

## Book review

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*The Polysaccharides: Volume 3*, edited by GERALD O. ASPINALL, Academic Press, Orlando, FL, 1985, xiv + 453 pages + Subject Index, \$85.00, £ 66.50.

This is the concluding volume\* of the first substantial work solely devoted to the polysaccharides since that of Whistler and Smart in 1953. In the opening chapter, Matheson and McCleary deal with the varied uses of enzymes in studying aspects of polysaccharide structure, in investigating heterogeneity of materials, in cleaving protein and other moieties from polysaccharides, and in polysaccharide detection, isolation, and characterisation. The reader is assisted in assessing advantages and practicalities, and confronted with some of the problems, in the use of enzymes as highly selective molecular investigators of host polysaccharides or derived oligosaccharides. James, Preiss, and Elbein, in the first part of a splendidly informative and interesting chapter on the biosynthesis of polysaccharides, deal extensively with the structural polysaccharides in bacterial cell-walls and then with those in fungi, algae, and higher land-plants. They then clearly and concisely describe the considerable knowledge of the biosynthesis of the starches and of bacterial and mammalian glycogens. Throughout this chapter, established facts, speculations, and uncertainties are interestingly interwoven without blurring distinctions between them.

The second half of this volume continues, and successfully completes, the major task begun in the preceding volume, namely, that of presenting an up-to-date account of the various classes of polysaccharide. Chapters on the chemistry and biochemistry of starch (Guilbot and Mercier) and glycogen (Geddes) provide a natural link with the first part, and are followed by others on mammalian glycosaminoglycans (Fransson) and chitin (Muzzarelli). The chapter on starch describes its fractionation and the structural study of amylose and amylopectin by chemical and enzymic methods. The morphology and ultrastructure of the starch granule are elucidated, and consideration is given to the nature of starch crystallinity, of the intercrystalline amorphous phase, and of gelatinization of starch granules. Geddes, in an elegantly written chapter, substantiates his view that the apparent simplicity of glycogen is "a deceit", and considers the study of glycogens and proteoglycan complexes by various techniques before dealing with the metabolism of glycogens in humans and other animals with and without glycogen-storage diseases. Descriptions in the excellent chapter on mammalian glycosaminoglycans encompass

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\*For reviews of Vols. 1 and 2, see *Carbohydr. Res.*, 123 (1983) c35–c36 and 134 (1984) c13–c16.

chondroitin and dermatan sulfates, hyaluronate, keratan and heparan sulfates, and heparin, and deal with specific associations between such polymers and others of like, and of different, type. In the concluding chapter, on chitin and chitosan, the stated objective is to provide "a selection of topics that are of importance in the exploitation of chitinous resources", and, to this end, there is a description of the structures of chitin and related compounds and derivatives, and comments on medical, and other, properties and uses. Chitin is demonstrated not to be a chemically intractable substance, as is often alleged.

Comment such as the above on details in a book can easily and inadvertently distort and misrepresent its balance, purpose, and achievement. There is considerable individuality in the tone and in the balances struck within the various chapters, and these give a pleasant liveliness while not detracting from the overall unity. In a major work on polysaccharides, I expected, and here and in the earlier volumes I find, excellent chapters on the main families of polysaccharides. Relatively less frequently discussed polysaccharides are not neglected, but are smoothly incorporated into one or other of the chapters grouping polysaccharides either by their origin or by their general chemical nature.

This volume, although of value in its own right, should not be considered primarily in isolation, but as part of the completed work. This can now be seen to provide the much-needed, modern, full, yet selective, structured, objective, and expert description, discussion, and explanation of a diversity of topics directly related to an understanding of the polysaccharides and methods related to their study. A particular strength of the work as an entity is the extensive, and separate yet integrated, coverage of relevant physical, chemical, and biological aspects. Integration of the work is aided by helpful cross-references between chapters—this is naturally easier between later and earlier volumes than the other way. Throughout, there is, as appropriate, interwoven or separated major and minor comment on biological, taxonomic, industrial, and other aspects of polysaccharides. The quality of writing is in general high, and the present volume, like its predecessors, is attractively produced, well printed, suitably illustrated, and modestly priced. (In the present volume, there are a few minor errors or inconsistencies; in the index and, elsewhere, Gram's name is printed as gram!) *The Polysaccharides* will clearly be the standard work for many years to come, and many will not be surprised if, at some future date, it were then to be joined by Volume 4.

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