MOLECULAR BIOLOGY
NEWSLETTER
Georg-August-Universität Göttingen · International Max Planck Research School
JAN 2014

Welcome message

Dear alumni, students, friends and colleagues, as every year, we would like to welcome our newcomers, congratulate our graduates, thank former faculty and program officials, and summarize major events of our Molecular Biology program with this newsletter. Once again, it includes personal contributions and scientific spotlights by our alumni, and a regional alumni report.

With the first generation of Molbio students graduating more than ten years ago, we are proud to observe their career progress towards senior positions around the world. Some started their own research group, others discovered new challenges in business. We feel privileged to witness this progress, thanks to the established personal connections between the current and former members of our program. Quite a few alumni joined us for the 10th anniversary of our Horizons meeting, which was a great success. In the coming years, we will get involved with social media such as LinkedIn for strengthening professional and scientific networks related to our program.

10th anniversary of the "Horizons in Molecular Biology" PhD student symposium

The year 2013 started with its own challenges. Financially, the program had to cope with an unexpected budget cut of 30%, imposed by the Max Planck Society on all IMPRS. Fortunately, the president of the Max Planck Society revoked the budget cut by the end of the year. In addition, the governmental body overseeing the MPS finances has lifted the ban on the financing of MSc students. With these decisions, a firm basis for continuous support of our Master's students has now been established.

Another important issue affecting future perspectives was the evaluation of the Molecular Biology program by the accreditation agency ZEvA, which has a strong focus on formal criteria. The main concern was about the workload in the first year of MSc courses, questioning whether the equivalent of 90 credits is manageable for the students. Such a system does not seem to support students who give a high priority to making scholarly achievements in the shortest time possible. The permanent accreditation commission finally approved the re-accreditation, largely owing to the strong support by present and former students who rapidly responded to a questionnaire regarding their personal experience with the workload during their studies.

Last but not least, Tomas Pieler has decided to step down as head of our examination board and to retire from our program committee. Tomas held this post since the program was launched 13 years ago. He has dedicated countless hours of his time to the program, which was on top of his considerable teaching load in the Medical Faculty. As one of our founding members he shaped major parts of the curriculum and was instrumental for the success of the program, particularly in its early years. We wish to thank Tomas for all of his efforts, his commitment and his unwavering support of the program! We are glad that he will remain an active faculty member and that we can count on his advice in the future. Congratulations and thanks to Peter Rehling, who accepted his election as a new member of the program committee and as the new head of the examination board!

M. Rodnina, J. Stülke, S. Burkhardt

CONTENT

Overcoming chemoresistance in tumors

The kinase MK2 in DNA replication upon genotoxic stress

Nowadays, more than half of the patients diagnosed with cancer survive the disease, telling us that therapy improved substantially during the past decades. Intense research and the development of new technologies indeed made it possible that cancer patients today receive treatment tailored to target the specific characteristics of their individual tumor. However, that is only half the story. For it is also true that, still, tumors often prove resistant against the chemotherapy applied to them. For some types of cancer this is the rule rather than the exception.

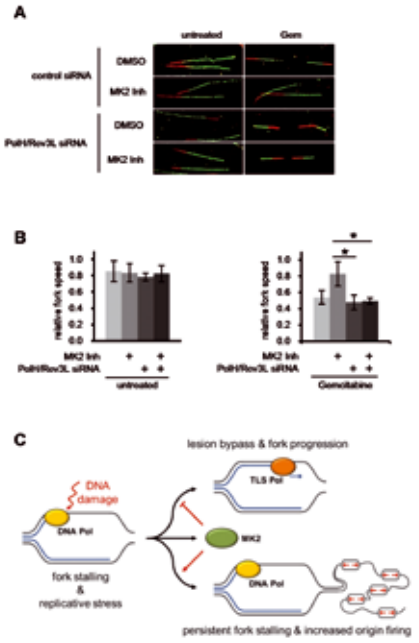

Fig. 1: (A) Reduced replication fork speed (shorter green DNA tracks) is rescued by MK2 inhibition. This rescue depends on the TLS polymerases PolH and Rev3L. (B) Quantification of replication fork speed in cells treated as described in B. Mean ± SD is shown. (C) A model of how MK2 regulates replication: Upon DNA damage, replication stalls. If stalling persists, firing of new replication origins occurs. To rescue stalled forks, TLS polymerases are recruited to bypass the lesion and replication can proceed. MK2 is required for efficient replication blocks. Its inhibition promotes replication despite disturbances, with the help of TLS.

Cancer cells often harbor mutations deactivating part of their DNA surveillance and repair system, making them highly susceptible to genomic insults. Chemotherapeutics that damage the cell's DNA exploit this special property of cancer cells. Therefore, one aim of today's cancer research is to identify cellular factors that determine the chemosensitivity of tumors. When identified and characterized, pharmacological manipulation of such factors, it is hoped, might increase the sensitivity of tumors to chemotherapeutic treatment.

Aiming to find proteins that determine the cellular susceptibility to DNA damage, we performed an siRNA screen in which we depleted cells of all known kinases and thereafter irradiated these cells with ultraviolet (UV) light. We thus identified the MAP kinase activated protein kinase 2 (short: MK2) to be a determinant of the response to UV irradiation. Further characterization revealed that depletion or inhibition of MK2 reduced the in-

PhD-related publications 2013 (PhD students of the Molecular Biology program in bold type)

Aggarwal S, Snaidero N, Paehler G, Frey S, Sanchez P, Zweckstetter M, Janshoff A, Schneider A, Weil M, Schaap I, Goerlich D, Simons M (2013) Myelin Membrane Assembly Is Driven by a Phase Transition of Myelin Basic Proteins Into a Cohesive Protein Meshwork. PLoS Biol 11(6)

Bakhti M, Snaidero N, Schneider D, **Aggarwal S**, Moebius W, Janshoff A, Eckhardt M, Nave K, Simons M (2013) Loss of electrostatic cell-surface repulsion mediates myelin membrane adhesion and compaction in the central nervous system. Proc Natl Acad Sci USA (8):3143-3148

Ban D, Mazur A, **Carneiro M**, Sabo T, Giller K, Koharudin L, Becker S, Gronenborn A, Griesinger C, Lee D (2013) Enhanced accuracy of kinetic information from CT-CPMG experiments by transverse rotating-frame spectroscopy. J Biomol NMR 57(1):73-82

Bareth B, Dennerlein S, Mick D, **Nikolov M**, Urlaub H, Rehling P (2013) The Heme a Synthase Cox15 Associates with Cytochrome c Oxidase Assembly Intermediates during Cox1 Maturation. Mol Cell Biol 33(20):4128-37

tensity of the cellular DNA damage response (DDR) and promoted cell survival. Also, MK2 knockout mice showed less apoptosis in the skin after exposure to UV light when compared to wild type animals.

As UV irradiation primarily – but not exclusively – affects cells during DNA replication, we next substituted it with the chemotherapeutic drug gemcitabine to see whether the effects observed are due to an activity of MK2 in S phase. Gemcitabine is a nucleoside analog that is incorporated into the DNA, causing premature chain termination during replication and thus specifically targeting cells in S phase. Indeed, as was the case with UV irradiation, we observed that, when depleting or inhibiting MK2, cells treated with gemcitabine displayed a reduced DDR and increased proliferation.

We thereupon tested whether MK2 directly affects DNA replication, the process hampered by gemcitabine. Strikingly, using DNA fiber assays, we found that inhibition of MK2 rescued slow replication fork speed caused by gemcitabine, demonstrating that, upon replicative stress, MK2 modulates replication.

As mentioned, incorporation of gemcitabine into DNA normally induces termination of DNA synthesis. This is because gemcitabine distorts the DNA double helix so that replicative DNA polymerases can no longer accommodate it in their active site, i.e. it forms a physical barrier. We therefore hypothesized that translesion (TLS) polymerases, specialized to synthesize a DNA strand over DNA-distorting lesions, might be regulated by MK2. Indeed, additional experiments revealed that the rescue of gemcitabine-induced slow replication fork speed by MK2 inhibition depended on TLS polymerases (Fig. 1 A,B).

Our work thus identified MK2 as a determinant of the cellular sensitivity to the chemotherapeutic drug gemcitabine. Depletion or inhibition of MK2 strongly protected cells from the consequences of DNA damage (see model in Fig. 1C). MK2 is therefore a potential drug target to modulate the chemosensitivity of tumors.

Frederik Köpper did his PhD under the supervision of Matthias Dobbelstein at the Department of Molecular Oncology, University of Göttingen Medical Center. He graduated from the Molecular Biology program in October 2012.

These results were published in PNAS, 2013, 110(42):16856-16861.

Becker J, **Barysch S**, **Karaca S**, Dittner C, Hsiao H, Diaz M, Herzig S, Urlaub H, Melchior F (2013) Detecting endogenous SUMO targets in mammalian cells and tissues. Nat Struct Mol Biol 20(4):525

Bhaskar V, Roudko V, Basquin J, **Sharma K**, Urlaub H, Séraphin B, Conti E (2013) Structure and RNA-binding properties of the Not1-Not2-Not5 module of the yeast Ccr4-Not complex. Nat Struct Mol Biol 20(11):1281-1288

Chmyrov A, Keller J, Grotjohann T, **Ratz M**, d'Este E, Jakobs S, Eggeling C, Hell S (2013) Nanoscopy with more than 100,000 ‚doughnuts'. Nat Methods 10(8):737

Cunha CE, Belardinelli R, Peske F, Holtkamp W, Wintermeyer W, Rodnina MV (2013) Dual use of GTP hydrolysis by elongation factor G on the ribosome. Translation 1(1):24315-0

Doelker* N, Blanchet* C, Voss* B, **Haselbach*** D, Kappel C, Monecke T, Svergun D, Stark H, Ficner R, Zachariae U, Grubmueller H, Dickmanns A (2013) Structural Determinants and Mechanism of Mammalian CRM1 Allostery. Structure 21(8):1350-1360

The mitochondrial presequence translocase

How signal recognition changes the organization of the protein transport machinery

It is commonly known that mitochondria, due to their endosymbiotic origin, possess their own genome and translation machinery. However, they largely depend on the host cell, as most of the proteins required for mitochondrial biogenesis are synthesized by cytosolic ribosomes and hence have to be transported into one of the four mitochondrial subcompartments (outer membrane, intermembrane space, inner membrane, or matrix). This task is performed by a set of sophisticated transport machineries, which recognize targeting signals within imported precursor proteins and selectively deliver them to their proper location. In the case of a matrix-targeted protein, the precursor has to be recognized on the cytosolic side of the outer mitochondrial membrane, transported across the membrane, forwarded to a second translocase in the inner mitochondrial membrane and, finally, to be transported across the inner membrane to be eventually released into the matrix. The signal, which targets proteins along this pathway, is referred to as presequence. In most cases, presequences are cleavable N-terminal amphipathic alpha helices, both necessary and sufficient for targeting.

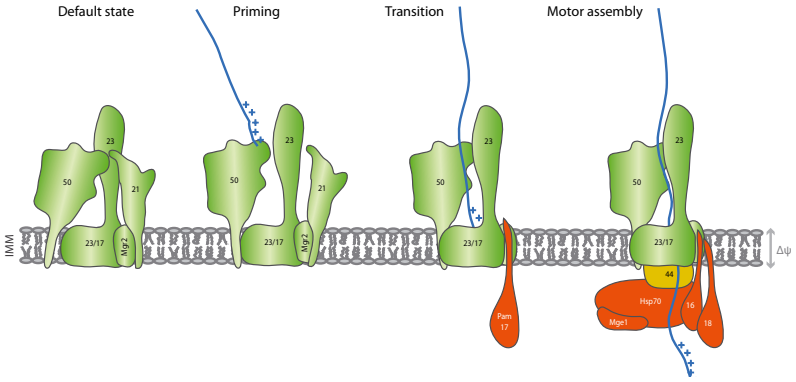

Fig. 1: Schematic representation of the presequence pathway. IMM, inner mitochondrial membrane; Δψ, membrane potential.

There are two protein complexes responsible for presequence recognition and translocation: The TOM complex in the outer and the TIM23 complex in the inner mitochondrial membrane. The TIM23 complex associates with a motor complex that drives protein translocation (PAM complex) in an ATP-dependent process. Most components of the translocation machineries are known (although new ones are still being discovered). However, it is still unclear, how they interact with each other and how these interactions contribute to protein translocation. Another, even more intriguing, question is the dynamic nature of the TIM23 complex. It has been suggested that

Droegemueller J, S**tegmann C**, Mandal A, Steiner T, Burmann B, Gottesman M, Woehrl B, Roesch P, Wahl M, Schweimer K (2013) An Autoinhibited State in the Structure of *Thermotoga maritima* NusG. Structure 21(3):365-375

Honigmann A, van den Bogaart G, Iraheta E, Risselada H, **Milovanovic D**, Mueller V, Muellar S, Diederichsen U, Fasshauer D, Grubmueller H, Hell S, Eggeling C, Kuehnel K, Jahn R (2013) Phosphatidylinositol 4,5-bisphosphate clusters act as molecular beacons for vesicle recruitment. Nat Struct Mol Biol 20(6):679

Javadi-Zarnaghi F, Höbartner C (2013) Lanthanide cofactors accelerate DNA-catalyzed synthesis of branched RNA. J Am Chem Soc 135(34):12839-12848

Juranek J, Mukherjee K, **Siddiqui T**, Kaplan B, Li J, Ahnert-Hilger G, Jahn R, Calka J (2013) Active zone protein expression changes at the key stages of cerebellar cortex neurogenesis in the rat. Acta Histochemica 115(6):616-625

Kari* V, **Karpiuk* O**, Tieg B, Kriegs M, Dikomey E, Krebber H, Begus-Nahrmann Y, Johnsen S (2013) A Subset of Histone H2B Genes Produces Polyadenylated mRNAs under a Variety of Cellular Conditions. PLoS One 8(5)

signal recognition causes translocase remodeling, including dissociation of some proteins from the translocase core and recruitment of others, but the nature and sequence of events is not known.

To understand how the translocase mediates precursor transport, we investigated dynamics of protein-protein interactions in the TIM23 complex in response to presequences. First, we analyzed interaction partners of Tim50, the primary presequence receptor of the TIM23 complex. Besides presequences, Tim50 is known to interact with the channel-forming translocase subunit, Tim23, and to regulate the open state of the channel. Using chemical cross-linking, we discovered a previously uncharacterized interaction of Tim50 with Tim21, one of the most dynamic TIM23 components. Surface plasmon resonance measurements performed with intermembrane space fragments of both proteins revealed that the Tim21-Tim50 interaction had a quite high affinity of approximately 260 nM, which is at least an order of magnitude higher than the Tim50-presequence interaction. Interestingly, this interaction was strongly dependent on the presence of the Tim23-channel protein, both in isolated mitochondria and *in vitro*. But what about the dynamics of the complex?

To address this question, we incubated intact purified mitochondria with presequence peptides and analyzed changes in protein-protein interactions. Addition of presequence peptides to isolated mitochondria induced dramatic changes within the translocase, including dissociation of Tim21 from Tim50 and an increased association of the Tim23-channel with Tim50. Moreover, while the amount of Tim21 that co-immunoprecipitated with the translocase in the presence of signal peptides was significantly lower, a motor constituent, Pam17, was recruited to the translocon. Based on these findings, we proposed a model of the early transport steps along the presequence pathway (Fig. 1). It starts with a default form, containing Tim21 tightly associated with Tim50, but no components of PAM. Presequence recognition by Tim50 (priming) increases association between Tim23 and Tim50 and leads to dissociation of Tim21, which, in turn, allows for recruitment of Pam17 (transition state) and subsequent PAM assembly.

Oleksandr Lytovchenko did his PhD under the supervision of Peter Rehling at the Department of Cellular Biochemistry, University of Göttingen Medical Center. He graduated from the Molecular Biology program in August 2012.

These results were published in EMBO J 32(6):886-898.

Khuong T, Habets R, Kuenen S, **Witkowska A**, Kasprowicz J, Swerts J, Jahn R, van den Bogaart G, Verstreken P (2013) Synaptic PI(3,4,5) P-3 Is Required for Syntaxin1A Clustering and Neurotransmitter Release. Neuron 77(6):1097-1108

Koepper* F, Bierwirth* C, Schoen M, Kunze M, Elvers I, Kranz D, Saini P, Menon M, Walter D, Sorensen C, Gaestel M, Helleday T, Schoen M, Dobbelstein M (2013) Damage-induced DNA replication stalling relies on MAPK-activated protein kinase 2 activity. Proc Natl Acad Sci USA 110(42):16856-16861

Kononenko N, **Diril M**, Puchkov D, Kintscher M, Koo S, Pfuhl G, Winter Y, Wienisch M, Klingauf J, Breustedt J, Schmitz D, Maritzen T, Haucke V (2013) Compromised fidelity of endocytic synaptic vesicle protein sorting in the absence of stonin 2. Proc Natl Acad Sci USA (6)

L**ytovchenko O, Melin J, Schulz C**, Kilisch M, Hutu D, Rehling P (2013) Signal recognition initiates reorganization of the presequence translocase during protein import. EMBO J 32(6):886-898

Control of the cell's splicing machinery

Dual regulation of spliceosomal RNA helicase Brr2 by Prp8 and links to retinal disease

The majority of eukaryotic pre-mRNA transcripts are embedded by long noncoding sequences (introns) that must be cleaved off, and the neighbouring coding sequences (exons) must be ligated to construct mature mRNAs that are directed for protein synthesis. This RNA processing event is carried out by the spliceosome, a large ribonucleoprotein (RNP) machinery composed of five small nuclear RNAs (snRNAs) and about 170 proteins.

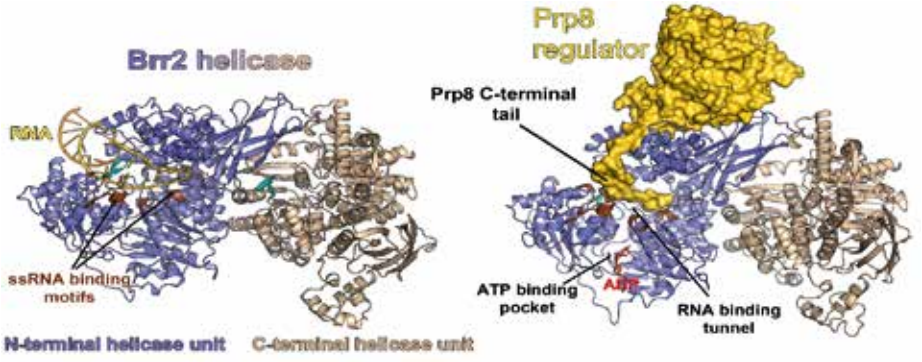

Fig. 1: Left: Modelled structure of the human Brr2 in complex with RNA substrate. Brr2 consists of an active N-terminal helicase unit (in blue) and an inactive C-terminal helicase unit (in wheat). Brr2 binds to ssRNA (in gold) through its N-terminal helicase central tunnel and removes any other base paired RNA as it walks along. Right: Crystal structure of Brr2 in complex with the C-terminal region of the splicing factor Prp8. The regulatory domain of Prp8 (in gold) docks onto the N-terminal helicase unit of Brr2, with its C-terminal tail penetrated into the RNA binding tunnel thereby, inhibiting Brr2 from binding to its RNA substrate. The conserved ssRNA binding motifs of Brr2 are shown in brown.

The spliceosome is initially assembled on the pre-mRNA in an inactive form, in which a spliceosomal snRNA (named U6), that acts as a main tool in the cutting process of introns, is kept inert. This is achieved by base pairing catalytically important sequences of U6 with another snRNA.

During the process of spliceosome activation, U6 is set free by a large spliceosomal protein, Brr2. Brr2 belongs to a family of RNA helicases, which are enzymes involved in various aspects of RNA metabolism and are known to unwind/remodel RNA duplexes. Brr2 contains two tandem helicase units, an N-terminal unit that shows helicase activity and an inactive C-terminal helicase unit that binds ATP and acts as an intramolecular cofactor for the N-terminal helicase unit.

Monecke T, **Haselbach D**, Voss B, Russek A, Neumann P, Thomson E, Hurt E, Zachariae U, Stark H, Grubmueller H, Dickmanns A, Ficner R (2013) Structural basis for cooperativity of CRM1 export complex formation. Proc Natl Acad Sci USA 110(3):960-965

Monecke T, **Haselbach D**, Voss B, Russek A, Neumann P, Thomson E, Hurt E, Zachariae U, Stark H, Grubmueller H, Dickmanns A, Ficner R (2013) Structural Determinants of Conformational Flexibility and Long-Range Allostery of the CRM1 Export Complex. Biophys J 104(2)

Mozaffari-Jovin S, Wandersleben T, Santos KF, Will CL, Lührmann R, Wahl MC (2013) Inhibition of RNA helicase Brr2 by the C-terminal tail of the spliceosomal protein Prp8. Science 341(6141):80-4

Pirouz M, **Pilarski S**, Kessel M (2013) A critical function of mad2l2 in primordial germ cell development of mice. PLoS Genet 9(8)

Sharif H, Ozgur S, **Sharma K**, Basquin C, Urlaub,H , Conti E (2013) Structural analysis of the yeast Dhh1-Pat1 complex reveals how Dhh1 engages Pat1, Edc3 and RNA in mutually exclusive interactions. Nucleic Acids Res 41(17):8377-8390

Albeit mechanisms of RNA displacement by helicases have been investigated in detail, our understanding of the mechanisms by which these enzymes are regulated as part of a larger complex is very limited. Since Brr2 functions as a core component within the splicing machinery, thus it calls for a tight control by other regulatory proteins.

We have discovered a novel mechanism whereby a key protein of the spliceosome, Prp8, regulates the function of Brr2. The C-terminal portion of Prp8 contains a globular domain that shows homology to deubiquitinating enzymes (enzymes that remove ubiquitin from their target proteins), though it has only retained the ability to bind ubiquitin.

We have shown that this domain interacts with the active N-terminal helicase unit of Brr2 and is essential for optimal helicase activity of Brr2. This Prp8 domain is followed by a protruding C-terminal tail which is of medical importance. Mutations in this region causes a disorder in the human retina, the so called retinitis pigmentosa (RP) that primarily affects rod photoreceptors leading to night blindness and even complete blindness at later stages.

Now our combined biochemical and structural investigations reveal that Prp8 inserts its C-terminal tail into the interior of the Brr2's RNA binding tunnel, and thus blocks RNA substrate binding to Brr2. In this way, Prp8 exerts a dual regulatory function on Brr2 and acts as a key that can intermittently switch Brr2 on and off during the splicing process.

In addition, we have experimentally shown that the RP-linked mutations in the Prp8 C-terminal tail impair this function of Prp8 as a regulator of Brr2, and as a result, misregulation of Brr2 activity may primarily disrupt the catalytic activation step of splicing. This could have a general negative effect on splicing in photoreceptor cells, or specifically disrupts the splicing of one or more pre-mRNAs leading to the development of RP disease phenotype.

Sina Mozaffari Jovin did his PhD under the supervision of Reinhard Lührmann at the Department of Cellular Biochemistry, Max Planck Institute for Biophysical Chemistry. He graduated from the Molecular Biology program in February 2013.

These results were published in Mozaffari-Jovin S, Wandersleben T, Santos KF, Will CL, Lührmann R, Wahl MC (2013) Science. 341:80-4.

Shema-Yaacoby E, **Nikolov M**, Haj-Yahya M, Siman P, Allemand E, Yamaguchi Y, Muchardt C, Urlaub H, Brik A, Oren M, Fischle W (2013) Systematic Identification of Proteins Binding to Chromatin-Embedded Ubiquitylated H2B Reveals Recruitment of SWI/SNF to Regulate Transcription. Cell Reports 4(3):601-8

Siksou L, Silm K, **Biesemann C**, Nehring R, Wojcik S, Triller A, El Mestikawy, Marty S, Herzog E (2013) A role for vesicular glutamate transporter 1 in synaptic vesicle clustering and mobility. Eur J Neurosci 37(10):1631-1642

Thakar* K, **Karaca* S**, Port S, Urlaub H, Kehlenbach R (2013) Identification of CRM1-dependent Nuclear Export Cargos Using Quantitative Mass Spectrometry. Mol Cell Proteomics 12(3):664-678

Volkov A, **Khoshnevis S**, Neumann P, Herrfurth C, Wohlwend D, Ficner R, Feussner I (2013) Crystal structure analysis of a fatty acid double-bond hydratase from *Lactobacillus acidophilus*. Acta Crystallogr D Biol Crystallogr 69:648-657

Will a bad memory kill you?

Control of epigenetic cellular memory by signaling factors

The first cloned mammal, Dolly The Sheep, was a scientific fluke. Only one of more than 200 embryos survived to become a viable embryo when the nucleus of an adult somatic cell was injected into an egg without a nucleus. The egg cell somehow managed to erase the cell's memory (epigenetic memory) and reprogramme the identity of the adult somatic cell.

In theory any adult cell can be reprogrammed and ultimately produce any other type of cell that might be required. The process for converting differentiated adult cells into stem cells was the subject of the Nobel Prize in 2012. The process involves induction of the pluripotency programme and erasure of epigenetic memory.

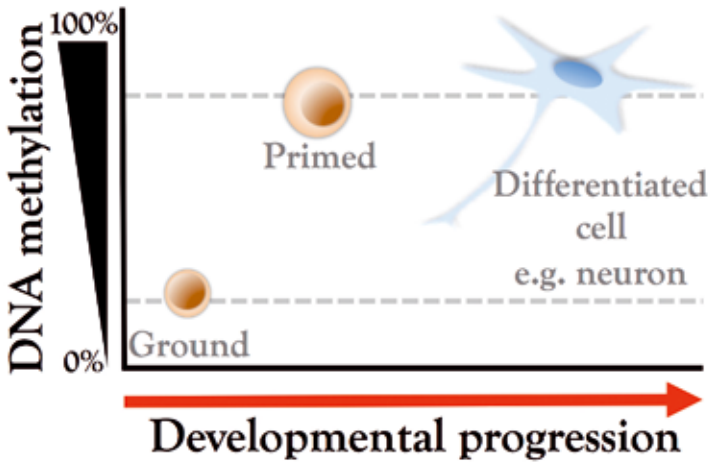

Fig. 1: Relationship between genomic DNA methylation and developmental progression; the global methylation level of naive stem cells (Ground) is low and increases as cells start to differentiate. Primed stem cells are starting to exit from pluripotency and have established a DNA methylation pattern characteristic to the lineage they will differentiate into.

The 'memory' of the adult cell (good or bad) is not always completely erased, and as a result the reprogramming is not always perfect. Problems in differentiation lead to a poor survival rate of cells, or worse, to run-away replication and cancer.

The full erasure of this 'cellular memory' has been the topic of my research. The model system I used was the mouse embryonic stem (ES) cell, which was derived 30 years ago by Martin Evans. A number of empirical culturing conditions are used to keep the cells pluripotent and proliferating. It was thought that ES cells needed stimulatory signals from the culturing environment to keep them pluripotent. More detailed analysis revealed that ES cell populations were heterogeneous in gene expression, and some sub-populations

Wirth M, **Karaca S**, Wenzel D, Ho L, Tishkoff D, Lombard D, Verdin E, Urlaub H, Jedrusik-Bode M, Fischle W (2013) Mitochondrial SIRT4-type proteins in *Caenorhabditis elegans* and mammals interact with pyruvate carboxylase and other acetylated biotin-dependent carboxylases. Mitochondrion 13(6):705-720

Weber G, Cristão VF, Santos KF, **Jovin SM**, Heroven AC, Holton N, Lührmann R, Beggs JD, Wahl MC (2013) Structural basis for dual roles of Aar2p in U5 snRNP assembly. Genes Dev 27(5):525-40

Zhang H, Park S, Pantazides B, **Karpiuk O**, Warren M, Hardy C, Duong D, Park S, Kim H, Vassilopoulos A, Seyfried N, Johnsen S, Gius D, Yu D (2013) SIRT2 directs the replication stress response through CDK9 deacetylation. Proc Natl Acad Sci USA 110(33):13546-13551

contributed more effectively to the embryo when they were injected into the blastocyst.

But recently it was found that ES cells exist in two defined states: primed and ground. Ground state pluripotency was introduced by Prof. Austin Smith's lab in 2008 (Ying et al., Nature 2008). The Smith lab found that if differentiation related pathways are inhibited while maintaining biosynthetic capacity (through inhibition of Fgf4-Erk1/2 and Gsk3β pathways, also called 2i inhibition), cells transit into the ground state. The ground state is characterized by slower proliferation, homogeneous population and decreased cell size. Primed cells are heterogeneous, and contain epigenetic information on the verge of differentiation and proliferate more quickly.

The primed and ground pluripotent states raised my interest in terms of their distinct epigenetic mechanisms in maintaining pluripotency. To my surprise I found that ES cells in the ground state had their genomes demethylated (see Figure 1). This demethylation was in part a result of oxidation of DNA methylation upon 2i signal inhibition. I found that components of the methylation machinery were suppressed and identified a signaling-responsive element upstream of the promoter region of Dnmt3b (a de-novo methyltransferase). One of the factors involved in mediating this response was Prdm14. This genome-wide demethylation was complete in 7 days. Although most of the genome was wiped of methylation some regions were resistant, such as the imprinted genes, major satellites and IAP retro-elements, a methylation pattern compatible with genomic stability and normal development.

Insight into how the full genome can be demethylated by signaling factors has future relevance in induced pluripotent (iPS) reprogramming and therapeutic applications. View the published work Ficz et al., Cell Stem Cell 2013 for more results on this study.

My current work at the Barts Cancer Institute in London extends this learning into the area of cancer initiation, where I am investigating the link between the aberrant epigenetic memory and the initiation of cancer – my hypothesis is that a bad (epigenetic) memory can kill.

Gabriella Ficz did her PhD with Donna Arndt-Jovin at the MPI for Biophysical Chemistry. She graduated from the Molecular Biology program in July 2005. After postdoctoral research at the Babraham Institute, Cambridge, UK she has been appointed a Lecturer and Group Leader at the Barts Cancer Institute, Queen Mary University, London.

These results were published in Cell Stem Cell, 2013, 13(3):351-359.

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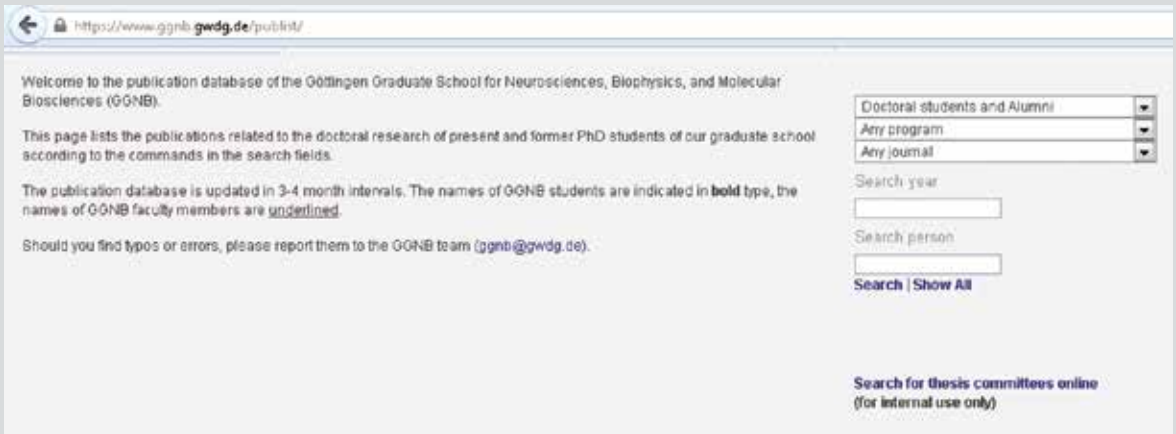


New Students

Master‘s class 2013/14

Arshiya Bhatt, India
BSc from Sri Venkateswara College, University of Delhi

Marc Böhning, Germany
BSc from Technical University of Munich

H. Alice Buchner, Germany
BSc from University of Erlangen-Nürnberg

Priyanka Choudhury, India
MSc from University of Delhi

Ridhima Gomkale, India
MSc from University of Delhi

Sebastian Grosse, Germany
BSc from University of Göttingen

Martin Helm, Germany
BSc from University of Erlangen-Nürnberg

Damian Hernandez, USA
BSc from University of Miami

Prajwal Karki, Nepal
MSc from University of Mysore

Ina Klusmann, Germany
BSc from Royal Holloway, University of London

Melina Köppelmann, Germany
BSc from University of Göttingen

Natalia Korniy, Ukraine
BSc from Ivan Franko National University of L‘viv

David López de la Morena, Spain
BSc from Universidad Complutense de Madrid

Sebastian Ludwig, Germany
BSc from University of Göttingen

Indira Memet, Romania
Bsc from University of Bucharest

Elizabeth Miller, USA
BSc from Gettysburg College

Sara Osman, Egypt
BSc from German University in Cairo

Marija Radovanovic, Serbia
BSc from University of Belgrade

Frank Richter, Germany
BSc from Jacobs University Bremen

Alan Rodriguez, Mexico
BSc from University of Swansea

Kashish Singh, India
BSc from Sri Venkateswara College, University of Delhi

Minhui Su, P. R. China
BSc from Hong Kong University of Science and Technology

Vedran Vasic, USA
BSc from University of Wisconsin-Madison

Applications 2013

In the year 2013, the Molecular Biology program received 523 applications from 63 countries.

Germany 33
other Western Europe 36
Eastern Europe 26
North America 17
Central/South America 18
North Africa 45
Central/South Africa 39
Asia, Near East 46
Asia, Far East 263

PhD projects started in 2013

Stefan-Sebastian David
Systematic analysis of histone ubiquitylation in the context of chromatin.
Wolfgang Fischle, Heinz Neumann, Claudia Höbartner

Manuel Maidorn
New affinity probes enhance super-resolution imaging accuracy in biological samples.
Silvio Rizzoli, Peter Rehling, Mikael Simons

Kanika Vanshylla
B cell antigen receptor signaling in class switsched memory B cells and ist evolutionary origins.
Jürgen Wienands, Matthias Dobbelstein, Roland Dosch

Kolja Eckermann
Genetic engineering of a killing-sperm system to improve the sterile insect technique.
Ernst Wimmer, Andreas Wodarz, Roland Dosch

Nataliia Naumenko
Protein dynamics of the mitochondrial import motor.
Peter Rehling, Blanche Schwappach, Reinhard Lührmann

Arturo Vera Rodríguez
In vitro evolution of proteins with new functionalities by ribosome display.
Dirk Görlich, Marina Rodnina, Heinz Neumann

Shrutee Jakhanwal
Regulation of the neuronal SNARE complex by accessory proteins.
Reinhard Jahn, Claudia Steinem, Silvio Rizzoli

Alexander Schendzielorz
Protein interactions and dynamics of mitochondrial presequence receptors.
Peter Rehling, Marina Rodnina, Dirk Görlich

Ahmed Warda
Functional characterization of Emg1 in Bowen Conradi syndrome.
Markus Bohnsack, Dirk Görlich, Jörg Stülke

Mahdokht Kohansal Nodehi
Study of the effect of phoshorylation on the function of presynaptic proteins.
Reinhard Jahn, Henning Urlaub, Jürgen Wienands

Katharina Seitz
Quantitative analysis of synaptic membrane trafficking.
Silvio Rizzoli, Halyna Shcherbata, Michael Thumm

G. Nicolás Lemus Díaz
Cellular mechanisms of the biogenesis of small gene regulatory RNA molecules.
Jens Gruber, Reinhard Lührmann, Halyna Shcherbata

Daryna Tarasenko
Towards targeted delivery of siRNAs with virus-like particles.
Lutz Walter, Stefan Pöhlmann, Jörg Stülke

External MSc projects

Toni Bäumler
Molecular investigation on the roles of SIBLINGs and possible SIBLING modifiers in cancel cell migration and dissemination; supervised by Göran Andersson, Karolinska Institutet, Stockholm, Sweden

Anne-Sophie Ernst
Signaling contributions of CD14 in TLR4-challenged microglia; supervised by Uwe-Karsten Hanisch, University Mehdical Center, Göttingen, Germany

Graduated Students

The Masters of 2013

Gurneet Braich (*Ivo Feußner*)
Identification of a novel fatty acid dioxygenase from green algae.

Kolja Eckermann (*Ernst Wimmer*)
Establishment of pre-requisites for the genetic engineering of a killer-sperm system to improve the sterile insect technique.

Evgeniia Edeleva (*Halyna Shcherbata*)
miRNAs in *Drosophila* model for muscular dystrophy.

Muna Ayesha Khan (*Boris Görke*)
The regulatory sRNA GlmY/GlmZ cascade in *Escherichia coli*: A potential target for antimicrobial chemotherapy and a model system for studying the RNA binding properties of chaperone Hfq.

Mahdokht Kohansal Nodehi
(*Henning Urlaub*)
Comparison between phosphorylation statuses of presynaptic nerve terminal proteins in different physiological conditions by in-depth phosphoproteomics.

Lena Musiol (*Blanche Schwappach*)
WRB knockout microsomes as a tool to test TRC40 dependency of mammalian tail-anchored proteins.

Sabin Prajapati (*Kai Tittmann*)
Structure and dynamics of the core of human pyruvate dehydrogenase multienzyme complex.

Emmanuel Reyna Gonzalez
(*Ivo Feußner*)
Comparative analysis of the lipidome of *Lobosphaera incisa* and *Phaeodactylum tricornutum*.

Katja Rust (*Andreas Wodarz*)
Analysis of domino, a potential bazooka binding partner in *Drosophila* neuroblasts.

Katharina Seitz (*Rolf Daniel*)
Identification and characterization of nitrilases from environmental samples.

Sumana Sharma
(*Julian Rayner, Wellcome Trust Sanger Institute, Cambridge, United Kingdom*)
Plasmodium falciparum erythrocyte invasion: Screening for novel protein-protein interactions.

Anita Smarandache (*Tomas Pieler*)
CPEB and germ cell development in *Xenopus laevis* embryos.

Kanika Vanshylla (*Jürgen Wienands*)
Evolutionary origins of the immunoglobulin tail tyrosine motif and ist effect on transcriptional regulators in antigen activated B lymphocytes.

Arturo Vera Rodríguez (*Dirk Görlich*)
An *in vivo* selection system for evolving a SUMO/SUMO specific protease pair with orthogonal specificity.

Olena Zaitseva (*Lutz Walter*)
Analysis of human KIR gene transcription at single-cell level.

The Doctors of 2013

Neva Caliskan
Mechanisms of programmed ribosomal -1 frameshifting in bacteria.
Marina Rodnina, Holger Stark, Ralf Ficner

Hema Chug
Biochemical characterization of the Nup62•58•54 nucleoporin complex and mutational analysis of the exportin CRM1.
Dirk Görlich, Reinhard Lührmann, Peter Rehling

Carlos Eduardo da Cunha
Dense-core vesicle maturation at the Golgi-endosomal interface in *Caenorhabditis elegans*.
Marina Rodnina, Kai Tittmann, Holger Stark

Aliaksandr Dzementsei
Role of cellular dynamics, adhesion and polarity in the context of primordial germ cell migration in *Xenopus laevis* embryos.
Tomas Pieler, Andreas Wodarz, Michael Kessel

Fatemeh Javadi Zarnaghi
Functional characterization and application of 2',5'- branched RNA forming deoxyribozymes using lanthanides as cofactors.
Claudia Höbartner, Reinhard Lührmann, Kai Tittmann

Koray Kirli
Exploration of cargo spectrum and NES patterns recognized by the exportin CRM1.
Dirk Görlich, Reinhard Jahn, Kai Tittmann

Karen Linnemannstöns
The transmembrane receptors Otk and Otk2 function redundantly in *Drosophila* Wnt signal transduction.
Andreas Wodarz, Annette Borchers, Reinhard Schuh

Wen-ti Liu
Strategies to stabilize RNP complexes for structural determination by 3D cryo-electron microscopy.
Holger Stark, Marina Rodnina, Kai Tittmann

Sina Mozaffari Jovin
Mechanism of regulation of spliceosome activation by Brr2 and Prp8 and links to retinal disease.
Reinhard Lührmann, Ralf Ficner, Reinhard Jahn

Sinem Saka Kirli
Studying protein organization in cellular membranes by high-resolution microscopy.
Silvio Rizzoli, Michael Kessel, Mikael Simons

Christian Schulz
Protein interactions along the presequence import pathway.
Peter Rehling, Kai Tittmann, Dirk Görlich

Olena Steshenko
Lipid organisation and dynamics in the myelin membrane sheets.
Mikael Simons, Silvio Rizzoli, Jörg Enderlein

Life is never boring in Canada

When we first came to Toronto 5 years ago, a lot of things seemed weird – ugly urban design, littered subway, crazy prices for mobile phones and suspiciously efficient government bureaucracy (we had to come in person just once to get our pictures taken, the rest was done by mail and internet, including visas and birth certificate for our daughter). Since then we survived a garbage strike, when the whole downtown turned in one giant dumpsite, a couple of blackouts due to snowfall, rainfall, freezing rain (in progress as of today), most recently a crack-smoking major… you get the picture, life is never boring in Canada.

At work, I was happy with my choice of postdoc project, which was a switch from lipid biochemistry to virology, vaccines and antibodies. The hard part was the realization that you are not a very talented and special Molbio student anymore and that all these nice things like counselling, organized social events, peer support were in the past. I am lucky to have a geeky husband who had no trouble finding a job in IT, so we were secure financially. But looking back I wish I had better ideas about two things: funding and a back-up plan.

Inside of Grand-Prix of Canada – we were the lucky winners of two-day passes to paddock and had a chance to view the F1 race from the pit lane.

Flatiron Building in downtown Toronto

A very brief description of how to run a lab at the University of Toronto: the administration pays your salary and provides you a room with electricity and running water. The equipment and people in this room must be paid from your grants, forcing you to make a lot of compromises. My supervisor was very open about funding issue and we applied for several fellowships, but it was difficult to make a strong case since I was not experienced in grant writing and his lab lacked convincing results as they had just shifted into new research area. I had to generate solid preliminary data and submit funding proposals within the first year of the postdoc, which did not work because nor cells, neither crystals were growing.

Suddenly, two years were gone and the lab was running out of money. I had solved my X-ray structure thanks to the mixture of good luck and perseverance and saw the modelled protein on the screen just a week before leaving the lab. Now was the time for a back-up plan, which I did not have. There was in general very little support for postdocs at U of T (in 2012 postdocs actually went to court in order to be recognized as university employees), I guess this situation is not unique to North America. So I was on my own and started to apply to industry jobs, but by the time I had an offer from Sanofi Pasteur I was ready for maternity leave and soon our daughter Zora was born.

I had a job at Sanofi two years later and had only one regret: that I did not consider industry right after finishing my PhD. There is this common opinion that industry is for those who are not hard-core enough to be "real scientists". But from my current perspective academia is extremely individualistic, it is always about "my project", "my paper", "my brilliant ideas" and so on. You are always racing with competitors and many discussions turn into quest for intellectual dominance rather than solving a problem. To be sure, there is intense pressure and competition in industry as well, but the big difference

Alena Liavonchanka
did her PhD with Ivo Feußner in the Dept. of Plant Biochemistry at the University of Göttingen where she graduated in 2007. She moved to Canada in 2008 to work as a postdoctoral research fellow at the University of Toronto. Afther a short family break, she assumed the position of a validation manager at Sanofi Pasteur Toronto.

Camping in Sandbanks Provincial Park

Christmas 2013 at home – Alena, Zora and Andrei

for me was the culture of collective decision-making (the drawback being that sometimes nobody has the authority to make a decision).

My biggest fear before the first job interview was that I had no training whatsoever in engineering, business, communications or any other industry-relevant skills. As it turned out, they mainly were looking for the ability to integrate in a big team of very diverse specialists, because there are rarely purely technical projects and most of the times you have to keep in mind manufacturing schedules, finance, legal issues, time management and communicate with the respective departments on daily basis. So you learn a lot and at least at Sanofi they encourage you to change directions and provide plenty of opportunities for personal development, without the pressure of publishing and getting a tenure.

I am sure many Molbios and Neuros faced similar challenges, in fact, reading the stories of fellow IMPRS graduates in social media and in this bulletin was a big support during my transition times. And I am also sure that many of you had this thought at some point: "Man, wasn't I lucky to have these four years of IMPRS experience, otherwise it would be so much harder to cope with the life outside of the lab".

To the current students I would say: not everything is measured in impact factors and though it sounds heretical, you can have a very fulfilling life if you include all your passions in the equation and look for the options outside of academia without the sense of underachievement.

Yours to Discover ...

"Ontario. Yours to discover" – the first slogan you see on pretty much every car's license plate after landing in Pearson International Airport and driving along a permanently overcrowded highway. At some point you even start wondering what one can discover in the province, which is 3 times larger than Germany, but has only about 13 million inhabitants, half of which is living in Toronto and its suburbs (here it is called Greater Toronto Area or GTA). Anyway, "Yours to discover" slogan we kept seeing everywhere, eventually encouraged us to explore the place a bit further.

Taking into account, that I have never considered myself as a "big city person", I will not be saying much adoration to the 550 m high CN tower, the variety of museums or the world longest Younge street. Instead I would rather like to share my excitements about another part of Ontario, which I have discovered for myself, the part called "National and Provincial parks".

As I have already mentioned, Ontario, and Canada in general, can barely be called an overpopulated land. But one can really be amazed how dry statistical data can come into a real life, when you get inside the car and drive 300 km any direction from Toronto. If you were brave enough to do so, then within a couple of hours you could find yourself in a totally different world, surrounded by a multitude of woods, picturesque lakes, beautiful hills, thousands of kilometers of hiking trails and canoe routes, and sometimes no people around.

Iryna Shnitsar

Yours to Discover ... (continued)

Of course, besides stunning views, there is a lot of wildlife, which, quite often, is totally fearless with human beings. So fearless, that you eventually stop being surprised when a chipmunk steals a cookie right from your hand or when you spot a raccoon (and hopefully, not a bear) looking through garbage cans in the middle of a day. In summary, there are 3 words I could describe Canadian nature with: "It's simply amazing."

Obvisouly, there were other things besides camping I managed to discover in Ontario. Among them was the lab, which I chose for my postdoctoral training. Although, instead of woods, I found myself surrounded by a multitude of high-rise buildings in the heart of Toronto downtown, I cannot say I was enjoying it less, when I saw the facilities and research opportunities I encountered here.

As funny as it may sound, but it feels like the prefix "high" can be attached anywhere. Several robotic systems, equipped with microscopes, to perform high-throughput analysis, confocal systems to do high-speed or high-resolution imaging, excellent electron microscope facilities, huge mass-spectrometry facility and much more high-technology devices served for research needs. Besides this, I was lucky enough to have friendly and helpful lab mates, who came from all corners of the world. Of course, we also have some lab "wildlife" inhabiting a contemporary mouse facility.

Iryna's daughter Bohdana

Camping at Mazinaw Lake

Another discovery, I was a bit anxious about, while boarding on the trans-Atlantic flight, was what I call "paper works". Having an experience of what it means to start a life in a new country (and here, in probably hundred and first time I have to acknowledge the great work Steffen is doing for all foreign IMPRS students, that made us feel so comfortable in Göttingen), I kept wondering how long will it take us to accomplish all small but vital tasks such as registering for social and health insurances, bank accounts etc in Toronto. To my great relief we were done in less that two days, and even managed to register my daughter for school in that short period of time. Moreover, after two years in the country, we could apply for and received permanent residency, which made the rest of "paper works" even easier.

Our fourth discovery was the food. Initially, I was a bit disappointed by what we encountered in a nearby supermarket, especially in regards to cheese, yogurts and bread products, and especially after we spent several years in Germany. Fortunately, in a couple of months (of course not without the help from friends and colleagues) we discovered a many stores, offering wide variety of pretty much all products we liked.

Needless to mention, that Toronto is truly an international city where you can find any country-specific foods starting from authentic Japanese sushi or smoked octopus in Chinatown to Little Italy's ice-creams or borsch with dumplings in the Ukrainian-Polish part of the city. So, at the end all food troubles were overcome by longer driving distances during grocery shopping.
Finally, I have to admit that the "Yours to discover" slogan makes sense. And I am pretty sure there are more things to discover here starting from stunning views along Lake Superior shores and to the life opportunities this country is offering.

Iryna Shnitsar did her PhD with Annette Borchers in the Department of Developmental Biology (Tomas PIeler) at the University of Göttingen. She graduated from the Molecular Biology program in December 2009. Since February 2010 she works as a postdoctoral research fellow at the Mount Sinai Hospital / Lunenfeld-Tannenbaum Research Institute, Toronto.

My new home: Canada

Who would have thought I would end up living in Canada? Actually, I was only about 18 years old when this idea crossed my mind for the first time, however I was really just dreaming about snowboarding all year long in the Rocky Mountains. Well, I was 31 years old when I finally set foot on Canadian ground to do a postdoc in Toronto. Funny enough, until today, I have not yet once stood on my snowboard in Canada. Believe it or not, there are no mountains close to Toronto.

Sure, some things have changed since I was 18; I actually came to Canada to work and not just to spend time on my snowboard. But, let's rewind a little bit. After I graduated from the MolBio program in 2006, I worked a little longer on germ cell migration in the lab of Erez Raz. No doubt I had a great time, however, I was looking forward to changing gears and moving in another direction. I wanted to invest my energy and passion into cancer research. I accepted an offer to do a postdoc in 'The Campbell Family Institute for Breast Cancer Research' (CFIBCR), one of the best cancer research institutes in Canada located in the renowned Princess Margaret Hospital. The first few years in Toronto were great. I made a lot of new friends from around the globe and I was motivated to do great science.

Unfortunately, things changed. As we all know, science does not always work in our favour as either Mother Nature proves us wrong, or a project that was once interesting doesn't seem to trigger a single spark anymore in the eyes of your reviewers or your boss. Oh well, one can call that science. So I tried to keep my spirit up and continued working hard for what I thought was worth it.

In such situations, one might say, 'just get up and keep going', but I had realized after a while that I had reached the end of the road doing research in an academic setting. I became aware that I no longer enjoy much of what academic research is all about nowadays. Ultimately, I had to switch gears again to move on. Fortunately, I got a great opportunity to keep working for the CFIBCR in collaboration with a biotech company. During the last few years, I have been working exclusively on finding new therapeutic targets that could lead to marketable products against cancer. I am also considering entering an MBA program that would give me more options for moving into the industry.

Heiko Blaser, his partner Krista, and their son Elijah

Bottom line, I don't regret my time as a postdoc as it taught me a valuable lesson: to be able to move on it's sometimes easier to know what you don't like instead of trying to figure out what you do like. Luckily, life is not all about work. Since I have a wonderful family including two dogs and a cat in our own house in an amazing country, I can clearly say that I know what life is really about and perhaps it's about time to ride my snowboard in the Rocky Mountains.

Toronto skyline as seen from Lake Ontario

Heiko Blaser did his PhD under the supervision of Erez Raz in the Germ Cell Development Group at the Max Planck Institute for Biophysical Chemistry, and later at the University of Münster. He graduated from the Molecular Biology program in 2006. Since 2008, he works as a postdoctoral research fellow at the Campbell Family Institute for Breast Cancer Research in Toronto, Canada.

The Emmy Noether Program

Funding for starting laboratory leaders

The Emmy Noether Program of the German Research Foundation DFG aims to recruit early career researchers to Germany, and it provides generous funding for a period of five years to starting laboratory leaders. Postdocs with international experience can apply, and there are no submission deadlines. Funding decisions are made on the basis of written reviews and an interview of the applicant with a review board of the DFG in Bonn. It takes approximately six months from application to decision, and the success rate for funding is around 20%.

I obtained an Emmy Noether Award in 2012 and started my research group at the Max Planck Institute for Developmental Biology in Tübingen in 2013. How did I get there? My research career followed the typical trajectory of a career in science. I did my undergraduate studies in Göttingen and Berkeley

from 1999 to 2004 and got particularly intrigued by one scientific question during this time: How do cells make decisions, and how are their decisions influenced by signals they receive from other cells? It became clear to me that I wanted to pursue an academic career with this question as my research theme. Following MSc research on the transcriptional output of a signaling system in Jim Darnell's lab at the Rockefeller University in New York, I started my doctoral work in Martin Zeidler's lab at the Max Planck Institute for Biophysical Chemistry in Göttingen. Together with Michael Boutros and colleagues at the German Cancer Research Center in Heidelberg, we performed a genome-wide RNAi screen to identify novel regulators of a signaling system with conserved functions in fruit flies and human cells. I received my PhD from the International Max Planck Research School in 2007 and was honored with the Otto Hahn Medal of the Max Planck Society, which further encouraged me to pursue an academic career.

Patrick Müller

During postdoctoral studies as an EMBO and HFSP fellow in Alex Schier's lab at Harvard University, I studied signaling-mediated pattern formation during development using experimental and theoretical approaches. I then applied to a handful of institutions and obtained an Emmy Noether Award in 2012. In 2013, I joined the Max Planck Institute for Developmental Biology in Tübingen as an independent investigator, where my group started to combine genetics, embryology, biophysics, and theoretical approaches to understand how signaling molecules pattern developing embryos and tissues. Since 2013, my research group is additionally supported by an HFSP Career Development Award. While I keep a lot of time free for my own research at the bench, I now enjoy new responsibilities beyond the laboratory: selecting applicants, building an effective team, and teaching the new generation of scientists.

It can take 10 to 15 years of higher education to become an independent investigator, and for most of us there are no shortcuts along the way. Developing my research theme, cellular communication, early on in my career made my work enjoyable throughout and helped me to keep my fascination for academic research during this long training phase. There are still many open questions in my field of research, and I am grateful that I can continue to explore these questions in my own laboratory with the support of the Emmy Noether Program.

Patrick Müller did his PhD with Martin Zeidler at the MPI for Biophysical Chemistry. He graduated from the Molecular Biology program in March 2007. After several years of postdoctoral research at Harvard University, he has been awarded an Emmy Noether Fellowship in 2012, started his lab at the Max Planck Institute for Developmental Biology in 2013, and since 2014 is heading a research group at the Friedrich Miescher Laboratory of the Max Planck Society in Tübingen.

Advancing towards the frontiers of science

In my January 2011 article for the Molecular Biology Newsletter, titled „Operating Far Behind the Frontiers of Science". I recounted my two years of experience doing science in Ghana. The months and weeks following this moment of deep soul searching brought me to the point where I had two clear choices, to stay or to leave Ghana in pursuit of my scientific career. I decided to make the most of my stay in Ghana and use my training in Göttingen to prove to myself that I got something to contribute, something that is worth going the long haul.

The first set of positive developments started to trickle in by the middle of 2011, two short-term postdoctoral fellowships by the EMBO and SNSF allowed me to study mass spectrometry-based proteomics at the ETH-Zurich. After the six-month research stay in Zurich, I had the impetus to apply for many research grants, while at the same time consolidate my new research area.

I envisioned for myself a research goal of working towards a world without drug resistant infections. This means I will combine concepts of Infection Biology, Microbiology, Mycology, Natural Product Chemistry, Proteomics and Protein Biochemistry and Cell Biology/Imaging to discover new chemical entities with uncommon structures and mechanisms of action.

In 2012, all but one of the many research grant applications succeeded. DAAD provided an equipment grant, which meant that I could expand my ongoing work of screening fungal metabolites for antimicrobial activities even without any other research funding. Based on the interesting preliminary data generated, I continued to apply for many diverse research grants and fellowships.

My idea is to set up a research laboratory, which is equipped sufficiently well to conduct the kind of research that will ensure that we achieved our goals in the end. I also feel compelled by the excellent training I received in Göttingen to dare and persist more in an environment where everything has got to be done by me.

Patrick Kobina Arthur

My major motivation has also been the many excellent scientists I interacted with in Göttingen, who have done well for science and humanity. I wish to also benchmark my own achievements by the levels of achievement obtained by my mates in Göttingen, eventhough they may be working in an environment unlike mine.

In 2013, I have won a number grants and fellowships, the most exciting one is from the Grand Challenges Canada. This year 2013 also brought me exciting honours such as a selection to attend the Lindau Nobel Laureate Meeting and the World Economic Forum meeting in Dalian, China.

To cap an awesome 2013, our team at Department of Biochemistry, Cell and Molecular Biology at the University of Ghana won a World Bank grant to set up an African Center of Excellence in Cell Biology of Infectious Pathogens. This means we now have the opportunity to move towards the frontiers of science and to make a unique contribution to fighting infectious diseases in Africa and the world. Join us in this pursuit.

Patrick Kobina Arthur
graduated from the Molecular Biology Master's program in March 2003. He continued with a doctoral thesis under the supervision of Tomas Pieler in the Department of Developmental Biochemistry, University of Göttingen Medical Center and reveived his doctoral degree from the University of Göttingen in 2008. He returned to his home University of Ghana in Legon-Accra, where he holds the position of a lecturer since 2009.

Deliverables: Delivery

After submitting my PhD thesis late in 2004 (my personal Christmas present) I stayed in Göttingen through 2005 for closing some on-going projects. Also, one task was to find a nice place to go for a PostDoc together with my wife. Making a decision on where to go was largely motivated by finding a place, where RNA interference is used as a tool for therapy development and *in vivo* studies, preferably in the field of infection biology.

After seeing a number of labs around Europe it turned out to be Ben Berkhout´s lab in Amsterdam. Very nice atmosphere, beautiful location and an interesting topic – RNAi based HIV-therapy research. But before starting at the Academic Medical Center of the University of Amsterdam it was necessary to apply for funding. Fortunately, I was successful with an application for a research fellowship from the DFG (German Research Council).

MRB Group (from left to right): Ellen Eckermann-Felkl, Jens Gruber, Astrid Backhaus, Stefan Lüdtke, Nicolas Lemus, Kai Böker

During the writing and waiting phase I accidently (or rather luckily) got to know Ingo Wilke, a very bright and very active scientist. We met in the horse clinic where my wife used to work at that time and I learned that he cooperated on a drug delivery tool with Wolfgang Lüke from the German Primate Center (DPZ). This get-together should have a major impact on many aspects of my later work-life. The two guys were working with recombinant virus like particles (VLPs) that are capable of transporting various "goods" into target cells – obviously perfect for RNAi. So even before moving to Amsterdam we did the initial experiments and succeeded.

Starting in Amsterdam I enthusiastically tried to apply the VLP-technology in anti HIV-RNAi. The crucial question was always: How to get synthetic siRNAs into the cells you want to cure, manipulate or protect...

Retrospectively not the best idea I had so far, since the lab´s focus was therapeutic shRNA/miRNA expression in lentiviral systems, making me a one-man show for the alternative approach.

Briefly, besides expressing antiviral miRNAs and studying off-target effects in human cells I could not quite let the VLP-idea go. In my spare time and with assistance from Germany we further developed the VLP-system, achieved delivery of siRNAs into T-cells and reached full inhibition of HIV-1 in cell lines and primary cells, then even filed a patent application. I was also involved in founding a biotech start-up, but that´s a different story and an epic fail is probably not well situated in a "Scientific Career" section.

Late in 2008 I returned to Göttingen and joined Lutz Walter in the Lab for Primate Genetics at the German Primate Center to study the interplay of retroviruses like HIV with small non-coding RNAs inside the host cells. Conducting the work in this project allowed me to gather new insights into the biology of RNAs and that there is much more to their multiple functions than being used for RNAi.

However, during the late phase of this postdoctoral project it became more and more clear, that the Primate Centre is highly interested to continue its successful line of VLP-research. Due to a very prosperous technology transfer policy it was possible to finance a research group from patent fees.

After the tragic death of Prof. Lüke in 2009 there was not much expertise left to follow up on the development of the VLPs for targeted drug delivery and, a blessing in disguise, I was appointed to head the junior research group "Medical RNA Biology". A big chance, but at the same time a big responsibility. At last having a chance to bring the VLP-work forward and to combine it with my favourite

research topic, splendid! But on the other hand: suddenly responsibilities for budget and personal, things I was not really prepared for. Luckily, I was accepted to join the "Young Leaders in Science" Program supported by the Schering Foundation, a program that is addressing crucial topics for scientists confronted with a "leading" situation for the first time. The training covered project-, personal- and budget-management, conflict-communications, work-life balance, PR, recruiting strategies and more. That helped a lot, at least in theory. Real life is of course different and I am still spending time on learning by doing.

When starting the new group in 2013 the most important thing in my eyes was to find the right people. And again luck was on my side; two technicians joined me from the Genetics Lab. Finding good PostDoc and PhD candidates was not as easy but after all it was a fun experience and ended in a team I could not wish any better. In particular Stefan Lüdtke, coming as a PostDoc from GGNB, is an asset to the team in many aspects, scientifically, socially and being a counterpart to me.

Now things are rolling and we are applying the VLPs in various animal studies to perform experimental therapies against diseases as diverse as osteoporosis and HIV-infection.

In the end I am more than happy that I am back in Göttingen and right now looking forward to move into a new building of the DPZ, setting up a brand new lab. Lastly, we are now involved in neurobiology providing a technology platform for Neuro-Optogenetics in the DPZ. We are just about to start recruiting of new people on PhD- and PostDoc-level. New challenges are around the corner and our deliverables: delivery!

Jens Gruber did his PhD with Mary Osborn at the MPI for Biophysical Chemistry. He graduated from the Molecular Biology program in February 2005. After two years of postdoctoral research at the University of Amsterdam he returned to Göttingen to join the lab of Lutz Walter at the German Primate Center (DPZ). Since 2013 he is heading his own research group at the DPZ.

Current profession and location of our PhD alumni

Profession

Academia / Research
Professors, permanent staff positions: 14 %
Postdocs: 57 %
Science management, public relations: 6 %

Private Enterprise
Consulting: 3 %
R&D scientists, lab heads: 14 %
Management: 10 %
Patent attorneys: 2 %

Other
e.g. other professions, family management, job applications: 4 %

Country Distribution

Europe
Germany: 54 %
United Kingdom: 7 %
Switzerland: 5 %
Denmark: 2 %
Estonia: 1 %
Netherlands: 1 %
Spain: 1 %
Turkey: 1 %

North America
United States: 15 %
Canada: 5 %

Asia / Australia
Singapore: 2 %
Australia: 1 %
Bahrain: 1 %
India: 1 %
Iran: 1 %
P. R. China: 3 %

An entire change – with a baby to China

Last September I left the universe of important scientific questions, the struggles with non-functioning experiments and the worries about grants, papers and the future behind and boarded a plane to China – just 4 weeks after our daughter Nila was born. My husband had changed the job within his company and this involved moving to Nanjing, a rarely known city 300 km west of Shanghai with "only" 9-million people. Since we both love travelling and are particularly fascinated by Asia, we decided that this is a great opportunity.

Besides the expected trouble and tiredness one has with a newborn, it was very challenging to suddenly live in a completely different world – starting with daily issues such as finding basic things in the supermarket, ordering food or just getting from one place to another with only three words of Chinese ("hello", "bye" and "thanks"). The biggest challenge, however, was to simply leave the house with a 4-weeks old blond baby into the black-haired Chinese world. I constantly had a crowd of people around me staring and talking at me as if I am completely insane: The baby is too young to go out (Chinese babies leave the house only after 8 weeks)! The baby is not wearing a hat and only 1-2 layers of clothes (at 30°C)! The baby doesn't get enough food (she had a perfectly normal weight according to German standards)! Etc. etc.

However, after a short time life became much easier. I learned how to confidently answer the FAQs in Chinese and to easily navigate through the concrete jungle flooded with blinking Chinese characters. Furthermore, since daycare for babies is non-existent in China (grandparents take care of them and daycare starts only from 2 years), we hired a Chinese nanny who was also housekeeper, chef and my Chinese teacher at the same time. It is an interesting experience to spend almost every day with someone from a completely different culture without sharing a single word in the same language – especially considering the contrary opinion towards raising and feeding a baby. After some weeks we managed to get along though…

Sina Barysch with husband Christian and daughter Nila

Thanks to phone, email and skype, I stayed in close contact with my boss Frauke Melchior and her group. I continued a lot of computer-based work and paper writing that I never managed during my time in the lab. In parallel, Frauke established the contact to Aaron Ciechanover, a Nobel Prize laureate for the discovery of ubiquitin-mediated protein degradation. He was just about to start a second lab in Nanjing and I helped him arrange the initial steps for this adventure.

As time passes by so quickly, we have already started the preparation for our return to Germany. We had a great time in China and it was a fantastic experience that I would not want to miss. Still, I have to admit that I am looking forward to coming back and becoming a "lab rat" again!

Sina Barysch did her PhD under the supervision of Reinhard Jahn at the Max Planck Institute for Biological Chemistry. She graduated from the Molecular Biology program in November 2009 and continued her postdoctoral research in the group of Silvio Rizzoli. In August 2010 she joined the lab of Frauke Melchior at the at the Center for Molecular Biology at the University of Heidelberg (ZMBH). Presently she is living in Nanjing, China.

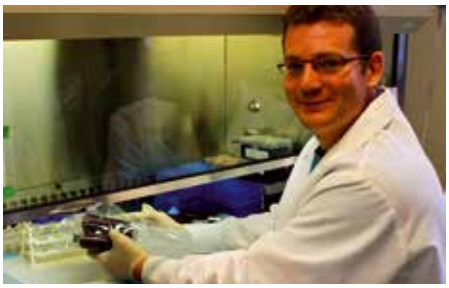
Doing immunology in humans

Why basic human immunology is a feasible, important and rewarding challenge

Mice and their immune system have evolved separately from us for about 65 million years under quite different selection pressures. In our labs these little animals are of course in vivo models yet they do not really have a life, being shielded from any kind of realistic genetic and environmental diversity. These differences matter and promising results often do not translate to humans, particularly as the immune system is increasingly studied as such and specific immuno-modulatory treatments gain importance.

This has contributed to the rise of translational research, with the aim of bringing specific findings to their application in humans. Nevertheless, the translational emphasis can be misleading as we understand relatively little about what is often the target of our translation - the human immune system. So unless it is awfully unscientific (injections in -black box- endpoint out), good translational research actually contributes a lot to our basic understanding of the human immune system. This is not a bad thing and that more research groups now specifically aim at doing good basic immunology in humans will enable serendipity, exciting science and surely also be a huge boost for applied research.

Work on humans stands and falls with the availability of samples. In lieu of mouse colonies, institutions invest major efforts in clinical collaborations, cohorts of well characterized subjects and large biobanks. Outreach is crucial and most patients are excited to be part of research and are willing to donate samples. Thus, while "from bedside to bench" is not the prime buzzword, it is really a foundation of human immunology and defines the limits of what can be achieved. Connected is the rise of the massive risk-association studies that reveal which genetic variants or environmental/life-style factors are correlated with risk for disease. This allows investigators to control some of the human diversity by carefully matching healthy controls and patients. Furthermore, risk association studies turn our diversity into a powerful and unbiased tool for discovery, provide novel directions for mechanistic studies and inspire (force) researchers to explain the molecular influence of specific environmental/life-style factors.



Examples of such studies have revealed that smoking, but not just nicotine, (enabled by Swedes, love for snuff) increases the risk for rheumatoid arthritis and multiple sclerosis when combined with a specific genetic risk factor. Starting from a specific disease, this has greatly advanced theories of autoimmunity and is changing our general understanding of the lung in immunity. Additionally, these results demonstrate how knowledge about environmental and life-style factors is essential to properly understand complex diseases.

Work in humans is limited, challenging and requires extensive collaboration and infrastructure. Nevertheless, constraints spur innovation (researchers even fed volunteers heavy water to study T-cell turnover) and fascinating observations are everywhere: "Women get more autoimmune diseases", "Genetic risk variants are common", "Immune cell-size is conserved but not body size". Methods like flow/mass cytometry, mass spectrometry, transcriptomics and bioinformatics have matured dramatically, enabling creativity and the study of such complex issues. It is also worth highlighting that thousands of humans already have their immune system perturbed each year by therapies, vaccinations and clinical trials - an absolute gold mine for immunologists waiting to be fully explored.

Of course, more powerful and "systematic" techniques such as intra-vitral microscopy and *in vivo* imaging have also transformed animal models, which have been and will remain absolutely instrumental for immunology. Even so would it not be great if more discovery and basic science was done in humans, with selected aspects specifically addressed in animal models, to yield combined insights that eventually result in novel mechanisms and therapies?

Hannes Uchtenhagen
graduated from the Molecular Biology Master's program in 2007. He defended his PhD in Structural Immunology at the Karolinska Institutet (KI) in October 2012. Presently, he is a postdoctoral researcher in the Dept. of Neuroscience at the KI in Stockholm and a visiting postdoc at the Benaroya Reasearch Institute on Seattle working on the transcriptional programming of autoreactive T-cells in rheumatoid arthritis.

Dual career in Switzerland

Product Manager and Sales Coach Oncology

My five years in Göttingen (September 2002 to October 2007) were very important years of my life. Next to obtaining my doctoral degree in the Molecular Biology program I met my wife Paola who herself was a fellow student of the Molecular Biology program. She obtained the Master degree within the program and afterwards pursued her career in medicine. She just recently obtained her specialization title in radiology.

But studying and falling in love were not the only two memorable things happening in those times, I met many great people from many different cultures and our first daughter (Sophie) was born in Göttingen as well. So after five years in Göttingen my life perspectives had significantly changed, starting as a 25 years old single with no responsibilities and eager to increase my knowledge in molecular biology I had become a 30 years old father with a wife who wanted to pursue her own career path. For me the uncertainties and challenges of an academic career was not anymore the most appealing path.

So after finishing my PhD, Paola and I decided to move to my home country (Switzerland) where she started to work as resident in radiology while I took a job as part time teacher next to taking care of our small family.

After a half a year a headhunter agency contacted me. They asked me if I would be interested in applying for a job as key account manager in oncology at Sanofi-Aventis. At that time I had no idea what a key account manager is and does. Nevertheless I agreed that they could submit my dossier to the company. Finding out during my preparations for the job interview that the position is essentially a pharmaceutical sales representative visiting medical oncologist I got rather skeptical if I would be the right fit for such a position and the right position for me. But I decided to keep an open mind and go through the job interview.

The first interview was with the national sales manager oncology at Sanofi-Aventis to whom this position reports. He is a real sales man in the best sense of it. This first interview with him was scheduled to take approximately one hour and lasted for more than three hours. He explained to me why he was seeking someone with a PhD, what vision he had for his team and that if I would take the position it would be a pilot for the future structure of his team with additional tasks and responsibilities. So he sold the position to me and the company was willing to give me, a greenhorn in sales and marketing, the job.

Markus Strasser, his wife Paola, and his daughters Sophie and Lina

The first 1,5 years in this job were for me fantastic; I learned many new things, I liked the team I was working in, could overtake interesting projects and received a lot of positive feedback. Things are moving much faster than in a laboratory the frequency of ups and down is much higher. But for my supervisors and me it was clear from the start that the position as key account manager was only a starting

position for me. So they supported me obtaining a certificate in advanced studies in the management of biotech, medtech and pharma ventures and planned that I should overtake an internal position as soon as a position would get vacant.

The Swiss pharmaceutical market (sales and marketing) is rather small, so one gets to know each other rather fast. After 2 years on the job the Business unit director oncology of Merck Serono in Switzerland contacted me to inform me that she has a position as product manager vacant. I took the job. As product manager oncology at Merck Serono I am responsible for all marketing activities (including development of promotional materials, training of sales representatives, brand planning, control over promotional budget etc) in Switzerland for one of the key brands of Merck Serono.

Since October 2013 I am now additionally responsible as sales coach for our two key account manager, defining their targets and coaching them on their talks with physicians.

Even though there are many skills I obtained during my time in Göttingen, which I do not need anymore, the most important ones, analytical thinking, identifying issues and developing strategies to solve them are key for success in my current job. With respect to family life Sophie got in 2010 a younger sister named Lina.

Markus Strasser did his PhD in the group of Erez Raz at the MPI for Biophysical Chemistry. He graduated from the Molecular Biology program in October 2007. In 2008 he joined Sanofi Aventis as Customer Specialist Oncology. In 2011 he moved to Merck Serono, where he presently holds the position of a Product Manager and Sales Coach Oncology.

Paola Valbuena did her MSc thesis under the supervision of Gunnar Dietz in the department of Mathias Bähr at the University of Göttingen Medical Center and graduated from the Molecular Biology with an MSc degree in 2004. She continued to pursue her career in medicine and recently obtained her specialization title in radiology.

Inhouse Consulting

Five reasons why I am doing it

You may have heard about consulting firms, but did you know about inhouse consulting – Here are five reasons why I decided to join Bayer Business Consulting two years ago.

Consulting firms attracted my attention already during my PhD and the Max Planck Institute in Göttingen. But when I took a closer look at the career model it stopped to be so attractive. I did not like the idea of being away from home 4 days a week all year long. I was not keen on working 14-16h a day. On top, I would probably consult companies I cannot really identify myself with.

I refrained from taking further steps in this direction and decided to do a postdoc in Cambridge at the Gurdon Institute. It was there that I stumbled over the website of Bayer Business Consulting and decided to apply about 2 years ago and never regretted to accept their job offer after the interview.

But what made and makes Bayer Business Consulting so special to me?

The company
Bayer is doing business in the area of pharmaceuticals (HealthCare), crop protection & seeds (CropScience) and high-performance materials (MaterialScience), which perfectly fits to my biochemical background. And a company with the slogan „Science for a better life" would be an obvious choice, wouldn't it? Apart from that Bayer is also a global company and therefore gives me global career development opportunities.

Bayer Business Consulting or as we call it BC has currently 150 employees and offices in Germany (Leverkusen & Berlin), China (Beijing & Shanghai), USA (Morristown near New York & Pittsburgh) and just opened an office in Brazil (Sao Paulo, still looking for colleagues). As an inhouse consulting company, we only do projects for Bayer. This way I can always identify myself with the company I am working for.

The people
The atmosphere can be compared to the one in a lab: Many young, very motivated people, coming from various countries all around the world. Join us on a Friday evening for some fun in Cologne, if you would like to get a better impression.

Besides BC, my different projects gave me the unique opportunity to get to know different people in different functions within Bayer in a very short time. This helps me in better understanding how Bayer works and what I could to do next in my career.

The projects
It is just amazing how much I learned about business in the last 2 years. In general, one works for 3-9 months on one project and the learning curve is impressive. One of my first projects was dealing with the supply chain of Bayer Healthcare. We were looking at how to ensure that we have just the right amount of stuff at the right time at the right place. Whenever you realize that the restriction enzyme vial is empty and somebody forgot to order new stuff, you basically have a supply chain issue. You would probably be a bit "peed" and go for a coffee, but Bayer might lose millions of euros in such a situation. Besides that I was also working on topics related to procurement, chemical plant shutdowns and quality management. And now tell me on how many projects you worked during your PhD in the last 3 years?

Marc Schneider (second from the right) with some colleagues at one of the numerous Christmas markets in Cologne

The right balance
I like to work as much as I like to have some leisure time. Finding the right balance is difficult, but at BC we all manage quite well. We do not end up in long night shifts and 14h days like some external firms are famous for. At the same time we motivate each other to get the best out of the time we spend

Marc Schneider did his PhD under the supervision of Reinhard Lührmann at the Max Planck Institute for Biological Chemistry. He graduated from the Molecular Biology program in May 2009. After postdoctoral research at the Gurdon Institute in Cambridge, UK he returned to Germany in 2011 to join Bayer Business Consulting.

Pickled Dolphins

Between the bench and the stage

at work. The best thing however is that weekends are really off. No need to split cells, take care of your Drosophilas or repeat the purification that did not work during the week.

Travelling is great, but too much of it and I feel like my life fits in a suitcase. BC is great in that respect because it offers a mix of projects in the proximity as well as global appointments. In the last two years I have not been away for more than 2 months in total, but I have colleagues who were on projects in Brazil, Australia and many other countries around the globe. It all depends on your preferences.

The perspective

BC is considered as one of the major pools for management talents at Bayer. This offers me a great perspective for a future management line function within the Bayer group. Due to our very successful rotation model (we rotate about 30 people each year), BC is constantly looking for young talent, either from the university or from the industry or consulting business. (I am happy to provide you with more insights, in case you find interest in a job opportunity at BC).

After their first successful rock concert, the four friends sat together and started to remember how everything has begun. It has all started in the stressing time of the lab rotations, as Ahmed (Egypt) and Sasha (Ukraine) the students from the 2012 Molecular Biology batch started playing together in

The Pickled Dolphins in action (photos taken by Tahere Kalantary Dehaghi)

the music room of their dorms. Later Lukasz (Poland) who is doing his PhD in Physics also joined them, and this formed the nucleus of the rock band.

"The three strangers" –as they describe themselves in one of their own composed songs- kept playing around twice per week for many months. During that time, because they got along with each other and created a relaxing and friendly atmosphere, they massively improved their music skills. Sasha started to cover guitar solos and even compose own ones, Lukasz learnt new for him slap/pop technique on his bass guitar and Ahmed started to perform the drum tricks he always admired. In parallel to this, they performed at the Culture Nights organized by the Program, where they played rock and non-rock German, English and Ukrainian songs. This helped them to get out of the box, as well as to practice public performance.

At some point, the idea of having a band came to them and they chose Pickled Dolphins as their name. They had auditions to choose a singer and this is when their fourth member joined the band. Marlon (Germany) also has the talent of composing own songs. With the completion of the band and the improvement of their performance, Pickled Dolphins decided to end the scientifically and musically successful year with their first rock concert. It took place in Escape Bar International - in a place where they had their after-exam party. Pickled Dolphins were performing whereas the crowd was cheering and dancing to their music.

In 2014, Pickled Dolphins will be producing more of their own songs and they will start recording in a professional music studio. They are also considering having musical collaborations with people playing on different instruments like saxophone as well as performing in larger places. Pickled Dolphins are and will always be grateful to Göttingen, the city that gathered this multi-national team.

Ahmed Warda

Ahmed Warda is presently a PhD student with Markus Bohnsack at the University of Göttingen Medical Center, working on the functional characterization of Emg1 in Bowen Conradi syndrome.

Learning from the best

Impressions from the 63rd Lindau Nobel Laureate Meeting

In July 2013, we, two PhD students of the IMPRS Molbio, had the chance to attend one of the most renowned interdisciplinary scientific meetings: The 63rd Lindau Nobel Laureate Meeting dedicated to chemistry. According to the motto of the meeting "Educate. Inspire. Connect." we experienced five days full of scientific exchange across a wide range of topics with researchers from different generations and more than 80 different countries all in the setting of Lake Constance in the South of Germany.

Simone Mayer and Irena Andreeva

The keystones of the meeting were the plenary lectures given by the laureates and the subsequent discussions with young scientists. Some of the most fascinating talks were given by Dan Shechtman (2011, Chemistry), Aaron Ciechanover (2004, Chemistry) and John E. Walker (1997, Chemistry). Physicist Shechtman pointed out in his talk how an "odd" observation made one day in the 1980s, carefully documented in his lab book, led – after several years of fighting for his discovery - to a paradigm shift in the field of crystallography when the existence of quasicrystals was finally recognized and rewarded with a Nobel Prize in 2011. The talk of Ciechanover was especially interesting, since he was talking about his current research focus – translational medicine, a topic becoming ever more important as we realize that personal medicine is required to successfully treat each individual patient. In the Master class that was organized by Ciechanover, this topic was further intensified by discussing the research of different young scientists related to new ways of drug delivery to specific cell types. Finally, Walker followed the theme of the conference on energy storage and conversion by sharing his insights into the function of one of the most fascinating molecular motors, the ATP synthase.

Irena Andreeva together with Brian Kobilka (Nobel Prize for Chemistry in 2012)

During various panel discussions and science breakfasts, industry specialists and Laureates exchanged ideas in a collaborative dialogue. Three main topics were covered: Green chemistry, conversion and storage of chemical energy, biochemical processes and structures. The creative atmosphere in these sessions encouraged one to openly ask questions and express one's own opinion. At one of the breakfasts, organized by the global chemical company BASF, we had the tough task to think about how to secure the energy supply for our grandchildren with unconventional ideas and approaches. Some suggestions were the use of new types of catalysts and bio fuels, along with novel energy systems.

The responsibility of scientists in the concept of sustainability was also reflected in the talks of the former secretary of energy (USA) Steven Chu (1997, Physics) and the Mexican chemist Mario Molina (1995, Chemistry). No other scientific meeting puts such an effort into educating the future generation to be more involved in society, as this one. It comes as no surprise that the knowledge exchange, conveyed in the meeting's motto, "Mission education", was achieved.

The meeting was also a great chance to obtain advice from the Nobel Laureates' diverse backgrounds and experiences. Richard Ernst (1991, Chemistry) dedicated his entire talk to sharing his passion for Tibetan Buddhist paintings and the analysis of their composition by a spectroscope, conveniently located is his cellar. He pointed out how important it is to have such a passion, as remote as possible from the own research field, as a balance and to prevent one-sidedness. In the discussion with young researchers after

his talk, Martin Chalfie (2008, Chemistry) gave valuable insights into how he manages his work-life balance, and which issues should be considered at different stages in a scientist's career. The only female Nobel laureate attending the meeting, Ada Yonath (2009, Chemistry), showed us a picture of the prize awarded to her by her granddaughter for the "best grandma" – the young girl, however, pointed out that this prize needs to be renewed yearly, in contrast to the Nobel Prize, which is awarded usually once in a lifetime. Thus Yonath emphasized that having a family and doing science are not mutually exclusive. In summary, the bottom-line of many of the laureates' advices was that one should follow one's own curiosity and attempt to answer those questions with whichever technology fits best. Often unexpected, accidental observations were the start of new research fields and breakthroughs that eventually led to the award of the Nobel Prize.

The Lindau meeting was much more than fascinating lectures! The busy social program aimed to create an informal setting and encourage participants to initiate dialogs and mingle with each other, for example through dancing. During the international get-togethers upon invitation of the Republic of Korea or the Elite Network of Bavaria, we enjoyed traditional music and participated in folk dancing.

It is definitely not true that chemists discuss only drugs and catalysis. We had the chance to interact with hundreds of young, talented scientists from all around the globe. After all, going back home with more than 50 contact cards and LinkedIn invitations sounds like some of us took "Mission Connect" maybe too seriously. One positive outcome of the extensive networking atmosphere was our meeting with Patrick Kobina Arthur, one of the second generations of Molbio IMPRS students. Now, as a successful group leader in his home country, Ghana, he only carries warm memories from his student days in Göttingen.

Irena Andreeva and Patrick Kobina Arthur

We also tried to make the best of our free time exploring the city. One afternoon, we found ourselves part of a guided Miró exhibition tour along with some of the Laureates, for example Edmond Fischer (1992, Physiology and Medicine). We were also one of the few participants who found a two hour time slot between the lectures to go for a swim in Lake Constance.

The highlight of the meeting was a boat trip to the flower and plant paradise called Mainau Island. The open boat deck was filled with top politicians and top scientists at the same time and the champagne served as a catalyst between science and society. The island was not only perfect for sightseeing, but also an ideal stage for discussing science policy and economics. Diplomat Jose Ramos–Horta (1996, Peace) and religious leader Gunar Stålsett shared some of the challenges to peace and justice in the 21st century in an open dialog. As a closing and most relevant panel discussion, on the Castle Meadow, chemists were put on the spotlight. The central topic was: what is the role of modern scientists in creating a sustainable world through green chemistry!

On the way back almost everyone, including Nobel Laureates, hit the dance floor and danced till the boat reached Lindau harbor celebrating the closing of a successful meeting. As a conclusion, the Lindau meeting taught us to be open to new ideas, remain curious, learn from one another and balance applied and basic research. "Mission inspiration" continues.

Irena Andreeva is presently a PhD student with Marina Rodnina in the Department of Physical Biochemistry at the Max Planck Institute for Biophysical Chemistry. In her PhD thesis she investigates ribosome dynamics during translation in bacteria.

Simone Mayer returned to Göttingen after an external Master's thesis in the group of Nenad Sestan at Yale University. She is presently a PhD student in the department of Nils Brose at at the Max Planck Institute for Experimental Medicine. In her PhD thesis she investigates molecular mechanisms of collybistin-dependent gephyrin clustering at inhibitory synapses.

Team Göttingen and iGEM 2013

It was the beginning of 2013, when the Sun was shy at its peak, a dozen of Master students formed a team to represent the University of Göttingen at iGEM 2013. The team was instructed by Prof. Dr. Jörg Stülke, Dr. Fabian Commichau and Dr. Katrin Gunka from the Department of General Microbiology, University of Göttingen.

So what is this iGEM? Is it a new innovative 'i' series from Apple Inc.? If this is your guess, you are probably wrong. iGEM is an international genetically engineered machine (synthetic biology) competition that originated from MIT, Boston, in 2004. It is conducted annually for university students, but there is no age limit for participation. The team can have students from the non-biological sciences as well, but this depends on the project.

Currently, iGEM is the biggest student competition in the world. The goal of iGEM sounds simple: conceive an innovative idea from existing data, find new data, and develop a novel biological system that benefits humankind. It does not stop there. Each team also has to perform additional tasks, e.g. helping iGEM teams from other universities, raising awareness in the public about synthetic biology, creating a webpage for each team to publicize their work and so on.

Since the competition is very intense, the best teams are first filtered through continental jamborees. In the continental jamborees, any number of teams may receive the gold, silver or bronze medals, but only a few of those teams will be selected for the World Championship jamboree. There are a few additional awards rewarded, e.g. Best Poster Presentation, Best Presentation, Best Novel Biobrick, Best Team Webpage, Best Simulation Project, Best Human Practices and so on. Every year, the World Championship jamborees are held at the Massachusetts Institute of Technology campus, Boston, US.

For iGEM 2013, Team Göttingen worked on drug resistance problems with Gram-positive bacteria, such as the methicillin-resistant *Staphylococcos aureus*, and the multi-drug resistant *Mycobacterium tuberculosis*. From past literature, we found that c-di-AMP is unique to Gram-positive bacteria and that it plays a major role in a variety of cellular processes. Yet the underlying molecular mechanisms of how c-di-AMP controls these processes are completely unknown. c-di-AMP is synthesized by diadenylate cyclase (DAC) from ATP.

We developed three major goals for the project: 1) to create a reporter system to screen thousands of compounds from chemical libraries against DAC [Reporter Team], 2) to study the mechanisms by which c-di-AMP regulates gene expression [Array Team] and 3) to determine the structure of DAC [DAC Team; informally called DUCK Team].

The Reporter Team successfully cloned the DarR operator sequence from *Mycobacterium smegmatis* upstream to a GFP gene and later transformed the plasmid into the laboratory *E. coli* strain. Since lab *E. coli* does not produce DarR protein, we also cloned a plasmid expressing DarR. DarR protein binds weakly to the operator in the absence of c-di-AMP, so the bacteria produces GFP protein and exhibits green fluorescence. On the contrary, if c-di-AMP is present, they bind strongly to the operator, and there will be no GFP protein and no fluorescence. Our team mascot, "Green Coli", and team slogan, "Keep the green light glowing", originated from this idea.

The Array Team tried to identify new c-di-AMP sensors using micro array

technology. Later, we planned to use this sensor for developing an alternative screening system. We collaborated with Team Groningen for this study. We found that the aptamer part upstream to ydaO gene a riboswitch responds to c-di-AMP. The Reporter Team also used this ydaO riboswitch instead of DarR and got interesting results.

Finally, the DAC team cloned the cyclase domain of DacA gene from *Listeria monocytogenes* into *E. coli* and expressed the enzyme in large amounts. Later, the enzyme was crystallized and the 3D structure of protein was determined by Dr. Achim Dickmanns and Dr. Piotr Neumann of the Molecular Structural Biology department (Prof. Dr. Ralf Ficner group) of the University of Göttingen.

A total of 58 teams from different universities in UK, Europe, Turkey and Israel participated in the European Championship held at Lyon, France in the middle of October 2013. We (Team Göttingen) not only won the gold medal for our project, but we were also selected to participate in the World Championship in Boston, which was held in the first week of November 2013. In the World Championship, we competed against 81 elite teams from around the globe. There, we won 'Best Presentation Award' in the overgraduate category.

As a general rule of thumb, we found that time was always our fiercest competitor and money was always the scarcest resource in realizing the goal. Yet in the end, all the hard work that we put in during the summer of 2013 was paid off.

Navaneethan Palanisamy

Special thanks: our team was generously supported by
KWS, GZMB, University of Göttingen Medical Center, G2L, and ERASynBio.

For more info on iGEM: http://igem.org/Main_Page
For more info on Team Göttingen's project:
http://2013.igem.org/Team:Goettingen

Written by **Navaneethan Palanisamy**
2nd year, Molecular Biology Program - IMPRS
iGEM-Team Göttingen 2013

Daily scientific miracles in Göttingen

The German cradle of science – the city of Göttingen – never ceases to amaze me. Once upon a time in November I had a great pleasure to listen to the Nobel talk by Kurt Wüthrich – Cecil H. and Ida M. Green Professor of Structural Biology at The Scripps Research Institute, La Jolla, CA, USA and Professor of Biophysics at the ETH Zürich, Switzerland. He was awarded the Nobel Prize in Chemistry in 2002 for „his development of nuclear magnetic resonance (NMR) spectroscopy for determining the three-dimensional structure of biological macromolecules in solution".

In his talk Prof. Wüthrich revealed the importance of the NMR method through the cornerstone of life – the very simple but mysterious water molecule. He emphasized the need to study organic compounds in the natural environment to shed a light on the molecular machines in our bodies. Prof. Wüthrich explained all twists and turns of the afore-said technique, and encouraging the young scientists to implement it into the research. Moreover he touched upon the prominent example of NMR application – investigation of the prion structure and the elegant confirmation of its protein origin.

Prof. Wüthrich also elucidated the main milestones of the swift development of Structural Biology: he led listeners from the lego-like models through the first computer databases to the current state of the art technologies. The whole talk had the marvelous flavor of the scientific humor, unquenchable enthusiasm and curiosity. Eventually Prof Wüthrich concluded that despite the cutting-edge technologies, the scientific community is still far from understanding the secrets of the nature, which gives a great brain food and inspiration to the young prominent researchers. The brilliant talk together with the magnificent atmosphere of majestical Aula made the event unforgettable and left wonderful impressions!

Natalia Korniy

Natalia Korniy is a 1st year Molecular Biology Master's student.

Horizons turned 10!

In October 2013, we celebrated the 10th anniversary of "Horizons in Molecular Biology"! Students and renowned speakers from all over the world came together to share the experience with us. We were especially happy to welcome Ralf Jauch, alumnus of our IMPRS and Horizons organizer of the first hour, who shared his experiences and anecdotes from the first ever Horizons – a two day conference with ten speakers and a few dozen participants. Today, we are up to more than twenty speakers, more than 300 participants and a 4-5 day conference and are excited to see where the journey will take us in the future.

However much may have changed, the main goals of Horizons remained the same throughout the years: bringing students into contact with excellence science and the equally excellent scientists who are behind it. For this reason, we promote direct contact of participants to the speakers throughout the conference, be it during intensive Speed Dating sessions, in the more relaxed atmosphere of our "Wine & Cheese" poster session, casually between lectures – or on the dance floor during the Conference Party.

Diversity is another feature that has always defined Horizons – this year we had the opportunity to experience talks on such diverse topics as using the bodies own cellular adhesion molecules for targeted cancer therapy (Erkki Ruoslahti), glycobiology in vaccine development against malaria and other diseases (Peter Seeberger), chaperonins and how they can literally shape a life in science (Arthur Horwich) or the evolutionary fight between our immune system and viruses (Kartik Chandran). Again, we also had the great opportunity to hear about potentially groundbreaking unpublished research – e.g. a novel cellular secondary messanger (Dinshaw Patel) or the exo-/endocytosis dynamics of synaptic vesicles *in vivo* (Erik Jorgensen).

But while looking back on the awesome anniversary, we are already planning the next conference! Next year, the 11th instalment of Horizons will see an even bigger focus on the students, for example with the opportunity to present your research in blitz-talks as a primer for the poster sessions, among other new features. We are happy to announce that we have already two Nobel laureates confirmed as guest speakers – Christiane Nüsslein-Volhard, the Grande Dame of *Drosophila* developmental genetics, and Ada Yonath from the Weizmann Institute, our long standing Israeli partner, who made seminal contributions to solving the structure of the ribosome. The 2014 symposium will take place September 15th-18th at the MPI-bpc – so mark your calendars!

Sven Truckenbrodt

Back to where it all started ten years ago …

It was a great privilege to be invited and give a presentation to the 10th anniversary of the Horizons in Molecular Biology symposium. Back in 2003, when together with some brave colleagues we organized the first Horizons as a small, low-key event, I had no idea how this adventure will develop. In 2005, Horizons grew with our enthusiasm, reached a reasonable size and attracted amazing speakers. Then, me and many of the brave colleagues graduated and left Göttingen with the hope that Horizons will at least keep the profile it achieved.

After 10 years, I was thrilled to see that Horizons has not only kept its profile but became a key symposium where students, postdocs, and even established scientists can broaden their knowledge. I was pleased to see that the topics remained as broad as we defined them initially. This makes the event special among other more focused conferences. The list of speakers remained impressive at every single meeting. In fact, it was a great honor to give a presentation among such great scientists. I also observed many important developments. For example, the career fair is a great initiative that alerts young scientists to other career paths and the workshops give the chance to students to be introduced to new methodologies. And, last but not least, the 10th anniversary had a great social program with good parties and food and with lots of networking opportunities. For me, it was an emotional return to Göttingen.

I hope Horizons will continue to be such a success and many anniversaries will follow. The organization by a team of young scientists in combination with the great research environment in Göttingen will ensure that the symposium will never become "yet another boring meeting".

Vlad Cojocaru

Horizons speakers 2013

From Genes to Function
Arthur Horwich, Edith Heard, Susan Gottesman, Claudia Höbartner, Jill Barber

Building Blocks of Life
Peter Seeberger, Karissa Sanbonmatsu, Andreas Plückthun, Janet Thornton

Cellular Communication
Anthony Hunter, Erkki Ruoslathi, Erik Jorgensen, Nina Tanfon, Erin Schuman, Doreen Cantrell, Kartik Chandran, Hollis Cline

From Techniques to Discovery
John Rubinstein, Dinshaw Patel, Albert Heck, Angela Gronenborn, Maria García Parajo

Vlad Cojocaru belonged to the first cohort of Molecular Biology students and graduated with a PhD degree in 2005. Presently he is heading a project group on Computational Structural Biology at the MPI for Molecular Biomedicine in Münster.

Ten days of "summer holiday" ...

... or why I was teaching epigenetics to teenagers last summer

When I told my colleagues about my "holiday" plans for the summer many of them thought I was insane: Why would anyone use some of the few days of holiday in a PhD student's life to teach some 16 teenagers science?

The reason is very simple – I think it is great fun to share my passion for science. That is why I decided to give a course at the "Schülerakademie", a summer school for highly gifted 15-18 year old high school students in Germany. Every German school can nominate one student to participate in such a summer school, where they take a course that goes beyond the level of the material taught at school and introduces them to the working style at university.

Having fun as a coordination team

Beyond the course work, a major emphasis lies on the extracurricular activities, which the students organize mostly by themselves. We thus had a wide range of musical activities including an orchestra, a choir and a band, and many got together to do sports, such as swimming, football and ballroom dancing, on the premises of the boarding school we stayed at. The evenings and long nights were spent with poetry readings, jamming sessions and a table football tournament. Thus the academy is an unparalleled chance to redefine one's own boundaries together with students from all parts of Germany, and even from German schools all over the world, as well as from different social backgrounds. Hence for many this experience is one of the most formative.

For me, as one of two course teachers of a course entitled "Epigenetics", preparing for the scientific sessions was at the heart of my duties and together with my co-course teacher Andrea, we put a lot of effort into making it as educational as possible. From my own experience I know that the Schülerakademie can be very influential for one's own career path. When I was 17 years old, I participated in a neurobiology course with the guiding question "How does the world enter the brain?" – a question I have followed in one way or another throughout in my studies up to now.

Students analyzing *Arabidopsis* mutants

During the course, I was also first introduced to scientific thinking by the course teacher, Moritz Helmstädter (some of you may know him from his talk in Horizons 2010), who at the time was a PhD student at the Max Planck Institute for Medical Research in Heidelberg. We stayed in touch, and a year after the course I had the chance to do a two-week internship with him, during which I performed my first immunohistochemistry experiments and was fascinated by the working style in a neuroscience lab. This certainly underpinned my interest to study biology, and more specifically neurobiology later on. During the first meeting I attended as a PhD student, the FENS Forum of Neuroscience in Barcelona in 2012, I met Moritz yet again after his talk for a short catch-up, so the connection to my first mentor remains.

It was with this background that I decided to jump into the challenge of designing a curriculum for a 30-hour course to 16 high school students. Since there were no restrictions or guidelines, we could be very creative on the content and the methodology of the course. We decided to go for a format, in which each of the students would prepare a short talk about one aspect of epigenetics, e.g. epigenetic mechanisms in plants or the involvement of epigenetics in psychiatric disorders.

One of the most challenging tasks was to find suitable material on this very new topic in German. Often we failed, so we decided to challenge the

students by giving the original publications and reviews in English. Even though this was very demanding for them and required a lot of preparatory work, they all managed amazingly well and this allowed us to achieve a very high level of discussions relatively quickly during the course.

One of our major goals was to show the students how textbook knowledge is created by doing experiments. In order to achieve this, on the one hand, we did a mini-journal club in which we analyzed a paper published in the month before the course in Nature Neuroscience. On the other hand, we organized an excursion to two epigenetics labs at the University of Düsseldorf. In the lab of Dr. Daniel Schubert, the students analyzed different mutants of a chromatin remodeling complex with regard to *Arabidopsis thaliana* leaf morphology. In the lab of Prof. Wolfgang Schulz, the students were introduced to cancer epigenetics and by running qRT-PCRs, DNA-PCRs and methylation-specific PCRs on different cancer cell lines they were able to examine whether the cancer may be due to genetic or epigenetic defects in a particular gene.

Very excitedly wearing their lab coats, gloves and safety goggles, and with a degree of concentration that got many cheeks red, the students were thrilled to do some real molecular biology themselves. When analyzing the patterns on the gels run with their PCR products and doing the statistics to determine whether the mutations in the epigenetic regulators had a significant effect on plant leaf number, the students are learned about the importance of control experiments and experienced the happiness following successful experiments.

In retrospect, the Schülerakademie was a great way to spend my summer holidays. Not only did spending 10 days with 90 teenagers and 14 other course teachers, take my thoughts away from my PhD project efficiently, but I also learned many things I would not have learned in Göttingen.

Epigenetics course excitedly wearing lab coats

Interactive course work

First, it was great to work in a multidisciplinary team. Of course, the students are from a different generation and are going through a very different phase in life, but it was also great to work together with my co-course teacher, who as a medical doctor has a very different approach to biomedical research. Furthermore, in a very diverse team of 15 course teachers and summer school coordinators, whose fields of expertise ranged from mechanical engineering to medieval philosophy, we were working cooperatively to ensure the well-being of our 90 protégés, but also had a lot of interesting discussions in our free time.

A second important learning point for me was that I needed to communicate the complicated science of epigenetics – which is not my speciality, so I had to read up on this topic in preparation as well – in a simplified language, and in German. This was initially a challenge, but I feel like I got more confident in it over the course of the week. Finally, it was very inspiring to see the development of the students over the 10 days and how we could assist them in their understanding and hopefully will be able to mentor them in the future. We probably felt a bit of the pride parents often feel, when one of the lab members in Düsseldorf, told us that the experiments with our students had run more smoothly than those they usually do as a methods course with their MSc students. It is in this spirit that I am looking forward to meeting the students again on some reunions in the future.

Simone Mayer

For the profile of **Simone Mayer** see page 29.

Still moving on?

About feedback, progress, career advice, and recent activities

How dynamic is an international graduate program after all these years of external evaluations and student feedback? Is it the time now to lean back (and perhaps read the positive comments by the referees once in a while)? Of course not! People may wonder though what has happened in our program recently.

One of the driving forces for progress and further improvement is the feedback by our current and former students. We also know that we can rely on them when it comes to important issues, such as the recent evaluation of our program by the **accreditation** agency ZEvA. This evaluation exercise is meant to verify whether formal criteria are met along the European guidelines for the modular structure of graduate programs. Not unexpectedly, in particular the high workload during the intensive first year of studies in our program was critically evaluated.

During the site visit in May 2013 it was difficult to convince the referees that our students are not only working hard, but also appreciate the advantages of the intensive training concept in spite of the challenges they have to manage and that our program is specifically tailored to the students' needs. To provide an unbiased evalluation of the approproateness of our curriculum, we invited the past six generations of students for an online survey investigating the perceived workload and whether our students feel well prepared for subsequent research or science-related professions. With their support (86% participation), and the clear statement in favor of the program the re-accreditation of our program was approved in the present form. We would like to say a big "thank you!" to all participants contributing to the survey.

While the re-accreditation had mainly the effect of allowing us to continue an established program, the visit of the **Scientific Advisory Board (SAB)** of our graduate school GGNB in December 2013 was intended to advise the graduate school in all of its activities, reporting suggestions for further improvement to the president of our university. The SAB meets biennially on the occasion of the **GGNB Science Day**, where more than 270 posters were presented by our advanced PhD students. The SAB members were excited about the research projects they were able to discuss. Many thanks to all members of the graduate school for contributing to this achievement.

The SAB was also very positive about the success of the new **GGNB Career Service Unit**, headed by Dr. Katrin Wodzicki (see also rear page of the last Molbio newsletter of January 2013). The career service unit is one of the key new measures of our graduate school in the second funding period of the excellence initiative, providing professional career support for postdoctoral researchers and advanced GGNB doctoral students. By now, Katrin has established a Career Blog, offers individual career advice together with guidance to other services, and organizes regular Career Impulse Sessions and workshops (see www.ggnb.uni-goettingen.de/career for further details).

This brings us back to the question of what are the new projects within the school. We believe that the main tasks of the next years should include measures to (1) further develop our career services for senior PhD students and postdocs, (2) strengthen established networks with **social media** (see also rear page of this newsletter) and other alumni-related activities, and (3) support scientific networks by expanding our **summer school program** and forming new **strategic alliances** with other graduate schools in related disciplines. For all these activities, we intend to closely involve our present and former students and appreciate their valuable comments.

Even the school-like Master's curriculum is, irrespective of established examination and study regulations, not graved in stone. Most recently, not only the timetable for the weekly **lectures and tutorials** has been modified. Moreover, the concept of the introductory **methods courses** was completely revised. Starting with the academic year 2013/14, newly designed project-oriented protein and nucleic acid courses integrate several previous short courses in response to course evaluations and a comprehensive discussion with our students.

Student-organized activities are characteristic of the Molecular Biology program, its twin program in Neuroscience, and the larger graduate school GGNB for many years. Building on an earlier student initiative, the second **Women's Career and Networks Symposium** in March 2013 was, once again, a great success. This meeting is intended to bring female PhD students in contact with women with a science background who have a successful career inside or outside academia and thus serve as role models and provide individual advice (see www.wocanet.uni-goettingen.de). The annual, student-organized

GGNB Summer Games took place, for the third time, in July 2013, featuring sports competitions to foster team spirit within and between the programs. Last but not least, student-organized social activities of our students include the monthly **Culture Nights**, taking advantage of the wide cultural diversity of the student community and, in some cases, attracting more than 200 participants. Great job you are doing there!

StB

Honors and Awards

Patrick Arthur, former Molecular Biology student in the group of Tomas Pieler at the GZMB, University of Göttingen Medical Center, and presently lecturer at the University of Legon, Accra, Ghana, was awarded several grants and fellowships in 2013 (see p. 19 of this newsletter), including a World Bank grant to set up an African Center of Excellence in Cell Biology of Infectious Pathogens.

Annette Denker, former PhD student in the group of Silvio Rizzoli, and presently postdoctoral research fellow at the Hubrecht Institute in Utrecht, Netherlands, was awarded a Human Frontier Science Program (HFSP) postdoctoral fellowship.

Helmut Grubmüller, faculty member of the Molecular Biology program and head of the Department of Theoretical and Computational Biophysics at the MPI for Biophysical Chemistry, was awarded the 2013 Rolf-Sammet Guest Professorship at the Goethe University Frankfurt, honoring his research on the function of biological molecules.

Stefan Hell, faculty member of the Molecular Biology program and head of the Department of NanoBiophotonics at the MPI for Biophysical Chemistry, received the Carus Medal 2013 by the National Academy of Science Leopoldina and the Paul Karrer Gold Medal. Both medals honor his scientific achievements in the field of high-resolution light microscopy. Furthermore, he was awarded the honorary doctorate of the Polytechnical University Bucharest, Romania.

Claudia Höbartner, faculty member of the Molecular Biology program and head of the Nucleic Acid Chemistry Group at the MPI for Biophysical Chemistry, received the prize of the Hellmut-Bredereck-Stiftung for her outstanding research in the field of nucleic acid chemistry.

Reinhard Jahn, faculty member of the Molecular Biology program and head of the Department of Neurobiology at the MPI for Biophysical Chemistry, was awarded the Eduard-Buchner-Preis of the Society for Biochemistry and Molecular Biology (GMB).

Fatemeh Javadi Zarnaghi, former PhD student in the group of Claudia Höbartner, received the first poster prize at the Horizons in Molecular Biology 2013 PhD student symposium.

Elizabeth Miller, MSc student in the Molecular Biology program, received a special poster award for her undergrduate research at the Horizons in Molecular Biology 2013 PhD student symposium.

Patrick Müller, former PhD student in the group of Martin Zeidler, and presently principal investigator at the MPI for Developmental Biology in Tübingen (see p. 18 of this newsletter), was one of eight awardees of the Career Development Award granted by the Human Frontier Science Program (HFSP).

Peter Rehling, faculty member of the Molecular Biology program and director of the Institute of Cellular Biochemistry at the University of Göttingen Medical Centers, was awarded an ERC Advanced Investigator Grant of 2.4 M€ for his research on mitochondria.

Katja Rust, PhD student in the group of Andreas Wodarz at the GZMB, University of Göttingen Medical Center, was awarded a GGNB Excellence Stipend for her doctoral research with *Drosophila* stem cells.

Heena Sharma, PhD student in the group of Marina Rodnina at the MPI for Biophysical Chemistry, was awarded a GGNB Excellence Stipend and a Boehringer Ingelheim Fonds PhD Stipend for her doctoral research on ribosome dynamics during tRNA translocation.

Holger Stark, faculty member of the Molecular Biology program and head of the 3-D Cryo Electron Microscopy Group at the MPI for Biophysical Chemistry, received the Ernst-Ruska-Preis 2013, awarded by the German Society for Electron Microscopy, for his outstanding scientific achievements in the exploration of the structures of biological macromolecules.

Changes in the program committee

Thank you, Tomas! Welcome Peter!

Breaking with long-lasting traditions, the first flowers handed over at the Master's graduation ceremony in October 2013 were not honoring the achievements of our students, but the achievements of Tomas Pieler, one of the founding members of our Molecular Biology program. Together with his colleagues Gerhard Braus, Reinhard Jahn and Kurt von Figura, Tomas had drafted the first versions of the concept and curriculum of the program more than 13 years ago and was a member of the Molecular Biology program committee since then. As the elected head of the examination board he was safeguarding the implementation and critical evaluation of the regulations of the program. As the coordinator of the lecture block "D" (model organisms) and the introductory methods course he has been contributing to the continuous refinement of the various training elements throughout the first year. As the director of the Department of Developmental Biochemistry he has hosted a number of PhD and MSc thesis projects of Molbio students and also offered, together with the members of his group, lectures and methods courses both at the MSc and at the PhD level. For sever-

Current faculty members

University of Göttingen - Biology: Gerhard Braus, Rolf Daniel, Ivo Feußner, Ralf Ficner, Christiane Gatz, Wilfried Kramer, Heike Krebber, Volker Lipka, Burkhard Morgenstern, Heinz Neumann, Stefanie Pöggeler, Jörg Stülke, Kai Tittmann, Ernst Wimmer

University of Göttingen - Chemistry:
Andreas Janshoff, Claudia Steinem

University of Göttingen - Physics: Jörg Enderlein, Dieter Klopfenstein

University of Göttingen - Agricultural Sciences: Bertram Brenig

University Medical Center Göttingen: Mathias Bähr, Holger Bastians, Tim Beißbarth, Markus Bohnsack, Matthias Dobbelstein, Roland Dosch, Wolfgang Engel, Uwe Groß, Jörg Großhans, Heidi Hahn, Tobias Moser, Tomas Pieler, Peter Rehling, Blanche Schwappach, Michael Thumm, Jürgen Wienands, Andreas Wodarz

European Neuroscience Institute: Till Marquardt, Silvio Rizzoli, Oliver Schlüter

MPI for Biophysical Chemistry: Henrik Bringmann, Wolfgang Fischle, Dirk Görlich, Christian Griesinger, Helmut Grubmüller, Stefan Hell, Claudia Höbartner, Herbert Jäckle, Reinhard Jahn, Stefan Jakobs, Michael Kessel, Reinhard Lührmann, Ahmed Mansouri, Erwin Neher, Marina Rodnina, Reinhard Schuh, Halyna Shcherbata, Holger Stark, Henning Urlaub

MPI for Experimental Medicine: Nils Brose, Klaus-Armin Nave, Moritz Roßner, Mikael Simons

German Primat Center: Stefan Pöhlmann, Lutz Walter

For details regarding the resarch of our faculty members, see www.gpmolbio.uni-goettingen.de/content/c_faculty.php

Student representatives

Congratulations to **Sven Truckenbrodt**, **Agata Witkowska**, and **Ina Klusmann** for being elected as the PhD and MSc student representatives for the 2013/14 term. Also congratulations to **Dragomir Milovanovic** and **Agata Witkoska for** representing the entire graduate school at the GGNB Board level in 2014. The students and the other members of the Molbio program appreciate your contributions and commitment. Many thanks to **Kevser Gencalp**, **Tino Pleiner** and **Manuel Maidorn** for having represented the PhD and MSc student community during the previous term.

Faculty changes in 2013

al years, Tomas has also been the driving force for a closer cooperation of the Göttingen Molecular Biology and Neuroscience programs with distinguished academic partners in Istanbul, Turkey, in particular with the Bogaziçi University. Among many other duties, Tomas is also the Research Dean of the Faculty of Medicine of the University of Göttingen. In the light of all these responsibilities, Tomas decided to step down from the position of the head of the Molbio examination board and to leave the program committee. A big thank you, Tomas, for your dedicated work! We are glad that you will remain an active faculty member in our program.

We would also like to welcome Peter Rehling, who accepted his election as a new member of our program committee and as the new head of our examination board. Congratulations! Peter joined the Molecular Biology program in 2007, when he was appointed as Professor of Biochemistry and director of the Department of Biochemistry II (now Department of Cellular Biochemistry). Since 2010, his group is also associated with the MPI for Biophysical Chemistry. Peter has already hosted several MSc and PhD thesis projects of our students and served on the Molecular Biology admission board. We look forward to our future collaboration on the program committee and the examination board.

StB

Left the program

Boris Görke received an offer by the University of Vienna at the Max F. Perutz Laboratories, where he is heading the "Signal transduction and post-transcriptional regulation in model bacteria" group. He joined the Molecular Biology program in 2011, when he was a group leader in the Department of General Microbiology at the University of Göttingen. Boris studied Biology with Genetics as main subject at the University of Freiburg, where he carried out his PhD thesis in the laboratory of Bodo Rak. From 2002-2004 he was a postdoctoral fellow in Anne Galinier's lab at the Laboratoire de Chimie Bactériénne at the Centre National de la Recherche Scientificiqie (CNRS), Marseille, France. He joined the Department of General Microbiology in 2004 and completed his habilitation in microbiology and genetics in 2009. During this time, Boris and his co-workers discovered that cell wall biosynthesis is controlled by a complex mechanism composed of two small non-coding RNAs and a novel RNA-binding protein in *E. coli*. Moreover, they identified a multi-protein phospho-relay system that controls potassium and phosphate homeostasis through interaction with histidine sensor kinases. The program thanks Boris for his contribution to the graduate education in our program and wishes him a successful continuation of his career and his fascination for the complexity of bacterial cells.

www.uni-goettingen.de/en/164534.html

Joined the program

Henrik Bringmann was appointed as an Independent Max Planck Group Leader and started his own „Sleep and Waking" group at the Max Planck Institute for Biophysical Chemistry in January 2009. His lab investigates the molecular mechanisms that regulate sleep using *Caenorhabditis elegans* as a model system. His group uses genetics, microscopy and micromanipulation to investigate sleep. Henrik joined the faculty of the Molecular Biology program in 2013, taking over the *C. elegans* lecture. He studied Biophysics and Biochemistry at the Ruprecht Karls University Heidelberg, where he concluded his diploma thesis in 2003 under the supervision of Thomas Surrey at the European Molecular Biology Laboratory (EMBL). He did his doctoral thesis on the molecular mechanisms of cytokinesis at the Max Planck Institute of Molecular Cell Biology and Genetics in Dresden under the supervision of Tony Hyman, where he continued his postdoctoral research for two more years. Before he came to Göttingen, he was a postdoctoral research fellow in the Medical Research Council (MRC) Laboratory of Molecular Biology, Cambridge, UK, headed by William Schafer.

www.uni-goettingen.de/en/138623.html

Let's further strengthen established networks

The Molbio LinkedIn Group

While LinkedIn, Facebook, and other social media are about to celebrate their 10th anniversary these days, the Molbio program started at a time at which video conferences were held via ISDN lines in combination with hand-held telephones (yes, also Skype came later). At that time, communication by e-mail was still considered a modern achievement, power point presentations began to replace the good old overhead transparencies, and digital cameras (followed by smartphones) started to become affordable for the public. Clearly, the first generations of Molbio students weren't "digital natives" which probably explained the small number of alumni using social media some time ago.

When we made a little survey two years ago, only 10 percent of all PhD alumni of our graduate school were LinkedIn members, a few more (18 percent) were members at XING, the most commonly used German business platform. As of January 2014, 65 percent of our Molbio PhD alumni have joined the LinkedIn platform as a professional network in addition to the private use of facebook, while XING still doesn't appear to be the first address for international young academics.

This seems to be the ideal time now for inviting all current and former Molbio students to joining our new Molbio LinkedIn Group, which will be opened soon. This group is intended to be a (closed) subgroup of the open LinkedIn Group of our "umbrella" school GGNB, taking advantage of the professional platform to learn more about the

career, experience and current interests of colleagues, share information and advice, contribute to a lively scientific network, and stay in touch. Everyone should feel invited to post information he/she considers relevant for the open GGNB Network Group there (the main group) and benefit from the larger community of our graduate school. The closed Molbio subgroup is restricted to its present and former MSc/PhD students. It helps you to find former fellows more easily, share professional "insider" knowledge that members may not consider appropriate for the open group, or seek personal advice from your fellows regarding professional plans and concerns.

Whether the goal of further strengthening the established scientific and professional networks within (and beyond) the Molbio community with the help of the Molbio LinkedIn Group can be reached will largely depend on the interest and commitment of its members. Beyond its use as a search tool for finding former fellow students, the group has a large potential for exchanging career-related information and sharing the professional and personal experience of other alumni. We hope that also communication of the Molbio program with its alumni will benefit, in addition to this newsletter which, as we hope, will still be appreciated as an annual review of the previous year.

The generation of "digital natives" is a continuously growing group also in our Molbio program and the means of communication and public relations will certainly develop accordingly – let's see when our first applicants will download a newly designed Molbio App from the University App Store in the future, unless apps have already become obsolete by then.

StB

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Publisher: Molecular Biology Coordination Office, Georg-August-Universität Göttingen
General Design: LifeTechMedia (Eva-Maria Twehues, www.lifetechmedia.de)
Layout: Dr. Steffen Burkhardt

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