JAN 2016

MOLECULAR BIOLOGY
NEWSLETTER

Georg-August-Universität Göttingen · International Max Planck Research School

Welcome message

This annual newsletter looks back again at a special year, as we celebrated the 15th anniversary of our international graduate program in Molecular Biology in May together with our colleagues from the Neurosciences. More than 450 guests joined us for this event, including many of our alumni.

The celebrations started with a scientific keynote lecture by Nobel prize laureate Stefan Hell in the historic University Aula. The President of the University of Göttingen, Ulrike Beisiegel, opened the 15th Anniversary

15th Anniversary Celebration in the University Aula

Ceremony, at which representatives of the Max Planck Society, the Scientific Commission of Lower Saxony, the program boards, students and alumni reflected on the achievements and their personal experience with the two programs. The highlights of the three-day event included an international alumni day with a career forum and "vision talks" by distinguished guest speakers holding strategic positions in science-related foundations or private enterprises. A detailed report on the 15th anniversary celebrations can be found on pages 32-35 of this newsletter.

The last year also marks a change in the leadership of the program. Jörg Stülke has served as a spokesperson of the Molecular Biology program since 2011. His two terms of office were characterized by important evaluations of the program such as the extension of funding as an International Max Planck Research School for a third 6-year period, the successful renewal of the DFG funding of the umbrella of GGNB in the German Excellence Initiative, and the re-accreditation of the MSc and PhD programs by the evaluation and accreditation agency ZEVA. During this time, the program also underwent major reforms of the Master's curriculum, including a revised structure of the methods course program, a significant expansion of training in bioinformatics-related courses, and numerous rearrangements of the sequence of lectures, including several new topics. Jörg will continue to contribute to the program's further development as a member of the program committee. We would like to thank Jörg for his committed work as a program speaker. The program very much appreciates his dedicated contributions to the continuous progress made by the program. We would also like to congratulate Peter Rehling to his election as a new spokesperson of the Molecular Biology program, and Claudia Höbartner to her election as a new member of the program committee.

We are particularly happy about the recent achievements by our faculty, current and former students as they are summarized in the honors and awards section on pages 26-27, including two Gottfried Wilhelm Leibniz Awards, three ERC Advanced Grants, one ERC Consolidator Grant, two ERC Starting Grants, and several prestigious PhD stipends and awards for our students. Our cordial congratulations also go to the teams who successfully applied for a new Collaborative Research Center on "Compartmental gates and contact sites in cells" and, together with Canadian partners, a new international Research Training Group on "Plant responses to eliminate critical threats".

Last but not least we would like to congratulate our students who successfully completed their Master's and PhD studies in the year 2015, the "Horizons" organizers for an impressive student-organized conference with Career Fair, and the authors of numerous exciting research articles, which led to an additional new section of "Science Abstracts" in this newsletter.

P. Rehling, M. Rodnina, S. Burkhardt

CONTENT

The Nup62•58•54 nucleoporin complex

Macromolecular transport between nucleus and cytoplasm occurs through highly specialized channels embedded in the nuclear envelope, the nuclear pore complexes (NPCs). NPCs are built from nucleoporins (or Nups), many of which harbor phenylalanine-glycine (FG) rich repeats, that impart selectivity to the nucleocytoplasmic transport. NPCs grant free passage to small molecules but become increasingly restrictive as the size of the diffusing species approaches or exceeds a limit of ≈30 kD. Nuclear transport receptors (NTRs) mediate facilitated NPC translocation as they can bind FG repeats and shuttle across the NPC, ferrying diverse cargoes.

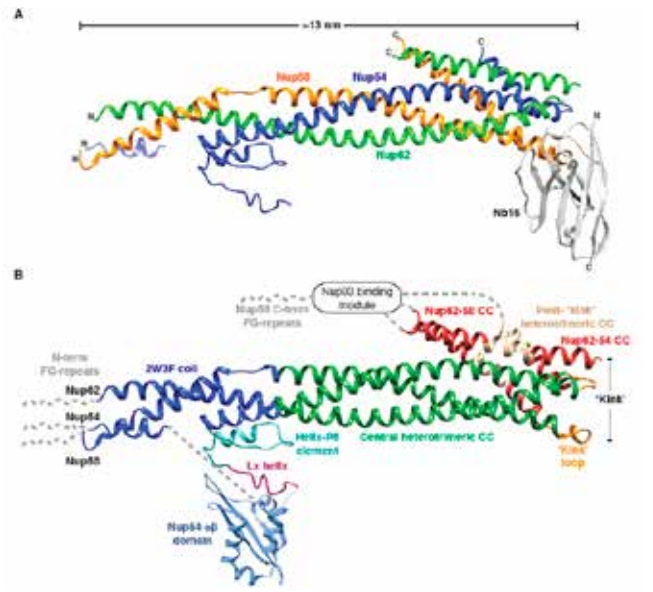

Fig. 1: Architecture of the *Xenopus* Nup62•58•54 complex. (A) Crystal structure of the xNup62•58•54 complex with nanobody Nb15 bound, comprising Nup62$^{358-485}$, Nup58$^{283-406}$, and Nup54$^{315-450}$. (B) Overall architecture of the Nup62•58•54 complex, combining crystal structures from (A) and of the Nup54$^{214-314}$ αβ domain. Coloring is according to the indicated structural modules. Dashed lines denote unresolved segments: the disordered FG repeat domains, a region in Nup54 preceding the αβ domain, and the C terminal Nup93-binding module. CC, coiled coil.

The metazoan FG Nup62•58•54 (Nup62) complex is anchored by Nup93 at the pore and is critical for NPC function. It contributes a considerable share of the total FG-repeat mass, and its depletion severely impairs nucleocytoplasmic transport.

There are two main views as to how FG repeats confer transport selectivity. In the first, FG domains themselves form the actual permeability barrier, which is then selectively traversed by NTR•cargo complexes. In a second series of models, FG repeats do not function as barrier-forming units but instead operate as "sensors" in a general gating mechanism, where the Nup62 complex forms an additional ring scaffold that restricts the passage of macromolecules but widens upon NTR binding to FG domains of either Nup54, 58, or 62. These models were based on crystal structures (PDB 2OSZ, 3T97 and 3T98) of small coiled-coil fragments from one or two subunits of the heterotrimeric complex and assume that the different observed interactions between these fragments and their oligomerization into higher-order assemblies indeed represent transport intermediates.

Our starting point for structural analysis was a larger Xenopus Nup62 complex lacking only the intrinsically disordered FG repeats. This "Complex 1" included

PhD-(and MSc-) related publications 2015 (PhD students of the Molecular Biology program in bold type)

Absmeier E, Wollenhaupt J, **Mozaffari-Jovin S**, BeckeC, Lee C-T, Preussner M, Heyd F, Urlaub H, Lührmann R, Santos KF, Wahl MC (2015) The large N-terminal region of the Brr2 RNA helicase guides productive spliceosome activation. Genes Dev [Epub ahead of print]

Barbot M, Jans D, **Schulz C**, Denkert N, Kroppen B, Hoppert M, Jakobs S, Meinecke M (2015) Mic10 Oligomerizes to Bend Mitochondrial Inner Membranes at Cristae Junctions. Cell Metabolism 21(5):756-763

Binotti B, Pavlos N, Riedel D, Wenzel D, Vorbrueggen G, **Schalk AM**, Kuehnel K, Boyken J, Erck C, Martens H, Chua JJE, Jahn R (2015) The GTPase Rab26 links synaptic vesicles to the autophagy pathway. eLife 4

Büchner A, **Krumova P**, Ganesan S, Baehr M, Eckermann K, Weishaupt JH (2015) Sumoylation of p35 Modulates p35/Cyclin-Dependent Kinase (Cdk) 5 Complex Activity. Neuromolecular Medicine 17(1):12-23

Busse RA, Scacioc A, **Schalk AM**, Krick R, Thumm M, Kühnel K (2016) Analyzing protein-phosphoinositide interactions with liposome flotation assays. In M Waught (Ed), Lipid Signaling Protocols.

all predicted coiled coils of all three subunits and a large preceding region in Nup54, whose amino acid composition and strong sequence conservation are also predictive of a globular fold.

Recombinant protein expression in E.coli showed that individual subunits as well as subunit pairs are highly prone to form inclusion bodies. Coexpression of all three subunits, however, yielded a soluble 1:1:1 stoichiometric complex that showed no signs of self-association. Complex 1 crystallized when bound to Nb15, a nanobody specific for the heterotrimer. However, the resulting crystals diffracted to only ≈7 Å. While optimizing the Nup62•58•54 complex for improved crystal packing, we observed that its interaction with Nup93 requires C-terminal regions of all three subunits. Deleting the heterotrimeric Nup93-binding module led to Complex 16, whose cocrystals with Nb15 diffracted to 2.9 Å.

A central element of the structure is a long, parallel heterotrimeric coiled coil formed by Nup62, Nup58, and Nup54. Given that so far only pairwise Nup62•54 and Nup58•54 interactions had been considered, this was unexpected. On the C-terminal side, the heterotrimeric coiled coil is followed by a sharp kink and by a post-kink coiled-coil structure, while on the N-terminal side, the central coiled coil loosens and the heterotrimeric coil structure gets interrupted to engage in interactions with further N-terminal parts of Nup54 (Figure 1). Nb15 recognizes the peculiar CC3-kink-CC fold of the Nup62 complex, which requires all three subunits to interact. The structure of Nup54 αβ domain revealed a ferredoxin-like fold with a ßaßßaß topology.

According to Nup62 complex-mediated NPC-gating model, rearrangements in the Nup62 complex, which occur upon NTR-binding to FG domains, bring about "constriction" or "dilation" of the NPC central channel. A structural comparison of the coiled coil fragments on which this model was based, with our structure, now shows that all proposed "ring-cycle" intermediates are prohibited in the context of the properly assembled Nup62•58•54 heterotrimer.

In addition, we also identified several N-terminal structural elements in Nup62•58•54 heterotrimer, whose extreme evolutionary conservation suggests them to be additional interaction sites with other nucleoporins or even with certain NTR•cargo complexes, which opens up many exciting questions for future research.

Hema Chug worked on her doctoral thesis in the group of Dirk Görlich at the Max Planck Institute for Biophysical Chemistry. She defended her PhD thesis in October 2013.

These results were published in Chug H, Trakhanov S, Huelsmann BB, Pleiner T, Görlich D (2015) Science (2015) 350, 106-110.

Caliskan N, Peske F, Rodnina MV (2015) Changed in translation: mRNA recoding by-1 programmed ribosomal frameshifting. Trends Biochem Sci 40(5):265-274

Carneiro MG, Koharudin LMI, Ban D, Sabo TM, Trigo-Mourino P, Mazur A, Griesinger C, Gronenborn AM, Lee D (2015) Sampling of Glycan- Bound Conformers by the Anti-HIV Lectin Oscillatoria agardhii agglutinin in the Absence of Sugar. Angew Chem Int Ed Engl 54(22):6462-6465

Carneiro MG, Koharudin LMI, Griesinger C, Gronenborn AM, Lee D (2015) H-1, C-13 and N-15 resonance assignment of the anti-HIV lectin from Oscillatoria agardhii. Biomol NMR Assign 9(2):317-319

Carneiro MG, Reddy JG, Griesinger C, Lee D (2015) Speeding-up exchange-mediated saturation transfer experiments by Fourier transform.. J Biomol NMR 63(3):237-244

Cass SDB, Haas KA, Stoll B, Alkhnbashi OS, **Sharma K**, Urlaub H, Backofen R, Marchfelder A, Bolt EL (2015) The role of Cas8 in type I CRISPR interference. Bioscience Rep 35 (3)

Protein folding on the ribosome

Up to now, protein folding has largely been investigated on purified proteins *in vitro*. However, protein folding in the cell is coupled to protein biosynthesis on ribosomes. Proteins are synthesized in a vectorial fashion, i.e. the N-terminal portion of the protein is produced first which allows it to sample 3D conformations in the absence of its C-terminal counterpart. Moreover, proteins travel through the exit tunnel within the ribosome and interact with ribosomal surface before they are released into the cellular matrix. Co-translational protein folding on the ribosome has never been monitored in real time and timing of folding events in relation to the kinetics of protein synthesis remains unexplored. Well, challenge accepted!

In order to monitor folding events on the ribosome, we have developed a system that allows us to site-specifically label nascent protein chains during translation. Having two distinct positions of growing polypeptides labelled with two distinct fluorescent probes, we can monitor protein movements on the ribosome

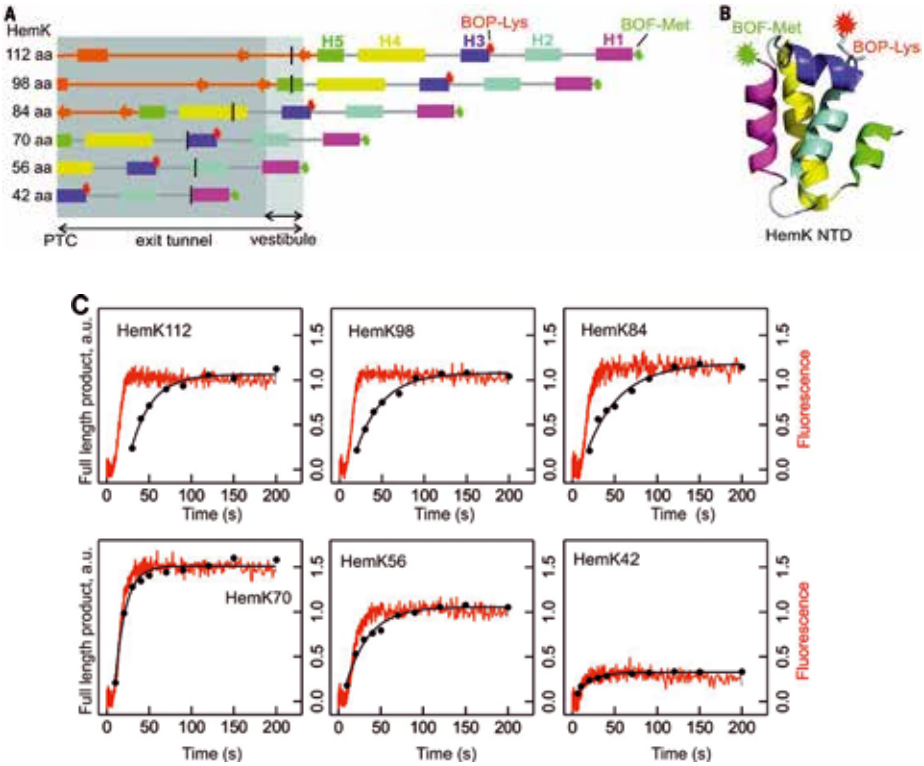

Fig. 1: Schematics of the model protein HemK N-terminal domain. **(A)** Secondary structure elements of HemK; helices H1 to H5 are shown as bars. Green and red stars indicate the positions of two dyes attached to the N-terminal methionine and lysine 34, respectively. Numbers of amino acids (42 to 112 aa) correspond to lengths of the nascent peptides. **(B)** Crystal structure of the HemK NTD. **(C)** Time courses of translation, derived from SDS–polyacrylamide gel electrophoresis experiments (circles) and normalized FRET changes (dye attached to lysine 34; red lines), for HemK constructs of different lengths.

Chari A, **Haselbach D**, Kirves J-M, Ohmer J, Paknia E, Fischer N, Ganichkin O, Moeller V, Frye JJ, Petzold G, Jarvis M, Tietzel M, Grimm C, Peters J-M, Schulman BA, Tittmann K, Markl J, Fischer U, Stark H (2015) ProteoPlex: stability optimization of macromolecular complexes by sparse-matrix screening of chemical space. Nature Methods 12(9):859

Chug H, Trakhanov S, Huelsmann BB, **Pleiner T**, Görlich D (2015) Crystal structure of the metazoan Nup62.Nup58.Nup54 nucleoporin complex. Science 350(6256):106-110

Gazit N, Vertkin, I, Shapira, I, **Helm MS**, Slomowitz E, Sheiba M, Mor Y, Rizzoli SO, Slutsky I (2015) IGF-1 receptor differentially regulates spontaneous and evoked transmission via mitochondria at hippocampal synapses, Neuron [accepted]

Goyal A, Belardinelli R, Maracci C, Milon P, Rodnina MV (2015) Directional transition from initiation to elongation in bacterial translation. Nucleic Acids Research [Epub ahead of print]

Haag S, **Warda AS**, Kretschmer J, Bohnsack MT (2015) Functional characterisation of the human rRNA methyltransferase WBSCR22. FEBS J 282

by Fluorescence resonance energy transfer (FRET). We decided to use a small, five-helix N-terminal domain of HemK as a model system (Fig. 1A, B). The protein was translated *in vitro* by using a fully reconstituted bacterial translation apparatus and fluorescent dyes were attached to the N-terminal methionine and a lysine at position 34.

When 42 out of 73 amino acids comprising the protein domain were synthesized by the ribosome, the peptide was still trapped in an extended conformation within the ribosomal exit tunnel and FRET remained low (Fig. 1C). Upon peptide lengthening to 56 and 70 amino acids, FRET reached maximum value, indicating peptide compaction before the entire protein domain emerges from the ribosome – most likely still in the wider end-part of the tunnel. When the domain is finally extruded from the tunnel in 112 amino acid long variant, it assumes a final fold which is accompanied by a decrease in FRET. The decrease occurs because two dyes in the final fold approach a tyrosine residue, which is known to quench fluorophores by photo-induced electron transfer. Stabilization of nascent peptide chains during protein synthesis was also probed with limited proteolysis on the ribosome, which further confirmed native fold formation when the protein domain reaches the exit of the ribosomal tunnel.

The compact folding intermediate observed on the ribosome was not registered during folding of purified N-terminal domain of HemK because it doesn't form in solution or it is too short-lived to be observed. This suggests that the ribosome can force an alternative folding pathway or stabilize folding intermediates that rarely occur in solution. Our findings show how the ribosome can, in principle, define the pathway for co-translational folding.

We have developed an experimental system which can be further used to dissect co-translational protein folding of proteins exhibiting more complex folding pathways. We can also record folding behavior of proteins known to misfold during disease development and investigate if co-translational folding has a role in inducing such pathogenic events in the cell.

Goran Kokic contributed to this paper during his MSc thesis research in the group of Marina Rodnina at the MPI for Biophysical Chemistry. After an internship in Cambridge, UK he returned to Göttingen for his PhD research with Patrick Cramer

These results were published in Holtkamp W, Kokic G*, Jäger M, Mittelstaet J, Komar A, Rodnina M (2015) Science 350, 1104-1107.

*first co-author

Haag S, **Warda AS**, Kretschmer J, Guennigmann MA, Hoebartner C, Bohnsack MT (2015) NSUN6 is a human RNA methyltransferase that catalyzes formation of m(5)C72 in specific tRNAs. RNA 21(9):1532-1543

Hauer F, Gerle C, Fischer N, Oshima A, Shinzawa-Itoh K, Shimada S, Yokoyama K, Fujiyoshi Y, Stark H (2015) GraDeR: Membrane protein complex preparation for single-particle cryo-EM. Structure 23(9):1769-1775

Hoffmann C, Neumann H (2015) *In Vivo* Mapping of FACT–Histone Interactions Identifies a Role of Pob3 C-terminus in H2A–H2B Binding. ACS Chem Biol [Epub ahead of print]

Holtkamp W, **Kokic G***, Jäger M, Mittelstaet J, Komar A, Rodnina M (2015) Cotranslational protein folding on the ribosome monitored in real time. Science 350(6264):1104-1107 (*first co-author)

Jaehne S, Rizzoli SO, **Helm MS** (2015) The structure and function of presynaptic endosomes. Exp Cell Res 335(2):172-179

Jessen D, Roth C, Wiermer M, Fulda M (2015) Two activities of long-chain acyl-coenzyme A synthetase are involved in lipid trafficking between the endoplasmic reticulum and the plastid in *Arabidopsis*. Plant Physiol 167(2):351-66

Ubiquitin flips the switch

Ubiquitylation determines cell fate by regulating translation

Ubiquitylation is an essential posttranslational modification required for somatic cell division, stem cell pluripotency, and differentiation. The specificity of ubiquitylation is conferred by E3 ubiquitin ligases, which recruit specific substrates and E2 enzymes, thus promoting the transfer of ubiquitin. Amongst ~600 human E3s, CUL3-RING Ligases are a family of multi-subunit E3s that use ~70 BTB domain-containing proteins as adaptors for substrate recruitment.

My interest in CUL3-based E3 ligases started during my postdoctoral studies the lab of Michael Rape at UC Berkeley. We found that these enzymes are tightly regulated during human embryonic stem cell (hESC) differentiation, strongly pointing to their involvement in regulating important steps in early development. Indeed, we made the exciting finding that CUL3 with its vertebrate-specific substrate adaptor KBTBD8 ($CUL3^{KBTBD8}$) is essential for the formation of neural crest stem cells during hESC differentiation (Fig. 1a). When we induced KBTBD8-depleted hESCs to undergo neural differentiation (that is, to induce differentiation into neural cells), they failed to produce neural crest cells and instead produced more central nervous system precursor (CNS) cells.

Neural crest cells are an important cell population that forms early during development and gives rise to many different tissues and cell types in the body (Fig 1b). To test whether $CUL3^{KBTBD8}$ is indeed important for specification of these cells in a developing organism, we teamed up with the lab of Richard Harland at UC Berkeley to perform studies in frog embryos. We showed that reduced expression or activity of $CUL3^{KBTBD8}$

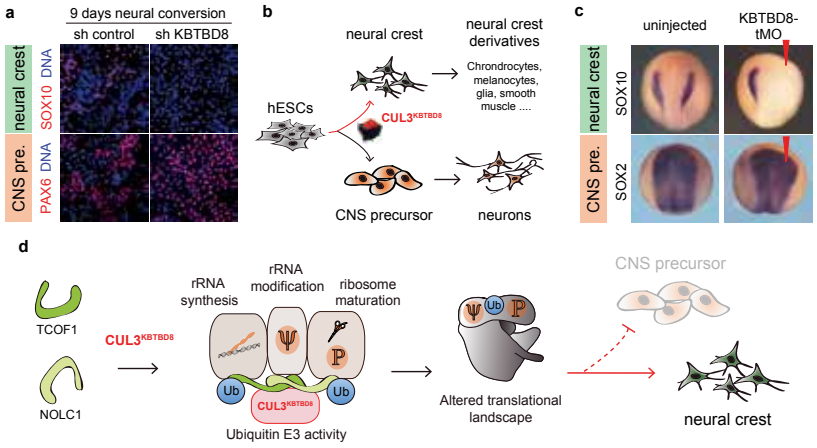

Fig. 1: $CUL3^{KBTBD8}$ directs differentiation of embryonic stem cells into neural crest cells by repressing translation of CNS precursor proteins. a, Control or KBTBD8-depleted hESCs were subjected to neural conversion for 9 days and subjected to immunofluorescence microscopy. b, *Xenopus tropicalis* embryos injected with translation-blocking morpholinos against KBTBD8 were analyzed by in situ hybridization. Red arrows mark the injected side of the embryo c, Model of the $CUL3^{KBTBD8}$-controlled developmental switch. d, Model of the molecular mechanism how $CUL3^{KBTBD8}$ controls neural crest specification

Kabatas S, **Vreja IC**, **Saka SK**, Hoeschen C, Krohnert K, Opazo F, Rizzoli SO, Diederichsen U (2015) A contamination-insensitive probe for imaging specific biomolecules by secondary ion mass spectrometry . Chemical Communications 51(67):13221-13224

Klomp J, Athy D, Kwan WC, Bloch N, Sandmann T, **Lemke S**, Schmidt-Ott U (2015) A cysteine-clamp gene drives embryo polarity in the midge Chironomus. Science 348(6238):1040-1042

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Kunadt M, Eckermann K, Stuendl A, Gong J, Russo B, Strauss K, Rai S, Kuegler S, Falomir Lockhart L, Schwalbe M, **Krumova P**, Oliveira L, Baehr M, Moebius W, Levin J, Giese A, Kruse N, Mollenhauer B, Geiss-Friedlander R, Ludolph AC, Freischmidt A, Feiler MS, Danzer KM, Zweckstetter M, Jovin TM, Simons M, Weishaupt JH, Schneider A (2015) Extracellular vesicle sorting of alpha-Synuclein is regulated by sumoylation. Acta Neuropathologica 129(5):695-713

Laulumaa S, Nieminen T, Lehtimaeki M, **Aggarwal S**, Simons M, Koza MA, Vattulainen I, Kursula P, Natali F (2015) Dynamics of the

prevented neural crest formation and expanded the territory occupied by CNS precursors (Fig 1c). Thus, we concluded that CUL3^{KBTBD8} controls a developmental switch that controls the formation of neural crest cells (Fig 1b).

To gain mechanistic insights into how this switch in cell fate occurs, we combined mass spectrometry-based, biochemical, and genetic approaches and identified the ribosome biogenesis regulators NOLC1 and TCOF1 as the essential substrates of CUL3^{KBTBD8}, which are monoubiquitylated during hESC differentiation. On the one hand, this finding corroborated our results, as mutation in TCOF1 cause a human disease of aberrant neural crest specification. On the other hand, we were surprised, since differentiation is frequently brought about by global changes to chromatin architecture or transcriptional networks. How could ubiquitylation of these ribosome biogenesis factors by CUL3^{KBTBD8} mediate cell-fate determination?

We tackled this question by first looking at the molecular consequences of the ubiquitylation reaction. Ubiquitylation of TCOF1 and NOLC1 induces the formation of a TCOF1-NOLC1 platform, which then connects RNA polymerase I with ribosome modification enzymes (Fig 1d). To test whether this ribosome modification platform produces ribosomes with distinct translational output, we joined forces with the lab of Nick Ingolia at UC Berkeley. We employed RNA sequencing and ribosome profiling and found that depletion of KBTBD8 changed the translational program of cells undergoing neural conversion. Analysis of regulated mRNAs showed that KBTBD8 suppressed the production of proteins specifying CNS precursors, whereas it did not affect translation of mRNAs connected to neural crest specification. From these and further experiments we concluded that CUL3^{KBTBD8} directs hESC differentiation into neural crest cells by repressing translation of CNS precursor proteins.

Our work documents an important role for ubiquitylation in remodeling translational programs during differentiation and it raises many intriguing questions concerning the molecular mechanisms of ubiquitin-dependent ribosome specification. What is the nature of the ribosome modifications? How do those modifications influence the interactions with select mRNAs or delivery factors that bring particular mRNAs to the ribosome? I hope to answer these questions in the future as an independent investigator.

Achim Werner completed his doctoral thesis under the supervision of Frauke Melchior, formerly Biochemistry I at the University Medical Center Göttingen and now ZMBH at the University of Heidelberg. He graduated from the Molecular Biology program in November 2010. Currently, he works as a postdoc at UC Berkeley (Rape Lab).

These results were published in Werner et al. (2015) Nature 525, 523-527.

peripheral membrane protein P2 from human myelin measured by neutron scattering - a comparison between wild-type protein and a hinge mutant. PLoS One 10(6)

Lin YJ, **Liu WT**, Stark H, Huang CT (2015) Expression of enterovirus 71 virus-like particles in transgenic enoki (*Flammulina velutipes*). Appl Microbiol Biotechnol 99(16):6765-6774

Liu S, **Mozaffari-Jovin S**, Wollenhaupt J, Santos KF, Theuser M, Dunin-Horkawicz S, Fabrizio P, Bujnicki JM, Luehrmann R, Wahl MC (2015) A composite double-/single-stranded RNA-binding region in protein Prp3 supports tri-snRNP stability and splicing. eLife 4, e07320

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Milovanovic D, Honigmann A, Koike S, Goettfert F, Paehler G, Junius M, Muellar S, Diederichsen U, Janshoff A, Grubmueller H, Risselada HJ, Eggeling C, Hell SW, van den Boogart G, Jahn R (2015) Hydrophobic mismatch sorts SNARE proteins into distinct membrane domains. Nat Commun 5984(6)

Functional dynamics of the anti-HIV lectin OAA

During the past decades, lectins from different sources arose as promising anti-HIV agents. Their potent and broad-spectrum anti-viral activity stems from the specific binding to high-mannose glycans on the viral protein gp120.

In this work, we focused on the *Oscillatoria agardhii* agglutinin (OAA), an anti-HIV lectin with a unique carbohydrate-recognition epitope. The X-ray crystal structures of sugar-free and sugar-bound OAA, determined by our collaborators, revealed a β-barrel-like structure with two glycan binding sites located at opposite ends of the barrel. By comparing the two structures, a distinct local backbone conformational change was identified, characterized by a ~180° flip of the orientation of a peptide bond within the binding sites.

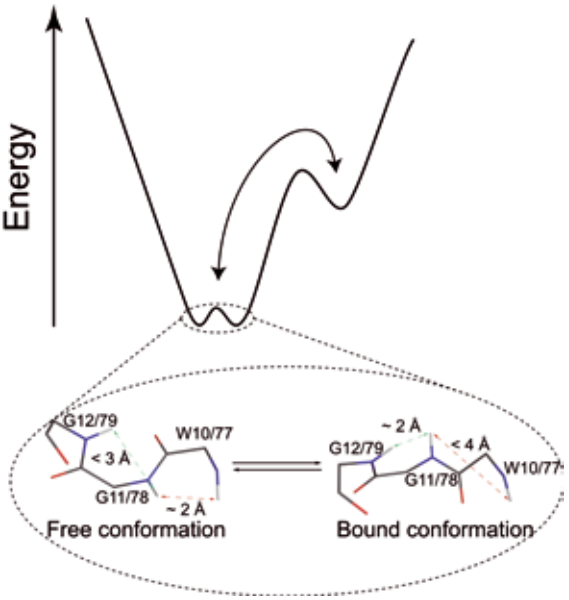

Fig. 1: Both the sugar-free and sugar-bound conformations observed by X-ray crystallography are conformational substates of the ground state in the absence of ligand. The rate of interconversion between these two conformations is faster than 166 µs. Our results suggest that the anti-HIV activity of OAA is accomplished via conformational selection within a ground state ensemble.

Such conformational changes observed between free and bound structures are often taken as evidence for an "induced-fit" mechanism of molecular recognition. This model suggests that only upon ligand binding the protein undergoes conformational rearrangements that result in the bound conformation. The alternative "conformational selection" model of molecular recognition takes into account the intrinsic, but often overlooked, conformational heterogeneity of proteins, and postulates that the binding interaction selects one of the multiple conformers that pre-exist in equilibrium in the absence of the binding partner. According to this recognition model, structural differences between free and bound states determined by X-ray crystallography or nuclear magnetic resonance (NMR) spectroscopy do not suffice to characterize the molecular recognition mechanism, as they most likely report on the lowest energy states, representing an incomplete picture of the structural heterogeneity experienced by the free protein. A necessary (but not sufficient) condition to demonstrate a conformational selection scenario is then, in the absence of binding partner, the existence of the bound conformation with comparable population as the alternative conformations in the ensemble.

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Park Y, Seo J, Fraind A, Perez-Lara A, **Yavuz H,** Han K, Jung S-R, Kattan I, Walla PJ, Choi M, Cafiso DS, Koh D-S, Jahn R (2015) Synaptotagmin-1 binds to PIP2-containing membrane but not to SNAREs at physiological ionic strength. Nat Struct Mol Biol 22(10):815-823

Pech U, Revelo NH, **Seitz KJ**, Rizzoli SO, Fiala A (2015) Optical dissection of experience-dependent pre- and postsynaptic plasticity in the *Drosophila* brain. Cell Reports 10(12):2083-2095

Pflanz R, Voigt A, **Yakulov T**, Jaeckle H (2015) *Drosophila* gene tao-1 encodes proteins with and without a Ste20 kinase domain that affect cytoskeletal architecture and cell migration differently. Open Biology 5(1):140161

Pirouz M, Rahjouei A, Shamsi F, **Eckermann K**, Salinas-Riester G, Pommerenke C, Kessel M (2015) Destabilization of pluripotency in the absence of Mad2l2. Cell Cycle 14(10):1596-1610

Pleiner T, Bates M, Trakhanov S, Lee C, Schliep J, **Chug H**, **Böhning M**, Stark H, Urlaub H, Görlich D (2015) Nanobodies: site-specific labeling for super-resolution imaging, rapid epitope-mapping & native protein complex isolation. eLife

NMR spectroscopy is a powerful technique for studying conformational heterogeneity in solution, given its sensitivity to a broad range of motional timescales in solution (from picoseconds to seconds and beyond) with atomic resolution. Thus, in order to elucidate the molecular recognition mechanism underlying OAA's anti-HIV activity, we investigated whether "bound-like" conformers are already sampled in solution in the absence of sugar.

We first turned to CPMG relaxation dispersion experiments – a popular NMR experiment that provides thermodynamic, kinetic, and structural information on conformational equilibria between the highly populated ground state and sparsely and transiently populated (excited) states. Interestingly, we found out that multiple residues sample an excited state, but the conformation of this is different from the conformation adopted in the glycan-complexed form.

Conformational fluctuations potentially relevant for molecular recognition can occur not only between ground and excited states, but also within the ground state itself. The nature of the conformational difference seen in the X-ray structures of OAA (peptide bond flip in the sugar binding region) results in drastic changes in the distance between adjacent backbone amide groups, and in the backbone dihedral angles, which can be readily probed with different NMR observables.

Further, since these NMR observables correspond to population-averaged values of individual conformations, conformational dynamics can be inferred from inconsistencies between experimentally derived structural parameters and a given (set of) structure(s). In addition, we have determined the solution structure of OAA. Our analysis indicates that both the sugar-free and the sugar-bound conformations are highly populated in the absence of sugar. In addition, we can estimate the interconversion rate between these two conformations to be faster than 166 µs. Taken together, our results suggest that recognition of high-mannose glycans by OAA proceeds by conformational selection within the ground state.

These insights into the molecular recognition mechanism essential for the anti-HIV activity of OAA may help guide further optimization and/or development of preventive anti-HIV therapeutics.

Marta Gião Carneiro conducted her doctoral research under the supervision of Christian Griesinger and Donghan Lee at the MPI for Biophysical Chemistry. She graduated from the Molecular Biology program in November 2015.

These results were published in Carneiro et al. (2015) Angew Chem Int Ed Engl 54:6462-6465.

Ratz M, Testa I, Hell SW, Jakobs S (2015) CRISPR/Cas9-mediated endogenous protein tagging for RESOLFT super-resolution microscopy of living human cells. Scientific Reports 5:9592

Sakin V, Richter SM, Hsiao H-H, Urlaub H, Melchior F (2015) Sumoylation of the GTPase Ran by the RanBP2 SUMO E3 Ligase Complex. J Biol Chem 290(39):23589-23602

Schmidt HB, Goerlich D (2015) Nup98 FG domains from diverse species spontaneously phase-separate into particles with nuclear pore-like permselectivity. eLife 4, UNSP e04251

Schmidt HB, Görlich D (2016) Transport Selectivity of Nuclear Pores, Phase Separation, and Membraneless Organelles. Trends Biochem Sci 41(1):46-61

Schneider C, Agafonov DE, Schmitzova J, Hartmuth K, Fabrizio P, Lührmann R (2015) Dynamic Contacts of U2, RES, Cwc25, Prp8 and Prp45 proteins with the pre-mRNA branch-site and 3' splice site during catalytic activation and step 1 catalysis in yeast spliceosomes. Plos Genetics 11:e1005539

FG phases with NPC-like permselectivity

Nuclear pore complexes (NPCs) are gigantic macromolecular machines that conduct massive transport fluxes mediated by shuttling nuclear transport receptors (NTRs), while keeping nuclear and cytoplasmic contents separated. Critical for this is a size-selective permeability barrier, which prevents the passage of objects larger than ≈5 nm in diameter or ≈30 kDa in size. NTRs, however, allow the facilitated translocation of selected cargoes much greater than this size limit. Yet, how this seemingly paradox barrier works in atomic detail remains a major question.

H. Broder Schmidt completed his doctoral thesis under the supervision of Dirk Görlich at the MPI for Biophysical Chemistry. He graduated from the Molecular Biology program in November 2012. Currently, he works as a postdoc at Stanford University (Rohatgi Lab).

These results were published in Schmidt HB, Görlich D (2015) eLife 4:e04251

The NPC barrier in *Xenopus* relies primarily on the intrinsically disordered FG domain of Nup98. We now observed that Nup98 FG domains of mammals, lancelets, insects, nematodes, fungi, plants, amoebas, ciliates, and excavates spontaneously and rapidly phase-separate from dilute (submicromolar) aqueous solutions into characteristic „FG-particles". This required neither sophisticated experimental conditions, nor auxiliary eukaryotic factors, but occurred already during FG-domain expression in bacteria. All Nup98 FG-phases rejected inert macromolecules and yet allowed far larger NTR cargo complexes to rapidly enter. They even recapitulated the well-established observations that large cargo-domains counteract NPC-passage of NTR cargo complexes, while cargo shielding and increased NTR:cargo surface-ratios override this inhibition.

Their exquisite NPC-typical sorting selectivity and strong intrinsic assembly propensity suggest that Nup98 FG-phases can form in authentic NPCs and indeed account for the permeability properties of the pore. Notably, the phase separation of proteins into liquid droplets and hydrogels is currently emerging as an important principle in cell biology, also underlying the formation of nuclear and cytoplasmic 'membrane-less' organelles (such as nucleoli, germ bodies or stress granules).

Clustering of SNARE proteins

The clustering of proteins and lipids in distinct microdomains is emerging as an important principle for the spatial patterning of biological membranes. Using plasma membrane-resident SNARE proteins as model, we now show that cholesterol-induced hydrophobic mismatch between the transmembrane domains and the membrane lipids not only suffices to induce clustering of proteins, but can also lead to the segregation of structurally closely homologous membrane proteins in distinct membrane domains.

Segregating SNARE proteins into distinct clusters at the plasma membrane has three key functional implications: (i) clusters act as the local hot spots for the vesicle

Schulz C, **Schendzielorz A**, Rehling P (2015) Unlocking the presequence import pathway. Trends Cell Biol 25(5):265-275

Schwenen LLG, Hubrich R, **Milovanovic D**, Geil B, Yang J, Kros A, Jahn R, Steinem C (2015) Resolving single membrane fusion events on planar pore-spanning membranes. Scientific Reports 5:12006

Sharma K, Hrle A, Kramer K, Sachsenberg T, Staals RHJ, Randau L, Marchfelder A, van der Oost J, Kohlbacher O, Conti E, Urlaub H (2015) Analysis of protein-RNA interactions in CRISPR proteins and effector complexes by UV-induced cross-linking and mass spectrometry. Methods 89:138-148

Shcherbatyy V, Carson J, Yaylaoglu M, Jaekle K, Grabbe F, Brockmeyer M, **Yavuz H**, Eichele G (2015) A digital atlas of ion channel expression patterns in the two-week-old rat brain. Neuroinformatics 13(1):111-125

Srinivas US, Dyczkowski J, Beissbarth T, Gaedcke J, Mansour WY, Borgmann K, Dobbelstein M (2015) 5-Fluorouracil sensitizes colorectal tumor cells towards double stranded DNA breaks by interfering with homologous recombination repair. Oncotarget 6(14):12574-12586

SNARE Proteins (contd.)

recruitment, (ii) the local enrichment provides sufficient number of proteins necessary for the fast, evoked synaptic release, (iii) closely homologous SNARE proteins such as synataxin 1 and 4 are segregated in non-overlapping membrane domains which is essential for their distinct roles in regulated (sytnaxin 1) and constitutive (syntaxin 4) exocytosis. Overall, our findings demonstrate that the structural organization of membranes is governed by a hierarchy of interactions with hydrophobic mismatch emerging as one of the fundamental physical principles.

Dragomir Milovanovic completed his doctoral thesis in the Department of Reinhard Jahn at the MPI for Biophysical Chemistry. He graduated from the Molecular Biology program in October 2015. Currently, he works as a postdoc at Yale University (De Camilli Lab).

These results were published in Milovanovic et al. (2015) Nature Communications 6, 5984

Sumoylation of GTPase Ran

Nuclear pore complexes (NPCs) in vertebrates are peculiar in that they have sumoylation and desumoylation activities associated with them. On the way to nucleus on cytoplasmic filaments is the SUMO E3 ligase, RanBP2 complex, whereas at the exit of NPCs on nuclear baskets are the SUMO isopeptidases, SENP1 and SENP2. In my PhD work (Sakin et al., 2015, JBC), we discovered that both RanBP2 and SENP1 play a role in regulating the sumoylation of the small GTPase Ran, which is the key regulator of nucleocytoplasmic transport. When we knocked down RanBP2, Ran sumoylation was completely vanished whereas knockdown of SENP1, but not SENP2, increased Ran sumoylation levels in semi-permeabilized cells. Our detailed in vitro sumoylation assays confirmed that Ran is sumoylated in the presence of RanBP2 complex, but not other SUMO E3 ligases and sumoylation is dependent on Ran-binding domains of RanBP2. In cells, Ran dynamically associates and dissociates with import and export receptors. Therefore, we tested Ran sumoylation in the presence of transport receptors and observed that all receptors (Imp Beta, Transportin, Crm1, NTF2) blocked Ran sumoylation. Mapping the sumoylation sites indicated that all receptors except for NTF2 may block the access of the E2-conjugating enzyme, Ubc9. However, the sumoylation sites in Ran-NTF2 complexes were perfectly accessible. Further investigations by isothermal calorimetry revealed that NTF2 reduces Ran's affinity to RanBP2's Ran-binding domains to undetectable levels. Taken together, we identified Ran as a sumoylation target of RanBP2 complex and showed that cells try to keep Ran in unmodified state, the importance of which needs to be further investigated.

Volkan Sakin completed his doctoral thesis in the group of Frauke Melchior, former University Medical Center Göttingen, now ZMBH, University of Heidelberg. He graduated from the Molecular Biology program in October 2012. Currently, he works as a postdoc in the Department of Infectious Diseases, Virology at the University Hospital of Heidelberg.

These results were published in Sakin et al. (2015) JBC 290, 23589

Truckenbrodt S, Rizzoli SO (2015) Synaptic Vesicle Pools: Classical and Emerging Roles. In Sumiko Mochida (Ed), Presynaptic Terminals, Springer Japan

Vreja I, Kabatas S, **Saka SK**, Kröhnert K, Höschen C, Opazo F, Diederichsen, Rizzoli SO (2015) Secondary-Ion Mass Spectrometry of Genetically Encoded Targets. Angew Chem, Int Ed 54:5784-5788

Vreja I, Nikic I, Göttfert F, Bates M, Kröhnert K, Outeiro T, Hell S, Lemke E, Rizzoli S (2015) Super-resolution Microscopy of Clickable Amino Acids Reveals the Effects of Fluorescent Protein Tagging on Protein Assemblies. ACS Nano 9(11):11034-11041

Warkocki Z, **Schneider C**, **Mozaffari-Jovin S**, Schmitzova J, Höbartner C, Fabrizio P, Lührmann R (2015) The G-patch protein Spp2 couples the spliceosome-stimulated ATPase activity of the DEAH-box protein Prp2 to catalytic activation of the spliceosome. Genes Dev 29(1):94-107

Wotton KR, Jimenez-Guri E, Crombach A, Janssens H, Alcaine-Colet A, **Lemke S**, Schmidt-Ott U, Jaeger J (2015) Quantitative system drift compensates for altered maternal inputs to the gap gene network of the scuttle fly Megaselia abdita. eLife 4

New Students

Master's class 2015/16

Laura Ahumada-Arranz, Spain
MSc from University of Salamanca

Gerald Ryan Aquino, Philippines
MSc from University of the Philippines-Diliman

Robert Lorenz Chua, Philippines
BSc from University of the Philippines-Diliman

Hadil El Sammak, Egypt
BSc from German University in Cairo

Mahmoud Tarek Elzayat, Egypt
BSc from German University in Cairo

Katharina Glaser, Germany
BSc from University of Göttingen

Rashi Goel, India
BSc from Sri Venkateswara College, University of Delhi

Bishoy Hanna, Egypt
BSc from Geman University in Cairo, Diploma from Cairo University

Katarina Harasimov, Serbia
BSc from University of Novi Sad

Deniz Kaya, Germany
BSc from University of Göttingen

Miriam Klaus, Germany
BSc from Freie Universität Berlin

Yi-Chen Lin, Taiwan
BSc from National Taiwan University

Yi-Tse Liu, Taiwan
MSc from National Taiwan University

Yen-Yun Lu, Taiwan
BSc from National Taiwan University

Valentina Manzini, Italy
BSc from University of Sussex, England

Volodymyr Mykhailiuk, Ukraine
BSc from Taras Shevchenko National University of Kyiv

Sofiia Reshetniak, Ukraine
BSc from Taras Shevchenko National University of Kyiv

Salma Sohrabi-Jahromi, Iran
MSc from University of Tehran

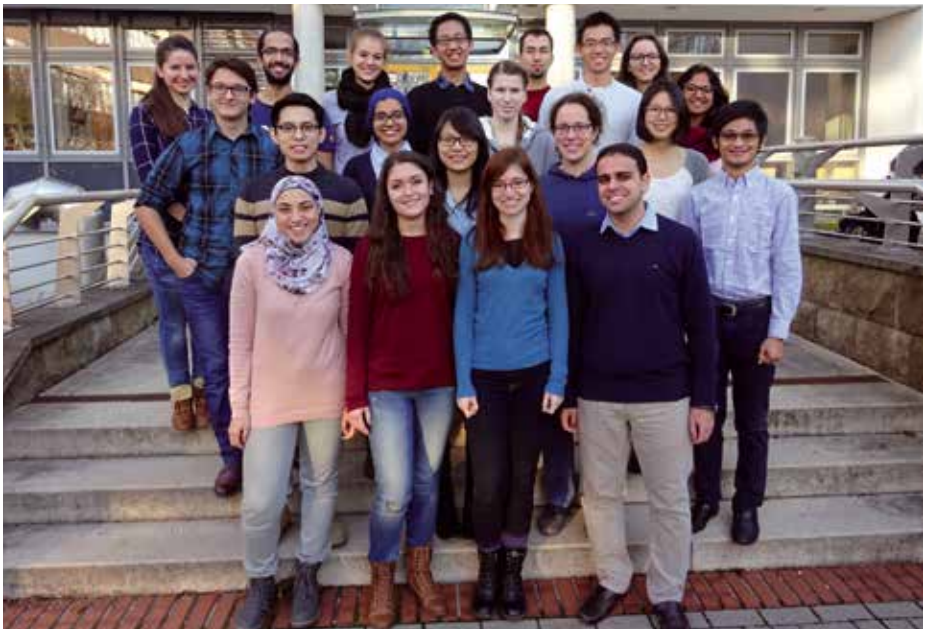
Kristina Stakyte, Lithuania
BSc from University of Edinburgh

Sung-Hui Yi, Taiwan
MSc from National Taiwan University

Applications 2015

In the year 2015, the Molecular Biology program received 709 applications from 65 countries.

Germany 20
other Western Europe 30
Eastern Europe 55
North America 15
Central/South America 17
North Africa 74
Central/South Africa 72
Asia, Near East 91
Asia, Far East 334
Australia 1



External MSc projects

Mohamed El-Brolosy
The role of Pyruvate Kinase-M2 in endothelial cell metabolism, angiogenesis and tumor progression.
Didier Stainier, MPI for Heart and Lung Research, Marburg

Matthew Logsdon
Mechanisms underlying immediate down regulation of putative tumor suppressors upon stimulation of mammary cells with EGF.
Yosef Yarden, Weizmann Institute of Science, Rehovot, Israel

PhD projects started in 2015

Arshiya Bhatt
Elucidation of molecular details of NF-kB activation in lymphocytes.
Jürgen Wienands, Blanche Schwappach, Steven Johnsen

Marc Böhning
Mass spectrometric investigation of kinase-specific RNA polymerase II phosphorylation.
Patrick Cramer, Henning Urlaub, Steven Johnsen

Priyanka Choudhury
Functional analysis of human RNA helicases.
Markus Bohnsack, Marina Rodnina, Jörg Stülke

Ákos Farkas
The TRC40 receptor and ist interactions with the translocation machinery at the ER.
Blanche Schwappach, Claudia Höbartner, Alexander Stein

Sebastian Grosse
The role of yeast shuttling SR proteins in mRNA quality control.
Heike Krebber, Reinhard Lührmann, Jörg Großhans

Prajwal Karki
Recoding events during stop codon read through.
Marina Rodnina, Halyna Shcherbata, Heike Krebber

Ina Klusmann
The tumor suppressor p53 and ist role in genomic stability.
Matthias Dobbelstein, Halyna Shcherbata, Steven Johnsen

Goran Kokic
Structural and functional analysis of mammalian transcription-coupled DNA repair.
Patrick Cramer, Holger Stark, Claudia Höbartner

Natalia Korniy
Recoding of mRNA through programmed ribosome frameshifting.
Marina Rodnina, Holger Stark, Stefan Pöhlmann

Daniel López de la Morena
Optogenetic stimulation of the cochlea.
Tobias Moser, Silvio Rizzoli, Tim Gollisch

Sebastian Ludwig
Regulation by post-translational modifications of the early assembly pathway of the spliceosome.
Reinhard Lührmann, Patrick Cramer, Ralf Ficner

Indira Memet
Analysis of RNA helicase function.
Markus Bohnsack, Marina Rodnina, Peter Rehling

Sara Osman
Towards the structure of the Mediator Kinase Module.
Patrick Cramer, Blanche Schwappach, Holger Stark

Kashish Singh
New sample preparation techniques for high resolution structure determination of macromolecular complexes.
Holger Stark, Kai Tittmann, Ralf Ficner

Shama Sograte Idrissi
Large scale super resolution imaging based on a novel probe screening methodology.
Silvio Rizzoli, Peter Rehling, Blanche Schwappach

Daryna Tarasenko
Molecular investigation of mitochondrial inner membrane morphology.
Michael Meinecke, Blanche Schwappach, Roland Dosch

Vedran Vasic
Mechanisms of retrotranslocation of misfolded proteins out of the endoplasmic reticulum.
Alexander Stein, Peter Rehling, Claudia Steinem

Students Graduated

The Masters of 2015

Arshiya Bhatt (*Wolfgang Wintermeyer*)
Characterization of peptide deformylase activity on ribosome-nascent-chain complexes.

Marc Böhning (*Dirk Görlich*)
Construction of a highly complex affibody phage display library using an optimized phagemid design.

Hannah Alice Buchner (*Stuart H. Orkin, Harvard Medical School*)
Investigating substrate specificity and redundancy of the KDM4 and KDM5 sub-family members of histone demethylases in mouse embryonic stem cells.

Priyanka Choudhury (*Marina Rodnina*)
Structural changes in elongation factor-G during translocation.

Sebastian Grosse (*Heike Krebber*)
Gbp2 phosphorylation in nuclear mRNA quality control and a possible role for Gbp2 and Hrb1 in cytoplasmic surveillance.

Martin Helm (*Silvio Rizzoli*)
An integrated approach to imaging postsynaptic projections.

Damian Hernandez (*Christiane Gatz*)
Purification of the *Arabidopsis thaliana* CC-type glutaredoxin ROXY19 and yeast-three-hybrid analysis of members of a putative repressive complex in *A. thaliana*.

Prajwal Karki (*Marina Rodnina*)
Kinetic insights into translation termination.

Ina Klusmann (*Matthias Dobbelstein*)
A supportive role of the tumor suppressor p53 in DNA replication.

Melina Köppelmann (*Marina Rodnina*)
The role of peptide dynamics on the ribosome during co-translational folding.

Natalia Korniy (*Marina Rodnina*)
Recoding of mRNA through programmed ribosome frameshifting.

David López de la Morena (*Tobias Moser*) *In vitro* transduction of spiral ganglion neurons. Establishing a method for testing Adeno-Associated Virus-mediated gene transfer in organotypic cultures of the organ of Corti.

Sebastian Ludwig (*Patrick Cramer*)
Knock-down of the factors SCAF4 and SCAF8 by the CRISPR interference method.

Indira Memet (*Markus Bohnsack*)
Regulation of RNA helicases by cofactors.

Elizabeth Miller (*Wolfgang Fischle*)
Characterizing the role of Lin-13 in *C. elegans* vulva development.

Sara Osman (*Patrick Cramer*)
Towards the structural and functional investigation of chromatin reader domains in *Saccharomyces cerevisiae*.

Marija Radovanovic (*Matthias Dobbelstein*) Interfering with p53 antagonists to restore tumor suppression.

Frank Richter (*Peter Rehling*)
Biogenesis of nuclear encoded respiratory chain subunits.

Alan Rodriguez (*Heinz Neumann*)
Engineering of a protein to catalyze a click chemistry reaction.

Kashish Singh (*Holger Stark*)
Purification of Human TRiC/CCT for structural studies by cryo-EM.

Minhui Su (*Mikael Simons*)
Microglia activation by myelin debris and the functions of microglial secretion in CNS remyelination.

Vedran Vasic (*Marina Rodnina*)
Monitoring the dissociation of the polypeptide chain from the ribosome during termination in real time.

Laura Winters (*Ivo Feußner*)
Improving triacylglycerol accumulation in algae.

The Doctors of 2015

Metin Aksu
Structural and functional investigation of cargo recognition by exportins.
Dirk Görlich, Reinhard Lührmann, Peter Rehling

Marta Gião Carneiro
Functional dynamics of the anti-HIV lectin OAA and NMR methodology for the study of protein dynamics.
Christian Griesinger, Jörg Enderlein, Tim Grüne

Ibrahim Ömer Cicek
The role of the mir-310s in Hedgehog signaling regulation under dietary stress in *Drosophila* ovary.
Halyma Shcherbata, Roland Dosch, Andreas Wodarz

Akanksha Goyal
Monitoring the late events of translation initiation in real-time.
Marina Rodnina, Heike Krebber, Heinz Neumann

Christoffer Hitzing
Vav guanine nucleotide exchange factors control B cell antigen receptor-induced Ca^{2+}-signaling.
Jürgen Wienands, Lutz Walter, Andreas Wodarz

Veena Jagannathan
The phosphatase MKP1 as a target to enhance replicative stress and apoptosis in tumor cells.
Matthias Dobbelstein, Wilfried Kramer, Holger Reichardt

Mariia Levchenko
Mitochondrial protein assemblies: Biogenesis of the cytochrome c oxidase and mitophagic signaling complexes.
Peter Rehling, Blanche Schwappach, Stefan Jakobs

Ewa Maj
Controlled levels of canonical Wnt signaling are required for neural crest migration.
Annette Borcher, Heidi Hahn, Andreas Wodarz

Dragomir Milovanovic
Nanoscale organization and dynamics of SNARE proteins in the presynaptic membranes.
Reinhard Jahn, Stefan Hell, Andreas Janshoff, Geert van den Bogaart

Momchil Ninov
Purification and characterization of proteins in active zones and vesicle docking.
Reinhard Jahn, Henning Urlaub, Silvio Rizzoli

Sona Pirkuliyeva
Structural and functional elucidation of the primary transducer module of the B cell antigen receptor.
Jürgen Wienands, Lutz Walter, Matthias Dobbelstein

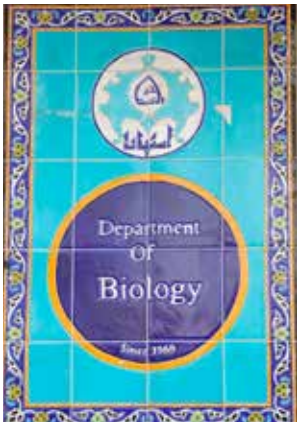
Michael Ratz
CRISPR-Cas9-mediated protein tagging in human cells for RESOLFT nanoscopy and the analysis of mitochondrial prohibitins.
Stefan Jakobs, Peter Rehling, Stefan Hell

Kundan Sharma
Investigation of prokaryotic immune defense system with quantitative and structural mass spectrometry.
Henning Urlaub, Jörg Stülke, Peter Rehling

Ingrid-Cristiana Vreja
Non-canonical amino acids as minimal tags for investigating protein organization and turnover.
Silvio Rizzoli, Reinhard Jahn, Blanche Schwappach

Life science and life in Isfahan

Although the application procedure for becoming a faculty member of one of the universities in the Ministry of Science of Iran is a time- and energy-consuming procedure, for me, my papers catalyzed this process. As a PhD student of the IMPRS for Molecular Biology I got the chance to work with Prof. Claudia Höbartner at the Max Planck Institute for Biophysical Chemistry. Effective supervision plus availability of material and instruments formed an ideal scientific environment and resulted in productive PhD research.



Left: Fatemeh and her team at the University of Isfahan. The black wear is called "Chador" and is the traditional clothing of women in Iran. *Right*: A ceramic tile on the wall beside the entrance of the Department of Biology

Now, as an Assistant Professor in the 50-year old Department of Biology at the University of Isfahan, I enjoy being responsible for four different types of tasks, namely teaching, research, administrative work and cultural activities. I teach approximately ten hours per week, for which an additional three office hours and, in the beginning, ten more hours of preparation are required. Although teaching takes a lot of time and energy, I feel happy when I realize the eyes of students shining from understanding something new.

Fatemeh at the University of Isfahan

During the PhD my research focus was on the characterization of nucleic acids. Here in Isfahan I emphasize more the application of these molecules. I have a team of students with whom I plan to develop a biosensing system which is applicable in any corner of developing countries and does not require a high level of instrumentation. Colorimetric biosensors using immobilized aptamers on gold nanoparticles are one of the best choices in this respect.

Besides teaching and research, I am involved in various administrative tasks. I have become a member of the educational committee of the Department of Biology. One of the responsibilities of this committee is to review the syllabus of all courses and coordinate them. To this aim, I benefit from being in contact with Göttingen. For example, during a one-month sabbatical in summer 2015 I received good advice from Prof. Ivo Feußner on how to manage microbiology and biochemistry programs.

I have also been selected as the Dean of „cultural affairs" in the Department of Biology. Together with a group of elected students a wide range of extracurricular activities are arranged for BSc and MSc students. We have started, for example, a "Biosiness" program at which students are taught how to write a business plan for a biotech company. Through the program they develop their own ideas with the potential of

The dome of "sheikh-lotofllah" from inside

Life Science and Life in Isfahan (continued)

being continued as a small biotech company after graduation.

Besides all these life science activities, living in a historical city of Isfahan has its own benefits. Walking on the side of the "Zaiande-rood" river and on the "33 pol", and having dinner on the calm and beautiful Naghsh-e-Jahan Square, known as Imam Square, in front of the Sheikh-lotfollah dome all together contributes to wonderful weekends for me and my family and leaves me with the rewarding feeling of enjoying life besides focusing on life science.

Effective relationship of "cultural affairs" of the Department of Biology with Red Crescent (an equivalent to the Red Cross in Iran)

Naghsh-e-Jahan Square (Imam Square)

The big bridge of "Si-o-se pol" (33 pol - 33 bridges) is one of several historical bridges over the "Zaiander-rood" river

Fatemeh Javadi Zarnaghi did her doctoral research under the supervision of Claudia Höbartner in the Nucleic Acid Chemistry Group at the MPI for Biophysical Chemistry. She graduated from the Molecular Biology Program in 2013. In 2014 she accepted the position of an assistant professor at the University of Isfahan.

Living the dream I never dared to have

I was one of the first intakes at the Göttingen MSc/PhD IMPRS program in 2000, graduating in 2005. At that time, although half the students were female, there were less than handful women as group leaders or professors. One of the most significant changes at Göttingen in this regard has been the appointment of a woman to the top post of the University in 2011 – something that the UK has been slightly ahead on but is still failing to access the full potential of the many incredible female scientists who end up drifting out of academia.

I clearly remember the day Prof. Anne Ferguson-Smith (Head of Department of Genetics, University of Cambridge) came to visit our lab at Babraham Institute during my postdoc time and took me aside to have a chat: "Gabi, you've got to do something!". That was after I published my Nature paper but still had no clear plans about what I wanted to do next. I had no career strategy, not even a hypothetical one. I was quite happily producing good science in the Reik lab, I got all the support a postdoc could dream of, but thinking that I should be my own boss was simply not on my radar.

If you think of the pyramid shape of the academic career progression, there is no rational reason for a PhD student or a young postdoc to think that one could successfully reach academic independence, particularly in the case of women (the same applies for many minorities). The diversity of role models simply isn't there. But with a bit of a kick from Anne and support from my postdoc supervisor Prof. Wolf Reik, I started to take this idea seriously.

Nobody finds it easy to secure their own independent academic position, but looking back at myself, and many of my colleagues, I am astounded by how few quality women even try. We as a society are missing out on the amazing potential of so many people, simply because role models such as Anne are all too few.

Top from left to right: Dr. Emily Saunderson (postdoc), Dr. Gabriella Ficz (PI), Kath Hodby (clinical research fellow, PhD student).
Bottom from left to right: Dr Michael Rushton (postdoc), Hemalvi Patani (PhD student) and Ateeq Hayat (PhD student)

The actual process of securing a post varies from place to place and person to person, but for me it was to apply to an advertised position of Early Career Researcher/Lecturer at the Barts Cancer Institute. The tenure-track offer came with a postdoc, accelerated access to a PhD student and £30k/year start-up money for 3 years within the Centre for Haemato-Oncology, with lab bench space for my group and access to equipment within the department and core facilities at the institute. I have access to MSc students through the MSc courses taught at the university and competitively to PhD students funded by MRC and CRUK studentships allocated to our university.

My responsibilities are to bring in external grant money; formulate competitive research projects; supervise my team; demonstrate that I have successfully built up my research team and that I have a promising scientific trajectory. I successfully competed for a New Investigator Award from MRC (receiving £860k grant funding in 2015) therefore the University will host me for the duration of the grant (until 2018). If my performance standard is satisfactory at the next Research Excellence Framework (REF) each UK University goes through every 5 years (where each academic has to put forward 4 publications above impact factor 10), my position will be secure until the following REF (which applies to everybody, from Lecturers to Professors).

However, looking back, the biggest hurdle was starting down the path to academic independence in the first place. Creating a scientific niche, building a network and, in particular for women, being considered serious contenders, are equally important for success.

The best advice I can give anyone comfortably sitting in a lab, blissfully ignoring their strategic career goals, is to seek out just one role-model, and ask just one question: What made you decide to try?

Gabriella Ficz did her doctoral research under the supervision of Donna Arndt-Jovin at the MPI for Biophysical Chemistry. She graduated from the Molecular Biology Program in 2005. Afterwards, she joined the laboratory of Wolf Reik at the Babraham Institute, University of Cambridge as a postdoctoral fellow. In 2013 she accepted the position of a lecturer at the Barts Cancer Institute, Queen Mary University of London, where she started her lab at the Centre for Haemato-Oncology.

From Göttingen to Elsevier

Leaving a cell biology lab and diving into the corporate publishing industry

I will never forget the surprised looks I got from my family, friends and colleagues when I told them that I was looking for a job outside academia. While the decision was easy, this process turned out to be more difficult than I expected. Discovering all the possible career alternatives, and understanding what would really interest me, was challenging. After applying for a wide variety of positions, I started looking into career perspectives in scientific publishing. I realized that I have always enjoyed reviewing and writing papers, as well as large organizational tasks such as grant applications. Fortunately, Peter Rehling, my supervisor, already provided me with ample opportunities to follow these interests during my time in Göttingen.

While investigating the possibilities of becoming a professional editor, I had the chance to attend a publishing conference where I met many professionals personally (Advice: prepare business cards and use them frequently!). This turned out to be significantly more efficient than sending formal applications. It was at this conference that I met one of the senior Elsevier managers and was eventually offered an Associate Publisher position in Chemistry following an interview in Amsterdam. My decision for this offer and against the chance of becoming an editor, was mainly led by the perspective of being able to go beyond science and to learn about businesses and publishing.

Once I started working in my new role, I had a very familiar feeling. Remember when you're starting to work in a new lab and you have no idea where things are standing and who is responsible for what? It is exactly the same when you start in a big, globally operating, company. There is an incredible amount of processes, products, abbreviations, roles and people. Elsevier has 7,000 employees (more than there are Scientists in the Max Planck Society) in 24 countries and getting your head around this can take a while.

Christian and his colleagues during the Elsevier Christmas party

My new responsibilities include managing nine chemistry journals focused on spectroscopy (including NMR and Mass Spectrometry). Accordingly, my first task was to understand the journals and their reputation in the respective scientific communities. This included meeting all the editors of these journals (35 from 15 different countries) and establishing great working relationships with them.

While spectroscopy in chemistry was certainly not my core area of scientific expertise, I brought along several important skills, which are helping me tremendously since the beginning: I) A basic understanding of the science (such as Mass Spectrometry and NMR). II) Knowing about and being interested in the publishing process. III) Being well organized and able to handle multiple projects and deadlines in parallel. IV) Working efficiently in an international environment.

My year is divided into two parts: conference season and office season. During the winter months I am working in the Amsterdam office, establishing journal strategies and budgets for the following year. One important part is to make sure we have the best possible editors working for our journals,

Christian Schulz Christian joined the Molecular Biology program in 2008 and worked on his doctoral thesis in the group of Peter Rehling at the Department of Cellular Biochemistry, University Medical Center Göttingen. He graduated in November 2013 and left Göttingen in 2015 after a short Postdoc. Since then he is an Associate Publisher in the Chemistry department of Elsevier in Amsterdam.

Drug discovery in the capital of Europe

Throughout my years in Göttingen, I never realized just how well my time in lectures, lab rotations, method courses and countless hours in the lab were preparing me to work as a scientist in the private sector. Reflecting back on my time in academia and the excellent training I received in molecular biology and mitochondrial research (a special thanks goes to Peter and the Rehling lab), my transition and success in the world of corporate science was immensely facilitated by the many times I had been pushed to perfect experiments, think problems through, and adjust to new and unexpected findings.

Shortly after defending my PhD thesis and kissing the Gänseliesel I accepted a job at UCB, a medium-sized pharmaceutical company with an emphasis on immunological and CNS related disorders, based in Braine l'Alleud on the outskirts of Brussels. My wife Anna-Shari and I relocated to the historical Waterloo, and I was immediately thrown into my own battles — in the deep end of drug discovery, in a strange and foreign country, where outside of my work cocoon, I couldn't even begin to communicate with the people around me.

Belgium is a peculiar country where you can be seemingly in an extension of France and then turn the corner and suddenly you are in yet another strange land with a different language, culture and traditions. This oddity made adjusting to life in Belgium all the more exciting and adventurous. After many, sometimes even borderline comical experiences, we finally found an apartment we liked, with people we could communicate with, and slowly started to build a life here. And it has been quite an experience on every level imaginable.

A few weeks into accepting the position of Senior Scientist at UCB, I was told that I needed to be an expert in an unfamiliar field and have numerous assays established for drug screening within the next months. It was truly a deer in the headlights experience. I knew the executives I would have to convince would not be satisfied, if I simply opted for an extension. The training wheels were off and I was either going to completely fail or dive in head first.

The months passed and I became more familiar with the way work and bench research are conducted in industry. For example, all experiments, no matter how insignificant they may seem, must be electronically logged and counter-signed by a colleague within a few days time to equip for possible patent disputes, which are a frequency in this world, with a potentially high price tag. This initially mind-boggling importance of immediate data entry, and the monstrous sums of money that are part of the daily work admittedly took some time to get used to.

Having mastered my new area of expertise and successfully established multiple disease-relevant screening assays, my project was fully adopted by the company, and since then I

From Göttingen to Elsevier (continued)

which can be a challenging task. In contrast to journals like Science and Nature, most of our editors are professors and research group leaders who contribute their time and expertise to the development of the scientific community. Being able to understand them and their motivations and to negotiate efficiently with them, are invaluable skills in the process of recruiting new editors.

In complete contrast to the office work, I am traveling a lot to meet editors and advisory board members and to attend conferences during the summer months (conference season). As the day-to-day business of the journals continues, this normally means working in the late evenings or early mornings in the hotel and airports to maintain a smooth operation of the journals. While this can be a tough period, I enjoy reaching out to the scientific communities and diving into the occasional poster sessions. A very interesting part of this work is being able to meet young scientists (PhD students and Postdocs) and supporting them in various ways (e.g. workshops or travel grants). If you are lucky, these events might even bring you back to Gottingen, as it happened to me this January, on the occasion of the Otto Warburg Lecture where I gave a Career Workshop.

Christian Schulz

Drug discovery in the capital of Europe (continued)

Jonathan and his wife Anna-Shari at the Belgian oceanside

have been overseeing all biology related matters for a few projects. Inevitably, the more management responsibilities I have taken on, the more meetings and telephone conferences I attend, which drastically reduces the amount of time I can dedicate to exploratory lab work. To be honest, my daily schedule has slowly evolved to consist of only 20 to 30 % wet lab time, nevertheless, I still always manage to set aside ample time for exploring novel drug targets, where I have found my true passion. Balancing both these aspects, lab work and "think tanking," I can truly call my work at UCB everything and more I had ever hoped to achieve at my age. After passing the one year mark of our move to Europe's capital, both my wife and I see us staying put for the foreseeable future. My wife, having completed her legal studies in Göttingen as well, took on a job as a competition lawyer at the Brussels office of one of the world's largest law firms. Little did we know that when we originally left Göttingen, we would be able to find our dream jobs, afford a very comfortable lifestyle, and slowly but surely start a family of our own in this strange and foreign land.

Jonathan Melin

Jonathan Melin worked on his doctoral thesis in the group of Peter Rehling at the Department of Cellular Biochemistry, University Medical Center Göttingen. He graduated from the Molecular Biology program in July 2014. After a short postdoc phase he joined the multinational biopharmaceutical company UCB (Union chimique belge) in Brussels, Belgium as a senior scientist.

Newsletter contributions by Molbio students and alumni

This annual newsletter builds on a lively exchange of information between all members of our scientific community. Since the first volume was published in January 2010, we received **143 newsletter contributions by our students and alumni** to, as we hope, a balanced mix of reports on scientific achievements, personal experience with careers inside and outside academia, challenges of combining family life with job duties, personal opinions, events and many other activities our students and alumni wanted to share.

When our current students contact us for feedback on their career plans and future perspectives, we always recommend to have a look at the alumni reports as a valuable source of information because they include not only their personal perspective but often also a piece of advice for their juniors who may consider a similar career path. Our alumni are approachable if advice is needed, so our students shouldn't hesitate to contact them with specific questions. Our **Molbio/Neuro LinkedIn network group** has already close to **300 members** and may serve as an additional forum for interaction. A completely revised and interactive **alumni database** with (internal) search functions will be ready later this year.

StB

labfolder - Year 2 in the start-up roller coaster

The year of 2015 was a particularly eventful year for our scientific start-up labfolder: we closed our Series A financing round with a seven-digit investment and only shortly after, we demonstrated our vision of a fully connected laboratory with the SmartLab – a special exhibition at the Biotechnica trade fair. And after all of that, the company celebrated its second birthday – time not only to boldly march forward, but also to look back a bit.

The commitment of our old and new investors in our Series A financing round allowed us to grow our team and lay the technical foundation to evolve our digital lab notebook into a platform for the smart connection of all agents in the laboratory: scientists, teams, devices, and reagents.

Together with partners like Sartorius, Eppendorf and many others, we showcased how labfolder can drive the planning, performing and evaluation of processes in the laboratory with smart work in which structured protocols collect analytical data from devices and create reports automatically. This setup allows for a detailed mining of all relevant data which can then, in turn, be used to optimize processes. The SmartLab was a tremendous success, showing that there is a rapidly growing demand for the digitization of the laboratory environment across all branches and scientific disciplines.

Growing the company is, apart from all the rewarding fun, quite a challenge: the right priorities have to be set, the company has to be organized into departments and the founders, instead of doing everything by ourselves, now have to advise others on how things are done.

The growth and 'compartmentalization' of labfolder also required a move of our office, which further reflects the changes which have been going on in the team: we moved from our 'one large living room' office right next to the hipster 'Silicon Allee' in Prenzlauer Berg to the business district in Charlottenburg where we could not only grow in space, but also finally give the developers their own rooms where they are not disturbed by phone calls and visitors.

It has been a tremendously exciting year with new developments, new team members, some of the old team members leaving and a lot of new experiences. One of the facts that make creating a start-up such an interesting and rewarding adventure has remained constant: There are new things to learn and to do every day, there is the unexpected, good and bad, waiting around every corner.

We are looking forward to an exciting journey to continue in 2016 – stay tuned for the future of the lab to come!

Florian Hauer did his doctoral research in the group of Holger Stark at the MPI for Biophysical Chemistry. He graduated from the Molecular Biology Program in August 2009, wondering why so many biologists are still not exploiting the full potential of computers for their every-day work in a research lab. Seeing the necessities of general changes in data handling and information management, he co-founded the start-up enterprise labfolder (www.labfolder.com), a free electronic lab notebook for laboratory research.

Which date is due first?

When I came to Göttingen in 2010 I couldn't imagine that it would become the place where I start a family. But the networking opportunities of the Molecular Biology program extend beyond scientific exchange. I met my partner Jonas, a student of the Neuroscience program, at one of the culture nights, and few years later we found ourselves married.

We planned on having a kid, but didn't expect it to happen so soon. When I found out that I was pregnant I was in the late stage of my PhD. "Which one should I have first: the thesis or the baby?" was the question I was trying to answer as I found out that my due date was in the same week as the PhD thesis submission deadline. After

some careful consideration I decided to speed up and submit the thesis two months earlier, so that I could also defend it before the baby was born and enjoy the start of motherhood without being distracted by work.
My plan was not easy to implement, especially because while pregnant I could perform very few experiments in the lab. I had to avoid toxic substances and my working space was reorganized. Luckily, I got a great amount of support during this time. My boss agreed to shift my thesis submission to the front and arranged technical assistance for me. Two technicians, as well as other lab members, including my collaborators at another institute, helped me so that I could finish all my work in time. Finally, the MolBio examination board made an exception to the rule and let me schedule my defense just 3 weeks after submitting the thesis. Of course I also had to be very efficient and organized. Fortunately, I was feeling great throughout most of the pregnancy, so my performance was not compromised. Also, I had the biggest motivation not to get stressed – a perfect condition for productivity!

Sona, Jonas and Alina (photo by litha-fotodesign.de)

Four weeks after I defended my thesis my daughter Alina was born. I was happy to have completed the PhD-related work, since life with a newborn was exhausting at the beginning and required an adaptation period. Luckily, many skills that I gained during my PhD turned out to be helpful for parenting as well - patience, time management and multitasking are just to name a few.

Now Alina is 8 months old. I am staying at home taking care of her and in parallel looking for a job. Planning a career with a family is not easy. There are more things to consider while looking for a job, such as working hours and childcare opportunities. My husband has a job in Goettingen now, so I am restricted in my search to this region. Also, finding time to work on job applications is sometimes tough. However I have a very supportive family and I am optimistic about the future. Sharing responsibilities with my husband is very helpful: he's taking care of Alina in the evenings while I do job hunting. We are also lucky to have grandparents nearby, who occasionally help with childcare. Despite the somewhat unstable career situation, I don't regret having a child at this time point and I really enjoy watching Alina grow and develop. There is no perfect time to have kids, sometimes one just has to take the risks and experience it.

Sona Pirkuliyeva completed her doctoral research in the group of Jürgen Wienands at the University Medical Center Göttingen. She graduated from the Molecular Biology program in February 2015.

Finding the balance

It is 5:30 am and the alarm goes off. I drag myself out of bed and sneak out. A quick shower, preparing breakfast to go and, shortly after 6:00, I leave home for another hectic day. Two tram lines later I arrive at Roche, shortly before my shift starts. The day begins and the calls come in. Customers of different types and attitudes and with different problems – most of them fortunately polite and grateful to receive help. Meetings, projects, discussions with colleagues on troubleshooting, more calls. Nine hours later, I hurry outside, catch the tram, and pick up my son from the kindergarten. Then the second job of the day starts; entertaining my son while taking care of other tasks in the house. Definitely not easy – as most working parents know, sometimes this second job can be even more demanding and stressing than the regular job.

However, my favorite part of the day is picking up my son Leonidas and finding a way to spend the evening with him until daddy comes home. Already walking to the kindergarten I cannot wait to see him running to me to get a hug accompanied by his usual "I am getting picked up now, bye!" farewell to the teachers. Sometimes he is stubborn and grumpy and then my patience is tested. Most days though he is a well-behaved two and a half year old boy, and he is finally at an age that we can create things together, like his favorite banana cookies, a drawing for grandma or a Christmas wrath.

Leonidas is growing up in a home with three different languages (German, Greek and English) and it has been very important to me to teach him the Greek language and culture. When I started working again, he was 13 months old and he was placed in child care for almost 9 hours a day. In the beginning that was very hard for me. I feared that I left him too early, that he would forget about me, or that he would not speak Greek because he would only hear German. But after a short period of adjustment for all of us, Leonidas actually liked going to the child care and with time I could see tremendous progress in his social skills and that he became more independent and confident. When he started talking his German was better than his Greek, but soon he could speak both very well. The policy of Roche for families and parents has also definitely helped facing the difficulties that come up for working parents. I work in shifts, but planning my shifts is done in accordance with bringing or picking up Leonidas from the Kindergarten. Also, when my son is sick, I can stay at home with him a certain amount of time and still receive my salary (normally in Germany each parent has the right to stay home with a sick child for 10 days a year, and the health insurance pays a reduced amount of the regular salary for those days. After that the parents need to stay home unpaid). Since both grandmothers are not in the nearby area, this is very helpful.

The biggest support for me as a working mom comes from my husband Christoph. I am very grateful to him for sharing every task at home and taking care of Leonidas. In that way, he makes it possible for me to work. Finally, even though they are further away, Leonidas' two grandmas are there to support us as well. Christoph's mom comes to us whenever Leonidas is sick but we cannot stay at home, or when we are so sick that we cannot take care of him. And my mom also comes at least once a year to take care of Leonidas during the longer holiday breaks. Without them it would be very difficult to manage our jobs.

In the end, the balance between work and family is different for everyone, and in my opinion finding the right balance is the key to being happy. Leonidas is like the sunshine in our house, he brings joy and laughter to our lives and it is the most amazing feeling watching him growing up and learning so many new things every day. However, I would not be happy just staying at home. My job gives me the chance to use my brain for something else than "what do we cook today" and "are there enough diapers left". I get a break from being a mom and housewife and can accomplish tasks using my skills and knowledge. And when I leave work in the evening, I can forget about it until the next day and focus on my life at home. We are now as a family looking forward to welcoming our fourth member, expected in less than 3 months from now. Certainly this will bring many changes and we will all have to adjust again. However, I am not worried about how it will all work out because I know that with love, patience and by supporting each other we will find the right balance again.

Konstantina Marinoglou
was a PhD student in the group of Matthias Dobbelstein. She graduated in 2010 and is now working as a product specialist at Roche Diagnostics Deutschland GmbH in Ludwigshafen. Her son Leonidas was born in 2013.

Changes in the Molecular Biology Program Committee

A big THANK YOU! to **Jörg Stülke**, who served as a spokesperson of the Molecular Biology Program for four years. Jörg followed Ivo Feußner on this position in the fall of 2011 and was leading the program during the successful "12-plus extension" of the International Max Planck Reseach School and the renewal proposal for a second funding period of the graduate school GGNB in the DFG-funded German Excellence Initiative in 2012. One year later, the Molecular Biology program was evaluated and re-accreditated by the accreditation agency ZEVA. While Jörg agreed to continue his membership in the program committee, he asked the committee to find a successor for the position of a spokesperson for the next two-year term.

Congratulations to **Peter Rehling**, who was elected unanimously by the members of the program committee as the new spokesperson of the Molecular Biology Program. In addition, Peter will remain the chairman of the Molecular Biology examination board, a task that he took over from Tomas Pieler in the year 2013.

Welcome and congratulations to **Claudia Höbartner**, who was elected by the Molecular Biology faculty at the annual plenary faculty assembly as na ew additional member of the Molecular Biology program committee. We look forward to her contributions to upcoming meetings.

Student representatives

Martin Helm and **Manuel Maidorn** were elected as PhD student representatives. **Laura Ahumada Arranz** was elected as the representative of the MSc students of the 2015/16 class. We congratulate our student representatives and thank them for their commitment.

Many thanks also to our former PhD student representatives **Momchil Ninov** and **Sven Truckenbrodt**, and to **Charlotte Blessing**, who represented the MSc student community during the previous term.

Current profession and location of our PhD alumni

Profession

Academia / Research
Professor, PI, academic staff (permanent): 8 %
Group leader, senior scientist (non-permanent): 9 %
Postdocs: 43 %
Science management: 1 %

Private Sector
Scientist, team leader, manager R&D: 13 %
Staff, team leader, manager non-R&D: 11 %
Consulting: 3 %

Other Profession
Media, publishing: 4 %
Patent attorney: 2 %
Scientific software development: 1 %

Other
other professions, internships, job applications, family management: 7 %

Country Distribution

Europe
Germany: 50 %
Switzerland: 6 %
United Kingdom: 6 %
Netherlands: 2 %
Denmark: 2 %
Poland: 2 %
Belgium: 1 %
Norway: 1 %
Spain: 1 %
Turkey: 1 %

North America
United States: 18 %
Canada: 5 %

Asia / Australia
China: 2 %
Singapore: 2 %
Australia: 1 %
India: 1 %
Iran: 1 %
Qatar: 1 %

Honors and Awards - Faculty

A new **Collaborative Research Center (CRC 1190)** "Compartmental gates and contact sites in cells" at the University Medical Center Göttingen has been approved by the German Research Foundation (DFG). The coordinator is **Peter Rehling**. Additional faculty members of the Molecular Biology program involved in the proposal include **Markus Bohnsack**, **Silvio Rizzoli**, **Marina Rodnina** and **Blanche Schwappach**.

A new **international Research Training Group (iRTG 2172)** "Plant responses to eliminate critical threats" (PRoTECT) at the University of Göttingen in close cooperation with the University of British Columbia in Vancouver, Canada has been approved by the German Research Foundation (DFG). The spokesperson is **Ivo Feußner**. Additional faculty members of the Molecular Biology program participating in the training program include **Gerhard Braus**, **Christiane Gatz**, **Kai Heimel** and **Volker Lipka**. The iRTG is integrated in the Göttingen Graduate School for Neurosciences, Biophysics and Molecular Biosciences (GGNB).

Holger Bastians, faculty member of the Molecular Biology program and group leader at the Institute for Molecular Oncology, University Medical Center Göttingen was awarded the **BINDER Innovation Prize 2015** by the German Society for Cell Biology (DGZ).

Henrik Bringmann, faculty member of the Molecular Biology program and group leader at the MPI for Biophysical Chemistry received an **ERC Starting Grant** by the European Research Council.

Nils Brose, faculty member of the Molecular Biology program and head of the Department of Molecular Neurobiology at the MPI for Experimental Medicine received an **ERC Advanced Grant** by the European Research Council.

Patrick Cramer, faculty member of the Molecular Biology program and head of the Department of Molecular Biology at the MPI for Biophysical Chemistry was awarded this year's **Arthur Burkhardt Prize** of the Arthur-Burkhardt-Stiftung für Wissenschaftsförderung.

Stefan Hell, faculty member of the Molecular Biology program and head of the NanoBiophotonics at the MPI for Biophysical Chemistry was awarded the title "**Entrepreneur of the year 2015**" (together with Gerald Donnert) by Ernst and Young professional services, the **Glenn T. Seaborg Medal** of the Faculty of Chemistry and Biochemistry at UCLA, the h**onorary doctorate of the KTH Royal Technical Institute Stockholm**, and the **Order of Merit (Verdienstorden) of the Federal State of Baden-Württemberg**. Furthermore, he was elected as fellow of the Physical American Society.

Reinhard Jahn, faculty member of the Molecular Biology program and head of the Department of Neurobiology at the MPI for Biophysical Chemistry was appointed as an e**xternal member of the US-American National Academy of Sciences** and as **member of the Akademie der Wissenschaften zu Göttingen**.

Herbert Jäckle, faculty member of the Molecular Biology program and head of the Department of Molecular Developmental Biology at the MPI for Biophysical Chemistry was awarded the **honorary doctorate of the University of Basel**.

Tobias Moser, faculty member of the Molecular Biology program and head of the Institute for Auditory Neuroscience at the University Medical Center Göttingen, received the **Gottfried Wilhelm Leibniz Award** of the German Research Foundation and an ERC Advanced Grant "OptoHear" by the European Research Council. Furthermore, he was appointed as **fellow of the Max Planck Society** and as a **member of the German National Academy of Sciences (Leopoldina)**.

Klaus-Armin Nave, faculty member of the Molecular Biology program and head of the Department of Neurogenetics at the MPI for Experimental Medicine, received already for the second time an **ERC Advanced Grant** by the European Research Council.

Marina Rodnina, faculty member of the Molecular Biology program and head of the Department of Physical Biochemistry at the MPI

Honors and Awards - Faculty (continued)

for Biophysical Chemistry received the **Gottfried Wilhelm Leibniz Award** of the German Research Foundation and the **Hans Neurath Award 2015** of the Protein Society.

Mikael Simons, faculty member of the Molecular Biology program until fall 2015 and former group leader at the MPI for Experimental Medicine, has received, for the second time, an **ERC Consolidator Grant** by the European Research Council.

Holger Stark, faculty member of the Molecular Biology program has been appointed as **permanent member of the Max Planck Society** and as a **director** at the MPI for Biophysical Chemistry.

Alexander Stein, head of the Max Planck Research Group Membrane Protein Biochemistry and PhD supervisor in the Molecular Biology program has been awarded an **ERC Starting Grant** by the European Research Council.

Honors and Awards - Students & Alumni

Samir Karaca, former PhD student in the group of Henning Urlaub at the MPI for Biophysical Chemistry received the **Young Investigator Award of the German Society of Proteome Research** at the Proteomics Forum 2015.

Ina Klusmann, PhD student in the group of Matthias Dobbelstein at the University Medical Center Göttingen was awarded a **PhD fellowship of the German National Academic Foundation (Studienstifung des deutschen Volkes)** and a **PhD fellowship of the Boehringer Ingelheim Fonds** (taken up).

Goran Kokic, PhD student in the group of Patrick Cramer at the MPI for Biophysical Chemistry was awarded a **PhD fellowship of the Boehringer Ingelheim Fonds**.

Manuel Maidorn, PhD student in the group of Silvio Rizzoli at the University Medical Center Göttingen was awarded the **first prize of the Darmstadt Science Slam 2015**.

Ewa Maj, former PhD student in the group of Annette Borchers at the University Medical Center Göttingen and the University of Marburg received the **FEBS Journal Poster Prize** during the Wnt Symposium 2015 in Heidelberg.

Simone Mayer, former PhD student in the department of Nils Brose at the MPI for Experimental Medicine was awarded an **EMBO Long-term fellowship**.

Dragomir Milovanovic, former PhD student in the group of Reinhard Jahn at the MPI for Biophysical Chemistry was an invited speaker and received the F**aculty of 1000 Award** at the **15th International Membrane Research Forum**, Kyoto, Japan.

Frank Richter, PhD student in the group of Peter Rehling at the University Medical Center Göttingen was awarded a **PhD fellowship of the Boehringer Ingelheim Fonds**.

H. Broder Schmidt, former PhD student in the group of Dirk Görlich at the MPI for Biophysical Chemistry received a **DFG Research Fellowship** by the German Research Foundation.

Achim Werner, former PhD student in the group of Frauke Melchior at the University Medical Center Göttingen received the **K99 Pathway to Independence Award** of the National Institutes of Health (NIH).

Summa cum laude distinctions for outstanding PhD theses have been awarded to the following Molecular Biology students: **Metin Aksu**, **Marta Gião Carneiro**, **Dragomir Milovanovic** and **Michael Ratz**. Congratulations!

MolBios meet Nobel laureates

65th Lindau Nobel Laureate Meeting Interdisciplinary: Physiology/Medicine, Physics, Chemistry

This year our MolBio team of PhD students had a unique opportunity to attend the 65th Interdisciplinary Meeting of Nobel Prize Laureates in Lindau. Apart from students, Prof. Stefan Hell and Prof. Ervin Neher, the two Nobel laureates from Göttingen, took part in the event. In total, 650 young scientists from different countries, distinguished professors and 65 Nobel laureates in Physics, Chemistry and Physiology or Medicine gathered to discuss current issues in science and share their knowledge and ideas. The motto of the meeting was, "Educate, inspire, connect" reflecting the essential functions of the scientific community in the modern world.

The program of the meeting was very diverse. We listened to the plenary lectures by Nobel laureates, where they did not only cover the "Nobel findings" but also presented recent data, and shared personal experiences in building a scientific career. I was impressed by the talk of Prof. Eric Betzig: after being unemployed for many years he and his friend constructed the first high resolution microscope in his living room and then went on to win a Nobel Prize for their "living room discovery". The most shocking talk was by Prof. Barry Marshal who was so convinced of his theory regarding the origin of ulcers that he risked his own health by drinking the culture of *H. pylori* to prove the bacterial cause of the disease.

MolBio team with Nobel Laureates from Göttingen. Natalia Korniy, Nataliia Naumenko, Stefan Hell, Ingrid-Cristiana Vreja, Dragomir Milovanovic, Eva-Maria Neher, Erwin Neher, and Mahdokht Kohansal Nodehi (from left to right)

MolBios at the Bavarian evening. Dragomir Milovanovic, Ingrid-Cristiana Vreja, Natalia Korniy, Nataliia Naumenko, and Mahdokht Kohansal Nodehi

Nobel laureates also shared with us their simple formula of scientific excellence: always follow your true interests, stay curious and open-minded and be critical to your data. We listened to the powerful lecture of Wole Soyinka, the first African to be awarded the Nobel Prize in Literature, who talked about the value of education and the link between the ignorance and violence in Africa. Kailash Satyarthi, the Nobel laureate in Peace, brought everybody to tears by talking about children's labor, and even worse, slavery and trading in India and other developing countries. He supported Wole Soyinka in proclaiming education to be the basic human right and also the solution to poverty and atrocity.

Along with lectures, the laureates held discussion sessions with

MolBios meet Nobel laureates (continued)

Boat trip on Lake Constance

students where everybody had a chance to ask both professional and personal questions. We discussed advances in cryo-EM with Prof. Venkatraman Ramakrishnan, the position of women in science with Prof. Elizabeth Blackburn, and the health care systems in different countries with Prof. Aaron Ciechanover. We also had a chance to present our own data and get a feedback from the laureates in the master classes.

The meeting was spiced with very dynamic panel discussions in which selected Nobel laureates and young scientists elaborated on the hot topics and meaningful or contradictory issues for science and society. One topic was the importance of communication, i.e. the constructive dialogue between scientists, media and public sector. We learned how we could contribute to the popularization of science by using forums and personal blogs and also about the responsibility journals have for the scientific content they share. In another panel discussion Nobel laureates stressed that multidisciplinarity in science is necessary to conduct complex projects, which require the expertise in different aspects of natural sciences. On the other hand, they condemned using interdisciplinarity only as a fashion trend for grant applications.

During Lindau meeting we had fabulous dinners with Nobel laureates and politicians, listened to the concert of classical music by Ensemble of the Vienna Philharmonic Orchestra, we enjoyed the city sightseeing in Lindau and swimming in the warm Lake Constance, visited splendid art exhibitions and had a great trip to the Mainau Island. Brilliant scientific talks and discussions along with excellent social program made Lindau meeting a spectacular and very memorable event for all of us.

LINDAU NOBEL LAUREATE MEETINGS

www.lindau-nobel.org

Mahdokht Kohansal Nodehi is currently a PhD student in the group of Reinhard Jahn at the MPI for Biophysical Chemistry.

Natalia Korniy is currently a PhD student in the group of Marina Rodnina at the MPI for Biophysical Chemistry.

Dragomir Milovanovic was a PhD student in the group of Reinhard Jahn. He is now a postdoc in the lab of Pietro de Camilli at Yale University in New Haven, USA.

Nataliia Naumenko is currently a PhD student in the group of Peter Rehling at the University Medical Center Göttingen.

Ingrid Cristiana Vreja was a PhD student in the group of Silvio Rizzoli at the University Medical Center Göttingen, where she is currently continuing her research as a postdoctoral fellow.

Assembly and disassembly at WIS

Visit of a student-organized conference at the Weizmann Instutute of Science in January 2015

A trip to our partners at the Weizmann Institute in Israel is always exciting – sometimes in more ways than you might think.

Our first evening started with us roaming Tel Aviv airport in search of a taxi to Rehovot. After we, presumably, arrived at our destination, we continued by walking in the exact opposite direction of where we were supposed to go. When we finally reached our dorm, our host Vered was extremely welcoming and ushered us into the elevator to reach our rooms and get some rest. It was a bit crowded with our entire luggage, but it was only three floors after all. Of course the elevator got stuck. We could hardly turn, but I think we had our biggest laugh of the entire trip in that elevator, while Vered shouted into the emergency phone in angry Hebrew.

This is Israel for you. If something does not work, you either laugh about it or you shout at it until it does – or both. We survived the elevator and were treated to the most delicious Israeli food and drink at a reception later that evening. We got to meet our other hosts, Nicolas and Ella, and had a chance to chat with some of the invited conference speakers. Here, Horizons and the Weizmann conferences definitely have the same approach – get close to the top scientists, get to know them on a personal level and develop your network. The discussion was so friendly and relaxed that we practically recruited Erika Holzbauer on the spot for our next Horizons symposium.

But not only the food and the company were good at Weizmann, the science was amazing, too. The conference on the Assembly and Disassembly of the Nervous System brought together some of the most eminent scientists in the field. Noam Ziv described the synapse as a river that, while always changing, with ever new waters running through it, is at the same time always staying constant. Martin Schwab showed us a new method for repairing spinal cord injuries which would have resulted in lifelong paralysis for the patients without his research. These are only two examples, but every single talk gave us something new to think about.

It is difficult to pick a highlight of our stay at Weizmann with all these great scientific, social, and culinary experiences, but for many it was surely our trip to Jerusalem on the last day of the conference. Our hosts and many of the invited speakers joined us for a tour of the Old City, the Wailing Wall, the Garden of Gethsemane, and many more historic sites than we can name here. We ran into a vivid discussion in the grave of King David, between youths who may have been punks or Orthodox Jews – or maybe both. We had amazing freshly ground coffee in the Muslim Quarter. We visited the Church of the Holy Sepulchre, which contains the site of Jesus' crucifixion and his empty tomb, and where half a dozen monastic orders fight over the rights of worship – sometimes literally, with their fists. There is surely scarcely another city in the world quite as vibrant and diverse as Old Jerusalem.

We left out a lot here, and could easily go on for pages. You really have to experience Israel yourself to appreciate it and so we can only hope that the exchange with Weizmann goes on for a long time and that all future MolBio generations can enjoy a team of hosts as awesome as Ella, Nicolas, and Vered – Weizmann is always worth a trip!

Sven Truckenbrodt, Ingrid-Cristiana Vreja, Dragomir Milovanovic

Six students of the Göttingen Molecular Biology and Neuroscience programs participated in the student-organized conference at the Weizmann Institute of Science in Rehovot, Israel: Drago Milovanovic, Ingrid Cristiana Vreja, Ramanathan Narayanan, Sven Truckenbrodt, Michael Ratz, Florentin Masurat (on the photo from left to right)

Battle of the brains: Science on stage

Almost 10 years ago, a new way to convey science to the public did emerge. Inspired by the 'Poetry Slam'- events where creative minds are presenting a piece of their literature, the 'Science Slam' was born: In 10 minutes young researchers (mostly PhD's) present their own research in a comprehensive and entertaining way. Since the public occurred to be highly interested in what is going on in life-science laboratories, Science Slams have been spreading all over Germany – even reaching the European level by now. There are also regional and Germany-wide competitions with brilliant slammers performing.

Personally, I got excited about this way of presenting research already in my Bachelor's studies. But at some point during my PhD, I finally decided to do the job properly. Since my first performance in Istanbul in 2014, I participated in a couple of slams in different corners of Germany. Lately, I was invited to Darmstadt (close to Frankfurt) – which is actually the home town of Science Slam – and surprisingly even was awarded 1st place for my presentation.

However, the competitive attitude is not the most attractive to me. What I really do like most about the concept of Science Slam is the idea of conveying current research to an (almost) entirely non-scientific audience. Together with people from many other disciplines such as physics, economy or mathematics you are fighting for the favor of the public audience. Obviously, the style of presenting is way less scientific and way more entertaining than you are used to. But sometimes it even makes yourself think differently about your project. In any case it is a great opportunity to combine the chance to talk about your project with an entertaining evening and some free drinks.

'The Power Of The Doughnut': The presentation of Manuel Maidorn at the Science Slam in Darmstadt, 2015 (photo: Ellen Eckhardt)

Altogether, Science slam nowadays is widely appreciated all over Germany. However, it is not only about entertainment, but indeed became a very important tool to communicate science to the general public. And even as a scientist there is a guarantee that you gonna learn things you never thought of before. So, as you reading this in the moment are likely to be related to science as well, I definitely recommend you to visit a Science Slam nearby. And if you became curious about trying it yourself: There are many stages waiting for you all over Germany. Just check the common websites, contact the organizers and enjoy the excitement other people share with you.

Manuel Maidorn

Manuel Maidorn is currently a PhD student in the group of Silvio Rizzoli at the University Medical Center Göttingen.

His presentation at te Science Slam in Darmstadt can be view on YouTube at:

https://www.youtube.com/watch?v=rXlNuIHsXFY

Horizons 2015: Desire, dedication & dreaming

The 12th Horizons in Molecular Biology PhD Student Symposium

As has become an annual tradition for the last 11 years, the Max Planck Institute for Biophysical Chemistry hosted the 12th Horizons in Molecular Biology Symposium on 14–17 September 2015, organized by the students of the International Max Planck Research School for Molecular Biology. The conference aims to bring together scientists and students from a broad range of interests in Molecular Biology at the very forefront of scientific discovery, from across the globe.

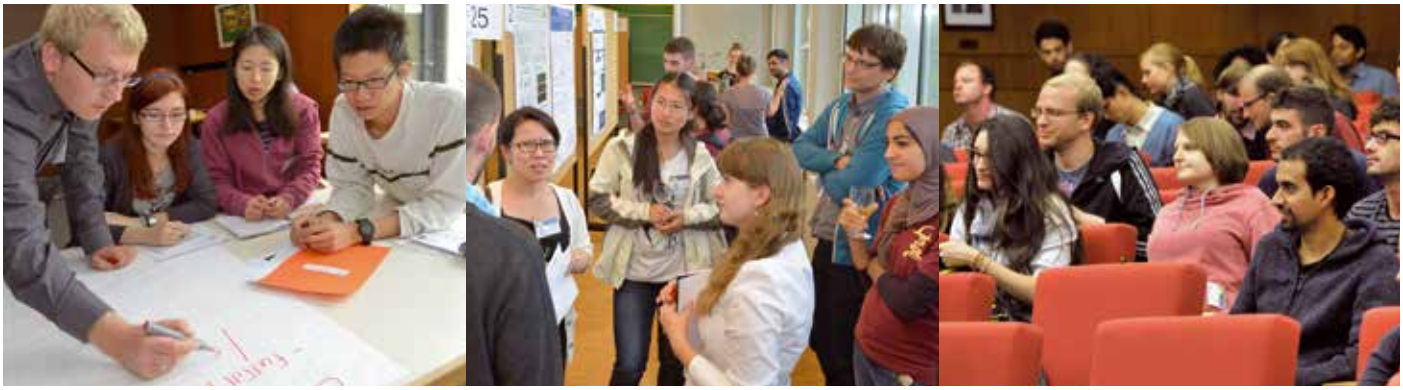
The Horizons 2015 organizers together with the invited speakers

Set in the foyer of the institute, its seminar rooms and the historical Manfred Eigen Hall, the symposium once again welcomed a selection of excellent speakers this year.

On the first day, the career fair, which was kicked off by a spectacular address by Michael Cox – author of the popular university textbook "Lehninger's principles of biochemistry" - about Science, scientists and the scientific method, attracted a large number of participants. He talked about the philosophical context in which life scientists operate and their responsibility towards society.

Melina Fan, founder of Addgene – the world's biggest open source plasmid library and database – talked about her experience in launching a non-profit startup. The career fair also included talks by Eva- Maria Neher who discussed the milestones reached by Göttingen's XLAB – a project aiming to bring science closer to high school students – which she founded in Göttingen 15 years ago, among several others. Additionally, workshops on CV writing, A Career in Consulting, and a speed-dating event with career representatives were held, giving participants a unique opportunity to develop important skills and establish valuable connections.

Following the career fair, the Keynote speech of Horizons 2015 was given by Tom Rapoport, who talked about



Horizons Career Fair, poster session and lectures

Horizons 2015 (continued)

his work on understanding how and why the Endoplasmic reticulum takes up the elegant shape we observe.

Over the course of the next few days, fascinating talks continued to garner widespread interest. Axel Brunger talked about the structure of proteins at synapses, Pamela Björkman showed us how she tweaks antibodies to make them better, and Adam Frost's good natured and friendly mannerism earned him popularity among the younger attendees as he talked about how ribosomes correct errors.

At the interface of physics and chemistry, Alice Ting talked about her groundbreaking progress in making chemical labels to study the proteome of live cells, and Charalampos Kalodimos discussed how NMR can be used to generate models of the dynamics of very large protein assemblies. Bringing basic science to the clinic, Manuel Mayr talked about how transcriptomes and proteomes can be mined for cardiovascular disease markers.

More than just science, several of the speakers also had important messages to share with their students. Scott Emr's animated character riveted the largely student audience as he shared his journey in science and the "three D's" that make a scientist in his opinion "Desire, Dedication and Dreaming". Maya Schuldiner encouraged students to explore and think outside the knowledge box in biology - there are many more unknown unknowns. The talk by Martin Chalfie – who received the 2008 Nobel prize in Chemistry for applying Green Fluorescent Protein as a marker – about his latest work in *C. elegans* genetics was met with a packed hall.

Tom Rapoport, Alice Ting, Carola Vinuesa, Martin Chalfie, Scott Emr and Maya Schuldiner (from upper left to lower right)

During the breaks, selected students got the opportunity to present their work in the awarded student talks, and poster sessions were held with the sophisticated backdrop of a selection of fine wines and cheeses. A panel of judges chose three of the posters to receive poster prizes; the most talked about of which was a set of pipettes signed by Göttingen's Nobel Laureates Stefan Hell, Erwin Neher as well as Martin Chalfie. In the evenings, speakers and participants joined us in exploring Göttingen's vibrant night life. Organized by PhD students for PhD students, Horizons is a refreshing occasion to step back from the focus of our daily lab work and remember the bigger picture. In this respect, Horizons this year more than just fulfilled our expectations. We look forward to welcoming you to another exciting conference next year! Follow us on twitter @HorizonsMolBio and facebook for continued updates.

Sara Osman

Horizons speakers 2016

Biochemistry and Cell Biology
Scott Emr, Kathleen Green, Fumiyo Ikeda, Christian Mandl, Tom Rapoport, Maya Schuldiner, Carola Vinuesa

Developmental Biology
Kimberly Mowry, Karuna Sampath, Didier Stainier

Neuroscience
Axel Brunger, Martin Chalfie, Erika Holzbaur, Ivan Manzini, King-Wai Yau

Structural Biology & Biophysics
Pamela Bjorkman, Adam Frost, Charalampos Kalodimos, Manuel Mayr, Alice Ting

15th Anniversary & International Alumni Day

The Molecular Biology and Neuroscience programs celebrated together

Why celebrate after 15 years? Isn't this rather unusual? Couldn't you wait until your 25th birthday? While it was clear on 10/10/2010 that we had a good reason to celebrate our 10th anniversary, another big party only five years later surprised quite a few. The wonderful celebration we experienced in May 2015, however, was not only fun but also illustrated the importance of regular meetings of that kind to further strengthen existing scientific networks. It was also the 10th anniversary of the successful PhD defense of many students of the first generation in our programs.

More than 450 current and former students, faculty members, friends and colleagues celebrated together, discussed science and career options and had fun. We were particularly delighted that almost 40% of our PhD alumni from 13 countries joined us for this event, accompanied by 29 "Molbio and Neuro kids", ranging from four months to six years of age. From Friday, May 29 till Sunday, May 31, the programs offered a broad spectrum of events and activities, including a scientific keynote, followed by an anniversary ceremony in the historic University Aula, guided tours through university collections and other highlights on campus, an alumni career forum with "vision talks" on the Max Planck Campus on Fassberg, and plenty of social activities, music and fun.

Scientific Keynote by Stefan Hell

On the first day, the scientific keynote titled „Nanoscopy with focused light" was given by **Stefan Hell**, a faculty member of both programs, who received the Nobel Prize in Chemistry 2014 for the development of super-resolved fluorescence microscopy. In his exciting keynote he summarized the main findings of his research on nanometer spatial resolution in light microscopy, pointing out that a change in the state of fluorescent molecules in STED microscopy is the key to overcoming the physical barrier to light microscopy. The scientific keynote was opened by **Gregor Eichele**, Dean of the International Max Planck Research School for Neuroscience and, at that time, managing director of the Max Planck Institute for Biophysical Chemistry.

15th Anniversary Ceremony in the University Aula

The President of the University of Göttingen, **Ulrike Beisiegel**, opened the 15th Anniversary Ceremony in the University Aula and congratulated the programs on their success: "It is something our university is proud of". She pointed out the success of the international programs in attracting talented students from all over the world to Göttingen and the pioneering work that was done by the programs towards structured PhD education, leading to the foundation of the Göttingen Graduate School for Neurosciences, Biophysics and Molecular Biosciences (GGNB), which is funded by the German Excellence Initiative since 2007. Future efforts should now be aimed at similar structures and networks in support of the postdoctoral community on campus.

Matthias Pätzold, Secretary General of the Scientific Commission of Lower Saxony, had accompanied the first steps and the further progress of the two programs when he was heading the division for international PhD programs at the German Academic Exchange Service (DAAD). He stated that, while 15 years on a geological time scale are "less than nothing", on the "time scale of the development in modern life the 15-year history could al-

Anniversary (continued)

ready be considered a remarkable achievement" – a reason to celebrate.

The Max Planck Society was represented by **Rudi Amann**, Chair of the Biology and Medicine Section. He congratulated the programs, which have been funded as International Max Planck Research Schools since he beginning "on the great success of the joint endeavor" that started in Göttingen over 15 years ago and endorsed the "spirit of cooperative open learning".

In her function as the Dean of the IMPRS for Molecular Biology, **Marina Rodnina** reflected on her "secret mission to find out the recipe for success" when she was first visiting the program in Göttingen while she was still a professor at the private University of Witten-Herdecke. She shared her experience of finally joining the program several years ago and pointed out that many aspects of the program were still unique in German graduate education, if not worldwide.

Detlev Schild, founding member and chair of the Neuroscience program committee from the beginning, joked that the 17.5th anniversary might be next, following the progression of having celebrated the 10th anniversary and the 15th right after. Looking back at the very first month of Master's courses in the Neuroscience program 15 years ago, he remembered that "it began in a quite chaotic way because there were students missing", as there were "just not enough interested people in what we wanted to do". As a consequence the original curriculum had to be adjusted to provide a solid basis of neuroscience education in the first place.

The students were represented by **Dragomir Milovanovic** (Molecular Biology) and **Siv Vingill** (Neurosciences) who shared their personal views and illustrated the numerous scientific and social activities of the student community in a brilliant and entertaining talk. Siv admitted that, before se joined the pogrram, while she was still living in a tiny village in the Norwegian mountains, "the closest thing we came to a Nobel Prize in science was when I named one of my sheep Dolly".

Lope Andrés Flórez Weidinger (Molecular Biology) and **Ira Milosevic** (Neuroscience) jointly presented the alumni speech at the ceremony. Lope highlighted the importance of scientific and social networks fostered in the two programs: "If I had to define what this program is about, I would have to choose the word "interconnectiveness". As the anniversary celebrations coincided with Lope's birthday, the audience welcomed him with a spontaneous "Happy Birthday" song. Ira belongs to the group of alumni of the first student generations who actually returned back to Göttingen to assume a group leader position after a few years of postdoctoral research abroad (at Yale University in the case of Ira).

Wonderful jazz performances by the **Jazz Group** of the Max Planck Institute for Dynamics and Self-Organization, including the Neuroscience faculty member Theo Geisel (saxophone) and the Molbio faculty member Dieter Klopfenstein (string bass) were another highlight of the event.

Site Visits on Campus

By the time the first generations of our students started in Göttingen, many of the university collections were not easily accessible to the public and facilities such as the **Göttingen Digitization Center** (GDZ) had just been founded. On Saturday morning, our alumni, their families and friends were invited to guided campus tours. On the central campus, they had the choice between two popular university collections, the **art collection**, which contains approximately 300 paintings, 2,500 drawings, 15,000 prints and about 100 sculptures and the **cast collection of antique sculptures** with more than 2,000 true-to-size reproductions of antique sculptures hosted by the Archaeological Institute of the University of Göttingen. The third site, the **GDZ**, records data such as prints, manuscripts and illustrations and presents them to scientists, teachers and students, owning an extensive collection of more than 15 million digitized pages.

The most attractive site for the second round of guided tours was a visit of the newly erected **Max Planck Institute for Solar Systems Research** with its fantastic architecture, which moved from Katlenburg-Lindau to Göttingen only two years ago, now located across from the physics institutes of the university. The institute closely collaborates with international space agencies such as NASA and ESA

Anniversary (continued)

on numerous missions and contributed significant equipment to the Rosetta mission to comet 67P/Churyumov-Gerasimenko, during which the orbiter Rosetta released the lander Philae, which touched down on the comet's surface in November 2014. Other attractive sites to visit on the North Campus included the **Göttingen Laser Laboratory**, a local enterprise acting in close cooperation with research institutions and industrial enterprises from all over the world in the area of application-orientated laser research. Of course, a visit of the Nobel Prize winning **microscopy lab of Stefan Hell**, at which cutting-edge research is done on the further development of light microscopy at the nanometer range was also part of the program.

Alumni Career Forum

Many of our alumni perceived the **Alumni Career Forum** on Saturday afternoon as one of the highlights of the anniversary celebrations and alumni reunion. The career forum consisted of various clusters, grouped by the current professions of our alumni, including academic staff, science managers, representatives of the private enterprise (e.g. pharma, biotech or optical industry), consultants, or science editors. In lively discussions, current and former students across the different generations and disciplines shared their experience and discussed career options.

Childcare also becomes an issue when graduate programs grow and invite their alumni. Throughout the afternoon, seminar rooms at the adjacent new building of the MPI for Dynamics and Self Organization were converted into a playground, at which the staff of the Child Day Care Agency (Kindertagespflegebörse) Göttingen entertained the Molbio and Neuro kids while their parents went to "boring talks and discussions".

Vision Talks & Panel Discussion

One key element of the Alumni Day on Saturday was the series of "**Vision Talks**", followed by a **panel discussion**. Both events were moderated by **Stefan Treue**,

scientific director of the Göttingen German Primate Center. Distinguished guest speakers holding strategic positions in science-related foundations or private enterprises accepted our invitation for this event. The vision talks included personal views by the speakers on current and expected future developments in their field with reference to the professional perspectives of our alumni as a generation of international young scientists seeking responsibility in leading positions.

Jochen Maas, General Manager R&D Germany at Sanofi, shared his personal view on the current state, and need for action and future perspectives for the pharmaceutical industry in his talk titled "Quo vadis pharmaceutical industry? Ways to overcome the innovation gap". In an exciting talk he illustrated current challenges for the companies, explaining how the development times for new medication are becoming longer and longer, while the success rate for approval of newly developed drugs continuously decreases and the R & D costs have tremendously increased over the last 10-15 years. This trend does not reflect a sustainable investment model, calling for a new concept of collaborations to generate win-win situations for the pharmaceutical companies, their external partners such as university or other research institutions, and – not to forget – the patients.

The Vice-President of Research Programs of the American Diabetes Association, **Tamara Darsow** introduced the audience to the role of non-profit and private organizations in disease-specific research and innovation. Starting from the vision of the American Diabetes Association aimed at "Life free of diabetes and all its burdens", she addressed the questions of what the association can do towards this goal and gave an overview of the objectives of their research programs.

Jan Philipp Reemtsma, professor of German literature, founder and director of the Hamburg Institute for Social Research, and sponsor and promoter of the Max Planck Foundation, accepted our invitation for a vision talk titled "Is there

Anniversary (continued)

a 'specific moral responsibility of science'?" Unfortunately, he had to excuse himself at short notice because of illness, but was kind enough to send us the text of his speech which has been made available on the anniversary website.

During the **panel discussion**, which addressed the question of perspectives and challenges faced by scientists after the PhD, three additional guests joined the stage: **Michael Madeja**, represented the Hertie Foundation, where he is the Managing Director with a focus on universities and neurosciences. He provided insight into the work of a non-profit organization such as the Hertie foundation and encouraged students who are "flexible, intelligent and open for new ideas" to look further into this field of work. **Bettina Goerner**, Alumna of the Molecular Biology program is now a Managing Director of Corporate Markets/Databases at Springer Nature. After she graduated with a Master's degree she decided not to further pursue a doctorate. Instead, she first ventured into the corporate world with assignments at McKinsey & Company and INSEAD Business School, before joining Springer in 2008. She encouraged the students that "there is a world outside" academia and offered her advice if someone seeks her feedback on the search for a non-academic position. **Manuela Schmidt**, Alumna of the Neuroscience program returned from a five-year postdoc position at the Californian Scripps Research Institute in La Jolla to become an Emmy Noether Group Leader at the MPI for Experimental Medicine. Her motivation to join the panel was to share her view with the students that academic research is fun and a luxury to pursue, while she considers the alumni day an amazing opportunity to see many different perspectives. She emphasized that everyone should carefully listen to his/her personal motivation. She added that, although the focus of university education is on an academic career, there is a large range of other fields and career opportunities, which will be, in the end, joined by the majority of graduates.

Music, Fun and Socializing

When so many different generations of current and former students meet, space for socializing and fun should not be forgotten. An extra room to broadcast the final of the German Football Federation Cup was also available so that nobody had to leave early. Throughout the evening students, alumni and their kids discovered hidden talents and contributed to our anniversary painting, which now decorates the Molbio office and will only be sold if the revenue exceeds one million euros. It can also be viewed for free at the anniversary homepage, where the guestbook signed by many is also available.

After the photographer of the MPI had to cope with the challenge of taking a group photo of everyone and, even worse, making the youngsters smile for the kids group photo, the guests were reminded of the good old days in the Mensa when queuing up for the barbecue buffet. Later in the evening, **Sandra Drube**

and **Mirja Blötz** of the Neuroscience office presented guitar songs, including a Molbio/Neuro anniversary song they composed for this event. Similar to the 10th anniversary, the evening continued with a faculty quiz, in which photos of faculty members from their early childhood were presented in the format of a faculty website and the audience had to guess the names. After it turned dark, the Molbio band "**Pickled Dolphins**" started their performance, also including an anniversary song they composed specifically for this event.

Sunshine was ordered for Sunday and it was served – the ideal conditions to join a group of over 200 people for a short hiking tour from Göttingen to the Plesse Castle with its gorgeous view over the river Leine valley. In this historic setting we enjoyed a delicious brunch buffet in the inner courtyard of the castle and had plenty of time to talk and say farewell.

One of our alumni commented in the evaluation tthat we invited them to fill out after the events: "You certainly made me feel as if I was part of a family and I really look forward to attending the next reunion."

StB

Joining the program in 2015

Kai Heimel was appointed as Junior Professor for Microbial Cell Biology by the University of Göttingen in 2012. He received his doctorate from the University of Marburg in 2010, before he joined the Karlsruhe Institute of Technology (KIT) in Karlsruhe as a postdoctoral fellow. Kai has been teaching a lecture on Fungi in the Molecular Biology program for several years already. His current research focuses on the Unfolded Protein Response (UPR) in development and disease signaling, a highly conserved cellular response to maintain homeostasis of the endoplasmic reticulum. His group uncovered that UPR signaling in the phytopathogenic fungus Ustilago maydis is required for disease development and directly coupled to the pathways that control parasitic growth of the fungus. Future studies aim at a characterization of these connections at the molecular level and further explore the role of UPR signaling in controlling cellular behavior and responses to different environments.
www.uni-goettingen.de/en/365796.html

Vladimir Pena has been actively involved in research at the Max Planck Institute for Biophysical Chemistry in the field of structural biology since 2006, when he started in Göttingen as a postdoctoral fellow. In 2009 he became a project leader. Since 2014 he is heading an independent Max Planck Research Group on Macromolecular Crytallography. Vlad received his PhD from the European Molecular Biology Laboratory (EMBL) in Heidelberg. He has been teaching lecture modules in the so-called "Week Zero" of the Molecular Biology program and hosting a methods course on X-ray crystallography for several years already. In 2015 he took over an additional lecture on protein structure. The aim of his research group is to understand the structural basis of spliceosomal assembly, remodelling and catalysis at atomic level. The main tool of investigation of his group is X-ray crystallography, often complemented by biochemical, biophysical and genetic methods.
www.uni-goettingen.de/en/164096.html

Melina Schuh was appointed as Director at the Max Planck Institute for Biophysical Chemistry, where she is heading the Department of Meiosis since January 2016. She will give a new lecture on meiosis in the Molecular Biology program. Melina worked on her PhD research in the group of Jan Ellenberg at the European Molecular Biology Laboratory (EMBL) in Heidelberg, where she received her doctorate in 2008. In 2009 she became a senior investigator scientist at the Medical Research Council (MRC), Laboratory of Molecular Biology (LMB) in Cambridge, UK. She followed the program leader track for five years and became a tenure program leader in 2014. Melina's group studies the meiosis in mammalian oocytes, the progenitor cells of eggs. Their main aim is to understand how defects at the interface between chromosomes and cytoskeletal structures lead to aneuploid eggs and pregnancy loss in mammals. They have been able to establish methods that now allow them for the first time to study the causes of chromosome segregation errors directly in live human oocytes, opening exciting new areas of research that her group plans to expand significantly in the future.
www.uni-goettingen.de/en/527947.html

Current faculty members

University of Göttingen - Biology: Gerhard Braus, Rolf Daniel, Ivo Feußner, Ralf Ficner, Christiane Gatz, Kai Heimel, Wilfried Kramer, Heike Krebber, Volker Lipka, Burkhard Morgenstern, Stefanie Pöggeler, Jörg Stülke, Kai Tittmann, Ernst Wimmer. **Chemistry:** Claudia Höbartner, Andreas Janshoff, Claudia Steinem. **Physics:** Jörg Enderlein, Dieter Klopfenstein. **Agricultural Sciences:** Bertram Brenig. **Medicine:** Mathias Bähr, Holger Bastians, Tim Beißbarth, Markus Bohnsack, Matthias Dobbelstein, Roland Dosch, Uwe Groß, Jörg Großhans, Heidi Hahn, Steven Johnsen, Tobias Moser, Tomas Pie-

Leaving the program in 2015

Heinz Neumann joined the Molecular Biology Program in 2010 after he became a junior group leader at the University of Göttingen, heading the Applied Synthetic Biology research group. He has been teaching several lectures related to protein structures and folding as well as reaction mechanisms and was involved in numerous thesis advisory committees of our PhD students since then. Heinz pursued his doctoral research with Andreas Mayer at the Universities of Tübingen, Germany and Lausanne, Switzerland. After the award of his doctorate in 2005 he joined the group of Jason Chin at the Medical Research Council (MRC), Laboratory of Molecular Biology (LMB) in Cambridge, UK. His research group in Göttingen developed new strategies to introduce spectroscopic probes into proteins to study the dynamic properties of chromatin. He was also interested in the effect of the post-translational acetylation of lysine residues on protein structure and function.

www.uni-goettingen.de/en/138501.html

Oliver Schlüter recently moved to the University of Pittsburgh to assume the position of an assistant professor. Oliver received his Dr.rer.nat. degree from the University of Hannover in 2000 and an MD PhD degree from the University Medical Center Göttingen in 2001 based on his research with Thomas C. Südhof at the Max Planck Institute for Experimental Medicine. After his postdoctoral work with Robert C. Malenka at Stanford University Medical Center, USA he was heading the Molecular Neurobiology group at the European Neuroscience Institute (ENI) in Göttingen from 2006 to 2015. A major goal of his group was to elucidate the underlying molecular events leading to and regulating changes in synaptic efficacy. Newly developed techniques of molecular replacement, using mouse genetics and/or viral-mediated gene transfer were applied to manipulate the molecular composition of single neurons in a spatial and temporal controlled manner.

www.uni-goettingen.de/en/58027.html

Mikael Simons accepted an offer by Technische Universität München (TUM) as a Professor of Molecular Neurobiology at the Clinic for Neurobiology. After his specialty qualification (Facharzt) and habilitation at the University of Tübingen in 2004 and 20005, Mika was heading a junior research group at the Center for Biochemistry and Molecular Cell Biology at the University of Göttingen, followed by a group leader position with an ERC Starting Grant at the Max Planck Institute for Experimental Medicine since 2008. In 2009 he assumed an additional Heissenberg Professorship at the Department of Neurology of the University Medical Center Göttingen. The main focus of his research group was to come up with new approaches of how to promote remyelination in demyelinating diseases such as multiple sklerosis. To realize this goal his group aimed at a better understanding of how myelin is formed during normal development by integrating cell biology into neuroscience of normal brain development and demyelinating diseases.

www.uni-goettingen.de/en/58034.html

ler, Peter Rehling, Silvio Rizzoli, Blanche Schwappach, Michael Thumm, Jürgen Wienands.
MPI for Biophysical Chemistry: Henrik Bringmann, Patrick Cramer, Wolfgang Fischle, Dirk Görlich, Christian Griesinger, Helmut Grubmüller, Stefan Hell, Herbert Jäckle, Reinhard Jahn, Stefan Jakobs, Michael Kessel, Reinhard Lührmann, Ahmed Mansouri, Vladimir Pena, Marina Rodnina, Melina Schuh, Reinhard Schuh, Halyna Shcherbata, Holger Stark, Henning Urlaub.
MPI for Experimental Medicine: Nils Brose, Klaus-Armin Nave.
German Primate Center: Stefan Pöhlmann, Lutz Walter.
see also www.gpmolbio.uni-goettingen.de/content/c_faculty.php

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