to the book is the second section, entitled "Specific Biological Processes," which deals with various roles of carbohydrates in the life sciences and is broken down into subsections about their central role in metabolism and biological recognition. The latter one discusses important examples such as lectins as specific carbohydrate receptors, cell adhesion, inositol triphosphate as a signal transmitter, ascorbic acid, heparin-antithrombin and blood coagulation, Man-P receptors, and a few others.

The third section, entitled "Metabolism," illustrates the specifics of carbohydrate absorption, glycolysis and glu-

coneogenesis, mobilization and storage. The section on biochemical modification of monosaccharides covers the importance of oxidation, reduction, substitution, alkylation, acetalation and acylation. The section on Biosynthesis of Condensed Higher Molecular Weight Carbohydrates discusses bacterial polysaccharides, cellulose and glycogen, glycosaminoglycans, N-, and O-glycosidic protein, glycosphingolipids and specific inhibitors of the biosynthesis of glycoconjugates.

The last section, "Biological Methods for the Synthesis and Interconversion of Carbohydrates," is divided into four subsections. The first subsection discusses oligosaccharide and glycoside biosynthesis via transglycosylation and reversal of the glycosides hydrolase reaction. The second subsection deals with redox reactions via dehydrogenation and oxidation, reduction and isomerization. The third subsection describes the formation of C-C bonds via aldolase and transketolase reaction, while the last subsection in this section presents various examples of protection and deprotection with acylases and lipases. This well written chapter concludes with supplementary literature and 263 references. The book concludes with an extensive subject index of thirteen pages.

This textbook provides the foundation for a course in carbohydrate chemistry or in a special topics course, for it introduces students to its newest biological developments through explanations and myriad figures. Although an in-depth treatment was not attempted, the volume balances thorough explanations with brief overviews well.

Thus, the volume is an indispensable reference for lecturers, especially in the emerging new field of modern aspects of molecular biology of carbohydrates. Organic and medicinal chemists, biotechnologists as well as all scientists engaged in research on the biochemistry and chemistry of carbohydrates, especially in the emerging field of biologically active oligosaccharides as potential new therapeutics, should pay special attention to this volume. This volume should be an essential addition to any institutional library.

Overall, the volume is well-organized and meticulously translated and edited, making it free of any obvious errors and a pleasure to read. In addition, the attractive price of the book should convince all scientists and graduate students engaged in research on carbohydrate chemistry to purchase it for their personal library, serving as a handy reference.

Zbigniew J. Witczak, University of Connecticut, USA

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