Carbohydrate Research, 249 (1993) C1–C5
Elsevier Science Publishers B.V., Amsterdam

Book reviews

Carbohydrate Antigens, Eds. P.J. Garegg and A.A. Lindberg. ACS Symposium Series 519. American Chemical Society Washington, DC (1993). 184pp Indexed. ISBN 0-8412-2531-1, $49.95.

This book reports on a symposium held in August 1991. Although a relatively slim volume, it is a treasure-trove of information accumulated from carbohydrate antigen research over the formative years. The major historical figures in the field are represented and their contributions on conformational, biosynthetic, chemical, and antigenic studies provide stepping stones to the now burgeoning area of carbohydrate molecular recognition. The symposium took place shortly after the death at 103 of Michael Heidelberger, to whom the book is fittingly dedicated. As the editors say in their preface "saccharides emerged as key substances in biological processes" due to the work in 1923 of M. Heidelberger and O.T. Avery showing that the "antigenic part of the bacterium of *Streptococcus pneumoniae* was a polysaccharide, not, as previously thought, a protein".

It is most appropriate that the first contributions should be from Elvin Kabat (a personal tribute to Michael Heidelberger) and Raymond Lemieux (How proteins recognise and bind oligosaccharides) who have done so much to further the field of structural carbohydrate immunochemistry. Professor Lemieux's chapter discusses work on lectin binding from which much has been learnt of oligosaccharide recognition mechanisms and, for example, emphasises the role of the release of bulk water in oligosaccharide-to-protein association kinetics. His chapter is particularly well illustrated despite the constraints of black and white printing for representation of space-filling models. The complexity of the role of the contributions of different functional groups in binding energy, which are as yet not fully delineated in different oligosaccharide-to-protein interactions, is highlighted by his work, finding for example (p 6), "that 5/10 hydroxyl groups of the Lewis b methyl glycoside remain in the aqueous phase" on association with the lectin *Griffonia simplicifolia*. The chapter moves forward into the modern era of the use of supercomputers (Cray-X-MP) to carry out theoretical calculations for relevant computer graphics molecular modeling.

A second important new approach, outlined in Chapter 3 (M. Meldal, S. Mouritsen, and K. Bock), exploits oligosaccharides in the field of immunology in the use of glycopeptides to illicit a T cell response-lacking in earlier attempts at polysaccharide vaccines. Classic comprehensive work is presented from the Copenhagen group on both *O*- and *N*-glycosylated peptide synthesis with detailed NMR chemical shifts. Equally comprehensive is Chapter 4 on fucosyl transferases from Winifred Watkins and associates. In the past together with Walter Morgan and,

later, Simon Donald, the blood group antigen fucosylated structures were characterised and now, in the new era of fucosylated antigens as recognition structures for selectins, their meticulous studies of transferase activities and serology are an important basis for our future understanding. The chapter is an excellent summary of the field which puts into correct historical perspective the characterisation of fucosylated antigens, their cell expression, and the underlying genetics. This gives an exceptionally useful resource of facts about Lewis-type antigens, raising for example the question of whether the X antigen can correctly be called Le^x and discussing at length their pathological disarrangements in leukemia.

Chapters by B. Lindberg (Ch 5), C.P.S. Glaudemans et al. (Ch 6), D.A. Zopf and W.-T. Wang (Ch 7), and B.M. Pinto (Ch 9) follow, which discuss different aspects of monoclonal antibody (MAb) binding to oligosaccharides. Chapters 8 (G. Magnusson et al.) and 10 (H. Paulsen et al.) deal primarily with lipid conjugates of oligosccharides (bacterial adhesion to glycolipids and the inner core region of lipopolysaccharides, respectively). These chapters, together with that by B.M. Pinto on derivatives of β-hemolytic *Streptococcus* group A antigens, give comprehensive information on chemical synthetic routes leading to conformational analysis.

No book on carbohydrate antigens would be complete without the detailed extensive work of E. Kabat on anti-α-(1 $\rightarrow$ 6) dextrans (Ch 11) and of S. Hakomori on tumour-associated antigens (TAA's) present on glycosphingolipids. To the former we owe, among many other things, the concept of grove- versus cavity-type antibody combining sites. The last chapter (M.R. Stroud, S.B. Levery, and S. Hakomori) brings us full circle to the relevance of oligosaccharide antigens in disease diagnosis and pathogenesis, ending with the promising note that "therapeutic application of MAb's directed to these TAA'S... could block human tumour progression". Many other biomedical areas are served by this book which should be the basic reading material for all scientists embarking on the *next* 70 years of oligosaccharide immunochemistry.

MRC Clinical Research Centre
Watford Road, Harrow,
Middx, UK

Elizabeth F. Hounsell

The Inositol Phosphates — Chemical Synthesis and Biological Significance, D.C. Billington, VCH Verlagsgesellschaft, Weinheim, 1993, xiv + 145 pages + Subject Index, DM126.00; £52.00; ISBN 3-527-28152-5.

In the last decade since the discovery of the calcium-mobilising, second messenger properties of D-*myo*-inositol 1,4,5-trisphosphate by M. Berridge and his colleagues there has been as explosion of research in biology and biochemistry in this area and as L. Hokin (who first observed agonist-stimulated phosphatidylinositol turnover in the 1950's) has recently commented; "the phosphoinositide field is currently the number one field in biochemistry in the number of citations (excluding molecular biology)". However a biologist or biochemist, unless he is very