FOREWORD

SYNTHESES OF *C*-GLYCOSYL COMPOUNDS

The biological importance of *C*-nucleosides was primarily responsible for the search for synthetic methods which allowed carbon–carbon bond formation at the anomeric position of carbohydrates. This is clearly reflected by a review written in 1976 by S. Hanessian and A. G. Pernet in Advances in Carbohydrate Chemistry and Biochemistry.

In the last decade, and especially in the past few years, the direct formation of C–C bonds at the anomeric center of carbohydrates has attracted considerable attention. One basic reason for such efforts is the presence of 2,5-dialkylated oxolane (*C*-glycofuranosyl compounds) and 2,6-dialkylated oxane units (*C*-glycopyranosyl compounds) in a wide variety of complex natural products; the marine natural compound palytoxin is a spectacular example. Furthermore, synthetic *C*-glycosyl compounds represent interesting starting chiral synthons, suitable for the synthesis of complex molecules, as they contain a larger number of chiral centers and functional groups. Monosaccharides have frequently been used as natural sources of stereocenters for the total synthesis of optically-active, "chirally rich", natural compounds. In most cases, appropriate manipulation of various cyclic pentoses and hexoses ultimately resulted in short segments that are the starting material for "off-template" chemistry. All things considered, the anomeric center of a monosaccharide is thus an off-template site which is only used to lock the molecule in the most desirable heterocyclic form, thus allowing the principles of conformational parameters to operate for the control of the endocyclic chiral transformations.

One attractive way of synthesizing a higher-carbon sugar possessing multiple chiral centers is indeed to take advantage of the anomeric stereoselection—a general phenomenon which is valid for C–C bond formation. Reactions of carbon nucleophiles at the electrophilic anomeric center of carbohydrates are by far the most exploited routes to *C*-glycosyl syntheses. They involve mainly the attack of various *C*-nucleophiles at the anomeric center of glycosyl halides, *O*-glycosylimidates, lactones, glycosides, thioglycosides, or glycals. Several selected examples of this traditional approach will be found in this issue. They include both Friedel–Crafts-type reactions or Michael additions. The stereoselective formation of *C*-glycosyl compounds *via* addition of an anomeric radical to alkenes has proved to be a versatile and mild procedure. It is an interesting case of manipulation of carbohydrate radicals, a field that is currently attracting wide interest and will probably grow rapidly as radical chemistry is particularly suitable for polyfunctional, complex molecules.

A new, flexible concept is based on the "Umpolung" of the chemical reactivity at the anomeric center. Thus, efficient and stereocontrolled introductions of carbon appendages have been described recently; they use either stabilized anomeric carbanions derived from anomeric phosphonium salts, nitro and phenylsulfonyl derivatives, pentacarbonylglycosylmanganese complexes, or 2-deoxy-D-glucopyranosyllithium reagents. One of the reasons for the rapid development of this field of research is the current interest of leading synthetic organic chemists in *C*-glycosyl compounds. Such a trend should undoubtedly be beneficial to the specialized field of carbohydrate chemistry.

A recent consequence of this flourishing carbohydrate chemistry area is the availability of *C*-disaccharides, which are disaccharides in which a methylene group takes the place of the interunit oxygen atom. *C*-Linked oligosaccharides are now highly in demand for studies of sugar metabolism and as enzyme inhibitors. These compounds also provide a unique opportunity to estimate the contribution of the *exo*-anomeric effect on the conformational preference of an oligosaccharide. It is hoped that this special issue dedicated to a rapidly growing field is timely and will stimulate further developments.

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