

PREFACE

The Beilstein Symposia address contemporary issues in the chemical and related sciences by employing an interdisciplinary approach. Scientists from a wide range of areas are invited to present aspects of their work for discussion, with the aim of not only advancing sciences, but also enhancing interdisciplinary communication. Traditionally, the Beilstein Symposia are kept small with up to 50 participants to provide a convivial atmosphere for the both lectures and lively discussions and the ready exchange of thoughts and ideas.

The appreciation and understanding of the role that carbohydrates play in nature has grown over the last few years driven by the advances in our ability to analyze and synthesize their structures. Their role not only as primary energy-storage molecules but also as structural modifiers of e.g. glycoproteins and glycolipids, as well as in physiological and pathological events such as adherence, cell-cell interaction, transport, signaling and protection is becoming clearer and more accessible to researchers. Over the last decade the fields of glycobiology and glycochemistry in combination with in-silico applications have been augmented by a further field – glycomics. A major aim of glycomics research is to achieve a comprehensive identification and characterization of the repertoire of glycan structures present in an organism, cell or tissue at a defined time. The continual improvement of analysis methods and computational techniques leads to glycan characterization and identification with increased depth, speed and efficiency but also generates ever increasing amounts of data of variable quality and completeness.

Thus the many web-accessible repositories result in a highly fragmented knowledgebase which in consequence complicates the development and application of bioinformatics tools for the analysis of this data.

This situation has led to a general consensus that community wide efforts should be spent towards consolidating and systematizing the collective knowledgebase with integration of universal bioinformatics tools for both the representation, mining as well as annotation of experimental data sets to advance and interface glycomics with related genomics and proteomics projects. Additionally, both experimentalists and bioinformaticians also expressed their demands for data reporting practices that include the comprehensive description of conditions, techniques and experimental results to enable researchers to evaluate the degree of structural definitions, to interpret the results and to reproduce the experiments.

The previous symposia held in 2009 and 2011 brought the stakeholders in the area of glycomics together and provided a platform to discuss the role of bioinformatics in this emerging field. One important outcome was the founding of a new working group called MIRAGE (Minimum Information Required for a Glycomics Experiment) under the auspices of the Beilstein-Institut. This group has the function, with involvement of the scientific community, to draw up proposals for reporting standards for glycomics experiments and for setting up a framework to integrate glyco-bioinformatics in a comprehensive platform that will serve biologists, chemists and all interested in glycosciences.

This symposium continued successfully to bring together those scientists that “produce” data with those that “use” the data and make it available to the community. In particular, in their presentations speakers delivered insights into the diverse physiological and structural subtleties of

sugars by covering aspects such as: structure-function relationships of carbohydrates, modeling carbohydrate structure and carbohydrate interactions with other biomacromolecules, deciphering carbohydrate signals, carbohydrate identification, annotation and analysis, metadata for the description of glycomics experiments, software tools for data mining and analysis.

We would like to thank particularly the authors who provided us with written versions of the papers that they presented. Special thanks go to all those involved with the preparation and organization of the symposium, to the chairmen who piloted us successfully through the sessions and to the speakers and participants for their contribution in making this symposium a success.

Frankfurt/Main, December 2014

Martin G. Hicks
Carsten Kettner
Peter Seeberger
