

## Book review

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*Advances in Carbohydrate Chemistry and Biochemistry*: Volume 44, edited by R. STUART TIPSON AND DEREK HORTON, Academic Press, Orlando, FL, and London, U.K., 1986, vii + 438 pages + Author and Subject Indexes, \$79.00, £ 66.00.

This latest contribution to the distinguished *Advances* series contains a tribute to the late Fred Shafizadeh, followed by six well-conceived and well-organized Chapters that will interest both carbohydrate chemists and biochemists alike. This Volume, however, certainly emphasizes the biological aspects of carbohydrates, and should be especially useful to researchers working in the areas of polysaccharide structure elucidation, polysaccharide biosynthesis, and glycolipid biochemistry.

The volume begins with a warm tribute to Fred Shafizadeh (1924–1983), the man and the scientist, as seen from the eyes of one of his former students, Gary McGinnis. The important and varied contributions that Fred made to the carbohydrate field and to the intellectual development of his students, and his enthusiasm for science, shine through in this obituary. This tribute provides a personal and comprehensive account of the life and career of an accomplished scientist that is valuable to all of us, but especially to young researchers, and it adds an important human character, at the outset, to this book.

The remaining portion of this Volume contains articles that represent several sub-disciplines of carbohydrate research: analytical (Vibrational Spectra of Carbohydrates), organic (Monosaccharide Isothiocyanates and Thiocyanates: Synthesis, Chemistry, and Preparative Applications), and biochemical (Enzymic Analysis of Polysaccharide Structure; Biosynthesis of Bacterial Polysaccharide Chains Composed of Repeating Units; Lipid-linked Sugars as Intermediates in the Biosynthesis of Complex Carbohydrates in Plants; and Glycolipids of Marine Invertebrates).

Mohamed Mathlouthi and Jack Koenig have provided a thorough treatment of the vibrational spectra of carbohydrates, including relevant discussions of the F.t.-i.r. and laser-Raman methodologies, the interpretation of spectra, and current applications. Although vibrational spectroscopy has been replaced by n.m.r. spectroscopy for some kinds of carbohydrate studies, it remains an important technique in investigations of hydrogen bonding and the hydration of biomolecules. This reviewer found the authors' consideration of these current problems, at the end of the article, most useful.

The chemistry of monosaccharide isothiocyanates and thiocyanates has been examined very carefully by Zbigniew Witczak. The fundamental reactivities of these carbohydrate derivatives are clearly discussed, and their use in the synthesis

of more-complex sugar derivatives such as nucleosides is delineated. The chapter ends with five pages of physical data (n.m.r., m.p., and optical rotations) on a variety of sugar isothiocyanates and thiocyanates.

Barry McCleary and Norman Matheson should be commended for their comprehensive treatment of the enzymic analysis of polysaccharide structure. These authors must have devoted much time and effort in preparing this article. This is the longest Chapter (120 pages) of the book and is divided into thirteen sections, each dealing with the characterization of a specific class of polysaccharide (*e.g.*, bacterial peptidoglycans, glycosaminoglycans, and glycoconjugates).

The role of "activated" sugars in the biosynthesis of bacterial polysaccharide chains is the topic of a review, by Vladimir Shibaev, of this active field of investigation. The author first orients nonspecialists by discussing the known sugar donors and acceptors involved in such biosynthesis, and then focuses on the current understanding of specific assembly mechanisms.

Rafael Pont Lezica, Gustavo Daleo, and Prakash Dey have written a timely treatment of the role of lipid-linked sugar intermediates in the biosynthesis of complex plant carbohydrates. The article begins with a practical discussion of the experimental techniques used in such studies, and this is followed by a critical account of past and recent work in the area. For example, the biosynthesis of such polysaccharides as cellulose and yeast mannans is given worthy attention, along with possible roles of heteroglycans as "information carriers".

The final Chapter, written by Nicolai Kochetkov and Galina Smirnova, deals with the rather specialized area of glycolipids found in marine invertebrates. Like the preceding report, this one begins with a discussion of experimental methods for glycolipid isolation that should be useful to those beginning work in this field. The emphasis of this article lies mainly in identifying the kinds of glycolipid structures found in marine invertebrates, and not on the more biological problems of their biosynthesis and turnover.

This *Advances* maintains the meticulous editorial standards that are now taken for granted in this series, and we are indebted to the editors, R. Stuart Tipson and Derek Horton, in this regard. From the standpoint of subject matter, this Volume is viewed, at least in this reviewer's mind, as a specialists' paradise. Those interested in the biochemistry of complex carbohydrates—students and researchers alike—would be advised to keep a copy at their finger tips. Those working on the periphery of the field will probably want to consult a library copy frequently.

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