

# MultiGlycoNano 2012 Conference – 1<sup>st</sup> COST CM1102 Meeting

## Scientific Report

Jean-Louis Reymond, Vice-Chair

The first meeting of our newly formed COST action CM1102 “MultiGlycoNano” took place 2-4 February 2012 at the Department of Chemistry and Biochemistry, University of Berne, Switzerland. The conference was entitled “MultiGlycoNano 2012” and should be the first of a conference series on this topic. The general aim of MultiGlycoNano is to develop new methods for producing nanomaterials for applications in drug delivery, in gene targeting and as diagnostic/prognostic tools. The themes are: WG1 Glycoconjugates for drug/gene delivery; WG2 Glycoconjugates for diagnostics; WG3 Vaccines/modulators of the immune system; WG4 Glycoconjugates as anti-pathogenic agents. Through these collaborations, the aim is to build a dynamic network across Europe and transform glycoconjugate research in Europe by establishing a new frontier at the interface with nanoscience.

The goal of the meeting was to bring together all groups participating in the newly formed COST Action and plan collaborative projects to be developed in the course of the program. The conference was attended by 64 participants coming from research groups in 16 different European countries including Norway, Finland, Denmark, Netherlands, United Kingdom, Ireland, Germany, Serbia, Czech Republic, Slovakia, Austria, Switzerland, Italy, France, Spain and Portugal.

The conference opened on Thursday, February 2, 2012 with a welcome word from the conference chair Prof. Jean-Louis Reymond, University of Berne, CH, followed by an introduction by the Action Chair, Dr. Bruce Turnbull, University of Leeds, UK, and an information on COST Switzerland given by Dr. Eva Klaper of the COST Office Switzerland. Then information was given on how to organize Short Term Scientific Missions (STSM), which are a main opportunity of support by COST, given by Prof. Cristina Nativi, University of Florence, Italy.

The first afternoon session then followed with talks by Myriam Bergmann, University of Berne, CH speaking on Multivalent Glycopeptide Dendrimers as High-Affinity Inhibitors against *Pseudomonas aeruginosa* Lectin LecA; Prof. Anna Bernardi, Università degli Studi di Milano, IT, speaking on Glycomimetic Glycoconjugates as Lectin Antagonists; Dr. Juan M. Benito Hernandez, CSIC - Universidad de Sevilla, ES, speaking on Probing protein-carbohydrate interactions with cyclodextrin-scaffolded glyoclusters; and Prof. Lothar Elling, RWTH Aachen University, DE, speaking on The Glyco-BioInterface – Glycoconjugates for the Biofunctionalization of Biomaterial Surfaces.

The second afternoon session had continued with a lecture on DC-SIGN and Langerin, two C-type lectins Receptors involved in dendritic cells biology: target for host-pathogen interactions, given by Prof. Franck Fieschi, Université de Grenoble, FR; a lecture on Inhibition and Detection of Pathogenic *Streptococcus suis* by Carbohydrate Ligands, given by Prof. Jukka Finne, University of Helsinki, FI; a lecture on Polymers and Polymeric Nanoparticles—Potential New Scaffolds for the Multivalent Presentation of Carbohydrates, given by Dr. David Fulton, University of Newcastle, UK; and a lecture on The lectin LecB of *Pseudomonas aeruginosa* interacts with the outer membrane porin OprF, given by Dr. Horst Funken, Heinrich-heine-Universität Düsseldorf, DE

The third afternoon session followed with lectures on Cyclodextrin-DNA nanocomplexes for gene delivery by Prof. José Manuel García Fernández, CSIC - Universidad de Sevilla, ES; Banana lectin: a tool for glycoproteomics and a candidate for lectin-mediated drug targeting by Prof. Marijana Gavrovic-Jankulovic, Faculty of Chemistry University of Belgrad, RS; Synthesis and

Immunological Screening of Some alpha-Linked Mono- and Oligovalent Mannosides by Prof. Reko Leino, Åbo Akademi University, FI; New Chemoselective Tools for Glyconanoscience by Prof. Knud Jensen, University of Copenhagen, DK; and Structure based design and screening of glycopeptide inhibitors of galactose-specific lectin LecA from *Pseudomonas aeruginosa* by Dr. Rameshwar Kadam, University of Berne, CH.

On Friday, February 3, 2012, the morning session started with lectures on Mucin and Mucus Layers: Understanding the soft and slimy lubrication, and beyond by Prof. Seunghwan Lee, Technical University of Denmark, DK; Synthesis of bivalent lactosides & mannosides and their activity in lectin based assays, including cell based assays, by Prof. Paul Murphy, National University of Ireland, Galway, IE; Hydrodynamic characterisation protocols for large glycoconjugates, by Prof. Steve Harding, University of Nottingham, UK; Multivalency and Photoswitching: Space for Collaborations in the Glycosciences, by Prof. Thisbe Lindhorst, Christiana Albertina-University, Kiel, DE; Structure-function relationship in biomolecular systems: Insights from molecular simulations, by Dr. Miguel Machuqueiro, Faculdade de Ciências da Universidade de Lisboa, PT, and Metallic Glyconanoparticles for Biomedical Applications, by Dr. Marco Marradi, CIC biomoaGUNE / CIUBER-BBN San Sebastian, ES.

The second session followed with talks on the *Paenibacillus alvei* S-layer as a model for a self-assembling glycan display system, by Prof. Paul Messner, BOKU - Universität für Bodenkultur Wien, AT; Microbial glycoconjugates and elicitation of eukaryotic innate immunity, by Prof. Antonio Molinaro, Università di Napoli Federico II, IT; Metabolic glycan imaging in the mouse, by Dr. André Neves, CRUK University of Cambridge, UK; Bacterial glycoconjugate vaccines based on synthetic oligosaccharides, by Prof. Stefan Oscarson, University College Dublin, IE; Structural elements in pectins of importance for their effects on the immune system, by Prof. Berit Smestad Paulsen, University of Oslo, NO; and Multivalent glycoconjugates and sugar mimetics: synthesis and therapeutic applications, by Prof. Francesco Peri, University of Milano-Bicocca, IT

The first afternoon session had talks on Multivalent glycocyclopeptides as immune system activators, by Dr. Olivier Renaudet, Université Joseph Fourier - Grenoble I, FR; Assessment of a multiple choice activation of the immune system induced by a synthetic analogue of a melanoma antigen: the outcome of the multivalent presentation of a glyco-based systems, by Dr. Barbara Richichi, University of Florence, IT; Glycodendritic Structures as tools in Chemical Biology, by Dr. Javier Rojo, CSIC-Seville, ES; Towards targeted drug and gene delivery using calixarene based ligands, by Dr. Francesco Sansone, Università degli Studi di Parma, IT; Bacterial Nanoglycobiology, by Prof. Christina Schaeffer, BOKU - Universität für Bodenkultur Wien, AT; and Molecular modeling of enzymatic catalysis and gold glyconanoparticles, by Dr. Igor Tvaroska, Slovak Academy of Sciences, SK.

The second afternoon session had talks on Polymersomes functionalized by N-glycans, by Prof. Carlo Unverzagt, University of Bayreuth, DE; Helminth glycans modulate host immunity, by Dr. Irma van Die, VU University Medical Center, NL; Concise synthesis of amphiphilic glycoconjugates: potential applications as novel anti-infection agents and soft materials, by Dr. Trinidad Velasco-Torrijos, National University of Ireland Maynooth, IE; DNA-carbohydrate interaction: Neutral and charged glyco-oligoamides bringing carbohydrates and glycoprotein mimics to DNA minor groove, by Dr. Cristina Vicent, Instituto de Química Orgánica General CSIC, ES; Synthesis of calixarene-based glycoclusters: Influence of the spacer arm on the affinity for lectins, by Dr. Sébastien Vidal, CNRS / Université Claude Bernard Lyon 1, FR; and Pentavalent interactions of GM1 to cholera toxin, by Prof. Han Zuilhof, Wageningen University, NL.

After the second break, the official Management Committee Meeting of the COST Action took place, with participation of all MC member and the Scientific Officer Dr. Lucia Forzi, who informed all participants about the current status of the Action and the opportunities offered by

COST to establish scientific networking and collaborations. The information was also given that the budget of the action has been increased by 50% for the year 2012 due to the additional participating countries that have joined the action since November 2011.

On Friday evening, the official conference Dinner took place at the Restaurant Hotel Bern and was attended by all meeting participants. The event was made possible by the generous financial support of the COST office Switzerland.

On Saturday, February 4, 2012, the first session had talks on Understanding, inhibiting and exploiting bacterial toxins, by Dr. B. Turnbull, University of Leeds;  $\beta$ -N-Acetylhexosaminidases in the Synthesis of Immunoactive Glycomimetics, by Prof. Vladimir Kren, Academy of Sciences of the Czech Republic; Structure and specificity of lectins from opportunistic bacteria, by Dr. Anne Imberty, CERMAV-CNRS, FR; and Multivalent Carbohydrates for Inhibition and Detection, by Prof. Roland Pieters, Utrecht University

During the coffee breaks that took place Thursday through Saturday, a poster session was organized in the coffee area, with posters on NMR and computational studies of the glycolixarene - lectin interactions, by Silvia Bernardi, Università degli Studi di Parma, IT; DNA minor groove carbohydrate-ligands with cooperative hydrogen bonding centres, by Maite Blázquez + Andrea Taladriz, Instituto de Química Orgánica General CSIC, ES; “Clicked” Multivalent Glycolixarenes: Synthesis and Recognition Properties, by Paola Fezzardi, Università degli Studi di Parma, IT; Syntheses of Lewis a and b motifs as thioglycoside block donors, by Martin Hollinger, University College Dublin, IE; Development of Glycosylated Nanomaterials, by Dr. David Kennedy, Max-Planck-Institute of Colloids and Interfaces, DE; Glycomimetics conjugated Nanoparticles with therapeutic activity and glycidic scaffold based targeting agents, by Dr. Barbara La Ferla, University of Milano-Bicocca, IT; Synthesis of Phosphorylated  $\beta$ -(1 $\rightarrow$ 2)-Linked Mannosides, by Jani Rahkila, Abo Akademi University, FI; Carbohydrate Thiazolines: Glycomimetics as Hexosaminidase Inhibitors or Substrates?, by Petr Simon, Academy of Sciences of the Czech Republic, CZ; The Development of Click-Chemistry Reagents for Glycan Imaging, by Dr. Henning Stöckmann, CRUK University of Cambridge, UK; and Strategy for Carbohydrate-Binding-Protein-Recognizable Immobilization of Reducing Sugars used in SPR-detectors, by Dr. Mikkel Boas Thygesen, University of Copenhagen, DK

After the Coffee break on Saturday morning, the second half of the morning was dedicated to four parallel group discussion session with each of the four different working Groups to discuss collaborative projects on their respective area of research, namely WG1 Glycoconjugates for drug/gene delivery; WG2 Glycoconjugates for diagnostics; WG3 Vaccines/modulators of the immune system; WG4 Glycoconjugates as anti-pathogenic agents. Finally, all groups gathered together and the meeting was closed by the Action Chair Dr. Bruce Turnbull, University of Leeds, UK.

All participants expressed their satisfaction with the organization of the conference and the productive exchanges that took place. We believe that the goal of the meeting to bring the participants of the CM1102 COST Action MultiGlycoNano together to start collaborative projects has been achieved.