

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<sup>x</sup> 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 oligosaccharides (bacterial adhesion to glycolipids and the inner core region of lipopolysaccharides, respectively). These chapters, together with that by B.M. Pinto on derivatives of  $\beta$ -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- $\alpha$ -(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 groove- 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.

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*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 an 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

sympathetic to organic chemistry, will find this book unrewarding because of the cursory review of the metabolic aspects of the phosphatidylinositol cycle (see, for example, the review of this book by S. Shears in *Trends in Biochemical Sciences*, 18 (1993) 271–272).

Research on the chemical synthesis of the inositol phosphates and analogues has now also become a major and competitive area of organic chemistry and this book is the latest review of this field. Two other reviews (one by the same author) were published in 1989 and 1990 and the book retraces some of the same ground. However, because of the pace of research the book (reviewing work published to 1991) reports much new work but was nevertheless considerably out of data at the time of publication. The author has made a brave effort in the final chapter ('Late Entries') to include some work published during 1992.

Because of the pharmacological interest in the subject much effort has been devoted to the synthesis of analogues of *D-myo*-inositol 1,4,5-triphosphate and the chapter reviewing this area (reflecting the author's primary interest) is probably the best in the book. It attempts to define, from the published work, those parts of the molecule which are important in interactions of the inositol phosphates and analogues with receptors and the metabolic enzymes.

The chapters devoted to the methods of synthesis of the various inositol phosphates are less satisfactory because, in attempting to include the large amount of work published (frequently as preliminary communications), the author has not been able to apply a critical appraisal of the methods used. Perhaps in another five years time, with hopefully more full papers available, this appraisal will be possible. In this respect one aspect worthy of future critical review is the comparative efficiency of the reported methods for the resolution of racemic intermediates, since most of the currently available methods of optical resolution have been applied in this area.

In reading these chapter it is comforting to observe that the once difficult area of phosphorylation of vicinal diols has been completely mastered by the application of the new methods of phosphorylation (particularly those using phosphoramidite methodology) introduced originally by workers in the nucleic acid field. It is also a source of some satisfaction to the reviewer to see that ten per cent of the numerous formulae in the book contain allyl ethers as protecting groups.

Although the inositols have occupied a comparatively minor niche in carbohydrate chemistry since the discovery of *myo*-inositol a century and a half ago by Scherer, two of the senior gurus of inositol chemistry (S. Angyal and L. Anderson) will be aware from this book that their past efforts have helped to accelerate the pace in this field although their fundamental contributions (dating from the 1960's) receive scant mention in the desire to include the abundance of recent research. It is also noticeable from the lists of references that the bulk of publications have been contributed by organic chemists whose names have not formerly been connected with inositol chemistry or indeed with main-stream carbohydrate chemistry.

One noticeable omission from the book is a discussion of synthetic work on the phosphoinositides themselves. The discovery of these inositol-containing lipids in brain by J. Folch some fifty years ago was responsible for the creation of this field of research. The current burgeoning biological interest in phosphatidylinositol 3-kinase and in the 'lipid anchor' of membrane-associated proteins is providing new objectives for the synthetic organic chemist and syntheses in this area should feature more prominently in future editions.

There are a few errors and misconceptions which should be corrected in a future edition. For example, there are reasons other than "the severe problems associated with efficient phosphorylation of polyols" that delayed the publication by our group of the phosphorylation of intermediates described on page 69. The priority for this type of phosphorylation had been established by the Russian group using dianilidophosphochloridate and the method was repeated by Ozaki in his publication in 1986. We were more concerned with an efficient optical resolution of the intermediates. Likewise there is a misconception about our work reported on page 45. The author is in error concerning the methods we used for phosphorylation and deprotection.

I can recommend this useful and readable book to any synthetic organic chemist who is interested in browsing in a new field or is contemplating entering the field. However, I would strongly advise the latter to consult the primary literature, associated with the names of those appearing in the lists of references, from the latter half of 1991 before designing his first experiment.

The overall impression gained from the book is that, for such a compact molecule, *myo*-inositol and its phosphates have stimulated the application of some fascinating chemistry which has been gleaned from many areas of synthetic organic chemistry. This fast moving field of organic synthesis is still accelerating because of the rapidly broadening base of the biological studies and there is still room for new ideas and methods, particularly those concerning the preparation of membrane-permeable derivatives of these highly polar compounds.

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*Advances in Natural Product Chemistry*, Proceedings of the 5th International Symposium and Pakistan-US Binational Workshop on Natural Products Chemistry, Karachi, Pakistan, 4–9 January 1992. Edited by Atta-ur-Rahman, Harwood Academic Publishers, Chur, Switzerland, 1992, ISBN 3-7186-5319-2, xii + 498 pages, \$140.

I must admit at the outset that I am not an aficionado of conference proceedings. They are mostly a hotch-potch of disparate contributions, vastly overpriced, and of little lasting value. I propose the creation of "The Journal of Conference