



Newsletter Spring 2012

AMERICAN CHEMICAL SOCIETY DIVISION OF CARBOHYDRATE CHEMISTRY

SWEET NEWS FROM ORLÉANS, FRANCE

Glycomolecules: from synthesis to enzymology

ICOA (Institute of Organic and Analytical Chemistry) is a multidisciplinary laboratory that belongs jointly to the University of Orléans and to CNRS and is located south of Paris, at about one hour drive distance. It gathers knowledge and skills of 33 researchers, a technical staff of 12 and between 50 to 60 PhD students and Post-docs.

groups involved in Glycosciences: i) Prof. Olivier Martin's work is currently dedicated to the development of original methods for the chemical synthesis of iminosugars as therapeutic agents against lysosomal and other rare diseases, and also of glycolipids mimics which exhibit immunostimulating properties;



The Glyco group at ICOA

In addition to research dealing with chemo-informatics, new analytical techniques and organic synthesis related to heterocycles and nucleosides, the laboratory especially includes four internationally recognized

ii) Prof. Arnaud Tatibouët's interest lies in the incorporation of the sulfur atom from unexpected and Nature-inspired thiofunctions in the carbohydrate scaffold of molecules from renewable resources, targeting natural

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sulfur-glycoprocessing enzymes; iii) Dr. Jean-Claude Jacquinet is the French specialist of the total synthesis of complex but well-defined glycosaminoglycans related to chondroitin sulphates with implication in the study of osteoarthritis; and iv) Prof. Richard Daniellou, who joined the institute last September, devotes all of his efforts in the cloning, the overexpression, the biochemical and structural characterization of glycosyl-transferases and -hydrolases from Mycobacteria and Protozoa as well as their use as innovative biocatalysts or therapeutic targets. Prompted by the arrival of Richard Daniellou, a biochemist, these groups have joined their efforts in a new program aimed at a better understanding of glycosyl

transferases using chemical and biological approaches.

The overall scientific activities of ICOA lead to an average of 60 publications per year in peer-reviewed journals; its leadership in the community of organic chemistry was recently confirmed by successfully being granted partnership in the "Laboratory of Excellence" LABEX SYNORG by the French government (with a financing of over 8,000 000 € for 8 years, for a cluster of four laboratories). We are now welcoming students and post-doc researchers from overseas to join us and take part in our challenging but sugar-tasty projects. French speaking is not required but great experimental skills and an enthusiasm for carbohydrates are!

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FUTURE NEWSLETTERS

The Carbohydrate Division Newsletter is published twice a year, just before the two annual National ACS meetings. If you have items for inclusion in future please send the information to:

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erozners@binghamton.edu

Useful links:

www.univ-orleans.fr/icoa
http://media.enseignementsup-recherche.gouv.fr/file/Fiches_Labex_2/61/0/SYNORG_207610.pdf

ANNOUNCEMENT FROM THE NATIONAL ACADEMY OF SCIENCES

What is the Future of Glycoscience?

The National Research Council of the National Academy of Sciences is undertaking a study on the future of glycoscience. The study will explore transformative impacts that advances in glycoscience can have across health, energy, and materials science and will articulate a roadmap and vision for future development of the field. Input from the broader scientific community is critical to the committees' ability to identify the key issues in which

glycoscience can contribute and the key challenges that must be overcome to move the field forward. The committee held a workshop in January 2012 that brought together glycoscience experts from a range of research and technical areas and scientists with broad perspectives in the biological and chemical sciences. If you have not yet had a chance to provide input, it is not too late! We invite you to address a few questions at <http://glyco.nas.edu/feedback>

or contact us at glyco@nas.edu. The study is sponsored by NIH, FDA, DOE, and NSF and the report is expected to be released in August 2012, in time for the results to be disseminated at the ACS fall meeting. For further information, please visit the study website at <http://glyco.nas.edu> or contact the NRC staff officers Katie Bowman (kbowman@nas.edu) and Doug Friedman (dfriedman@nas.edu).

KUDOS

Congratulations to Dr. Derek Horton on the election as a Fellow of the Royal Society of Chemistry!

Dr. Horton will participate in the IUPAC-IUBMB meeting on nomenclature this coming May in Cambridge, UK, where he will be involved with new documents on carbohydrate nomenclature and flavonoids.

BOOK NEWS

Advances in Carbohydrate Chemistry and Biochemistry, Volume 66

Volume 66 of *Advances in Carbohydrate Chemistry and Biochemistry* has been published in December, 2011. Several of the authors are Division members. The series began in

1945 with Volume 1, which was edited by Ward Pigman and M. L. Wolfrom and an executive committee that included Claude S. Hudson, W. N. Haworth, Hermann Fischer (son of Emil

Fischer), and W. N. Haworth (Nobel Prize for synthesis of Vitamin C). The full texts of all 66 volumes of *Advances* is available on line through Science Direct.

Preface of *Advances in Carbohydrate Chemistry, Volume 66*

In this 66th volume of *Advances*, an extended tribute to the life and work of Anthony C. Richardson (Dick) is provided by Hale (Belfast). In the present day, when the successful young academic usually expects to abandon the laboratory bench and progress to become the leader of a large research group, Richardson was an anomaly in remaining an outstanding synthetic chemist who spent his entire career doing the laboratory work he loved. He had a brilliant and incisive mind coupled with a warm and nurturing personality, but he never sought the limelight or public recognition beyond the satisfaction from working with a small group and achieving a remarkable range of accomplishments in carbohydrate synthesis. These justly merit the extended documentation presented here in Hale's account. From elegantly conceived syntheses of (-)-swainsonine to

Richardson's rules for predicting the outcome of sulfonate displacement by nucleophiles, to the noncaloric sucrose-derived sweetener Splenda® (trichloro-galacto-sucrose) with the Hough laboratory, and the provision of many valuable synthetic intermediates, he has enriched the carbohydrate field with a very substantial legacy.

The coordination behavior of sugars and their derivatives with inorganic cations has been largely "under the radar" of mainstream carbohydrate science in recent years, given the strong focus of many of today's researchers on glycobiology targets. However, the complexation of carbohydrate derivatives with the element chromium, in particular, has important implications in both human and animal health, and in problems of environmental damage from industrial pollutants. The toxicity and carcinogenicity of

chromium is well recognized, and the use of microorganisms or plants for bioremediation of contaminated soils requires careful evaluation. The unpaired d-subshell electrons in the multiple valence states exhibited by chromium lend themselves ideally to studies of the complexes by electron paramagnetic resonance. This article by Sala and colleagues (Rosario, Argentina) details current knowledge gleaned from use of traditional continuous-wave EPR spectrometers and addresses the potential of newer pulsed and high-field instruments for significant advancement of our understanding.

While the pyranose and furanose ring forms of the sugars dominate the carbohydrate literature, the uncommon septanose ring forms have long intrigued sugar chemists, with particularly notable contributions by Stevens in Australia. The article in

this volume from Saha and Peczuh (Storrs, Connecticut) provides a comprehensive overview of the subject from both the synthetic and structural viewpoints and presents a detailed analysis of the conformational behavior of these ring forms. It may be noted that the structures of the seven-membered rings and their acyclic precursors are most conveniently depicted, respectively, by Mills-type formulas and the supposedly oldfashioned Fischer-type formulas, rather than the Haworth conformational formulas commonly favored for five- and six-membered rings. This article offers intriguing prospects for involvement of these ring forms in biological applications, especially with regard to antisense oligonucleotides.

A most important variant of the monosaccharide structures is the

class of sugar derivatives wherein nitrogen replaces the ring-oxygen atom, namely, the imino sugars. In the comprehensive overview presented here by Stütz and Wrodnigg (Graz, Austria), they integrate the wide range of imino sugar analogues now known to occur in Nature with their remarkable functions as potent inhibitors of the glycosidase enzymes. Complementary work on numerous synthetic analogues has added important new understanding of the mode of action of glycosidases in general. The authors include a detailed structural tabulation of all such inhibitors currently known, along with the Protein Data Bank links to the enzymes that they inhibit, and offer exciting prospects for the therapeutic potential of these

inhibitors in modulating essential metabolic processes.

The deaths are noted with regret of two leading carbohydrate biochemists, Nathan Sharon (June 17, 2011) and Saul Roseman (July 2, 2011). Dr. Sharon served with distinction for many years as a member of the Board of Advisors of this *Advances* series, and his advice and input will be sadly missed. His work will be recognized in an upcoming volume of the series.

With this volume Professor Arnold E. Stütz is welcomed as a new member of the Board of Advisors.

Derek Horton
Washington DC
October 2011

ANNOUNCEMENTS

Postdoctoral Position Available

The [Andreana Group](#) is currently soliciting highly motivated, independent and fearless postdoctoral fellows. You will be expected to work on a multidisciplinary platform that will include small molecule and carbohydrate synthesis,

biochemical assays, and in vivo work with mice to elicit immune responses against tumor associated carbohydrate antigens (TACAs). There will be ample opportunities for collaborative efforts with leading researchers in tumor biology and

vaccine design and development.

Please email [Peter Andreana \(pra@chem.wayne.edu\)](mailto:pra@chem.wayne.edu) with a CV, research summary and provide a list of references (no less than 3).

Travel Grants to the International Carbohydrate Symposium

The U.S. Advisory Committee for International Carbohydrate Symposia, Inc. will make travel grants to the ICS to be held in Madrid, 22-27 July 2012. To be eligible for a grant of \$1,000-2,000, the applicant must be

either a student or a post-doc studying in the United States and have submitted an abstract to the ICS covering results of research done in the US. Applications (a letter of request and a copy of the submitted

abstract) should be made to Prof. James N. BeMiller, Whistler Center for Carbohydrate Research, Purdue University by e-mail (bemiller@purdue.edu).
Deadline: April 15, 2012.

UPCOMING MEETINGS

8th Annual National Carbohydrate Symposium, Banff, Alberta

The poster features a dark background with a 3D molecular model of a carbohydrate chain in shades of red, yellow, and green. The text is arranged in a clean, modern layout. At the top right, a white text box contains information about a free afternoon activity. The main title is in large, bold, white and blue letters. Below the title, a list of confirmed speakers is provided. The dates and location are prominently displayed in white text on a blue background. At the bottom, contact information is provided in white text on a dark blue background.

Free afternoon for sightseeing or spring skiing at the Sunshine Ski Resort

8TH ANNUAL NATIONAL CARBOHYDRATE SYMPOSIUM

Confirmed Speakers:

Arturo Casadevall, Alan Cross,
Jerry Eichler, Xuefei Huang,
Anne Imberty, Dennis Kasper,
Theresa M. Reineke, Pauline Rudd,
Ronald Schnaar, Jon Thorson,
Thomas Tolbert, Yvette van Kyooyk

MAY 9th - 11th 2012
Banff Park Lodge – Banff, Alberta

For more info or to register: www.glycomicscentre.ca or by phone: Heather Ross: 780-492-4794

The International Carbohydrate Symposium – Madrid, July 22-27, 2012

The New Orleans Carbohydrate Symposium – March 23, 2012

The New Orleans Carbohydrate Symposium (NOCS) will be holding its 19th meeting on March 23, 2012. The Symposium was begun by the late Margaret Clarke in 1985 when she was the managing director of Sugar Processing Research Institute (SPRI). Following her death in 1998, there was a 10-year hiatus until 2008 when it was reinstated in her honor. The symposium is unlike other carb meetings, in that the unifying theme is simply carbohydrates, so the program is eclectic, with talks encompassing all aspects of carbohydrate science, ranging from chemistry, glycobiology, fiber, nutrition, pharmaceutical medicine, analysis and synthesis, energy, etc. It is a celebration of the recognition that carbohydrates play a fundamental role in science and in our lives. The cross disciplinary nature of the discussions has proved to be popular with the attendees. Support and funding comes from SPRI as well as other organizations. The ACS Carbohydrate Division has contributed funding to NOCS over the years.

For a preview of this year's program, go to www.spriinc.org and click on NOCS.



 **XX International Roundtable on
Nucleosides Nucleotides and Nucleic Acids**

5-9 August 2012

Montréal  Québec, Canada

SECOND CIRCULAR



Montréal, Québec CANADA: Photo by Daniel Raphael Cooper (obtained with permission)

Important Dates

- **February 1, 2012** Conference registration opens
- **April 30, 2012** Deadline for abstract submission
- **May 14, 2012** Deadline for early registration
- **July 15, 2012** Online registration closes
- **Aug 5-9, 2012** XX IRT Conference, downtown Montréal, Canada

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