

## Report EUROGLYCOFORUM Science Meeting 3518

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### *1) Scientific Summary:*

Specialised workshops provide an opportunity for groups with a common interest to get together for focussed presentations on a particular area of glycoscience. In this sense, eight EGSF-sponsored workshops were held in the framework of the 21st International Glycoconjugate Symposium (Glyco21) in Vienna in August 2011. Workshops can provide an more informal atmosphere than the main scientific programme of a symposium and can facilitate both discussions and also offer training in specific areas. At a meeting such as Glyco21 there are delegates and speakers with a wide range of interests and their input into workshops can be very beneficial.

Interest in holding workshops at larger scientific conferences has been expressed by a number of people including some from Interest Groups of the Euroglycosciences Forum. Previously there has not been an opportunity to arrange meetings of several groups at the same time. The format of the meeting in Vienna allowed workshops in several areas to be held in one place and allow wider participation by those attending the main meeting.

The topics selected represent a wide variety of interest. There are those dealing with key technologies or bioinformatics but also those concerned with specific scientific or biomedical areas. At Glyco21 the following workshops (in alphabetical order) were offered:

Crystallography and Modelling (A. Imberty, France), Glycobioinformatics (S. Haslam, UK & N. Karlsson, Sweden), Glycoimmunology (P. Crocker, UK), Glycolandscape Engineering (S. Flitsch, UK & N. Bovin, Russia), Glycoproteomics (D. Kolarich, Germany), Mass Spectrometry (G. Allmaier, Austria & R. Geyer, Germany), Methods in Glycolipid Analysis (A. Zamfir, Romania), and Prokaryotic Protein Glycosylation (P. Messner & C. Schäffer, both Austria).

The workshops were planned to complement topics which were covered in the main scientific programme of the meeting where appropriate but allowed delegates to focus on alternative or more specialised areas. They covered several areas of glycoscience and attracted appr. 550 participants from Europe and overseas. The lectures were given by the leading scientist in a particular field but also young investigators in the early stage of their careers where selected to facilitate in the workshops. Due to limited access to lecture theatres the eight workshops were held in parallel sessions but it was possible to attend more than one workshop. The response from all the session chairs showed that this workshop format was well accepted by the participants.

## 2) *Scientific Content and Discussion*

The 21st International Symposium on Glycoconjugates (Glyco21) is a major meeting in the field of glycosciences and was held in Vienna from August 21 to 26, 2011. There were 526 registered participants from 35 countries worldwide, with large delegations from Austria, Japan, Germany, United Kingdom and USA. A new element of this year's symposium were eight workshops that were financially supported by the Euroglycoscience Forum with an amount of € 22,000.- and with the following focuses (in alphabetical order, incl. organiser(s)):

Crystallography and Modelling (Anne Imberty, CNRS Grenoble, France)

Glycobioinformatics (Stuart Haslam, Imperial College London, UK & Niclas Karlsson, University of Gothenburg, Sweden)

Glycoimmunology (Paul Crocker, University of Dundee, UK)

Glycolandscape Engineering (Sabine Flitsch, University of Manchester, UK & Nicolai Bovin, Shemyakin & Ovchinnikov Institute, Moscow, Russia)

Glycoproteomics (Daniel Kolarich, MPI Colloids & Interfaces Berlin, Germany)

Mass Spectrometry (Günter Allmaier, Vienna University of Technology, Austria & Rudolf Geyer, University of Giessen, Germany)

Methods in Glycolipid Analysis (Alina Zamfir, University of Arad, Romania)

Prokaryotic Protein Glycosylation (Paul Messner & Christina Schäffer, both University of Natural Resources & Life Sciences Vienna, Austria)

The workshops presented an excellent opportunity for participation of groups with interests in particular areas as well as Interest Groups set up by Euroglycosciences Forum. They concentrated on a number of different topics and provided means for focussed presentations as well as interactive discussion. The participation and support of the Euroglycoforum Network allowed the invitation of selected speakers for each workshop who are considered as leading experts in the respective field. Further, in some workshops, in addition to the invited speakers, speakers for short presentations were selected from the submitted abstracts.

Due to the limited availability of lecture theatres at the University of Vienna parallel workshop sessions were planned on Tuesday, August 23, 2011, in the afternoon (four workshops), and Wednesday, August 24, 2011, in the morning (four workshops). During those times no competing lectures were held at Glyco21. Every interested participant could attend the workshop of choice (as long as there was no parallel workshop at the same day). Since during registration for Glyco21 individuals could already opt for participation at specific workshops the lecture theatres were allocated accordingly.

In the following there are direct responses from the respective workshop chairs. For details about the content of the presentations compare with the attached programme of the respective workshops.

### **EGSF Crystallography & Modelling Workshop (Imberty)**

The ESF workshop “Crystallography and Modelling” took place during the morning of Wednesday 24th August 2011 (Glyco XXI) in Vienna. The contributions included three invited speakers with expertise in different domains, and four selected communications. Two of the invited speakers, Annabelle Varrot and Serge Pérez, gave very pedagogical presentations of the state-of-the-art methodologies in structural glycobiology. The many questions demonstrated that difficulties are still encountered in both glycan X-ray crystallography and modelling protein-carbohydrate interactions. The third invited speaker, Robert Woods, presented the connection existing between glycan array data and molecular modelling. High-throughput arrays and modelling were also the subject of one of the selected communications. The four selected speakers (J. Kona, P. Ramsland, N. Reuel, and A. Petrova) dealt with different aspects of molecular modelling in glycobiology: from conformational analysis of plant polysaccharides to novel approaches of docking or quantum chemistry in enzymatic mechanism.

### **EGSF Glycobioinformatics Workshop (Haslam & Karlsson)**

There are a number of useful resources now available both for reference purposes, and also tools to assist in analytical techniques, several of which were developed in the recently completed EuroCarbDB project. This workshop aimed to introduce and demonstrate these tools using on line access to the resources and tutors to guide participants through application of these thus providing good hands-on experience in tutorials and guidance on using all the features. The tools covered in the workshop are designed to assist in the interpretation and annotation analytical data from both mass spectrometry and HPLC analyses. For mass spectrometry data there are programs available on line allowing data input and analysis and also in drawing diagrams to depict the glycan structures in annotation of the MS chromatograms. For interpretation of HPLC data programmes which allow calibration of the systems, analysis including exoglycosidase digestions and comparison against reference values for a large number of N-glycans will be demonstrated.

The following contributions were presented at the workshop: Glycobioinformatics (Haslam), UniCarb-DB: Functional assignment using epitope substructures (Hayes), building blocks for a new glycomics knowledgebase (Campbell), GlycoWorkbench/Glyco-Peakfinder: tools for the computerassisted annotation of mass spectra of glycans (Damerell), GlycoBase and GlycoExtractor: tools for HPLC-based glycan analysis (Struwe), and an update on SAGS, the structural assessment of glycosylation sites database (Petrescu).

### **EGSF Glycoimmunology Workshop (Crocker)**

It is now recognised that there are many aspects of immunology which are influenced by glycosylation and this has been an area of considerable interest in which there have been considerable advances in knowledge in recent years. This impacts both cellular immunology

with changes in cell surface glycosylation during lymphocyte maturation and humoral immunity where for example the glycosylation of IgG can substantially affect interaction with immunoglobulin receptors. There is no doubt that the interaction of carbohydrate binding proteins with various ligands plays an important role in the regulation of the immune system in many ways and recent work is providing insight into the extent of this and the mechanisms by which it operates.

Overall this was a very successful 'workshop'. The aim was to cover some aspects of glycoimmunology with a main focus on C-type lectins, siglecs and galectins. There were four invited speakers, namely M. Yazdanbakhsh (Leiden, The Netherlands), L. Nitschke (Erlangen, Germany), G. Brown (Aberdeen, UK) and P. van den Bruggen (Brussels, Belgium) and two speakers selected from the abstracts.

This workshop was held in the large auditorium and because the speakers were selected based on their excellent science, so it did not really have a workshop feel to it and would have been better described as a 'minisymposium', but nevertheless allowed for a very interesting series of talks, both invited and proffered that was a useful addition to the main conference.

#### **EGSF Glycolandscape Engineering Workshop (Flitsch & Bovin)**

The aim of the workshop was to discuss the current state of our understanding of glycosylated synthetic and biological surfaces and tools for manipulating these surfaces. There were six talks from an interdisciplinary group of scientists (N. Bovin, Moscow, Russia; T. Lindhorst, Kiel, Germany; K. Toshima, Yokohama, Japan; R. Pieters, Utrecht, The Netherlands; M. Lahmann, Bangor, UK; and C. Lingwood, Toronto, Canada), in the area of synthetic chemistry, nanotechnology and medicine. One of the most important issues highlighted is the presentation of glycans on synthetic and biological surfaces/cell surfaces, in particular in terms of clustering and polyvalent presentation, which is particularly relevant for carbohydrate/protein interactions.

#### **EGSF Glycoproteomics Workshop (Kolarich)**

The glycoproteomics workshop held during Glyco21 in Vienna was attended by approx. 50-60 persons. This number was larger than I expected and indicates the growing interest in the topic of glycoproteomics. This is also emphasised by the fact that for the upcoming Glyco Symposium in Dalian, China, Glycoproteomics and Glycobioinformatics, are scheduled to be hosted in own main sessions. It is noteworthy that both, Glycobioinformatics and Glycoproteomics, were represented by separated workshops during the Glyco21 in Vienna, and personally I believe that the workshops might have positively contributed towards the decision of the organising committee.

The workshop tried to cover a broad overview of glycoproteomics research, ranging from bioinformatics challenges to latest examples regarding N-glycopeptide as well as O-glycopeptide analyses. A major focus was laid on considerations towards glycopeptide

sample preparation prior analysis and several questions from the audience initiated interesting discussions. It is noteworthy to mention that apart from questions directly related to the respective presentations several questions and comments from the audience were related towards issues in sample preparation and target compound detection. In my opinion this shows that still the complexity of protein glycosylation and its site directed analysis still poses severe challenges in less specialised laboratories and future workshops and possibly specialised summer schools held in a comparably small dimension might be of interest for the community in the near future. These options have been discussed within the members of the EGSF glycoproteomics research group and will be pursued further in the near future.

### **EGSF Mass Spectrometry Workshop (Allmaier & Geyer)**

The minisymposium was organized by G. Allmaier (Vienna University of Technology) and R. Geyer (Justus-Liebig-University Giessen). It started out (G. Allmaier) with the first step usually performed in the characterization of isolated oligo/polysaccharides and glycoproteins, namely the determination of the molecular weight and of the sample heterogeneity. The following techniques ESI, MALDI and DESI were presented as desorption/ionization techniques of underivatized glycomolecules. The combination of these techniques, generating intact charged gas-phase molecules, with different mass spectrometric analyzer was discussed. Finally several examples applying the described methods were presented and also potential pitfalls (e.g. in case of large cyclic glycans) were discussed. This was followed (R. Geyer) by discussion the importance of linkage analysis in carbohydrate analysis using permethylation combined with GC/EI/MS. The approach using tandem or multistage mass spectrometric analysis of permethylated oligosaccharides was also discussed outlining the great power of the latter technique. As next lecture F. Altmann asked the question “To label or not to label – is that the question? He showed examples for fluorophore labelled oligosaccharides in HILIC separation and unlabeled oligosaccharide separation with graphitic carbon. Both approaches were evaluated in terms of combination with MALDI and ESI mass spectrometry. After a short break, the workshop proceeded with the enrichment procedures (M. R. Larsen) applied in quantitative glycoproteomics. The successful combination of TiO<sub>2</sub> enrichment and HILIC separation in biomarker discovery projects was shown. Now, the next talk (N. G. Karlsson) was focused on the challenging analysis of O-linked glycans. The use of graphitized carbon LC-ESI-MS approach turned out with the appropriate sample isolation procedure as the method of choice. Furthermore on-line resources were applied to assign structures and support data interpretation from MS/MS spectra. Finally, mass spectrometric analysis of N-glycans in a high throughput environment was demonstrated (M. Wührer) by using a micro-SPE method and nanoHILIC separation followed by tandem MS. The data interpretation was supported by the freely available software tool GlycoWorkbench giving this strategy a boost in glycosciences.

### **EGSF Methods in Glycolipid Analysis Workshop (Zamfir)**

The contributions included two invited speakers (S. Levery, Copenhagen, Denmark; Z. Vukelić, Zagreb, Croatia) with expertise in different domains, and originally three selected communications. One of them, however, was cancelled on short notice because of illness of the speaker (T. Taki). S. Levery reported on glycosphingolipid derivatisations for mass spectrometry and microarray “omics” applications and Z. Vukelić mass spectrometry of gangliosides as human brain biomarkers in health and disease. The many questions after the talks demonstrated that difficulties are still encountered in mass spectrometry of these important biomolecules. The two speakers selected from the abstracts covered additional aspects and problems encountered during characterization of glycosphingolipids and dolichol-linked sugar precursors for N-glycans.

### **EGSF Prokaryotic Protein Glycosylation Workshop (Messner & Schäffer)**

The area of “Prokaryotic Protein Glycosylation” is an increasingly emerging area of glycobiology. To familiarize delegates of Glyco21 with this still very specific area, we selected two speakers for that workshop which are current leaders in the field. The covered topics were a general protein O-glycosylation system of *Neisseria* (M. Koomey, Oslo, Norway) and archaeal S-layer glycosylation in *Sulfolobus* (S.-V. Albers, Marburg, Germany). In addition, three short presentations were selected from abstracts which included the presentation of a Prokaryotic Glycoprotein Database (PRO GPDB) (A. Rao, Chandigarh, India) and two contributions about the glycoproteomics analysis of O-glycans (M. Pabst, Vienna, Austria) and the outer membrane vesicle glycoproteome (V. Friedrich, Vienna, Austria) of the oral pathogen *Tannerella forsythia*.

### *3) Assessment of the Results and Impact on Future Directions*

As a new element of scientific information and exchange of ideas eight EGSF-sponsored workshops were organised at Glyco21 for the first time. The workshops were well accepted by the participants of that symposium. This positive conclusion can be drawn both from the responses of the workshop chairs as well as from direct responses of participants. Because of the limited availability of lecture theatres all workshops took place on two days only. In total about 550 participants were counted during these events, despite the fact that on both days four parallel workshops were running. The offered workshops can be divided into two groups, i) those which covered topics of general interest such as Mass Spectrometry, Glycoimmunology, or Glycolandscape Engineering, and ii) those with more specific topics which not always are in the main stream of the glycosciences. Among them were Glycoproteomics, Crystallography and Modelling, Prokaryotic Protein Glycosylation, Methods for Glycolipid Analysis, and Glycobioinformatics. The actual numbers were appr. 160 participants in Mass Spectrometry, about 100 in both Glycoimmunology and Glycolandscape Engineering, 50 to 60 in Glycoproteomics, 30 to 50 in Crystallography and

Modelling, appr. 40 both in Methods in Glycolipid Analysis and Prokaryotic Protein Glycosylation, and about 30 in Glycobioinformatics. A few session chairs thought that the parallel sessions could have been a reason for lower numbers of participants.

In future planning it should be considered whether eight workshops is an appropriate number for a five-day conference. There were suggestions to reduce the total number and have, for example only one workshop per day. This, however, is also very much dependent on the local room situation. G. Allmaier & R. Geyer (Mass Spectrometry) and also P. Crocker (Glycoimmunology) found, for example, that their lecture theatre was too large; they had the feeling to have organised 'mini-symposia'. According to their replies this prevented to some extent the creation of an atmosphere for focussed presentations and interactive discussions. A suggestion was then to limit the access to particular workshops. In contrast, the session chairs of the 'smaller' workshops had no complaints about the room capacities; for example, A. Imberty (Crystallization and Modelling) stated that this smaller number of participants was perfectly suited for establishing lively discussions at the end of each talk.

Which subjects should be considered for future workshops? This clearly is a decision of the Local Organisation Committee of a future conference. However, as S. Haslam & N. Karlsson (Glycobioinformatics) stated, "projecting forward we feel that an area to pay attention to is how to make sure the workshops have a clear identity, not just a series of presentations, and more of an interactive event". D. Kolarich (Glycoproteomics) mentioned already that at the upcoming Dalian Conference in 2013 "Glycoproteomics and Glycobioinformatics are scheduled to be hosted in own main sessions". What definitely should be kept in mind is that beside the important mainstream themes there should always be room for "less attractive", new emerging glycoscience themes with presumably smaller numbers of participants.

In conclusion, as the general outcome of the received responses, we can put forward to ESF that the experiment with EGSF-sponsored workshops within the framework of a larger conference was successful and that there is definitely potential to develop this format further to an indispensable element of future conferences.

4) *Final Programme of the Workshops* (in the order of appearance in the programme)

TUESDAY, AUGUST 23, 2011

16:45 – 18:25 Euroglycoscience Forum *Glycoimmunology* Workshop AUDIMAX  
Chair: *P. Crocker*

16:45 – 17:05 The T cell balance during chronic helminth infections  
M. Yazdanbakhsh

17:05 – 17:25 Pattern recognition and anti-microbial immunity: The role of C-type lectins  
G. Brown

17:25 – 17:35 Induction of antigen-specific B cell tolerance through the development of a versatile platform to target siglecs.  
M. Macauley, F. Pfrengle, C. Nycholat, J. Paulson

17:35 – 17:55 Regulation of B cell activation by inhibitory receptors of the Siglec family  
J. Jellusova, I. Obermeier, A. Hoffmann, L. Nitschke

17:55 – 18:05 Targeting C-type lectin receptors with synthetic carbohydrates to modulate immune responses  
M. Eriksson, M. Maglinao, M. Irgang, P. Seeberger, B. Lepenies

18:05 – 18:25 Is it possible to correct the anergy of human tumor-infiltrating lymphocytes?  
G. Wieers, N. Demotte, A. Klyosov, P. van der Bruggen

16:45 – 18:35 Euroglycoscience Forum *Glycobioinformatics* Workshop HÖRSAAL 7  
Co-Chairs: *S. Haslam, N. Karlsson*

16:45 – 17:05 GlycoBioinformatics  
S. Haslam, D. Damerell, A. Dell

17:05 – 17:25 UniCarb-DB: Functional assignment using epitope substructures  
C. Hayes, M. Campbell, F. Lisacek, W. Struwe, P. Rudd, N. Packer, N. Karlsson

17:25 – 17:45 Building blocks for a new glycomics knowledgebase  
M. Campbell, C. Hayes, W. Struwe, F. Lisacek, P. Rudd, N. Karlsson, N. Packer

17:45 – 18:05 GlycoWorkbench / Glyco-Peakfinder: tools for the computer-assisted annotation of mass spectra of glycans  
D. Damerell, S. Haslam, A. Dell

18:05 – 18:25 GlycoBase and GlycoExtractor: tools for HPLC-based glycan analysis  
W. Struwe, J. O'Rourke, P. Rudd

18:25 – 18:35 An update on SAGS, the structural assessment of glycosylation sites database  
A. Petrescu

16:45 – 18:25 Euroglycoscience Forum *Glycoproteomics* Workshop KLEINER FESTSAAL  
Chair: *D. Kolarich*

16:45 – 17:10 Bioinformatics in glycoproteomics – challenges, frontiers and solutions  
D. Kolarich, E. Rapp, N. Packer

17:10 – 17:35 ETD-MS and mucin-type *O*-glycopeptides: getting closer to the holy grail?  
N. Packer, M. Andersen, D. Kolarich, M. Christiansen, P. Jensen, B. Wilkinson, R. Payne

17:35 – 18:00 How glycopeptides (and peptides) behave on reversed-phase and graphitic carbon columns  
M. Pabst, J. Grass, J. Stadlmann, F. Altmann

18:00 – 18:25 Characterisation of *O*-glycan structures and glycosylation sites of proteins in proteomic samples  
J. Nilsson



TUESDAY, AUGUST 23, 2011

- 16:45 – 18:30 Euroglycoscience Forum *Methods in Glycolipid Analysis* Workshop HÖRSAAL 30  
*Chair: A. Zamfir*
- 16:45 – 17:15 Glycosphingolipid derivatizations for mass spectrometry and microarray “omics” applications  
S. Levery
- 17:15 – 17:45 Mass spectrometry-based characterization of composition and structure of gangliosides as human brain biomarkers in health and disease  
Z. Vukelić, D. Marinčić, A. Serb, A. Zamfir
- 17:45 – 18:00 New Approach for glycolipidomics -Molecular scanning of human brain gangliosides by TLC-Blot and MALDI-TOF MST  
T. Taki, T. Valdes Gonzalez, N. Goto-Inoue, W. Hirano, H. Ishiyama, T. Hayasaka, T. Nishimura, S. Yazawa, M. Setou (*withdrawn*)
- 18:00 – 18:15 Complementary triad of thin-layer chromatography, overlay technique and mass spectrometry as a versatile tool for exploring glycosphingolipid-based host-pathogen interaction  
J. Müthing, I. Meisen, M. Mormann, K. Dreisewerd, H. Karch
- 18:15 – 18:30 Isomeric analysis of oligomannosidic *N*-glycans and dolichol linked precursors by PGC-LC-ESI-MS  
J. Grass, M. Pabst, R. Strasser, E. Liebming, F. Altmann

WEDNESDAY, AUGUST 24, 2011

- 09:40 – 10:40 Euroglycoscience Forum *Mass Spectrometry* Workshop I AUDIMAX  
*Co-Chairs: G. Allmaier, R. Geyer*
- 09:40 – 10:00 Molecular weight determination by mass spectrometry - the first step in the characterization of polysaccharides and glycoproteins  
G. Allmaier
- 10:00 – 10:20 Mass spectrometric analysis of methylated monosaccharides and oligosaccharides  
R. Geyer
- 10:20 – 10:40 To label or not to label - Is that the question?  
M. Pabst, J. Grass, S. Toegel, A. Thader, L. Neumann, F. Altmann
- 11:20 – 12:20 Euroglycoscience Forum *Mass Spectrometry* Workshop II AUDIMAX  
*Co-Chairs: G. Allmaier, R. Geyer*
- 11:20 – 11:40 Selective enrichment of sialylated glycopeptides from biological samples for quantitative glycoproteomics  
G. Palmisano, S. Lendal, P. Højrup, M. Larsen
- 11:40 – 12:00 Glycoproteins: MS analysis of *O*-linked glycans  
N. Karlsson
- 12:00 – 12:20 Glycoproteins: MS analysis of *N*-linked glycans  
M. Wuhrer
- 09:40 – 11:00 Euroglycoscience Forum *Crystallography & Modelling* Workshop I HÖRSAAL 7  
*Chair: A. Imberty*
- 09:40 – 10:10 144 - Leveraging glycan array data with computational carbohydrate grafting to define the 3D structure of an anti-tumor antibody in complex with carbohydrate antigen  
M. Tessier, J. Heimbürg-Molinario, S. Jadey, A. Gulick, K. Rittenhouse-Olson, R. Woods
- 10:10 – 10:40 The molecular modelling facets of glycoscience  
S. Perez

WEDNESDAY, AUGUST 24, 2011

- 10:40 – 11:00 Computational modeling on the catalytic cycle of inverting  $\beta$ -1,4-galactosyltransferase-1  
M. Malička, J. Koňa, I. Tvaroška
- 11:20 – 12:35 Euroglycoscience Forum *Crystallography & Modelling* Workshop II HÖRSAAL 7  
*Chair: A. Imberty*
- 11:20 – 11:50 Advices to determine and refine X-ray structures of protein-glycan complexes and glycoproteins  
A. Varrot
- 11:50 – 12:05 Computational studies of carbohydrate-antibody interactions using docking, site-mapping and conformational filters  
P. Ramsland, M. Agostino, E. Yuriev
- 12:05 – 12:20 A weak affinity dynamic microarray for glycan profiling: modeling and preliminary experimentation of a high-throughput tool for screening and profiling glycoproteins  
N. Reuel, J. Ahn, J. Kim, J. Zhang, A. Boghossian, M. Strano
- 12:20 – 12:35 Establishment of the principles of flax rhamnogalacturonan I three-dimensional organization by computer modeling  
A. Petrova, P. Mikshina, T. Gorshkova
- 09:40 – 10:40 Euroglycoscience Forum *Glycolandscape Engineering* Workshop I KLEINER FESTSAAL  
*Co-Chairs: S. Flitsch, N. Bovin*
- 09:40 – 10:00 Towards cell glycolandscape  
S. Henry, E. Korchagina, A. Tuzikov, A. Formanovsky, I. Popova, N. Bovin
- 10:00 – 10:20 Switchable glycomimetics: Conformational control of bacterial adhesion  
T. Lindhorst
- 10:20 – 10:40 Target-selective photodegradation of oligosaccharides by designed small organic molecules  
K. Toshima
- 11:20 – 12:20 Euroglycoscience Forum *Glycolandscape Engineering* Workshop II KLEINER FESTSAAL  
*Co-Chairs: S. Flitsch, N. Bovin*
- 11:20 – 11:40 Enhanced potencies of multivalent carbohydrates on microarrays and magnetic nanoparticles  
R. Pieters
- 11:40 – 12:00 Synthetic Glycocluster – Tuning avidity and selectivity by topology  
M. Lahmann
- 12:00 – 12:20 Cholesterol masking of plasma membrane glycosphingolipids  
C. Lingwood, A. Novak, B. Binnington
- 09:40 – 10:40 Euroglycoscience Forum *Prokaryotic Protein Glycosylation* Workshop I HÖRSAAL 30  
*Co-Chairs: P. Messner, C. Schäffer*
- 09:40 – 09:45 Introductory Comments  
P. Messner, C. Schäffer
- 09:45 – 10:05 *Neisseria* species as a model system for bacterial O-linked protein glycosylation  
B. Borud, R. Viburiene, F. E. Aas, Vik, M. Hartley, W. Egge-Jacobsen, B. Imperiali, M. Koomey
- 10:05 – 10:25 Elucidation of the N-glycosylation pathway in the crenarchaea  
B. Meyer, S. Albers

WEDNESDAY, AUGUST 24, 2011

10:25 – 10:40 Prokaryotic Glycoprotein Database (PRO GPDB): A database of experimentally characterized glycoproteins of prokaryotic origin

A. Rao, A. Bhat

11:20 – 11:50 Euroglycoscience Forum *Prokaryotic Protein Glycosylation* HÖRSAAL 30  
Workshop II

*Co-Chairs: P. Messner, C. Schäffer*

11:20 – 11:35 Glycoproteomic analysis of *O*-linked glycans from the oral pathogen, *Tannerella forsythia*

M. Pabst, G. Posch, L. Brecker, P. Messner, C. Schäffer, F. Altmann

11:35 – 11:50 The outer membrane vesicle glycoproteome of the periodontopathogen *Tannerella forsythia*

V. Friedrich, G. Posch, G. Sekot, Z. Megson, M. Pabst, F. Altmann, P. Messner, C. Schäffer

Presenter: underlined