



sessions: SmarTech, NanoTech and BioTech.

The opening session started on Sunday, 16 October at the Mediterranean University Center, a fascinating old structure on the Promenade des Anglais. The lecture hall, including theatre-style seating with a magnificent ceiling, hosted the plenary session. The conference opened with short welcoming remarks by the chairman of the conference, Prof. F. Guittard, who also presented an overview of IUPAC activities. The first part of the session focused on the theme, "Biomimetics and Innovation: how learning from nature can solve technological problems in a more sustainable way". This topic was illustrated by Dr. Kristina Wanieeck (Germany) and Dr. Prateep Beed (Germany). The session continued after the coffee break with three compelling plenary talks delivered by Prof. Bushan (USA) on superhydrophobic, self-cleaning and low drag surfaces; Prof. Messersmith (USA) on bioinspired coating from polyphenols; and Prof. Sanchez (France) on bioinspired approaches to advanced nanostructured materials.

The conference continued from 17-19 October at the Negresco Hotel, the legendary palace overlooking the Promenade des Anglais. The conference included 5 parallel sessions during 3 days, with over 55 keynote presentations (25 minutes), 164 oral presentations (15 minutes), and 106 poster presentations. The conference welcomed over 400 attendees, who came from 48 countries and from all continents. This edition also included two workshops on how to implement biomimetics in R&D strategies and opportunities for polymers and biobased materials. These workshops were organized in collaboration with the European Center of

Excellence in Biomimicry of Senlis (CEEBIOS) and the competitiveness clusters Industries & Agro-Resources (IAR) and TRIMATEC.

The conference social event consisted of a sightseeing tour of Monaco, the smallest country in the world after the Vatican State. We first visited the old town, with the Prince's Palace, the institutional building, the renowned Oceanographic Museum, the Cathedral, and more. We also strolled through the surroundings of the Casino, a mythical place with fabulous architecture, the Café de Paris, the gardens, and the fountains. The visit ended with a dinner at the A'Trego restaurant in Cap D'Ail, at the Monaco border, a trendy restaurant on the sea designed by Philippe Starck.

International Carbohydrate Symposium

by Al D. French

The 28th International Carbohydrate Symposium (ICS, www.ics-2016.org) was held in New Orleans, Louisiana, USA, 17-21 July 2016. The meeting followed a traditional format, starting on Sunday afternoon with the technical program closing on Thursday evening. The technical program was followed by a banquet at Mardi Gras World, a business that creates the floats used in Mardi Gras parades, that educates about this major event in New Orleans, and that provides a venue for receptions and banquets. With the excep-

Conference Call

tion of the banquet, a Tuesday evening Cultural Night held in the nearby St. Louis Cathedral, and a dinner for the country representatives to the International Carbohydrate Organization at a nearby restaurant, all of the meeting was held in the Marriott Hotel. As usual, Wednesday afternoon was free from technical programming, giving the participants time for tours of various destinations in and around New Orleans. The social program included a Sunday evening reception, while the Cultural Night included a jazz quartet and gospel choir. The banquet also included a jazz trio.

The meeting had the endorsement of IUPAC and the sponsorship of the American Chemical Society's Division of Carbohydrate Chemistry and its Division of Cellulose and Renewable Materials, as well as its Louisiana Section. Sponsorship was also received from a number of commercial and university interests.

The meeting was organized under the auspices of the U.S. Advisory Committee for International Carbohydrate Symposia, with membership from the above two ACS Divisions. This committee is the designated organization in the USA to determine the location of ICS. Although the ICS Scientific Committee was otherwise dominated by members from the Carbohydrate Division, the Program Chair, Dr. Sheila Murphy, was the then-current chair of the Cellulose Division, while the Meeting Chair, Dr. Alfred French, has served as Chair of both Divisions at different times. The Scientific Committee was very involved in the selection of Plenary, Keynote, and Contributed Oral Lectures. The functions of registration, receiving abstracts, contract negotiation, etc. were provided by the American Chemical Society's Conference Management Services.

The conference's 505 attendees came from 39 different countries, with the largest contingent from the USA and the second largest from Japan. Visa problems were few in number and caused by very late application.

The program included three award addresses with presentations and a surprise award. The International Carbohydrate Organization's \$25,000 R. L. Whistler Award was presented to Benjamin Davis of Oxford University and its Young Researcher Award was presented to Benjamin Swarts of Central Michigan University.

Ben Davis spoke on "Sugars and Proteins", delineating mechanisms of carbohydrate processing systems and their ligands to provide an understanding of their fundamental role in Biology and Immunology, as well as the use of molecules to modulate and manipulate such processes, with a strong associated potential for diagnosis, therapy, and application and interven-



Benjamin G. Davis (left), Oxford University, is presented with the R.L. Whistler Award in Carbohydrate Chemistry by N. Jayaraman, President of the International Carbohydrate Organization. All photos in this report by Michael Santiago Cintrón



Benjamin Swarts (left), Central Michigan University, winner of the ICO Young Researcher Award, with Zbigniew Witczak, incoming President, International Carbohydrate Organization



Left to Right: Dr. Koichi Kato, National Institutes of Natural Sciences, Japan; Serge Perez, former Scientific Director of the European Synchrotron Radiation Facility; Pamela Marino, National Institutes of Health, and Geert-Jan Boons, winner of the Claude S. Hudson Award



Carolyn Bertozzi, Stanford University, giving the Opening Plenary Lecture of the Symposium

tion in medicine and other biotechnologies. In the final minutes, he described the possibility that the application of trehalose could help to substantially increase agricultural production.

Ben Swarts' title was "Marking the mycomembrane: Chemical tools for studying and targeting glycolipids of the mycobacterial outer membrane." The lecture focused on the development and applications of probes based on trehalose, a disaccharide that is central to mycomembrane biosynthesis but absent from humans. Mycomembranes are composed of arrays of distinctive glycolipids, including the trehalose- and arabinogalactan-linked mycolates that are important to mycobacterial physiology and pathogenesis. The award was sponsored by TCI America.

The Carbohydrate Division presented its Claude S. Hudson Award to Geert-Jan Boons, who described "An integrated approach to uncover ligands for heparan sulfate binding proteins". The methodology has been employed to identify ligands for the ROBO-1, a protein involved in cell signaling and development. Furthermore, the synthetic HSoligosaccharides have been used for the development of a microarray and screening efforts have uncovered novel aspect of heparin sulfate-protein binding.

Megazyme's Bruce Stone Award for Excellence in Plant Polysaccharide Biochemistry went to Harry Brumer, University of British Columbia. The Bruce Stone Award is presented as a surprise at appropriate international scientific conferences, in this case right after the contributed lecture "The evolution of carbohydrate-active enzyme specificity in genomes." Brumer covered Glycoside Hydrolase family 16 (GH16) which comprises a large diverse group of enzyme specificities encoded by microbial and plant genomes. The specific biological role(s) of GH16 members remains enigmatic, but the present biochemical and structural characterization



From left: Victoria Smith, Angelika Trujillo, and Jessica Causey, Lindenwood University, with H.N. Cheng, USDA, presenting a Poster Award

provides new insight into plant cell wall enzyme evolution, which will continue to inform genomic analyses and functional studies across species.

The eight plenary lectures and their titles were:

- Carolyn R. Bertozzi, "Glycocalyx engineering toward probing cancer glycome evolution"
- James C. Paulson, "Sialic acids as determinants of self"
- Muthiah Manoharan, "GalNAc-conjugated oligonucleotides as a new paradigm in RNAi therapeutics for human diseases"
- Soledad Penadés, "Glycans and glyconanotechnology"
- Koichi Kato, "Structural views of glycan-dependent determination of glycoprotein fates in cells"
- Stephen Withers, "Accessing new and improved CAZymes through metagenomics, synthesis and directed evolution"
- Vincent Bulone, "A journey into the world of Eukaryotic cell walls: structure and biosynthesis of essential polysaccharides"
- Bruce Hamaker, "Carbohydrate quality and how the concept may relate to healthier foods."

The 32 invited keynote lectures headlined most of the five parallel sessions, which were completed by 203 contributed oral papers. A wide range of topics were covered in both the plenary lectures and oral papers. There were 200 posters on display throughout the meeting in the same area as the exhibits and coffee breaks. Poster prizes were awarded based on voting by meeting participants. Interest in the sessions was high, despite the location of the meeting at the edge of the French Quarter, a famous entertainment district.

There were several innovations at this meeting, with excellent participation. A special Sunday morn-

ing panel discussion on Directions in Glycoscience was presented. It was chaired by Geert-Jan Boons (University of Georgia), with panelists Pamela Marino, NIH (USA); Serge Perez, European Union; and Koichi Kato, National Institutes of Natural Sciences (Japan). A session on new technology for characterization of carbohydrates was presented by representatives of instrument manufacturers. The sustainability of processes and products at DuPont were described in another organized session. Both of those sessions were keynoted by university faculty members, however. The program was available in printed form, except for the abstracts of the contributed papers, which were available in the full program presented in various electronic formats, including a smart device app.

Nikolay Nifantiev and Amelia Rauter have volunteered to shepherd the various lectures to publication in *Pure and Applied Chemistry*. Peer review is currently underway. The next International Carbohydrate Symposium XXIX ICS (2018) will be held in Lisbon, Portugal, 15-19 July 2018, organized by Professor A. Rauter.

Validation of Test Methods, Human Errors and Measurement Uncertainty of Results

by Ilya Kuselman

The 3rd biannual international IUPAC/CITAC workshop on quality and metrology of chemical analytical results, organized with the participation of the Israel Analytical Chemistry Society (IACS) and the Israel Laboratory Accreditation Authority (ISRAC), was held 23 January 2017, in Kfar Maccabiah, Israel. The event was sponsored by Sigma-Aldrich Corporation (now a part of Merck) and arranged by Bioforum Ltd. Reports on the previous two workshops are available in *Chemistry International*. [1, 2]

The present workshop, titled, "Validation of Test Methods, Human Errors and Measurement Uncertainty of Results," was planned as a milestone of IUPAC project 2016-007-1-500. Validation of test (chemical analytical) methods is one of basic requirements for the competence of testing and calibration laboratories (ISO/IEC 17025) [3] and reference measurement laboratories in laboratory medicine (ISO 15195). [4] The same is required by national regulators, such as the U.S. Food and Drug Administration, the UK Medicines

and Healthcare products Regulatory Agency, and others. There are also a number of guidelines in different industries and chemical analytical societies adapting these requirements for specific purposes and laboratories. The main aim of the workshop was to facilitate the discussion of the experience of chemists-analysts, metrologists, and quality specialists in method validation in pharmaceutical industry, food analysis, environmental analysis, and other fields. This discussion included the following topics:

- use of results of human error study at validation of an analytical method;
- evaluation of measurement uncertainty of the test (analytical) results as a part of the method validation task;
- evaluation of probabilities of false decisions at conformity assessment of test results obtained by the method under validation.

Opening remarks were given by Dr. Ilya Kuselman, Independent Consultant on Metrology, Israel, Chair of the Workshop International Advisory Committee. Dr. Bertil Magnusson, SP Technical Research Institute of Sweden, then delivered the keynote lecture "The fitness for purpose of analytical methods: a laboratory method validation and related topics", explaining the Eurachem guide. [5] Mr. Ilan Landsman, ISRAC, Israel, informed the workshop participants in his lecture about changes in requirements to method validation and verification at accreditation of measurement and testing laboratories in the new upcoming issue of ISO/IEC 17025, under voting now. The next lecture was on setting and using target uncertainty in chemical measurement by Prof. Ricardo J.N.B. da Silva, University of Lisbon, Portugal. It was dedicated to understanding the key concept of method validation "fit for purpose" or "fit for intended use" in terms of measurement uncertainty and its target value, as in the Eurachem/CITAC guide. [6] Evaluation of probabilities of false decisions (risks) in conformity assessment of test results caused by measurement uncertainty was the subject of the lecture of Dr. Francesca Penneccchi, Istituto Nazionale di Ricerca Metrologica (INRIM), Italy. This lecture, based on the guidelines of JCGM 106, [7] Eurachem/CITAC, [8] and IUPAC/CITAC, [9] helped the participants to understand the metrological and mathematical background necessary for an evaluation of the risks. Dr. Penneccchi also announced the IUPAC task team's lecture on evaluating total risk of false decisions on conformity of a multicomponent material at