INFOrum Scientium

Study Visit Boston

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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 PhD students as well as postdocs. 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 23-25, 2012, the Forum Scientium members Anders Elfwing, Erik Martinsson and Camilla Halvarsson arranged an intensive study visit in Boston during which opportunity was given to visit numerous research groups at, among others, Harvard and MIT (Massachusetts Institute of Technology).
/Fredrik Bäcklund and Sofie Sundberg

Center for Neurologic Diseases

Dr Daniel Kanmert

About half of our group started the study visit in Boston on Monday morning with a visit to Harvard Medical School. Thanks to the former Forum member Daniel Kanmert, we had the opportunity to visit the Center for Neurological Diseases, where Daniel has a postdoc position in the group of Dr. Walsh and Dr. Selkoe.

Forum participants outside Center for Neurological Diseases

The Center for Neurological Diseases is comprised of a group of multidisciplinary biomedical research laboratories, which creates an excellent environment for the study of various neurological diseases, e.g. multiple sclerosis, Alzheimer's and Parkinson's disease. Dr. Selkoe's lab is world leading in its field and has identified the fundamental mechanisms underlying the development of Alzheimer Disease.

After bringing us through the security at Harvard, Daniel gave a brief introduction to his research, which is mainly focused on neurodegenerative diseases and the Tauprotein. We took the opportunity to discuss the working environment and the lab life in general and Daniel shared his view of working abroad and the differences between Linköping and Boston.

Following this very informative talk, our group was divided into three parts to discuss the research and experiences with Oliver Homes and Ulf Dettmer, Daniel's postdoc colleagues at Dr. Selkoe´s lab.

Oliver started his postdoc in 2008 at Dr. Selkoe´s and Dr.Wolfe´s lab and focuses on the role of lipids in the APP processing by the γ-secretase among other projects. He gave an interesting presentation about his latest results and also shared his background with us.

Many of us that joined this study visit have met Daniel Kanmert before, either at the Forum meetings or by working with him. It is always nice and very informative to meet former Forum members and to share their experience. It is especially valuable to share this first-hand knowledge at an outstanding research environments like Harvard Medical School.

/Jutta Speda and Sara Helander

Karp Lab

Prof. Jeffrey Karp
Dr. Xu Chenjie, Dr. Praveeen Vemula and Dr. Suifeng Zhang

Karp laboratory works in a multidisciplinary fashion to create biomaterials and devices aimed for therapeutics. Some of the areas Jeffrey Karp and his group are working in are cell sorting, drug delivery, cell targeting and tissue adhesives.

At the Karp laboratory we were welcomed by Prof Jeffrey Karp. Jeffrey talked about his academic carrier, and how he changed direction from chemical engineering towards biomedical engineering as his interests changed. Jeffrey gave us a good tip for applying for post doc-positions; when he was searching for a post doc, he managed to get a Letter from professor Langer, the manager of the lab he was interested in, saying that if Jeffrey managed to get funded, he would be welcome in the lab. This letter was submitted together with the funding application, which was successful. Also, Jeffrey strongly suggested us to find a mentor for our research activities, "someone whose hindsight can become your foresight".

After Jeffrey's presentation, Xu Chenjie, Suifeng Zhang and Praveeen Vemula, all post-docs in the group, shortly presented their work, their view of being a post-doc and gave us specific tips for being a successful post-doc. For example, Praveeen recommended us to write multiple grant proposals, start a lot of collaborations and to mentor many students.

Lab facilities at Karp lab

After the presentations and discussions, we got a tour around the lab facilities, and a chance to further discuss their research.

/Erik Gabrielsson

Cancer Vaccine Centre

Prof. Ellis L. Reinherz

A short walk or a longer subway trip took us to the Cancer Vaccine Center where Professor Ellis L. Reinherz welcomed us with coffee and snacks. He introduced us to the Center and their goal to perform basic science, vaccine development and translate this into clinical applications. He pointed out the importance of interdisciplinary collaborations. Thereafter a couple of eminent scientists described their different fields such as bioinformatics (Vladimir Brusic), mass spectrometry (Bruce Reinhold), antibodies against HIV (Mikyung Kim) and T-cell based vaccines (Derin Keskin). The visit ended with a short introduction of different equipment and projects.

/Alexandra Ahlner and Leif Johansson

Dana Farber Cancer Institute (DFIC)

Dr Tobias Otto

Ph. D. Tobias Otto guided us to the buildings of DFCI where we were welcomed with a healthy buffet of vegetables and bread. We were divided into three groups for a one-hour tour to see wet labs, confocal microscopy, flow cytometry and the new hospital building. One very nice thing was the patient's relaxation room with flowers and bird tweet. After the tour, we gathered to hear about being a postdoc at Dana Farber. Four postdocs described their current work and how they ended up at Dana Farber; Hilary Wade, USA, working with estrogen receptors, Miia Suurinemi, Finland, risk alleles outside the protein coding regions, Tobias Otto, Germany and Per Hydbring, Sweden, both working with the role of cyclins in normal cell proliferation. After a fruitful discussion, we left Dana Farber with more knowledge about an interesting research area and the life as a postdoc in Boston.

/Alexandra Ahlner and Leif Johansson

Centre for Nanoscale Systems

James Reynolds

The Center for Nanoscale Systems is a shared-use facility center that has an outstanding number of specialized spaces (such as clean rooms), instruments, and computational resources for use by anyone willing to pay a fee. Our host, James Reynolds, was very knowledgeable and informative and seemed as excited about the services he was providing as I assume many are to have access to them. The most impressive aspect of the facility was the number and quality of the instruments and spaces. The clean rooms had automatic

safety provisions to control and diffuse fires as well as a computer monitoring system which fed-back and automatically compiled data concerning the rooms' use of energy and research time on the instruments. The facility housed both instruments for imaging and analysis such as scanning probing microscopy, TEM, to rooms devoted to device fabrication such as thin film deposition, etching, and lithography.

James Reynolds showed us the facilities

Best of all, they provided courses covering the use of each of the instruments as well as technicians to assist the researchers in increasing the quality of their work! Overall, it was a nice visit and the Dunkin' donuts they provided even included Boston Creams! ☺

/Rozalyn Simon

Charles Leiber Lab

Prof. Charles Leiber

After a short but wet walk/run through the rain from CNS to Professor Charles Lieber's lab just across the street we were greeted by Prof. Lieber, one of his PhD students Thomas Kempa as well as a postdoc in the group, Dr. Chong Xie. Due to a tight schedule our lunch break was cut a bit short so we were all quite relieved to see the very nice sandwiches and salad we were treated to upon arrival.

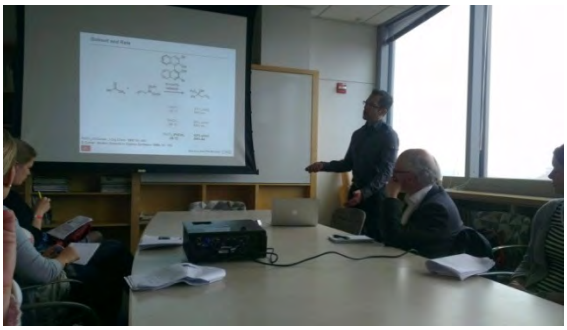
First up was a general presentation of the lab and research performed there by Prof. Lieber himself. Grad Student Thomas Kempa followed by presenting some of his research on coaxial nanowires and their applications in solar cells. Thomas also talked a little about his time working in the Lieber research group in particular and the Boston area in general. The third and last of the presentations were given by Dr. Chong Xie, postdoc in the Lab. His presentation was more about his road and strategies through academia so far and how he was planning on continuing. After the presentations there was a Q&A session followed by a tour where we had the chance to see the facilities.

/Henrik Toss

Schaus Lab

Prof. Scott Schaus

Professor Schaus started his career as a PhD student in the lab of Jacob Harrison at Harvard University. When finished, he got a postdoc position in another lab at Harvard, and in 2001 he started his own group at Boston University.



Scott Schaus presented his research

Our visit started with a tour of the lab, where prof. Schaus showed us the equipment and techniques used in his lab. After this we got a nice presentation of some of the parts in the group's research. To begin with Prof. Schaus went through the design and use of boron chemistry and how they did screening of different compounds to find the best enantiopurity and yields. The synthesized compounds were for example used for inhibition of liver cancer and as anti-malaria substances.

The aim of the liver cancer project was synthesis of inhibitors of transcription factor LSF oncogene in hepatocellular carcinoma. There is a higher concentration of LSF in tumor cells and sequestering of LSF leads to reduced tumor growth. The

Schaus group screened 110 000 compounds for inhibition of LSF DNA-binding with a positive outcome of 580 compounds. A second screen was conducted to exclude inhibition of other DNA-binding transcription factors with a positive outcome of 85 compounds which were further examined. In vivo data from mouse models showed an 80% tumor reduction after i.v injection of the final compound and no observable toxicity was seen. This looks very promising and might be about two years from going into humans.

Antimalaria compounds: The aim was to study compounds that are active against all strains of malaria and not only one. The antibacterial compounds should be of higher molecular weight and be ionized. To find suitable compounds they used quantitative high-throughput screening. They also looked at normal human cells to exclude toxic compounds. On a positive note, the final compound was not subject to efflux, which is the mechanism of resistant strains.

Overall the visit was very interesting and it really showed that a combination of different techniques are crucial, for example; organic chemistry, bioinformatics, system biology and biochemistry.

/Fredrik Lysholm and Maria Jonsson

Department of Surgery Brigham and Women's Hospital

Prof. Elof Eriksson, Dr. E J Catersson and Dr. Johan Junker

Johan Junker, Ph.D. welcomed us to the department of Surgery and briefly explained how he ended up doing his postdoc in the group. He told us about his not so traditional postdoc work, where he is not spending as much time in the lab as many other postdocs, but is actually doing a lot of project planning and supervision.

E. J. Caterson, M.D., Ph.D. then told us about the work at the laboratory for Tissue Repair and Gene Therapy. In summary it's all about healing wounds. E. J. Caterson explained the basic principles of wound healing and told us that there are three pillars of Tissue Engineering – Cells, Signals and Scaffolds. None of the pillars can be considered in isolation, when seeking to understand wound healing. The whole system must be studied.

Professor Elof Eriksson, M.D. Ph.D., who likes to call himself a wound healer, continued the presentation with more clinical examples. He explained about the micrografts - that started with a pizza cutter in his garage - where skin is cut into small cubes and then spread out on a wound. This makes it possible to heal a wound by taking a much smaller area of skin from the patient than what is possible with conventional methods, which also implies that larger wounds can be healed.

Another area where the group has made a major impact is in face transplantations. Elof Eriksson showed us pictures of patients having severely deformed faces, and then pictures of the same patients when they have received a face from a donor. It is easy to recognize the huge improvement in patients' quality of life that is possible with this technique, and the immediate importance of this research. I think I speak for the majority of the Forum group when I say this visit was very inspiring and that it had a big impact on us.

/Amanda Jonsson

Merrimack

Murat Cirit

A number of us went to Merrimack to see the environment of a pharmaceutical company in the middle of all fantastic research that is going on in Boston. Merrimack works primarily with the development of cancer medicines and they are focused on the underlying mechanisms to the different diseases. They use a systems-biology approach in teams combining experts in mathematics and

modeling, with the more traditional experts in biology/medicine. Murat Cirit, one of the senior modelers at Merrimack, showed us around to see their different offices and labs, and Birgit Schoeberl, vice president of discovery at Merrimack, presented the company and their process of discovery of new drugs. After the presentation we had a long informal chat with both Murat and Birgit, where we were free to ask all kinds of questions and get to know the company better.

/Elin Nyman

Pierce Atwood LLP

The Swedish American Chamber of Commerce of New England (SACC-NE)

Robert Stier Jr

On Tuesday afternoon we visited the Swedish American Chamber of Commerce of New England. Robert Stier Jr who is an attorney at Pierce Atwood LLP hosted this meeting. Mr Stier, who speaks excellent Swedish, is mainly working with patent jury trials and is focusing on helping Nordic Biotech companies to succeed in the US. During the meeting, he introduced us to some of his colleagues in Pierce Atwood LLP. In addition, the vice-consul from the Swedish Consulate in Boston, Margareta Sewerin-Olsson, participated. During the meeting, some of the Forum Scientium members presented their work to the group, giving a representative view of the Forum Scientium network. After the presentations we were served some food and refreshments while mingling with the rest of the group. During the evening, we all went out to dinner together at a restaurant close by and continued our discussions.

/Stefan Klintström

Mundel lab, Wednesday morning

Prof. Peter Mundel and Dr. Lisa Buvall

On Wednesday morning a small group of us visited the Mundel lab, at Harvard Medical School in Charlestown. We first listened to Professor Peter Mundel talk about proteinuria, which is a complication from kidney dysfunction and also a risk factor for renal disease. In the Mundel group they study a specific cell type called the podocyte, which is a highly differentiated cell with limited cell division capability. After his talk we listened to Astrid Wein, M.D. who did her post doc in Professor Mundel's lab and is now pursuing a career as a P.I. herself. She talked about her career path from being a student in Germany up until becoming a P.I. and gave us many helpful tips. The last speaker was Lisa Buvall, who studied in Uppsala, moved to Gothenburg and got a degree from Chalmers. She then attended the biomedical research school and did a PhD at Sahlgrenska and the University of Gothenburg. She did her first postdoc in nephrology at Sahlgrenska and then moved on to do a postdoc in Mundel's lab, where she now focuses on studying the structure of the actin skeleton.

A couple of tips from the Mundel group:

- Be persistent with your problem, keep hammering it!
- Collaborations have to be win-win
- Decide early if you want to go home or stay in the U.S. (VISA application depends on it)
- Try to get a green card if you want to stay in the U.S.
- Build a network of people that can help you
- Look at what the people have produced before, shows if you have a realistic chance of publishing
- Two years is too short for a postdoc, unless you want to publish in low impact journals
- Check the P.I.'s track record; what has happened to the people after they leave the lab? Talk to people in the lab but also people that left the lab already
- Do the work that makes you happy!

/ Linda Helmfors

David H Koch Institute and Langer Lab

Joseph A. Ryan and Prof. David Langer

Entering the main entrance of the beautiful building of David H Koch institute for Integrative Cancer Research at MIT, we were absolutely taken with the welcoming art exhibition “capturing the life sciences” displaying large colorful biomedical images.

We were greeted by Alex Fiorentino and Dr. Joseph Ryan who gave us a general presentation about the research center while guiding us around the facilities. The building of David H. Koch Institute was newly opened in 2011. The open areas and the numerous doors and walls made of glass were designed to facilitate interaction and collaboration among biologists and engineers. As David H. Koch Institute is an inter-disciplinary research center, one of the main thoughts behind the architecture is to allow opportunity for spontaneous and informal talks in order to promote new collaborations and information sharing.

Entrance art exhibition “Capturing the life sciences” at David H. Koch Institute

After the general tour we were introduced to members of Professor Robert S Langer’s lab. This large research group conducts research at the interface of biotechnology and materials science. We met with Dr. Janet Zoldan, Dr. Beata Chertok and Dr. Leon Bellan who are postdocs at the Langer lab.

While showing us her lab, Dr. Zoldan shared her views on doing a postdoc and her interesting work with controlling differentiation of embryonic stem cells by using siRNA. Dr. Chertok then talked about her background with an undergraduate degree in pharmaceutical sciences and how her curiosity made here take a second degree in biomedical engineering and later on the research path of drug delivery. She enthusiastically told us about how she in her current research uses gas core microbubbles incorporated with drugs in combination with ultrasound as a system of drug delivery. By using microbubbles filled with gas it is possible to follow the bubbles in the body with the ultrasound. Ultrasound focusing enables the drug to get released exactly on the spot where the drug is needed, which may for instance be applicable in the treatment of cancer tumors. Finally, Dr. Bellan talked about his fascinating work on creating three-dimensional scaffolds for recreating vascular networks. He realized during his time as a graduate student that cotton candy (!) resembles capillaries within the vascular network. He then, in a very creative way, used cotton candy as a mold to solve the problem of making scaffolds of the correct dimensions. Silicone was cast around the cotton candy mold, which in turn could be dissolved in water leaving a scaffold with dimensions similar to capillaries.

This visit was very well planned and nice in general. Most of all, it was exceptionally inspiring that the main idea of the institute is actually the same as for Forum Scientium –encouraging and enabling multidisciplinary networks.

/Amanda Nordigården, Kristin Persson and Per Erlandsson

Hemostasis and Thrombosis (Center for Life Science)

Prof. Bruce Furie

We were welcomed by prof. Bruce Furie who was our host during the visit. Bruce is running the lab side by side with his wife Barbara Furie. Around 30 researchers are currently working in the lab. Bruce told us that he and Barbara have a special connection to Sweden; they often travel to Malmö to meet with their friend and colleague Johan Stenflo, professor in Clinical Chemistry. Bruce also has an honorary degree from Lund University.

During the past 30 years Bruce and Barbara have made major contributions within the field of hemostasis and thrombosis. They were the first group to identify p-selectin, a platelet activation marker expressed on the platelet surface upon activation.

Another major focus of Bruce's and Barbara's research has been to understand the role of vitamin K in the synthesis of gamma-carboxyglutamic acid. They have a satellite laboratory at the Marine Biological Laboratory in Woods Hole, where they study the function of gamma-carboxyglutamic acid in invertebrates. Today, their research mainly focuses on studying the coagulation process *in vivo.*

Professor Bruce Furie gave us a tour of the lab

After telling us about their research, Bruce gave us a tour of the lab. Bruce showed us the high-speed confocal and wide field microscopy facility, where they had an ongoing experiment.

When Bruce, Barbara and their research group first came up with the idea to set up a microscope, which could allow them to study the coagulation process in living animals, few of their research colleagues thought they would succeed. But they did! Today they have spent a huge amount of money on this system, which is a very important tool in their research. They have also helped other labs around the world to set up similar systems.

When we were finished with the tour, we thanked Bruce and his coworkers for an interesting visit.

/Liza Ljungberg and Karin Magnusson

Kaplan Lab

Prof. David Kaplan

The Kaplan lab is situated in the Tissue Engineering Research Center at Tufts, located in a more cozy part of Boston. Carmen Preda, senior technician met us at the entrance of the Biomedical Engineering building on Colby Street. The friendliness with which we were welcomed charmed us all. The visit began with an informative talk by Professor Kaplan; he gave a brief introduction to Boston and Tufts University. Although very busy he took the time to answer some general questions about Tufts University and his group. Carmen then rounded up a few (several, actually) postdocs to talk to us about their research and the choices that had led them to Kaplan's group in Boston. The visit ended with a generous buffet of food and drinks, were we had the opportunity to discuss with PhD's and postdocs.

A hearty welcome by Professor David Kaplan

It was clear from the mix of presentations that the lab has a very broad set of skills. Professor Kaplan had stated that international exchange and cooperation is beneficial to scientific endeavors, and such a principle certainly showed in the mix and histories of his group members. To name a few – Rosella from Italy talked to us about the difference between Italy and America, more so Boston, in terms of research. Nick, with a Serbian background, had completed the MD/PhD program and spoke to us about his reasons for staying in research rather than in the clinic. Jody told us the ups and downs of working in industry, having worked for Wyeth until the merger with Pfizer. Her talk centered around "bracing yourself for a different focus" when working in a company. Leah was on her way to the University of Pennsylvania after three years in the Kaplan lab. It seems that David Kaplan and his group works to promote the well-being of the researchers at all levels. Most postdocs were working on several different projects and were encouraged to travel and to move on to other labs after three years, so as to keep their careers current.

Most, if not all, of the research in the Kaplan lab is based on silk, isolated from the silkworm cocoon. The material is biocompatible and available in large quantities (we received samples as a parting gift), which together with the simplicity of the isolation procedure lends itself to numerous uses in biomedicine. One example is the fabrication of a micro-scale silk-based needle array for cutaneous drug delivery; another example (which is really several examples) is the use of the material as scaffolding for tissue engineering. Several important uses for the silk-based biomaterials have been suggested in the numerous papers written by the Kaplan group to date and the size of the group (70+) combined with their positive professional energy means that there are troves of interesting publications still to come.

On behalf of Forum Scientium we wish to thank David Kaplan and his group for the hospitality, the good food and the silk, and extend a standing invitation to Linköping University.

/Abeni Wickham and Jonathan Rakar

General things about the Boston study visit

Our overall impression of Boston is that it is a very nice city and one of the best places in the world for doing research.

In terms of research, we were very impressed by the high amount of "state of the art" equipment that was made available for everyone through a core facility-based system. Furthermore, all the labs that we visited had a very stimulating environment with a positive atmosphere where the research appeared to be carried out in an organized and focused manner. They were also very friendly and we are very grateful to them for letting us visit.

Hostelling international Boston

During the study visit, we stayed at HI-Boston hostel. Although the rooms were quite small, crowded and of low standard, the location was excellent and the labs were therefore very easily accessible by public transport or by foot. The hostel was located very close to the city centre with a lot of great shops, restaurants and pubs nearby. Speaking of restaurants and pubs, there was a wide range of restaurant offering everything from vegetarian, seafood to steaks. The high density of microbreweries in the area also offered a great variety of beer selection.

I am pretty confident that I speak for most of us when I say that we are very pleased with our trip to Boston and that we are very impressed by the stimulating environment present in the labs.

/Thommie Karlsson