Forum Scientium

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Study Visit Heidelberg area

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Editor: Susanna Lönnqvist

As part of the career planning PhD-students within the graduate school Forum Scientium make study visits to research-intensive companies and to research departments at various universities. During these visits, we try to meet persons doing interesting research, 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. During May 19-21, 2014, Forum Scientium member Andreas Skallberg arranged a study visit to the Heidelberg area. The old university town of Heidelberg and its surroundings is a research dense area with institutions such as the main site of EMBL (European Molecular Biology Laboratory) outside Heidelberg and several Max Planck institutes in addition to a number of prestigious universities. During the three-day stay, we had the opportunity to visit mentioned organizations and several other interesting sites in the area. .

German Cancer Research Center (DKFZ): Cell and Tumour Biology – Vascular Oncology and Metastasis

A group of eight Forum members visited the German Cancer Research Center (DKFZ) and were greeted by Prof. Dr. Hellmut Augustin who is working at the department of Cell Biology and Tumor Biology, division of Vascular Oncology and Metastasis. Prof. Dr. Augustin studies the molecular mechanisms of tumour and blood vessel interactions as they relate to angiogenesis and tumour metastasis. His group studies functional interactions between tumour and endothelial cells. The group aims at deciphering the molecular mechanisms of site-specific metastasis and the role of endothelial cell surface molecules in this process.

Prof. Dr. Hellmut Augustin (left)

At our visit Prof. Dr. Augustin started his talk with the discovery of vascular endothelial growth factor (VEGF) in 1989. VEGF is an important factor for angiogenesis, a normal and vital process in development and wound healing but also in cancer where angiogenesis is a fundamental step in the transition of tumours. Prof. Dr. Augustin and his group are working with developing new strategies for cancer treatments. In one of their present projects they developed novel and more effective inhibitors of angiogenesis for cancer treatment. Furthermore, he also told us about his journey from finishing veterinary school, his way through a PhD, and how he finally became a professor.

/Emina Vorkapic

Applied Physical Chemistry – Surface Science and Analytics

Prof. Michael Zharnikov demonstrating the art of presenting with only a white board as aid. Very inspiring!

After a short walk from the hotel we were welcomed by Prof. Michael Zharnikov to the Physical Surface Chemistry group at Heidelberg University.

The group is focused on synthesis and characterization of ultrathin organic films, both in basic research and more applied projects in collaboration with industry. This includes research on self-assembled monolayers to be able to perform application specific designs and modification of these SEMs by X-rays, electron irradiation, UV-light, and by lithographic methods. Other activities of the group include fabrication of free standing monomembranes, spectroscopic

characterization of liquids, and conventional surface science. After a very interesting overview of the research topics of the group and questions from Forum members, we were introduced to the facilities and laboratories of the applied physical chemistry group.

/Björn Kronander

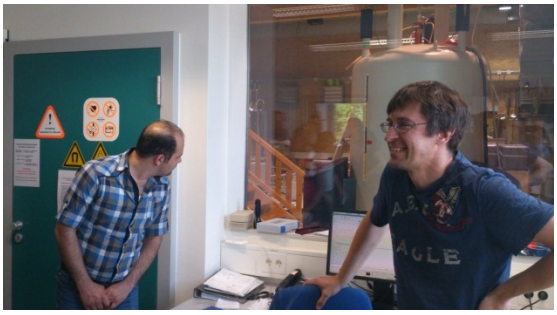
European Molecular Biology Laboratory (EMBL)

We took a bus from Heidelberg, and after a few minutes we had left Germany and ended up on international ground, where the European Molecular Biology Laboratory (EMBL) is located. EMBL is a cooperation between several European countries, soon with 22 member states. The main laboratory is the one in Heidelberg, but EMBL has four outstations throughout Europe (Hamburg, Grenoble, Monterotondo and Hinxton).

The EMBL Advanced Training Center building is inspired architecturally by the DNA double helix.

The founding idea is to collaborate and to provide training and high standard equipment and platforms to the member states. It is open for any researcher from any member state to apply for training or use equipment for free, where the only expenses will be for accommodation and food during the time of stay.

When we arrived to EMBL the weather was fantastic and we had a few minutes to look around and spend time in the sun. Soon it was time for a delicious lunch in the food court. First stop after lunch was at the Nuclear Magnetic Resonance (NMR) center where facility manager Dr. Bernd Simon showed us the NMR facilities and told us about their role as core facility and field of applications for NMR.



Dr. Bernd Simon, NMR Facility Manager

We then continued to a conference room where we learned to know more about EBML's organization and ideas from Angela Michel from the Communication Department. Additionally we were visited by Brenda Stride, a Postdoctoral Programme Administrator, and told us more about the postdoctoral programs ESPOD and EIPOD, and other postdoctoral opportunities at EMBL.

The final part of the program at the EMBL visit was a scientific talk from Matt Rogon from the Center for Biomolecular Network Analysis. The topic was "Integrating –omics through network analysis", and he showed us how network analysis can be a powerful tool when it comes to modeling and visualization of data, as a complement to traditional statistics.

/Theresia Arbring and Alejandro Vicente Carrillo

Biophysical Chemistry – Heidelberg University

As we arrived at the University of Heidelberg we were greeted by Dr Ada Cavalcanti. She told us that, unfortunately, Prof. Joachim Spatz could not join us for the meeting as planned. Dr Cavalcanti, however, took very good care of us in his absence and gave us a general introduction to the group and their research after which she gave the stage to the PhD students of the group.

First out was Amin Rustom talking about "bio-synthesized" electricity. After this we received talks about microfluidic systems and steps towards artificial cells (Jan-Willie Janiesch), cell forces and automotive mechanisms (Rebecca Medda), embryogenesis, tumor invasion and wound healing (Sebastian Rausch) and finally some materials to make the study of single cell functions in vitro possible (Dimitris Missirlis).

Of course we also wanted to share some info, and Stefan first talked about Forum Scientium in general. Katarina Bengtsson gave a talk titled "Additive 3D printing for biological applications" and Andreas Skallberg "Development of nanoprobes with contrast enhancement and luminescence properties for biomedical imaging".

As lunchtime approached we all took a stroll to a restaurant in the vicinity to enjoy some food together with the organizers and some of the presenters before we started moving towards the next visit of our trip.

/Henrik Toss and Peter Eriksson

Zentrum für Molekulare Biologie der Universität Heidelberg (ZMBH)

We were greeted by manager Dr. Ralf Tolle and were given an introduction to the center: there are 15 research groups, 9 professors, 4 junior group leaders and 2 additional groups at ZMBH. The ZMBH hosts 240 researchers from 20 countries. Its budget allows financing and acquisition of cutting-edge technologies. The ZMBH is an independent institute but is linked to the University of Heidelberg, so some teaching tasks are included in the duties of all the PhD students enrolled at the center. The center collaborates closely with the research program Cell and Tumour Biology at DKFZ.

The center is directed by Prof. Dr. Bernd Bukau and the main topics of research are:

- Protein folding and protein fate and cellular consequences
- Computational studies
- Studies of chromosome segregation during cell cycle
- Posttranslational modifications
- Telomere Biology
- mRNA processing

The model systems utilized at the center include bacteria, yeast, trypanosomes, drosophila, xenopus and rodents.

The center aims to be involved in diverse research questions and to answer fundamental questions in molecular biology and as these topics are under constant change, so is the direction of the

center. We had a quick overview of the center and were shown the microscopy facilities by Dr Hernan Sendra, at the proteomics service, and sequencing facilities. The proximity to other research centers in the area (as DKFZ) enables the use of other facilities as well.

/Daniel Sanchez

BioInterfaces International Graduate School, Karlsruhe Institute of Technology (KIT)

The description of the BioInterfaces graduate school at KIT may sound familiar to Forum Scientium ears; the graduate school is a multidisciplinary research school aimed to offer research opportunities, education and training to students within the fields of biology, chemistry, physics, engineering and informatics. We visited the KIT North Campus of Karlsruhe University in Mainz on, in Swedish measures, a tropically warm day. We were introduced to the organization and aims of the graduate school by Prof. Dr. Uwe Strähle and Prof. Dr. Christof Niemeyer.

The next item on the agenda was presentations by Forum Scientium members Alina Sekretareva (Chemical and optical sensor systems: self-powered biosensors), Amanda Jonsson (The ion pump: an electrophoretic device based on polyelectrolytes, with electrically controlled ion delivery) and Onur Parlak (Switchable bioelectronics on a graphene interface). Students of the BioInterface graduate school followed with interesting talks on a variety of topics: Marie Spitzner; A novel zebra fish model of glioma reveals cell fate alteration through expression of oncogenic Ras, Benjamin Görling; Metabolic screening of zebrafish by high resolution NMR spectroscopy, and Iris Morath; Ligand specific recruitment of CD44 isoforms in ErbB signaling.

After the presentations and some refreshments two students led us on a tour around two of the facilities on campus; we visited the EZRC Zebra fish facilities (European zebra fish resource and screening center) and the ANKA. ANKA is the Synchrotron radiation facility at KIT, an impressive facility with the institutes' own synchrotron light source and labs.

Our visit ended with a poster session where all participating students could present their work. We would like to thank BIF-IGS for an interesting afternoon at KIT and especially Dr. Larissa Kaufmann for great arrangements.

/Susanna Lönnqvist

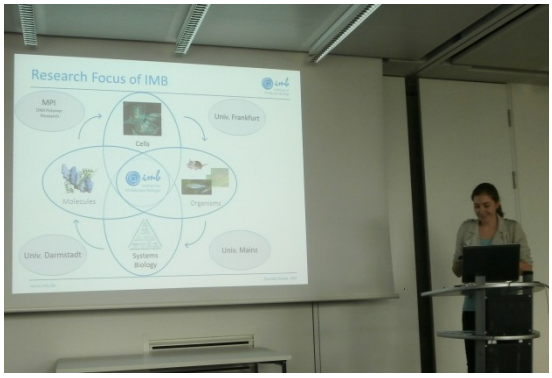
The Institute of Molecular Biology GmbH (IMB), Mainz

The Institute of Molecular Biology (IMB) is situated in the Johannes Gutenberg University campus in Mainz. The IMB is a newly established research centre, which is funded by the Boehringer Ingelheim

Foundation. IMB is a non-profit company that operates as an academic research centre.

Katharina Zeller from the Grants Office and Daniela Kaiser, IPP and fellowship manager at the Science Management Department at IMB met us at the entrance of the research centre. The visit began with a presentation by Daniela Kaiser and she gave a detailed introduction to the organization and funding of the centre, and a brief mention about future prospects of the company. Questions from the students mostly concerned research and development, and there was a short discussion about possibility of collaborations or joint research and about the PhD program of the centre and postdoc fellowships.

During a short break, we visited the administrative part of the building and had a coffee break in their nice coffee room.



Daniela Kaiser representing the Science Management Department of IMB.

During the second part of our visit technician Sandra Ritz gave us broad and more focused talk and lab tour in the core facilities of the centre. She described what kind of instruments and devices they have, and how people work safely in their research environment. In addition, we got the chance to see how they design a new lab.

On behalf of Forum Scientium, we wish to thank IMB for their hospitality, the nice presentations and extend a standing invitation to visit Linköping University.

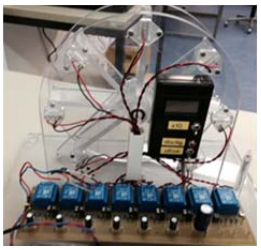
/Onur Parlak and Stefan Klintström

Physical Chemistry of Polymers and Molecular Electronics Research Groups, Max Planck Institute for Polymer Research, Mainz

The Max Planck society governs a number of institutes in Germany and abroad. We visited the Max Planck Institute for Polymer Research in Mainz. We began with visiting the Physical Chemistry of Polymer Research Group which is led by Professor Katharina Landfester and conducts research within different areas of physical chemistry of polymers and material science.

We were greeted by Dr. Rafael Muñoz Espí who is one of the group leaders at the institute, and he presented the general structure of the institute and his own research. He focused on colloid assisted crystallisation processes and described the application of the confinement provided by colloidal systems for the control of structure, morphology, and the crystallinity of materials as the driving scientific problem addressed by their team. He told us that they are interested in how such precipitation/crystallization processes are confined at the surface of particles, to the interior of droplets, and to the liquid–

liquid interface of miniemulsion droplets. After his 30 minute presentation we were divided into three groups to visit the biology and material characterisation-oriented laboratories. In the biochemistry lab we met with one of the postdoc researchers who gave us a brief description of how nanoparticles are used for cellular therapeutics in regenerative medicine, how particle-cell interactions occur and how to visualise this interaction. We had also a little chat about how the research environment is at the institute and possibilities of finding postdoc positions.



After the official visit five members of Forum Scientium decided to extend their stay to speak to one more research group in the institute. Dr. Espi kindly offered us one more visit at the Prof. Dr. Paul Blom group and we spent one more hour with the Molecular Electronics Research Group. We met postdoc Ilias Katsouras and PhD student Menguyan Li. We had a short discussion in front of their posters where their recent publications and studies were highlighted. The main focus of this group is on molecular structure, charge carrier density, and impurities in organic devices. We particularly discussed ferroelectronic capacitors and devices. We also walked through their research lab and had a chance to observe what types of devices that they have and how they measure and characterise them.

/Onur Parlak and Fredrik Bäcklund

International Heidelberg

Heidelberg is a historic town by the river Neckar in the Baden-Württemberg state in Southwest Germany. The city is well preserved with a picturesque old town. A mere 350 steps above the old city centre stands the landmark of Heidelberg; the ruins of the castle overlooking the old town. Some of the participants of the study visit have also experienced that by asking nicely one can be served a cold beer by the restaurant late one evening after making the climb…

An interesting fact we learned at our visit to EMBL was that the research institute was not on German ground but in fact was owned by member states and governed by its director. At EMBL we could hear about the international working environment; the 1700 employees of EMBL come from 60 different states. IMB brought up the same aspect of working at the centre. The Heidelberg – Karlsruhe - Mainz – Frankfurt area is truly international and recognized in research fields that are of high interest for Forum Scientium members. Both EMBL and IMB promoted their annual career days, which can be a good way to gain more insight into living and working in the Heidelberg area.

/Susanna Lönnqvist

Participants of the 2014 Study visit to the Heidelberg area outside EMBL