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Book review

Carbohydrate Chemistry—9, edited by A. B. FOSTER, Pergamon Press, Oxford, 1979, 172 pp., £18.25; $42.00.

This slim volume contains the material presented as eight plenary lectures at the Ninth International Symposium on Carbohydrate Chemistry, held in London, U.K., during April 1978. Although the text has also appeared in *Pure and Applied Chemistry*, Volume 50 (1978), this separate publication caters for the bibliophilic needs of individual carbohydrate chemists.

Most of the papers deal with aspects of chemical synthesis (structural polysaccharide chemistry is not represented), and at least four of the papers could persuade sceptical organic chemists that carbohydrate chemistry is not an alien discipline. In the opening paper, Lichtenthaler (Darmstadt) gives a timely and well-organised account of the chemistry of sugar enolones. The enolones are readily prepared by β-elimination reactions of acylated pyranosuloses, and routes to the latter compounds *via* the halogenation or peroxidation of 2-hydroxyglycal esters are discussed in some detail. In his survey of the reactions of sugar enolones, Lichtenthaler concentrates on their use in the preparation of 2-deoxy and 4-deoxy sugars and on their conversion into γ-pyrones. The possible relevance of the laboratory reactions to the biosynthetic production of γ-pyrones (kojic acid and maltol) is also considered.

The differential functionalisation of similar hydroxyl groups in diols is a frequent problem in organic synthesis, and has led to much innovative chemistry in recent years. Among such reactions for the preparation of halohydrin esters is the conversion of acyclic diols or cyclic *cis*-1,2-diols into bromohydrin acetates on treatment with hydrogen bromide in acetic acid. In their contribution to the symposium, Pedersen and his colleagues (Lyngby) described the effects of this reagent on various simple carbohydrates. Whereas anhydroalditols and aldonic acids (usually as lactones or salts) give bromodeoxy acetates in a largely predictable way, aldose derivatives are apparently unable to form the expected intermediate dioxolanylium ions with fused rings under the reaction conditions. Pedersen's paper ends with a brief review of the synthetic potential of bromodeoxylactones.

One of the most rewarding and educative of the eight papers is that by Verheyden, Moffatt, and their collaborators (Palo Alto), which rationalises and describes chiral syntheses of the antibiotics anisomycin and pentenomycin from D-glucose. The synthesis of pentenomycin, in particular, is a worthy testament to the tenacity, as well as the scientific command, of its originators, and one's appreciation of their achievement is further enhanced by the narrative style of their paper. In a second paper on the synthesis of antibiotics, Umezawa (Kawasaki-shi) provides a general review of the clinically important aminoglycosides and describes recent syntheses of butirosin B, neomycin C, and dihydrostreptomycin. The serious problem of plasmid-mediated drug resistance in bacteria has presented synthetic chemists with a more vital challenge and, in the second part of his paper, Umezawa discusses the strategic modification of natural antibiotics to obtain active compounds (*e.g.* dibekacin and amikacin) that resist enzymic inactivation. Effective modifications include specific deoxygenation, *N*-acylation, and *N*-alkylation.

Stereoselective glycosylation, a primary requirement in carbohydrate syntheses, is featured in Umezawa's paper and is the main topic in two others. Sinaÿ (Orléans) describes and exemplifies his novel imidate method for the synthesis of 1,2-*cis*-related glycosides, *e.g.*, α-glucosides. The ready preparation of the imidates from suitably protected glycosyl chlorides and *N*-methylacetamide, together with the efficiency and selectivity of the glycosylation, make this an important advance. In his relatively short and fragmented paper, Perlin (Montreal) assesses the synthetic potential of 1-*O*-sulphonyl derivatives of aldoses. Advantages over glycosyl halides were noted in the synthesis of α-D-mannopyranosyl disaccharides and in the range of compatible blocking-groups. Among other topics considered by Perlin are the effect of ring sulphur on ^{13}C–^{1}H coupling at the anomeric centre in 5-thio-D-galactopyranose, and inter-residue ^{13}C–^{1}H coupling in relation to the orientation of glycosidic bonds in disaccharides.

Biological glycosylation is the subject of the paper by Shibaev (Moscow). As part of a general interest in the biosynthesis of carbohydrate polymers, Shibaev and his colleagues are studying the specificity of glycosyl transferases involved in the elaboration of *Salmonella* O-antigens, for which the structures and biosynthetic pathways are well established. Useful progress with the preparation of polyprenol-linked oligosaccharide intermediates and analogues of the natural nucleotide sugars is described. Work with the latter compounds indicates that the glycosyl transferases are not highly specific for the glycosyl donor.

The remaining contribution, by Shallenberger (Geneva, New York), reminds us that loose ends and unsolved problems may be found even in the chemistry of simple compounds, in this case fructose. Shallenberger leads us solicitously through the convoluted history of studies of the mutarotation of fructose, and produces new and surprising values for the specific rotations of the furanose forms. This interesting contribution ends with a discussion of the structural and conformational features that appear to confer sweetness only on the β-D-pyranose anomer.

The production of the book from camera-ready typescripts has inevitably led to variations in format and quality of the presentations, and has perpetuated a sprinkling of typographic and other errors. However, most of the papers are easy on the eye, and in general the errors are not such as to confuse or deceive. Publication was worthwhile, and for those who attended the symposium, the book provides a pleasant souvenir of a successful scientific and social occasion.

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