

Preface

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XXVIII International Carbohydrate Symposium (ICS-28)

DOI 10.1515/pac-2017-0405

Keywords: carbohydrates; Conference series; ICS-28; Organic and Biomolecular Chemistry.

Carbohydrates are the molecules of life! Together with genes and proteins they play a determinant role in biological processes, in health and disease, that challenged the formation of a special interdisciplinary research area across to organic and biomolecular chemistry, chemical biology, analytical chemistry, molecular biology, computational sciences, and others – namely glycosciences. Tackling problems that require urgent solutions, glycoscientists can give insights into molecular mechanisms and role of carbohydrate structures in cell recognition processes including the interactions of cells with toxins, virus, bacteria, micro-organisms and antibodies, offering approaches for design of corresponding drugs, vaccines and diagnostic techniques of unmet need.

In this context, as members of the IUPAC Division (III) of Organic and Biomolecular Chemistry and carbohydrate chemists, we are honored to dedicate this and a subsequent PAC issue to Glycosciences, covering topics presented at the XXVIII International Carbohydrate Symposium – ICS 2016 in New Orleans, Louisiana, USA from the 17th to the 21st of July 2016.

Glycochemistry is illustrated with the utility of endocyclic cleavage reactions by S. Manabe, the review on the synthesis of core-fucosylated *N*-glycans, whose biochemistry is also described by A. E. Calderon, and the synthesis of *p*-methoxyphenyl sulfated β -GalNAc derivatives as inhibitors of the Japanese encephalitis virus, by M. Sakuragi. Chemical glycosylation remains an important tool to access biologically active molecular entities and A. Demchenko described in this issue *N*-alkyl-*S*-benzimidazolyl glycosyl donors with the universal activation profile. Recent advances in the synthesis of fungal antigenic oligosaccharides by N. E. Nifantiev and the synthesis of Group B Streptococcus type III polysaccharide fragments aiming at the evaluation of their interaction with monoclonal antibodies by R. Adamo, are also presented and J. Voglmeier reported on a new fluorogenic label for milk oligosaccharides. Glycosides with polycyclic aglycones, e.g. triterpene or steroids, the saponins, have a diversity of bioactivities and in this issue A. Fernandez-Tejada describes the synthesis and evaluation of saponin variants related to vaccine adjuvant QS-21. Glycoside analogues with anomeric oxygen replaced with nitrogen or carbon also display relevant bioactivities. The synthesis of anti-proliferative azido-nucleosides and their phosphoramidate derivatives is reported by N. M. Xavier and co-workers, while A. P. Rauter and co-workers present synthetic strategies and the studies demonstrating the relevance of key structural features of flavonoid aglycones able to prevent A_{β} oligomerization and fibrillation. These compounds are analogues to genistein, the aglycone of 8-glucosylgenistein, an antidiabetic agent that emerged with the ability to prevent A_{β} oligomerization. Analytical methodologies applied to glycosciences are reported by I. Compagnon, using gas phase IR spectroscopy integrated to mass spectrometry to discriminate patterns of *N*-acetylation in chitooligosaccharides, and by H. N. Chang who presented the NMR analysis of compositional heterogeneity in polysaccharides.

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Papers that demonstrate the biological importance of carbohydrates in various areas are also included, namely glycosylglycerols for cosmetics by R. Daniellou, biomedical and biotechnological applications of trehalose derivatives by B. M. Swarts, chitosan nanoparticles as vaccine carriers for cancer immunotherapy by Y. Li, and carbohydrate-based inducers of cellular stress to target cancer cells by F. Ndombera.

Molecular dynamics simulations of hexopyranose ring distortion by W. Plazinski and a metagenomic approach to discover a novel β -glucosidase from bovine rumens by P. Kongsaree complete the contributions of this issue, dedicated to the glycosciences. We are very grateful to Prof. Hugh Burrows, editor in Chief of Pure and Applied Chemistry for the dedication of this issue to ICS 2016, and all authors for their contributions, that demonstrate the uniqueness of carbohydrates in chemistry, biology and medicine, with potential industrial applications in medicine, material design, biotechnology, agricultural, food and other area of economy.