

Book review

Advances in Carbohydrate Chemistry and Biochemistry: Volume 39, edited by R. STUART TIPSON AND DEREK HORTON, Academic Press, New York and London, 1981, ix + 447 pages + Author and Subject Indexes, \$55.00.

The most recent recipient of the Hudson Award, Professor Clinton Ballou, has provided an eminently appropriate obituary of Karl Paul Gerhardt Link. The biographical profile of this salient personality and prestigious chemist emphasized the impact which Karl Link had on carbohydrate chemistry not only through his own research but also through the many excellent students who trained under his direction and then went on to make their own substantial contributions in this field. The memoir clearly indicates the close personal relationship the author enjoyed with Professor Link, and validates the justifiably high opinion held of Karl Link's personage and work.

Professor Alan Haines's most welcome chapter reviewing methods for the selective removal of protecting groups complements the author's earlier chapter on the relative reactivities of hydroxyl groups, which was published in Volume 33 of this Series. The present work is assiduously reasoned and meticulously referenced (through mid-1979); it demands careful reading, and rewards the effort. Acetal selective hydrolyses, acetolyses, and isomerizations form the initial subject matter, followed by a survey of selective deacylations at sites other than the anomeric center. A separate sub-section on deacylation of nucleoside esters should prove useful to many readers. A range of alkyl and aryl ethers is considered next, and examples of the cleavage of one of a number of like ethers are included. The hydrolysis of oxygen-boron bonds is reviewed briefly. Denitration and dephosphonylation reactions are summarized, the latter including illustrations of selective openings of cyclic phosphates. The article concludes with an astute critique of selective de(trialkylsilyl)ations of carbohydrates.

The succeeding chapter affords a well-documented (through early 1979) account by Dr. Jacques Gelas of the synthesis and reactivity of cyclic acetal derivatives of carbohydrates. In his consideration of a broad array of synthetic methods, the author has stressed discerningly the importance of stereochemical factors and catalysts. A discussion of the oxidation of cyclic acetals incorporates a brief review of Deslongchamps' work on their ozonolysis. The thorough synopsis of photolytic and halogenation reactions of these derivatives includes a careful examination of the pertinent mechanisms, and forms a useful complement to the preceding chapter. Among the other topics covered by this article are hydrogenolysis, cleavage with Grignard reagents, and the action of strong bases.

The current, burgeoning interest in synthetic polysaccharides makes Professor

Conrad Schuerch's important chapter on the synthesis and polymerization of anhydro sugars particularly apposite. The preparation of all types of anhydro sugars is reviewed critically. The polymerization and co-polymerization of anhydro-aldoses in both the furanose and pyranose forms are summarized, with emphasis being given to the nature of the catalysts, the control of the characteristics of the products, and the reaction mechanisms.

Dr. Riaz Khan has provided this volume with a comprehensive survey of the chemistry of maltose, carefully documenting the properties of its derivatives in a series of fifteen Tables which will be a standard reference for many years. Syntheses of maltose, and its glycosides, esters, and ethers, are reviewed, together with a succinct discussion of the application of ^1H - and ^{13}C -nuclear magnetic resonance spectroscopy and mass spectrometry to the study of maltose and its derivatives.

Fucose is one of the few sugars both of whose enantiomers occur in Nature, and Dr. H. M. Flowers has written an absorbing review of its chemistry and biochemistry. The importance of fucose, and fucose-containing compounds, in a number of human diseases, the antigenic properties of complex fucans, including the ABH antigens, and the occurrence of this sugar in a broad spectrum of natural products have been cogently reviewed. In addition, the chemical preparation, biosynthesis, and biodegradation of fucose are discussed, and evidence pertaining to the relative reactivity of its hydroxyl groups is examined. Information on a large number of fucose derivatives is summarized in two extensive Tables. The consideration of the occurrence and properties of D- and L-fucosidases adds to the notability of this excellent chapter.

Professor James Barnett has written an authoritative, exhaustive survey of glycoside and disaccharide utilizations by yeasts, thereby affording readers a sequel to his earlier article, on the metabolism of monosaccharides by yeast, published in Volume 32 of this Series. Glycosidases occurring outside the plasmalemma are considered according to the nature of the substrate hydrolyzed. The documentation of the species which can degrade a particular disaccharide is of particular importance at this time, when so much interest centers on the utilization of carbohydrates by micro-organisms for biosynthetic purposes.

The final chapter is a review by Professor John Pazur of affinity chromatography employing adsorbents bearing carbohydrate ligands. The great value of affinity chromatography for the resolution of mixtures of solutes of high molecular weight is well documented in the discussion of the applications of this technique. The principles of this type of chromatography, the methods useful for the preparation of chemically or physically modified polysaccharides, and the reactions suitable for coupling carbohydrate monomers to polymeric support-material are reviewed with clarity and discernment.

Once again, the very high standards of excellence characteristic of this Series have been achieved with an impeccable selection of authors and topics. To all in this field of endeavor, this volume will be a source of fact and intellectual stimulation whose worth is far in excess of its cost.

The production of this volume deserves two comments. Some of the Figures have been so reduced in size as to make the small print which they contain approach the limit of resolution of middle-aged eyes. Perhaps a slightly larger format or a larger type could be employed in the future. Second, the removal of the Cumulative Index, was an understandable, but nevertheless significant, loss to this Series. It may be that the ease with which articles in the Series could be located would be enhanced if those volumes containing a 5-year index could be distinguished readily, say, by the addition of an extra gold band on the spine.

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