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Foreword

In the last few years we have enjoyed the increased profile of the glycosciences as a key topic of research. Indeed, thanks to the efforts of many eminent scientists, from chemists to medical doctors, it has been demonstrated that complex carbohydrates are definitively involved in a large range of cellular functions and are essential for life. From the chemical viewpoint, advances in organic synthesis have made it possible to access natural and modified oligosaccharides with simple to tremendously complex molecular architectures. Today, and in the years to come, the combination of solution-phase and solid-support technologies, together with advances in chemoenzymatic approaches, should make available a plethora of oligosaccharides with diverse properties. Although these advances in oligosaccharide synthesis have also been accompanied with key developments in the protocols to understand the three-dimensional shapes of these molecules in solution, a molecular-level understanding of many processes in glycobiology is often unavailable. Nevertheless, advances in X-ray, NMR, and other spectroscopic techniques, usually in combination with theoretical calculations, have permitted the elucidation of the fine details of the interaction of sugars at atomic resolution with different lectins, antibodies, nucleic acids, and carbohydrate-processing enzymes. The jump from understanding a molecular recognition event to a biological or biomedical process is often too high.

In many cases, carbohydrates are labile compounds and in particular they are sensitive to the presence of enzymes and acidic or basic media, which may preclude their direct use as drugs or even molecular probes. Thus, chemical modification of the carbohydrate structure permits access to more stable modified-sugars, glycomimetics, which in some cases even lose their carbohydrate signature. Methods for obtaining these structures, which can be tremendously diverse thanks to advances in synthetic chemistry, are of paramount importance as are techniques for understanding their conformational properties, both in their free and receptor bound state. Such investigations will allow these compounds to be used not only as tools for biochemical or biomedical studies but also for the generation of novel vaccines or as lead compounds for new therapeutic agents. Nevertheless, although these glycomimetics are key for studying diverse phenomena, their potential as novel carbohydrate-based drugs is yet to be realized.

Since its initial issue over 40 years ago, *Carbohydrate Research* has published advances in the area of carbohydrate analogs, from their synthesis to their use as recognition probes. On this basis, the Editors and Editorial Board of *Carbohydrate Research* chose to solicit papers for this special thematic issue on glycomimetics. The papers in this issue, the publication of which has been timed to allow distribution at the EUROCARB XIV Symposium, which will be held in Lübeck, Germany, from September 2 to 7, 2007, represent the results of these efforts.

This issue contains 39 contributions, including 27 Full Papers, 8 Notes, and 4 Reviews, from scientists in 16 countries. A broad range of topics in the area of glycomimetics is included, ranging from novel general synthetic methodology to the generation of specifically designed molecules including both small molecules and glycoconjugates. Also presented are a variety of examples of conformational studies of these molecules in solution, in membrane-like environments, or when bound to natural receptors.

The glycosciences are currently flourishing like never before and there is no doubt about the importance of glycomimetics for the continued development of these fields. The use of carbohydrate-related molecules has no visible end for a variety of purposes. We thank all the authors whose work is reported here for their contributions and hope that this issue will further underscore the importance of *Carbohydrate Research* as a leading journal for publishing advances in this topic.

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