

Book review

Carbohydrates: Synthetic Methods and Applications in Medicinal Chemistry, H. Ogura, A. Hasegawa, and T. Suami (Eds.), VCH Verlagsgesellschaft, Weinheim, 1992, xiv + 406 pages + Subject Index, DM208, £78, ISBN 1-56081-701-1.

At the outset it must be stated that this book goes beyond synthetic methods in Carbohydrate Chemistry. The later chapters summarise the biological roles of mammalian glycoconjugates — glycoproteins, glycolipids and proteoglycans. The earlier more chemical chapters include useful introductions and summaries heading each subsection allowing the synthetic methods to be put into their biological and historical context. This makes the book a largely very readable account of methodology and application. It amply demonstrates the great importance of this branch of chemistry in areas as diverse as plant cell walls, polysaccharide vaccines, many examples of complex antibiotic synthesis, the roles of sialic acid analogues, antibody recognition studies, carbohydrate ligands for selectins, and manipulation of heparin structure for anti-coagulant, anti-atherosclerotic, or anti-angiogenesis activity.

The first five chapters set the scene by illustrating the advantages and disadvantages of monosaccharides as chemical building blocks: on the one hand, their importance for providing optically active centres for all branches of chiral synthesis and, on the other the problems of unwanted chirality and polyhydroxy functionality. With respect to this last property, the major examples of modern blocking strategies abound throughout the book. As these are now largely agreed upon they are not overstressed, nor are the new “tricks” overplayed for stereoselective glycosidic bond formation (for both O- and C-glycosides) which have largely come into play over the last fifteen years. They are both just illustrated by numerous examples from the various authors’ experience in their particular fields. What we end up with is a catalogue of synthetic strategies in a comprehensive list of applications as illustrated by the last three chapters in the first Section on morpholins, spiro-acetals, alkaloids, the mycin antibiotics, and pseudo (carba) sugars.

The second Section of the book is a timely and comprehensive survey of the enzymic methods now being used in carbohydrate synthetic chemistry.

The third Section deals exclusively with sialic acids studies, both synthetic and biological, giving chapters which are a great resource in this difficult but important area. Studies on sialic acid-protein recognition by influenza virus haemagglutinin are well described and the design of analogues for inhibition (of viruses, microorganisms, tumour growth, etc.) illustrated. Also described are the enzyme

specificities to sialic acid analogues, but unfortunately with the omission of the (perhaps too recent) story of the design of high affinity inhibitors of influenza virus neuraminidase [e.g., see *Nature* for the 3rd June, 1993].

Finally there is a small fourth Section on Functional and Biological studies of Glycoconjugates which contains some useful chemistry on the synthesis of polygalactose antigens and heparin analogues but also provides a description of the structures involved in selectin binding.

The book is well illustrated, referenced, and indexed with a uniformity to be praised in a multi-author format. Of the two typographical errors I could find, the first was most unfortunate – the misspelling of Carbohydrates on the first line of the Contents! — and the second negligible (try finding it on p 276). One other interesting wording repeated in the Contents and at the beginning of Section IV itself was the use of the singular ‘Glyco-Conjugate’ which I have changed above to the plural non-hyphenated form. Although very readable, a disadvantage of the book to some may be that it is not a text book. Therefore, for any new molecules that the reader may wish to synthesize it would be necessary to scour the book for the most relevant strategy, i.e., the book is applications led and not discussed by the types of chemical reactions. I can however still highly recommend this unique attempt to catalogue the most “efficacious” (p 195) synthetic methods available in an approachable form.

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