Forum Scientium

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Study Visit Copenhagen

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Photo: Wetra Yandi

As part of the PhD-students career planning Forum Scientium members make study visits to research-intensive companies and to research departments at various universities. During the visits, we try to meet persons responsible for employment, as well as persons who recently made the transition from being a PhD student to being a professional. The network of earlier Forum members, the so-called Former Scientium, is valuable when arranging the study visits and contributes to the high quality of the visits. May 27-29, 2013, the Forum Scientium members Björn Kronander and Angelika Holm arranged an intensive study visit in Copenhagen during which 29 Forum Scientium members had the opportunity to visit numerous companies and research groups.

Biotech Research and Innovation Center (BRIC)

Ewa Ohlsson (Porse group) and Dr. Arne Nedergaard Kousholt (Sörensen group)

Arne Nedergaard Kousholt, Ph.D., and Ewa Ohlsson, Ph.D. student, welcomed us to the Biotech Research and Innovation Center (BRIC). Arne took us for a tour of the labs and the cell culture labs where we saw their equipment and techniques used, including flow cytometry and microscopy. After the tour, we were treated with coffee and croissants. We got a general presentation of BRIC, with focus on understanding the molecular mechanisms leading to various diseases, including cancer, CNS-related diseases and metabolic diseases. Arne and Ewa are both members of the Association of Students and Postdocs (ASAP), which arranges many social events as well as welcoming newcomers, inviting international speakers and arranging courses. After the introduction two postdocs presented their current research; Alejandro Mayorca (Erler group), trying to understand metastasis, and Yunpeng Feng (Groth group), studying histone modifications. The visit ended with an informal chat with Ewa and Arne where we had the chance to ask all kinds of questions.

/Camilla Halvarsson and Elin Nyman

Danish Stem Cell Center (DanStem)

After the visit at BRIC, we were guided to the Danish Stem Cell Center (DanStem). Hjalte List Larsen, who works as a research assistant but plan to become a Ph.D. student, welcomed us and gave us a tour of the labs. There are currently three groups sharing the big wet lab, and there are also labs for microscopy, flow cytometry, animal dissection/making transgenic mice and cell culture. During the tour, we learned that DanStem was established around two years ago by a grant from NovoNordisk foundation. After the tour, we got a presentation of DanStem by prof. Joshua Brickman.

Postdoc Jurriaan Hölzenspies and prof. Joshua Brickman

He told us about the mission of DanStem; to enhance and integrate basic, translational and early clinical stem cell research and the aim; to develop new stem cell-based therapeutic approaches for diabetes and cancer. We also had a round table discussion with some of the postdocs at DanStem. Prof. Joshua Brickman finished the visit by giving us

some tips what to think about when applying for a postdoc position:

- Read published articles from the group and include in your application what you find interesting in the projects and why you want to apply for a postdoc in that group
- Show that you are prepared to move closer to work (e.g. embryonic stem cells need frequent care almost every day)
- It could be a good idea to do your postdoc abroad, this could make it easier to later on get a job in Sweden since you might contribute with new knowledge and techniques

/Camilla Halvarsson and Elin Nyman

DTU Nanotech

After an initial train ride followed by a bus-ride and a short walk we arrived at Denmark Tekniske Universitet (DTU) Nanotech situated on Ørsteds Plads in Lyngby. Well there we were greeted by Prof. Anja Boisen and Prof. Jenny Emnéus. After some coffee, the visit started with an introduction about DTU Nanotech. It is a department at DTU, where they work in a multidisciplinary way within micro- and nanotechnology. The department is organized around four strategic research fields (Materials and fabrication, Energy, environment and security, Lab-on-a-chip and Biomedical and life sciences). Each project can include research/researchers from several of these strategic fields. In addition to research, the different fields are also involved in education. As an example of this, two summer schools that might be of interest to some Forum Scientium members were mentioned "Polynano" and "Micro- and nanotechnology for label-free sensing". The morning then continued by a presentation of the research carried out by Prof. Jenny Emnéus (Bioanalytics group) and Prof. Anja Boisen (Nanoprobes group), and was finished off by a presentation of the current and past research projects of two postdocs, Kinga Zor (Bioanalytics group) and Robert Burger (Nanoprobes group). Following these very interesting presentations, we were treated a well tasting lunch at the nearby campus restaurant. We were then shown around the lab facilities, including DTU Danchip, which is the national center for micro and nano fabrication and also houses the biggest clean room in Denmark, PDMS milling lab, 3D printers and the lab-on-a-chip device.

Prof. Jenny Emnéus' group is working with the Lab-on-a-chip concept and is trying to develop new tools for detecting cellular events. Examples of projects are lab chips that contain up to eight individually addressable cell cultures, carbon electrodes that can be used to scan for dopamine release and the construction of a bioartificial liver.

Prof. Anja Boisen's group is focused on micro- and nanosensors. She described a project where the group had developed a

sensor for detection of explosives combining four different types of sensors, a calorimetric sensor, a colorimetric sensor, a cantilever sensor and an optical sensor using Raman scattering. She also described how the normally time-consuming cantilever sensor had been incorporated into a high throughput detector.

Before saying goodbye, we were reminded that there might be possibilities of both research collaborations and future postdoc positions at DTU Nanotech.

/Wetra Yandi and Anna Södergren

Institute of Sports Medicine, Bispebjerg Hospital

Former Forum Scientium member Pernilla Eliasson greeted us welcome to the facilities, where she is working on her postdoc. The team consists of seven senior researchers, seven postdocs, seven PhD students, and a number of secretaries and lab technicians. The team's research focus is on the effect of mechanical loading on tendon and musculature. This they do on tissue, matrix, and nano-level. The turnover rate of proteins, and what regime of exercise that is most efficient at retaining a patients muscle mass, are examples of questions that the group work with.

Pernilla showed us the lab where she is working on a project in which cells capable of producing collagen are integrated with a scaffold. This creates an in vitro model of a tendon, in which effects of load on e.g. gene expression can be monitored.

Pernilla had a number of thoughts on working as a post doc in general, as well as on doing it in Denmark in particular.

- Even for someone not considering an academic carrier, doing a post-doc can be rewarding. The increase in independence makes it a worthwhile enterprise for most people
- To try a group different in composition from the one you did your PhD in, e.g. if your former group was small and well-established, trying a larger and more newly started group.
- The first couple of months are usually very slow, which can be frustrating.

• Visiting a group you are considering to go to for a post-doc is highly recommendable. In addition to getting a grasp of the social situation, try to meet a postdoc or similar and ask about e.g. how long workdays are expected, how is the general social situation in the group, etc.

• Any preparations that you can do beforehand will greatly help speed up your projects, ethical approvals, grants, planning are examples.

• Copenhagen is 4 hours by train from Linköping.

• Danes have a 37 hours' workweek. In the Nordic countries and Holland, family gets priority over working life.

• Danish are positive towards Swedes working in their country.

• Renting an apartment is a bit more expensive then Linköping, buying is cheaper than in Stockholm.

• Young people in Denmark usually do not speak Swedish, though older people do.

/Olof Sandberg

Novo Nordisk A/S

A majority of participants on the study visit chose to join the visit to Novo Nordisk centralized drug research center in Måløv, right outside Copenhagen. Novo Nordisk is a large healthcare company active within the fields of diabetes care, haemophilia care, growth hormone therapy and hormone replacement therapy. They have almost 34.000 employees worldwide, of which around 6.000 work in R&D. We were welcomed by former Forum member Johan Paulsson, employed at the site as an *in vitro* biologist within R&D. He started by giving a presentation on the company describing core competence areas of Novo Nordisk, and explained how the R&D division works. By relating his own tasks to the research – development – commercialization chain he gave us a broad picture of how a new project could proceed. Johan continued his presentation with a more personal description of how he made his way to Novo Nordisk and told us about his work in Diabetes NBE's (new biological entities) & Obesity Biology. He also explained the organization of departments around a common project. His work as an *in vitro* biologist mainly involves target discovery, characterization of selected analogues, dissecting biological mechanisms of the target drugs and development of bioassays to assess the compounds' activity. In addition to the development of new ideas and targets, biologists also provide intellectual and practical support to the IPR (Intellectual Property Rights) department and give biology input to other groups involved in a particular project. Johan finished the presentation with tips on how to get a foothold in a company like Novo Nordisk, and what to think about when applying for a position.

Johan F. Paulsson

The next presenter was also a former Forum member, Sofia Håkansson Hederos, Senior Director of the Department of Protein Chemistry. She described her journey from a PhD in Molecular Biotechnology at LiU to her career development at Novo Nordisk. In the role as a manager, she also gave us tips on what is considered when filling a

position, highlighting scientific excellence, drive and ambition, and fitting into the department and organization of a work place.

The presentations were finished by Forum member Elin Nyman presenting her work in Peter Strålfors group, with the title Insulin signalling in type 2 diabetes: experimental and modelling analyses reveal mechanisms of insulin resistance in human adipocytes. Elin gave a concise description of the mathematical model and results they have achieved.

The visit continued with guided tours in the well-equipped biology labs and protein purification- and characterization facilities, after which we were invited to lunch with the possibility to continue our discussions with Johan and Sofia. The entire visit was well organized and informative, with an accessible atmosphere welcoming questions.

/Linda Åkerman & Susanna Lönnqvist

Glycom A/S

On day two, four of us visited Glycom AS, located in Lyngby, at the DTU campus, north of Copenhagen. Here, Mattias Tengdelius had arranged a meeting with the former Forum Scientium member Markus Hederos. Markus defended his thesis in organic chemistry in 2005. His first position after exam was at Astra Zeneca in Gothenburg. He then started at Glycom in 2008 and became one of the many commuting Swedes to Denmark. Glycom's focus is to produce human milk oligosaccharides (HMOS), both using synthetic chemistry and fermentation. The company was founded in 2005 in cooperation with Danish and Hungarian scientists. The office in Hungary focuses on Technology and up-scaling of the HMOS, while the office in Denmark focuses more on bio-labs and R&D. Glycom now consists of 55 employees all over the world. The majority of the 18 scientists have a PhD. The office and laboratories in Denmark are situated at the DTU campus, in different buildings within a five minutes walking distance.

The challenges Glycom meet are to go from a lab scale to a larger scale, get a commercial product and to expand their biotech/fermentation facilities. They also support different research groups throughout the world with HMOs to stimulate the research of the effects of HMOs and the importance they might have in a human diet.

/Katarina Bengtsson and Mohsen Golabi

The Novo Nordisk Foundation - Centre for Protein Research (CPR)

Founded in 2007 the Novo Nordisk Foundation Centre for Protein Research is an independent institute within the Faculty of Health and Medical Sciences at the University of Copenhagen. Focusing its research on proteins of medical interest the CPR is divided in four programs. The research departments include Proteomics, Disease Biology, focused on studying mitosis and the processes of DNA damage/repair, and Disease Systems Biology, working on bioinformatics. The CPR also has a core Protein Productions Facility with teams working on protein

expression in prokaryote and eukaryote host cells, protein purification and biophysical characterization.

After an introduction to the history and overall operation of CPR by our hosts Charlotte Svensson, Tine Kragh Nielsen, Carl Diehl, we had a guided tour in the impressive laboratory facilities. The center utilizes a wide range of techniques for protein expression, characterization and protein-function interaction, most of which can be found in-house, including the biggest protein mass spectrometry resource in Scandinavia. All this enables CPR to conduct broad studies on proteins and their correlation to different diseases.

Two of our hosts being Swedish also gave us an excellent opportunity to get insight into the readjustment of working in Denmark as a scientist coming from Sweden. All questions were gladly answered until the enjoyable study visit at the Novo Nordisk Foundation Centre for Protein Research had to end.

/Mattias Tengdelius

Radiometer A/S

The participants of the Radiometer visit in front of the headquarter of company

The Radiometer A/S is situated in the northwest of Copenhagen. Radiometer is one of the most well-known and leading company in the field of sensors especially for production of high sensitive and trustable devices such as blood gas analysers, transcutaneous (TC) monitoring and immunoassays. The company dominates the bench top blood gas analyser market with 33% of the market.

Firstly, Frank Nielsen, the head of the sensor department, met us at the entrance of the headquarter of the company. The visit began with a general informative talk by F. Nielsen. He gave an introduction to the historical evolution of Radiometer by giving some examples of crucial products of the company. He also mentioned future prospect of the company. We discussed research and development (R&D) of glucose biosensors and the possibility of having collaborations or joint research (academia & industry) programmes like PhD and postdoc fellowships.

In the second part, the principal scientist of the R&D department, Poul Ravn Sörensen, gave a broad and more focused talk on devices that the company produces and details about the technology behind them. He described blood gas and immunoassay analysers. In addition, we got the chance to see produced electrode materials visually and learn how they produce them. He also mentioned about non-invasive measurement of carbon dioxide (CO_2) monitoring in blood. This part was quite interesting especially using “non-invasive” technique. “Although this technology has not been precise yet, it is promising as well especially monitoring the amount of CO_2 non-invasively in babies and infants” as Poul said.

Thereafter, the senior scientist Martin Nygaard, who is a production engineer with five years of experience in the company, introduced us to the clean room facility-production department. Here, we got the chance to observe how electrochemical sensors are produced and

specifically how enzymes and polymeric membranes are immobilised on electrode surfaces.

On behalf of Forum Scientium, we wish to thank F. Nielsen, P. R. Sorensen, and M. Nygaard for the hospitality, the good snacks and extend a standing invitation to Linköping University.

/Onur Parlak and Thommie Karlsson

Clinical Research Center (CRC) Malmö, Sweden

The CRC is located in close proximity to the Malmö University Hospital to facilitate and encourage patient related research such as TEDDY (The Environmental Determinants of Diabetes in the Young). We were welcomed by Hanna Skärstrand, a PhD student that helped arrange the visit. She showed us around the facility and introduced us to the people working there. Hugh Connell, the director for CRC showed us the building and explained to us the thought behind the architecture of the building. For example, how each wall was colour coded (red walls for instrument rooms, grey for laboratories etc.), the narrow staircases and glass walls for offices were designed to encourage interaction and meetings between people. Despite the lack of art works on the walls, the beautiful chairs and sitting areas at CRC made it look very nice and inviting. We were shown the state of the art surgery simulation rooms where the students practice for educational purposes and he also talked about the different research areas at the center. Moreover, even if the center holds research for social medicine and epidemiology and patient related research, the focus for the rest of the visit were type-1 diabetes.

We visited the areas where samples were taken from children taking part in TEDDY. There Prof. Åke Lernmark introduced us to the project TEDDY, a worldwide cohort study funded by the NHS about type-1 diabetes or insulin dependent diabetes mellitus. He explained how samples were taken from children from birth and every 3 months for 4 years, thereafter the child is visited every 6 months until they are 15. They collect blood and stool samples from the children and look for genetic and dietary markers and sequence the children's microbiome. Currently there are six countries involved in this study but Sweden is the country with the highest percent of participants. The main reasons for that seems to be that the parents reason that there their child will get continuous check-ups and secondly that they want to help science.

Then Dr. Helena Elding Larsson talked about DiAPREV-IT (Diabetes Prevention Immune Tolerance), a randomized, double-blinded, placebo-controlled clinical trial where the safety and effect of Diamyd (a vaccine based on the autoantigen GAD65) is studied in children that have multiple islet cell autoantibodies but not yet diabetes.

/Narges Bayat & Angelika Holm

Dako A/S

Our visit at Dako was hosted by the former Forum Scientium member Annika Eklund and her colleague Karsten Bork Nielsen. Annika is Senior Affairs Specialist and Karsten works as Senior Scientist. Annika and Karsten started the visit by informing us about Dako in general. Dako is now owned by Agilent and since Agilent acquired the company more money are invested in R&D and the number employed in Denmark have increased. Right now, Dako in Denmark employs around 520 persons and the main competencies are research, development

and production of reagents. The other site for R&D is situated in California, US.

Dako focus on diagnostics and their main customers are pathology labs that use Dako antibodies for cancer diagnostic. Further, they have several collaborations, mainly with companies within the pharmaceutical industry. Following the general information Annika and Karsten presented their view of working in the company and one of the challenges as they see it is the collaboration and communication with other companies in forms of responsibilities etc.

Many of the employees within Dako have a PhD degree, but not all work as scientists. Other roles can for example be specialist, project leader or team leader. In Annika's work as a Senior Affairs Specialist, courses within basic legal finance are valuable and Annika and Karsten also recommended courses within GCP and GLP.

In summary, the visit at Dako was very well organized. We had the chance to discuss several topics with Annika and Karsten and we all enjoyed the information and discussions during the visit as well as the nice coffee and sandwich!

/Sara Helander and Emina Vorkapic

Bone support AB, Lund, Sweden

Eva Lidén, the head of research at Bone support AB, welcomed us at the entrance and invited us to a conference room. The group that visited the company was a small group (four persons) so we started the visit by introducing ourselves. Eva showed us their product CERAMENTTM and how it works, and then she explained how this company had started and developed through the years.

Bone support AB is a small company that just started to expand. The company developed from a PhD project done by Malin Nilsson at Lund University and her supervisor Lars Lidgren. The product is a mix of hydroxyapatite and calcium hemihydrate sulphate that can be injected to osteoporotic bone for supportive purposes. The company was established 2001, the product was approved in USA 2005 and introduced to USA 2007. It has grown from eight employees (2004) to 30 employees (2013) and have employees in Sweden, USA, Germany and Netherlands.

It was a very nice and pleasant visit and Eva was open for questions during the presentation so we had many interesting discussions.

/Fredrik Bäcklund and Malin Hammerman

Lund Stem Cell Center

Our last day of the study visits started with a train trip to Lund, Sweden, and after a short and beautiful walk through the city of Lund, we arrived at the Biomedical Centre and Lund Stem Cell Centre.

After a short presentation of ourselves and of Forum Scientium, Mattias Magnusson, one of the group leaders gave a presentation of his research and of Lund Stem Cell Center. The focus in Mattias research, as written on the homepage, is "to investigate intrinsic and extrinsic regulators of hematopoietic stem cell (HSC) function and to identify biological differences between HSC and leukemic stem cells (LSC)". Then Maria Kraft, Scientific coordinator, gave a presentation of Lund Research School in Stem Cell Biology. The school has around 80 applicants yearly to 10 positions. The aim of the school is among others to provide the PhD students and young researchers with all the necessary theoretical as well

as practical tools that allow them to develop into independent scientists.

After a short coffee break and informal discussions, Annika Andersson Sjöland presented a postdoctoral programme called LuPod. The programme is open to people who have their PhD and are working at Lund University. LuPod has a portal that provides information about postdoctoral activities and arranges two seminars per semester and meetings once a month.

Sofie Singbrant gave us a presentation about her carrier. Sofie has been studying and working at several different places around the world, Kalmar, Australia, Astra Zeneca and now at the Stem Cell Center in Lund. She is still in contact with the former colleges in Australia in collaborations and future projects.

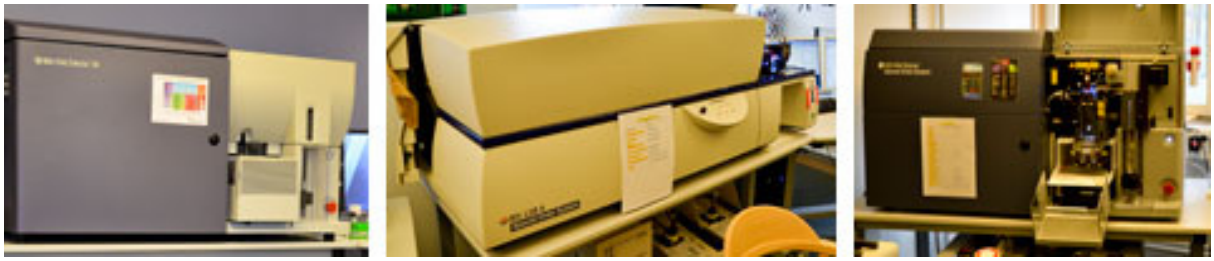
We got a guided tour of David Bryder to see the FACS instruments. The core facility has three large instruments that can sort many different cells at the same time depending on how the different lasers are combined.

Then Ann-Katrin Häger showed us how they culture the stem cells. We had to put on lab coats, shoes and hair covers and gloves before entering the lab. We saw the cell populations in the microscope and learned for example that the stem cells need feeders (another cell line on the bottom of the cell culture flask) to grow properly. Ann-Katrin also told us that the cells could be split both mechanically and chemically.

Since we were a fairly small group, we could all ask our questions and the visit was very informative. We thanked a lot for an interesting study visit and walked down to the city centre of Lund (in the rain). We enjoyed Lund for a few hours before heading back to Linköping.

For more information see http://www.med.lu.se/labmedlund/lund_stem_cell_center

/Leif BG Johansson and Karin Magnusson



FACS machines (Photo taken from http://www.med.lu.se/labmedlund/lund_stem_cell_center/technology_platforms/facs_core_scc/facs_machines June 18th 2013)

Copenhagen in our spare time

The city of Copenhagen is full of buildings and monuments taking you back in time creating a truly warm atmosphere. The frequently visited symbol of Copenhagen is the statue of the little mermaid placed on a stone by the water. Since it's installation in 1913 the mermaid have been a must for tourist visiting Copenhagen but it has also on a number of occasions been the target for vandalism, she has been decapitated twice. Known to lots of people is also the Tivoli Gardens, which opened in 1843, this makes it the second oldest operating amusement park in the world. To our surprise, the city is full of canals with boat traffic as well as kayaks. Some of us went on a guided tour on canal boats, which was a very pleasant, experience looking at the city from a different perspective.

During our visits, we met a couple of Swedes that talked about what it's like to work in Copenhagen. Many of them commute to Copenhagen from Malmö or Lund and describe this as a very good option. Since there are many Swedes living in Sweden and working in Denmark there are excellent ways to commute by train. There was also a feeling among the Swedes that we met that Copenhagen and Denmark in general is a very family-friendly place to live.

/Jutta Speda and Camilla Sandén