Forum Scientium

Munich Study Visit 2008

Forum Scientium is a multidisciplinary doctoral programme; established in 1996, for PhD students within the areas of Physics, Technology, Biology, Chemistry and Medicine at Linköping University. The programme arranges courses, seminars, study visits and summer conferences every year to broaden the relationship between Forum Scientium members and to make contacts with other research groups and companies throughout Europe. This year the study visit took place in Munich, Germany, from the 3rd to the 7th of June 2008. During the study visit, we visited research institutes, a multinational company and the European Patent Office. We also experienced some other social activities all of which is described in the following reports.

080603 – Evening
Augustinerkeller

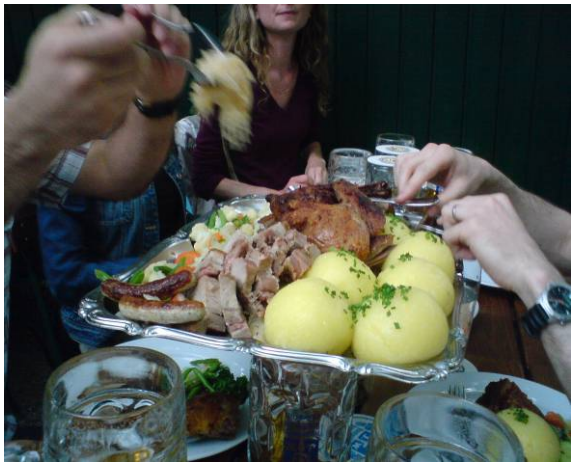


Plate with among a lot of other delicious food - Knödel

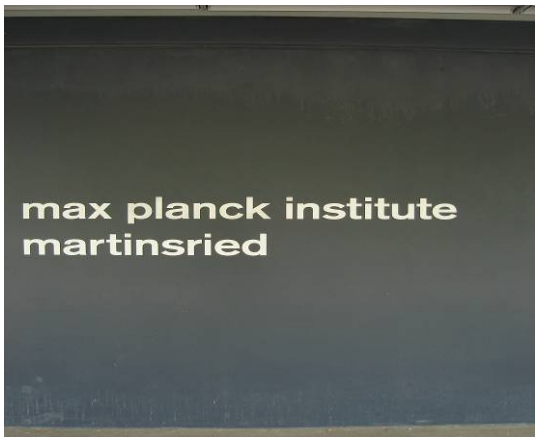
We arrived in Munich at about 4 or 5 PM I think. It's hard to remember because getting the rental cars and people misplacing their passports took a long time. After spending almost an hour in the Munich rush hour traffic in the city centre, we quickly got rid of our luggage and headed down Arnulfstrasse, to Augustinerkeller, one of Munich's many famous Biergarten.

Slightly after 7 PM we arrived, by now very hungry after little else than a Danish pölse or two for lunch. To our delight we did not have to wait long until the waiter brought us each a litre of wonderful Augustinerbräu. Sebastian and Janosch quickly realized that it would take hours for everyone to order and get their food, and concluded that the best option was to order three plates, one for each table, of traditional Bavarian food. This turned out to consist of Knödel (some strange species of potato with croutons in them!), Sauerkraut (which is better than you'd think) and more kinds of meat than you've probably eaten at the same time before. (Except maybe at Christmas...) There was also a vegetable or two. I think it was intended as garnish though.

We also sang in Swedish since we had some birthdays to celebrate, I can only assume to the immense joy of the other guests at the Biergarten. Overall it was a very enjoyable evening however, and for me and I think at least for a few of my colleagues for whom this was the first study visit, it was great to meet and get to know some of the Forum members under other circumstances than the coffee break during our monthly meetings.

/Mikael Pihl

080604



On the first day of our study visit, we split up into three groups before and after lunch. Different groups visiting research groups in the Max Plank Institute (MPI) and at the Technische Universität München.

Prof. Dr. Michael Sattler –
Dep of Chemistry, TUM

We were first welcomed by Dr. Gerd Gemmecker who picked us up in the foyer and brought us to a seminar room where Prof. Dr. Michael Sattler held an overview about their facilities, the NMR technique and about their research. Their research is mainly about understanding the structural basis of protein and RNA interactions that are important for gene expression. After the presentation Dr. Gerd Gemmecker showed us around the facilities and the different NMR machines. The machines were ranging from 250 Hz up to 900 Hz. Some of them had cryo-cooling to reduce the resistance in the wires and thereby reducing the energy costs. They also had a 500 Hz, wide bore, to study solid states e.g. amyloid fibres and precipitation. Dr. Gerd Gemmecker also explained how the magnetic field was orientated around the machine and explained that it was important to have the large machines in a separate building due to the strength of the fields.

After a short coffee break, three of the PhD-students in Prof. Dr. Sattlers group presented their projects:

Tobias Madl is working on a project to study the protein topology of the 3' splice site, and looking at interaction interfaces and orientation.

Anders Fiberg is studying the structure and interactions of the Tudor-SN and their implications for splicing and has found out that tudur isn't binding to the RNA but promotes splicing.

André Mourão is looking at the Phax protein on the U snRNA export pathway. The Phax protein binds non-specific to the RNA.

/Pernilla T Eliasson

Prof. Dr. Andreas Bausch –
Dep of Physics, TUM

Prof. Bausch gave a short presentation about their main research activities, and later his PhD. students gave us guidance around their labs, introducing their instrument set-up, research projects running status and so on.

In Prof. Bausch's presentation, he described how they are focusing on studying cell/membranes fibril formation mechanisms using frequency-dependence method to convert back to structure determination. The fibril formation is an important property to be understood due to the fact that understanding its basic physical mechanism can help interpret further functions, for instance, protein bundle and cell migration from a bottom-up perspective. The frequency-dependence method is built in combination with STM (scanning tunnelling microscopy) to analyze three domains in terms of dynamic polymerization/depolymerization of proteins. By tuning microscopic parameters and adding different cross-linkers, one can understand the biological function through fluid, entropic polymer elasticity and diffusion behaviour.

We also had a chat with Prof. Bausch after his presentation: about getting jobs in Germany industries, and doing post-doc in

Germany academia. In the end of our discussion, Prof. Bausch said two sentences worth to bring home: In research; see how far you can go. Do whatever you are interested in and enjoy training to be productive in your PhD life.

Afterwards, Prof. Bausch's students brought us to visit their labs. It is located in a long corridor shared with many other groups. Their research projects include: measuring protein folding force using AFM (atomic force microscopy), building up microfluidic devices to assembly spider silk proteins, study protein fibril formation by radioactive labelled fluorescence using confocal microscope and of course the frequency-dependence shear persistence method to determine fibril formation.

/Feng-i Tai

Prof. Friedrich Lottspeich –
Dep of Biochemistry, MPI

Doctor Kellermann, a senior scientist in the group, picked us up at the main entrance of Department of Biochemistry Max-Planck-Institute, Munich. Dr Kellermann talked shortly about the organization of the group and their research field, proteomics, in general. This group considered them selves quite small, with two senior scientists, two post docs and two graduate students at the moment. Both the two post docs and two graduate students presented their work.

The main method used in the lab was in house made and called Isotope Coded Protein Label (ICPL). The group mainly uses this method to find biomarkers for colon cancer. They have discovered that the variance in concentration of a certain protein differs a lot between healthy subjects making a comparison between a healthy and sick group of people irrelevant. Instead, they used samples from blood donors who got colon cancer at least a few years after their first blood donation. A small sample of donor blood was saved at every donation making it possible to study the same person both as healthy, before getting the cancer, and while having cancer. This made every participant his or her own control.

We had a small tour of the lab, the group members joined us for a nice lunch in one of the restaurants of the site, and we were encouraged to ask them all our questions.

/Erik Martinsson and Cecilia Johansson

Prof. Horst Kessler –
Dep of Organic Chemistry, TUM

Prof. Kessler himself welcomed us to the Department of Chemistry at TUM (Technische Universität München). He gave us an interesting multidisciplinary lecture concerning several of his research projects, both present and former, including some examples of his 35 patents.

In the research group of Organic Chemistry the work mainly concerns synthesis of bioactive compounds and studies by Nuclear Magnetic Resonance (NMR) Spectroscopy. Peptide mimetics and cyclic peptides are small compounds synthesized to mimic the function of biological peptides. In this group, peptide mimetics are designed to inhibit protein-protein interactions, which is a problem in several diseases. The motto is "small is beautiful", which describes the importance of downsizing drugs to improve the bioavailability. Other areas of interest in the research group are biomaterial coatings

and biomolecular imaging. After Prof. Kessler's presentation, he showed us the group's laboratories and then we sat down in his office for a nice discussion about careers for PhD's. He is interested in employing post docs in the near future.

http://www.org.chemie.tu-muenchen.de

/Emma Ericsson

Prof. Nediljko Budisa –
Dep of Molecular Biotechnology, MPI

Since, Prof. Nediljko Budisa himself couldn't meet us this afternoon his senior scientist and post doc Dr. Birgit Wiltschi took care of us. She started the visit with a general presentation about Max Planck Institute (MPI) and then continued with a research presentation. The study visit finished with a roundtrip in their lab including discussions with their PhD students. The research group of Nediljko Budisa is mainly focusing on genetic code engineering. The aim is to expand the standard genetic code of 20 amino acids in protein biosynthesis by modification of the protein translational machinery and hence the coding capacities. Natural expansion, by posttranslational modifications, already occurs to receive a larger variation of functions of the genetic code. Example of this is glycosylation, phosphorylation and disulfide bridges. The ambition to create even further functionalities occurs by artificial expansion, which means incorporation of non-canonical amino acid into proteins. Function of interest can be to add chemo selectively reactive groups, fluorescent groups etc. The artificial expansions can be made through genetic engineering that means mutation on DNA-level or genetic code engineering by changing the protein biosynthetic level. The last method can be made by stop codon suppression (SCS) or by sense codon and selective pressure incorporation (SPI). Examples of applications would be to change the protein stability, increase unfolding or add a fluorescent marker and its characteristics. Chemical control of cotranslational modifications requires good chemists. Bioorthogonal amino acids, azides and alkynes are biochemically inert and require specific conjugations. To mention some methods synthetic glycoconjugates and click-chemistry is used to add sugars, fluorescent labelling etc. The tricky part is that more advanced organisms such as cells, yeast etc are smart and know how to spit out the non-canonical amino acids. This is a new field that has only existed for about 10 years and still offers a lot of interesting issues.

http://www.biochem.mpg.de/budisa/

/Maria Bolin and Daniel Kanmert

Prof. Stefan Jentsch –
Dep of Molecular Cell Biology, MPI

Unfortunately, Prof. Stefan Jentsch himself couldn't meet us. However, his PhD-student Natalie Hiller met us at the entrance of MPI. She took us on a tour around the lab showing us some of their fancy new robots (yeast spotting stamp, peptide synthesizer and ChIP on Chip pipetting robot).

We were offered fine coffee and sweets before some members of the department came and gave us short presentations, about an overview of the current research in the Jentsch lab. It is focused on posttranslational modifications by ubiquitin-like proteins (e.g. ubiquitination and SUMOylation). Mostly yeast is used to study these PTMs that control different processes in the cells. An Ubiquitin molecule is made up by seven lysine residues and several ubiquitines can be combined in different ways to regulate for example protein degradation. SYMOylation is an ubiquitin-like molecule that regulates transcription and other important processes.

We also got some information about how ubiquitination affects DNA repair, an ubiquitinational view on regulation of the

fate of proteins in the proteasome-proteolysis or processing and also about live spectroscopy videos of cells undergoing mitosis and how a protein named BRUCE localizes to the midbody (and of course ubiquitination is involved). Finally, Stefan Müller gave a presentation of SUMOylation in mammalian cells. After the nice presentations, we thanked our host with a gift suitable for the day (an umbrella).

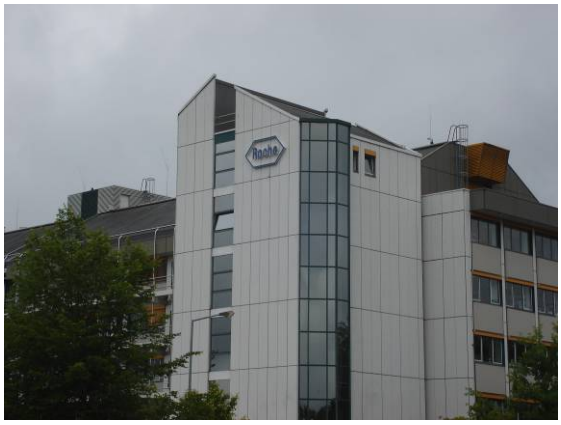
/Pernilla M Eliasson and Åsa Svensson

080604 – Evening
Andechs monastery

Duke Albrecht III of Bavaria founded Andechs monastery in 1455. Beyond being a religious centre, it is also known for its distillery and brewery. Our visit included a guided tasting tour of the monastery distillery, which is the production site for the liqueur Schnäpse vom Kloster Andechs". Afterwards we headed towards the monastery restaurant. Here we were served a delicious dinner and were also given another tasting tour, this time of the beer from the Andrechs brewery. The brewery is the biggest and most modern monastery brewery in Germany. The beer is sold throughout Germany and is also exported to several European countries (unfortunately not to Sweden) and to Japan. A total of seven different varieties of beer are produced in the brewery and our tasting included all of these. A guide enthusiastically described the nature of the beers and together with the food this was a perfect end of the second day of the trip to Munich.

/Andreas Eriksson

080605 – Morning
Roche, Penzberg



On the 5th of June we visited Roche in Penzberg. Our hosts were Barbara Jopp-Heins and Prof. Dr. Georg-B. Kresse. They each presented the company as well as the pharma research at the Penzberg Biotechnology site. Roche is a leading healthcare company with a broad spectrum of innovative medical solutions. The location in Penzberg, with more than 4,400 employees, is one of the biggest Biotech-Centers in Europe, where research, development and production for the pharmaceutical and diagnostic divisions are combined under one roof. Biopharmaceuticals for the five therapeutic areas of Roche: Oncology, Virology, Inflammatory Diseases, Metabolic Diseases, and Central Nervous System Diseases, are generated in Penzberg. The site is also the company's central research lab for therapeutic proteins, including monoclonal antibodies, as Trastuzumab (Herceptin®) aimed for breast cancer treatment.

After the very informative presentations and coffee break, we were divided into two groups and given guided tours. One group visited the Analytics department (MALDI/ESI-mass spectrometry), presented by Dr. Thomas Koch. The other group visited the Antibody Development/Cell Biology lab, where Dr. Monica Soukupova presented their work in developing highly specific monoclonal antibodies. We were also introduced to their immunohistochemistry (IHC) lab,

where a Benchmark® from Ventana Medical Systems completely automates the processing of IHC slides. The study visit ended up with a pleasant lunch at Roche's "Casino restaurant". For those who are interested in a future career at Roche, please visit http://www.roche.com/home/careers.htm where the latest job offers are presented.

Contact information: www.roche.com

/Stina Axelsson

080605 – Evening

In the evening of July 5th we travelled to a hotel in the small town of Kochel am See. This was a nice change from the hostel we had been staying at and we split up into groups to explore the area. One group took a car and headed into the mountain range nearby and using a cable car travelled up into the mountains to 1600 meters and had some fika at a nice café. Others walked around the village and took a hike in the nearby countryside. We then had a pleasant meal in the hotel itself before retiring for the night.

080606 – Morning
The European Patent Office (EPO)

On Friday morning we departed from the Alpenhof Postillion Hotel in Kochel am See and arrived by minibus to the European Patent Office (EPO) in Munich. At the EPO foyer we were welcomed by Christine Short and escorted to a seminar room where she started the first presentation of the day with the title "The European Patent Office and the patent granting procedure". She shortly introduced us to the history, mission and structure of the EPO organization. Over 20 states met at a diplomatic conference in Munich in 1973 to discuss the introduction of a European patent grant procedure. The conference concluded with the signing of the European Patent Convention by 16 participants. Four years later the Convention came into force, and in 1978 Sweden became a member. The mission of the EPO is to support innovation, competitiveness and economic growth for the benefit of the citizens of Europe. After a coffee break the second speaker, Anette Hollreiser, gave the lecture "epo-line and esp@cenet" which was a guide through the EPO web pages and also the searchable database that contain all granted patents.

The last speaker of the day was Dr. Axel Jahnsen who presented "Career at the EPO". Dr. Jahnsen, who is employed as a patent examiner, described the different steps in the procedure for the application and grant of a patent. He also talked about career opportunities at the EPO and what benefits are given to the employees. He then proceeded to describe the daily work of a patent examiner, which in brief consists of searching and examining patent applications received by the EPO. The patent applications consist of texts and drawings describing an invention and are submitted by individuals or companies seeking legal protection for their product. The patent examiner must also be fluent in all of the EPO's three official languages, German, French and English, since all communication and patent applications are only allowed in these languages. The study visit was ended with a delightful lunch at the impressive EPO restaurant.

/Mikael Chéramy

080606 – Afternoon
German Museum

On Friday afternoon, the 6th of June, an optional visit to the German museum was undertaken. A short ride by tram from the hostel took us to the Karlsplatz and from there by foot, passing through the Marienplatz, covered the rest of the distance. During the walk Sebastian continuously pointed out sites worth seeing in the heart of Munich. After passing over the bridge Ludwigsbrucke that gave a good view over the river Isar we had reached the

German museum, which was situated on an island in the river.

The German Museum is the largest Museum for Master-Works of Science and Technology in the world. It displays more than 17 000 objects divided into 50 different sections of science and technology occupying an area of 50 000 sq.m. The museum was founded in 1903 and was moved in 1925 to its current location.

The visit started with a section describing the history of steam engines and from there on sections dedicated to aviation, medicine, chemistry and physics. These were only a few of the main sections but due to their enormous size, not enough time was available to cover everything. Some highlights included an aviation area were there was the possibility to enter planes, cockpits and a space shuttle. The medicine exhibition was dedicated to the cell and its components and also how different drugs/toxins influence the body.

Fat cell – somehow rather similar to Knödel?

The chemistry and physic displays were more interactive than the others. Here chemical reactions and physical phenomena could be watched by pushing a button. Unfortunately most of the information concerning individual objects on display was in German making it hard to understand all the details but the general meaning could be easily be understood. Overall, it was a very interesting visit.

/Robert Selegård and Francesca Dini

080606 – Evening

After the German museum, we had a final dinner together at a restaurant called Madras, just on the outskirts of Munich. The food was exquisite and all of the participating Forum members would like to thank Janosch Hennig and Sebastian Shultz for organizing a memorable and inspiring study visit.

/Satish Moparthi, Stephen Macken and Liza Ljungberg