

Scientific Report for the Structural Glycosciences Training School

COST Action: CM1102

Date: 4-6 november 2013, Grenoble, France

Location: Grenoble, France

Organisers: Anne Imberty, Serge Pérez & Franck Fieschi

Purpose: The purpose of the working school was to give young scientists an integrative/multidisciplinary overview of the different approaches that can be used for characterizing the three-dimensional structures of glycans, glycoconjugates or protein/glycoconjugates complexes. Plans were to also cover the current methods for analyzing the kinetics and thermodynamics of the interaction between a glycoconjugate and a protein receptor or an enzyme. Illustrations were to be provided in health-related domains of application.

Participants: The meeting hosted 46 young scientists from 15 different countries that are part of COST Action CM1102. 13 trainers from 4 countries were involved in the lectures and practical organisation.



Monday 4th November 2013 / CERMAV (University Campus)

13:30- **Registration**

Chairman : Christelle Breton

14:00-14:15 - **Opening and Welcome**

Christelle Breton: Opening as head of the Grenoble doctoral school in Chemistry and Life Science

Bruce Turnbull: COST-CM1102 Chair

Anne Imberty: Local organization

14:15-14:45 - **Lecture 1.** Introduction – Protein carbohydrate interactions

Anne Imberty (CERMAV-Grenoble)

14:45-15:30- **Lecture 2.** : Protein-sugar Interaction: Surface Plasmon Resonance

Nicole Thielens (IBS-Grenoble)

15:30-16:30 - **Attendees Flash Presentations (3 minutes / 3 slides) 15 presentations**

16:30-16:50 - **Coffee break**

16:50-17:35 - **Lecture 3.** Protein-carbohydrate interactions: Isothermal Micro-Calorimetry
Bruce Turnbull (University of Leeds)

17:35-18:45 - **Attendees Flash Presentations (3 minutes / 3 slides) 20 presentations**

19:30 - **Get together (wine and cheese party) with all participants**

Tuesday 5th November 2013 / Site of ESRF-ILL-IBS

8:00 Meeting at ILL/ESRF gate for passing security check

Chairman: Annabelle Varrot

8:45 - **Welcome by Helmut Schober** (Director of scientific division ILL) / Amphitheater Chadwick

9:00-9:30 - **Lecture 4.** Monosaccharides to polysaccharides – structural introduction
Serge Pérez (CERMAV-Grenoble)

09:30-10:15 - **Lecture 5.** X-ray crystallography of protein/carbohydrate complexes
Bauke W. Dijkstra (ESRF- Grenoble)

10:15-10:35 - **Coffee break**

10:35-11:15 - **Lecture 6.** Kinetic crystallography of a glycoenzyme
Antoine Royant (IBS- Grenoble)

11:15-11:55 - **Lecture 7.** Application of neutron diffraction to glycosciences
Trevor Forsyth (ILL-Grenoble)

12:00-12:10 - **Group photo**

12:10-13:00 - **Buffet lunch /IBS2**

13:00-15:20 - **Practicals at IBS2 (to be chosen in a list of 5 possibilities)**

15:30-18:00 - **Visit of ESRF (with beam line to be chosen in a list of 5 possibilities)**

Wednesday 6th November 2013 / CERMAV (University Campus)

Chairman : Olivier Renaudet

9:00-9:45 - **Lecture 8.** Molecular modeling: building carbohydrate and docking in receptor sites

Alessandra Nurisso. (University of Geneva)

9:45-10:30 - **Lecture 9.** NMR as tool to decipher "sweet " words between microbe and host
Antonio Molinaro (University of Napoli)

10:30-10:55 - **Coffee break**

10:55-11:40 - **Lecture 10.** Integrated approaches: The fascinating DC-SIGN story
Franck Fieschi (IBS – Grenoble)

11:40-12:30 - **Questions and discussion**

12:30-13:00 - **Evaluation of workshop**

13:15-14:15 - **Lunch (Cafeteria near CERMAV)**

14:15-14:45 - **Handling of attendance certificates / Concluding remarks**

Reports: The training school lasted three days and was held in different locations of Grenoble in order to give the opportunity to visit the different campuses in Grenoble.

- **Day 1.** After a general presentation of the University Joseph Fourier and the doctoral school "Chemistry and Life Sciences", the first session was held at Centre de Recherche sur les Macromolécules Végétales. It introduced the young researchers to the molecular basis of protein-carbohydrate interaction and to some of the biophysical methods to quantify them. Two sessions of flash presentations were included so that all non-local participants could present their research in few slides in order to facilitate further interactions and networking. The day was concluded by a get-together party in a wine bar with great social interaction between all participants.

- **Day 2.** The morning session was conducted at the Institut Laue Langevin, an international research center for neutron diffraction that was presented by its scientific director. Lectures were focused on the use of x-ray and neutron diffraction for the structural study of carbohydrate molecules and their complexes with proteins such as glycosylhydrolases.

The afternoon session was devoted to practicals and visits. Practicals were organised in the new building of Institut de Biologie Structurale. The participants could follow demonstration and, when possible, practice data analysis for one of the following methods:

- Surface Plasmon Resonance

- Titration Microcalorimetry
- Nuclear Magnetic Resonance
- Molecular Modelling
- Analytical Centrifugation

The second part of the afternoon included a visit of the European Synchrotron Research Facility with a general presentation and a visit of the ring where experiments are conducted. The group was divided in order to visit experimental set-up on different beam-lines:

- ID13 : Microfocus – structure of soft matter
- ID17 : Biomedical beamline
- ID21/ X-ray microscopy and microanalysis
- ID29: Macromolecular crystallography
- ID29S : Cryobench – kinetic crystallography

- **Day 3.** In the last session, the structural approach was completed by lectures about molecular modeling and nuclear magnetic resonance. A final lecture illustrated the integrated use of all presented methods for the case study of a human lectin of biological importance in infection process. Sometime was saved for discussion about the workshop and for evaluation by participants.

Evaluation from participants

Evaluation sheets with 10 questions were distributed at the end of the last evaluation. 44 were returned anonymously and the analysis is given below. The participants are vastly satisfied with the content and the organisation of the course and they evaluated very positively both the theoretical courses and the practicals. Some of them (although a minority) would have appreciated that more time is devoted to questions and discussions. When asked for suggestions for improvement, many indicated that they particularly appreciated the tutorial and demonstration session and would have love to have longer times on the machines.

| % on 44 answers | Strongly agree | Agree | Neutral | Disagree | Strongly disagree | No opinion |
|--|----------------|-------|---------|----------|-------------------|------------|
| 1. The training met my expectations. | 38.6 | 56.8 | 4.5 | 0.0 | | |
| 2. The content was organized and easy to follow. | 59.1 | 38.6 | 2.3 | | | |
| Theoretical courses | | | | | | |
| 3. The quality of teaching was good. | 47.7 | 52.3 | 0.0 | | | |
| 4. The materials distributed were pertinent and useful. | 50.0 | 45.5 | 4.5 | | | |
| 5. Adequate time was provided for questions and discussion. | 34.1 | 47.7 | 11.4 | 2.3 | 2.3 | 2.3 |
| Practical sessions and ESRF visit | | | | | | |
| 6. The practical was well organized. | 47.7 | 40.9 | 4.5 | | | 6.8 |
| 7. The practical will help me in my future research. | 31.8 | 38.6 | 22.7 | | | 6.8 |
| Networking | | | | | | |
| 8. I intend to keep in contact with participants/trainers. | 31.8 | 52.3 | 13.6 | 2.3 | | |
| 9. The workshop should be useful for my future scientific career | Excellent | 52.3 | 4.5 | | | |
| | Excellent | Good | Average | Poor | Very poor | No opinion |
| 10. Overall rating | 40.9 | 56.8 | 0.0 | | | 2.3 |