

## Book Review

***Bioorganic Chemistry: Carbohydrates.* Edited by Sidney M. Hecht, 1998, First Edition, Oxford University Press, ISBN 0-19-508469-1, 640 pages, Hardback, \$79.95**

‘Carbohydrates’ is the final of three volumes in a series on Bioorganic Chemistry, following ‘Nucleic Acids’ and ‘Peptides and Proteins’. Intended as part of a series of books in support of teaching and research to bridge chemistry and biology, this volume comprises a foreword by Ray Lemieux, one of the pioneers of carbohydrate chemistry, and 13 chapters written by well-known experts in the field. Each chapter begins with a comprehensive review of the topic and then builds up to finish with the most recent advances in the area.

The first chapter provides the foundation with regard to terminology and basic concepts by introducing carbohydrates, their basic constitution, conformation, and properties. Furthermore, a general overview of the different forms in which carbohydrates are encountered in nature is provided. Following one chapter on glycosylidene carbenes, the chemical synthesis of oligosaccharides is discussed. After a review of the most important glycosylation procedures and their applications, the third chapter concludes with very recent results on the solid-phase synthesis of oligosaccharides. The next chapter on the chemical synthesis of complex carbohydrates recalls some of the classic syntheses and culminates with the construction of elaborate structures such as calicheamicin. Starting from these compounds, Chapter 5 provides a closer look at DNA-binding glycoconjugates and their mode of action. The enzymatic synthesis of carbohydrates rounds out the mostly synthetic first half of the volume, before the use of NMR for the determination of carbohydrate structure,

conformation, and reactivity is covered. After discussion of cell adhesion molecules and their cellular targets, the recognition of carbohydrate antigens by antibody binding sites is reviewed. An even more detailed view is provided in the chapter on atomic interactions between proteins and carbohydrates. Two chapters on cyclodextrins and the biosynthesis of mammalian glycogen and plant starch biosynthesis conclude this volume.

‘Carbohydrates’, just as the preceding volumes on peptides and nucleic acids, is intended as an introduction to the field for graduate student researchers. The number of chapters is designed to equal the number of weeks in a semester for use in a one-semester graduate-level special topics course in carbohydrates.

All chapters adhere to the standard of introducing the subject matter in a general form to those unfamiliar with the topic and are well referenced throughout. Towards the latter part of each chapter, the most recent results are summarized to bring the reader up-to-date with the cutting edge research in the field. The chapters are arranged such that a foundation in the chemistry of carbohydrates is built before structural and biological aspects are discussed. While some overlap between chapters exists (e.g., the review of glycosylation procedures in the chapters on oligosaccharide synthesis and the synthesis of complex carbohydrates), this is not necessarily a disadvantage, particularly when this book is used in classes that may not cover all chapters but rather focus on select issues.

Overall, a balanced account of the field of carbohydrates is given as far as is possible in a single volume. The general reader gets introduced to the terminology in the introductory chapter and the specialized terms are adequately defined in each chapter. All chapters

are well referenced, covering the literature until the end of 1997. 'Carbohydrates' is well edited with regard to content and style and the high quality of figures and schemes is consistent throughout. The volume is well indexed and virtually free of typographical errors.

As a textbook, 'Carbohydrates' fulfills its intended purpose if used over an entire semester. Even for classes in bioorganic chemistry covering nucleic acids, peptides, and carbohydrates in one semester, several chapters make for excellent reading. Only the price may be somewhat prohibitive for the use of this book in this manner. A less-expensive softcover edition would ensure even wider dis-

tribution for a book that is certainly a good introduction to a dynamic field of research.

Although this book is intended as a textbook, it can also be recommended to researchers, and particularly graduate students, who are interested in the field of carbohydrate chemistry and glycobiology. This book makes for a good addition to one's personal library and the entire three-volume set on Bioorganic Chemistry should not be missing from the library of any university.

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