

MOLECULAR BIOLOGY NEWSLETTER

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



JAN
2017

Welcome message

Dear alumni, students, friends and colleagues,

When our Molecular Biology Program was founded in the year 2000, its concept was guided by the idea of covering the entire field of molecular and cell biology, with the scientific directions being mainly determined by the development of the research fields represented by its faculty members. All students should get a broad theoretical and practical exposure to the life sciences, enabling them to reach an informed decision after the Master's courses regarding their future PhD research. As the program has a broad and diverse scientific focus, its evolution is gradual, yet dynamic, reflecting the expertise of newly appointed faculty members, the direction taken by new collaborative research centers on campus, and the importance of recent scientific techniques and discoveries.

Over the last year, the most prominent change has been a completely revised concept for computational biology, statistics and bioinformatics in the Master's curriculum. This led to a significant expansion of courses offered in this field in the fall of 2015. However, the initial plans to train newcomers in the programming language R and introduce them to advanced topics in bioinformatics was slightly overambitious, judging from the course evaluations by the students. To address their comments, a "bioinformatics task force" of faculty members and students met in spring 2016 to reconsider goals and define efficient measures to achieve them. The feedback given by the new class of Master's students in a recent review session makes us confident

that the new bioinformatics concept has, by now, been implemented successfully, providing a solid basis for further refinements.

In spring 2016, we enjoyed a wonderful PhD retreat to the city of Hamburg. In an ambitious scientific program, more than 30 PhD projects were presented and discussed. Bright sunshine, not always guaranteed at this place, invited us to take a harbor tour and choose from various opportunities to spend time along the river Elbe and in the *Speicherstadt*, the largest historic warehouse district in the world.



Molbio PhD Retreat in Hamburg

In September 2016, we celebrated the 10th anniversary of our scientific cooperation with the Feinberg Graduate School at the Weizmann Institute of Science in Rehovot, Israel. It has become a tradition to visit them on the occasion of their biennial Life Sciences Open Day and so we did with a group of twenty students and faculty members (see pp. 30-31 for further details). On our flight back from Israel, our group was joined by several PhD students of the Feinberg Graduate School, visiting, in return, our annual student-organized

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"Horizons in Molecular Biology" conference. This meeting was, once again, one of the scientific highlights on the Göttingen Campus, reflected by an impressive list of renowned speakers. A review of the meeting together with testimonials by some of the speakers can be found on pp. 32-33.

The year 2016 ended with a visit of the GGNB Scientific Advisory Board on the occasion of the GGNB Science Day. Featured student and alumni talks included Molbio presentations by Kanika Vanshylla, serving as a good rehearsal of her thesis defense a week later, and by Andrea Burgalossi who reported about his current research as a group leader at the University of Tübingen. At this time we also received the great news that new International Max Planck Research School for Genome Science, headed by Patrick Cramer, was approved. Congratulations!

P. Rehling, M. Rodnina, S. Burkhardt

Rapid rotation of the ribosomal subunits

The ribosome, a macromolecular machine, ubiquitously performs the work of synthesizing proteins in all cells. During protein synthesis, the ribosome moves along the mRNA by one codon and at the same time the two tRNAs bound to the ribosome in the A and P sites move to the P and E sites, respectively - a process promoted by elongation factor G (EF-G).

One of the key dynamic processes important for ensuring forward translocation of the tRNA-mRNA complex is the rotation of the small subunit (SSU) of the ribosome relative to the large subunit (LSU). However, the exact role of subunit rotation in translocation and the effect of EF-G on subunit rotation had been unclear so far.

We followed the rotation of the SSU relative to the LSU in real time by forming double-labeled-ribosomes (Fig. 1A). We attached fluorophore reporters on ribosomal proteins S6 of the SSU and L9 of the LSU and monitored changes in the FRET signal due to the rotation of the subunits relative to each other using rapid kinetic approach. The counter-clockwise (CCW) SSU

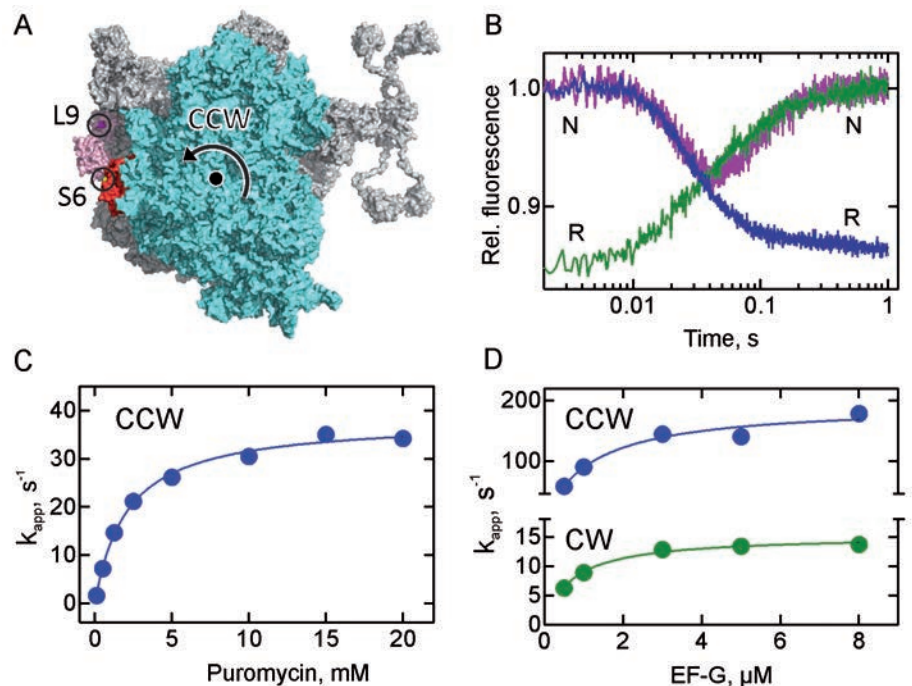


Fig. 1: Rotation of the ribosomal subunits in real time. (A) Proteins S6 (red) of the SSU and L9 (pink) of the LSU were labeled with fluorophores for FRET measurements. Labeling positions are encircled. (B) FRET changes upon addition of EF-Tu-GTP-Phe-tRNA^{Phe} to 70S-mRNA-fMet-tRNA^{fMet}, which results in peptide bond formation followed by CCW rotation (blue). Addition of EF-G to the PRE complex results in CW rotation (green). 70S-mRNA-fMet-tRNA^{fMet} was mixed with EF-Tu-GTP-Phe-tRNA^{Phe} and EF-G together (pink). N is non-rotated and R is rotated state. (C) Dependence of spontaneous CCW subunit rotation on puromycin concentration (D) Dependence of EF-G-induced CCW (blue) and CW (green) subunit rotation on EF-G concentration.

PhD-(and MSc-) related publications 2016 (PhD students of the Molecular Biology program in bold type)

Agafonov D, Kastner B, **Dybkov O**, Hofele R, **Liu W**, Urlaub H, Lührmann R, Stark H (2016) Molecular architecture of the human U4/U6.U5 tri-snRNP. *Science* 351(6280):1416-1420

Aksu M, Trakhanov S, Görlich D (2016) Structure of the exportin Xpo4 in complex with RanGTP and the hypusine-containing translation factor eIF5A. *Nat Commun* 7:11952

Bareth B, **Nikolov M**, Lorenzi I, Hildenbeutel M, Mick D, Helbig C, Urlaub H, Ott M, Rehling P, Dennerlein S (2016) Oms1 associates with cytochrome c oxidase assembly intermediates to stabilize newly synthesized Cox1. *Mol Biol Cell* 27(10):1570-1580

Baronsky T, **Dzementsei A**, Oelkers M, Melchert J, Pieler T, Janshoff A (2016) Reduction in E-cadherin expression fosters migration of *Xenopus laevis* primordial germ cells. *Integr Biol* 8(3):349-358

Belardinelli R, **Sharma H**, **Caliskan N**, **Cunha C**, Peske F, Wintermeyer W, Rodnina M (2016) Choreography of molecular movements during ribosome progression along mRNA. *Nat Struct Mol Biol* 23(4):342-348

rotation results in a decrease in the FRET signal, while clockwise (CW) SSU rotation leads to an increase in the FRET signal (Fig. 1B). In principle, the formation of deacylated tRNA in the P site upon the peptidyl transfer reaction can drive spontaneous CCW rotation.

This prompted us to first measure the kinetics of spontaneous rotation with different tRNAs either in the P or A site. We prepared ribosome complexes with P-site tRNA and initiated peptide bond formation with either puromycin - a mimics of the 3' end of the aminoacyl-tRNA - or aminoacyl-tRNA as an A-site substrate. With global kinetic analysis using numerical integration we determined that the rate of spontaneous subunit rotation was about 40 s^{-1} independent of the identity of tRNAs tested (Fig. 1C). Our measured rate is about 10 times faster than rates reported so far. This is because in our experimental conditions, the rate and fidelity of protein synthesis are close to those in vivo, rather than conventional slowly-performing translation systems.

The next question we asked was how EF-G affects the dynamics of subunit rotation. We monitored subunit rotation during EF-G promoted translocation and observed that EF-G accelerates CCW subunit rotation to 200 s^{-1} , 5-times faster than spontaneous rotation (Fig. 1D). Binding of EF-G stabilizes the ribosome in the rotated state and upon GTP hydrolysis the ribosome transits back to the non-rotated state, accompanied by tRNA-mRNA movement by one codon, at much slower rate of about $10\text{-}20 \text{ s}^{-1}$. Thus, we concluded that the EF-G-induced CCW rotation of the SSU is one of the fastest events on the reaction coordinate and is not rate limiting for tRNA-mRNA translocation as opposed to many previous reports.

Our work demonstrates that although the ribosome is a supramolecular assembly, its large-scale conformational changes are thermally driven, intrinsically rapid and are governed by its ligands such as tRNAs and EF-G.

Heena Sharma worked on her doctoral thesis in the group of Marina Rodnina at the Max Planck Institute for Biophysical Chemistry. She defended her PhD thesis in November 2016.

Results of this work were published in Sharma H, Adio S, Senyushkina T, Belardinelli R, Peske F, Rodnina M (2016) *Cell Reports* 16, 2187-2196.



Brown N, VanderLinden R, Watson E, Weissmann F, Ordureau A, Wu K, Zhang W, Yu S, Mercredi P, Harrison J, Davidson I, Qiao R, Lu Y, Dube P, Brunner M, Grace C, Miller D, **Haselbach D**, Jarvis M, Yamaguchi M, Yanishevski D, Petzold G, Sidhu S, Kuhlman B, Kirschner M, Harper J, Peters J, Stark H, Schulman B (2016) Dual RING E3 architectures regulate multiubiquitination and ubiquitin chain elongation by APC/C. *Cell* 165(6):1440-1453

Butkevich E, Hartig W, **Nikolov M**, Erck C, Grosche J, Urlaub H, Schmidt C, Klopfenstein D, Chua J (2016) Phosphorylation of FEZ1 by microtubule affinity regulating kinases regulates its function in presynaptic protein trafficking. *Scientific Reports* 6:26965

Callegari S, **Richter F**, Chojnacka K, Jans D, Lorenzi I, Pacheu-Grau D, Jakobs S, Lenz C, Urlaub H, Dudek J, Chacinska A, Rehling P (2016) TIM29 is a subunit of the human carrier translocase required for protein transport. *FEBS Lett* 590:4147-4158

Cascante-Esteva N, Gunka K, Stülke J (2016) Localization of components of the RNA-degrading machine in *Bacillus subtilis*. *Front Microbiol* 7:1492

Understanding the Basis of a Ribosomopathy

Dysfunction of the rRNA methyltransferase EMG1 in Bowen-Conradi syndrome

The production of eukaryotic ribosomes is a highly complex process that consumes up to 90% of the cellular energy and is regulated by several proto-oncogenes and tumor suppressors. This pathway requires the coordinated action of all three RNA polymerases and involves more than 200 *trans*-acting biogenesis factors, including many enzymatic proteins like nucleases, RNA helicases, and RNA methyltransferases that catalyse irreversible remodelling steps on the pre-ribosomal subunits. Recently, a number of severe genetic disorders, termed “ribosomopathies”, have been found to be caused by mutations in ribosomal proteins or ribosome biogenesis cofactors.

One such ribosomopathy is the Bowen-Conradi syndrome (BCS), which is characterised by bone marrow failure, bone abnormalities and early infant death. BCS is caused by a single mutation leading to an aspartate 86 to glycine (D86G) exchange in the ribosomal RNA methyltransferase EMG1. In yeast, *Emg1* is an essential protein that functions in the hypermodification

of U1191 of the 18S rRNA and also has additional roles in the assembly of the small ribosomal subunit.

In this study, we aimed to understand the molecular basis of BCS by establishing an RNAi-based rescue sys-

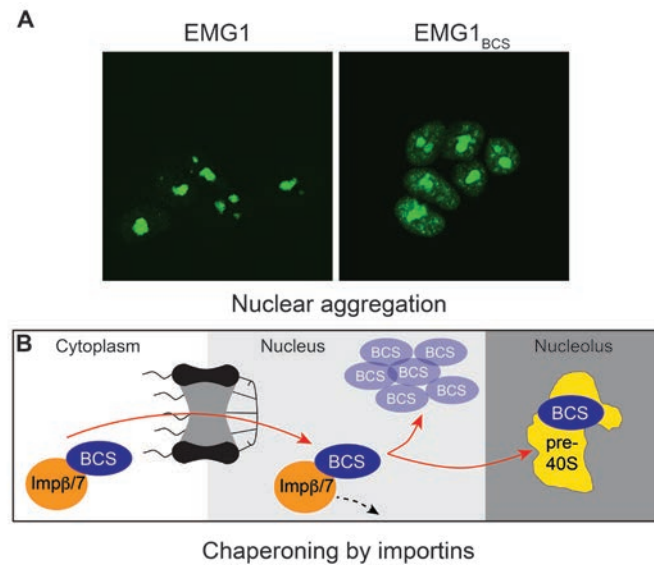


Fig. 1: A) HEK293 cells were transfected with siRNAs targeting EMG1 and expression of siRNA-resistant untagged EMG1 or EMG1_{D86G} (BCS) to endogenous levels was induced by doxycycline. The localisation of EMG1 or EMG1_{D86G} was determined by immunofluorescence. While wild-type EMG1 shows a nucleolar localisation, EMG1_{D86G} only partially accumulates in nucleoli and is also present in nuclear speckles. B) Schematic model showing chaperoning of EMG1_{D86G} by the IMP7/β heterodimer in the cytoplasm and during nuclear import. Some of the protein is recruited to nucleolar pre-ribosomes (pre-40S), but a significant fraction of EMG1_{D86G} aggregates in the nucleus upon disassembly of the import complex.

Cicek I, Karaca S, Brankatschk M, Eaton S, Urlaub H, Shcherbata H (2016) Hedgehog signaling strength is orchestrated by the mir-310 Cluster of microRNAs in response to diet. *Genetics* 202(3):1167-1183

Cretu C, Schmitzová J, Ponce-Salvatierra A, **Dybkov O,** De Laurentiis, **Sharma K,** Will C, Urlaub H, Lührmann R, Pena V (2016) Molecular architecture of SF3b and structural consequences of its cancer-related mutations. *Mol Cell* 64(2):307-319

Fourmann J, **Dybkov O,** Agafonov D, Tauchert M, Urlaub H, Ficner R, Fabrizio P, Lührmann R (2016) The target of the DEAH-box NTP triphosphatase Prp43 in *Saccharomyces cerevisiae* spliceosomes is the U2 snRNP-intron interaction. *eLife* 5:e15564

Gazit N, Vertkin I, Shapira I, **Helm M,** Slomowitz E, Sheiba M, Mor Y, Rizzoli S, Slutsky I (2016) IGF-1 receptor differentially regulates spontaneous and evoked transmission via mitochondria at hippocampal synapses. *Neuron* 89(3):583-597

Gleditzsch D, Müller-Esparza H, Pausch P, **Sharma K,** Dwarakanath S, Urlaub H, Bange G, Randau L (2016) Modulating the Cascade architecture of a minimal Type I-F CRISPR-Cas system. *Nucleic Acids Res* 44(12):5872-5882

tem to mimic the disease. For this, cell lines were engineered in which endogenous EMG1 could be depleted and expression of siRNA-resistant untagged EMG1 or EMG1 carrying the BCS mutation (EMG1_{D86G}) could be induced. Using these cells either expressing the wild-type or the mutated EMG1, we discovered that although the levels of the wild-type and mutant mRNAs were similar, the EMG1_{D86G} protein levels were considerably lower, indicating instability of the mutant protein. Furthermore, the reduced protein levels were found to cause defects in maturation of the small ribosomal subunit and interestingly, immunofluorescence showed that a significant portion of EMG1_{D86G} is mislocalized to nuclear speckles that likely represent protein aggregates (Fig. 1A). This raised the possibility that in Bowen-Conradi syndrome, the nucleolar recruitment of EMG1_{D86G} is impaired.

Using immunoprecipitation experiments and mass spectrometry, we identified protein interaction partners of EMG1 that can recruit both the wild-type and mutant protein to the

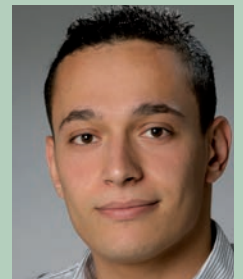
nucleolus. This implies that the D86G mutation affects an earlier stage in the lifetime of the EMG1 protein and we therefore analysed how EMG1 reaches the nucleus after its translation in the cytoplasm. Nuclear import assays using permeabilized cells showed that EMG1 is imported to the nucleus by the classical importin (IMP) α /IMP β pathway, as well as by the IMP7/ β heterodimer. Interestingly, we found that IMP7/ β heterodimer acts as a chaperone for EMG1/EMG1_{D86G} by preventing interactions between the basic patches of the protein and cytoplasmic polyanions (e.g. tRNAs) that would otherwise lead to non-specific aggregations of the protein (Fig. 1B).

Together, our data show that in BCS, the IMP7/ β heterodimer serves as a chaperone for EMG1_{D86G} during its nuclear import, but that disassembly of the EMG1_{D86G}-IMP7/ β complex in the nucleus leads to aggregation of EMG1_{D86G} and its proteasome-mediated degradation. The reduced levels of EMG1 that can be recruited to the nucleolus then lead to defects in the biogenesis of the small ribosomal subunit.

These new insights into the dysfunction of EMG1_{D86G} in BCS highlight the exciting possibility that drugs targeting the stability of EMG1_{D86G} could form the basis of a treatment for this ribosomopathy.

Ahmed Warda is a PhD student in the group of Markus Bohnsack in the Department of Molecular Biology at the University Medical Center Göttingen.

These results were published in Warda A, Freytag B, Haag S, Sloan K, Görlich D, Bohnsack M (2016) *Hum Mol Genet* [Epub ahead of print].



Goebbels S, Wieser G, Pieper, Alexander, Spitzer S, Yan K, Edgar J, **Yagensky O**, Wichert S, Agarwal A, Karram K, Renier N, Tessier-Lavigne M, Rossner M, Káradóttir R, Nave K (2017) A neuronal PI(3,4,5)P3-dependent program of oligodendrocyte precursor recruitment and myelination. *Nat Neurosci* 20:10-15

Haag S*, Sloan K*, Ranjan N*, **Warda A***, Kretschmer J, **Blessing C**, Hübner B, Seikowski J, Dennerlein S, Rehling P, Rodnina M, Höbartner C, Bohnsack M (2016) NSUN3 and ABH1 modify the wobble position of mt-tRNAMet to expand codon recognition in mitochondrial translation. *EMBO J* 35(19):2014-2119

Hassouna I, Ott C, Wüstefeld L, Offen N, Neher RA, Mitkovski M, Winkler D, Sperling S, Fries L, Goebbels S, **Vreja I**, Hagemeyer N, Dittrich M, Rossetti M, Kröhnert K, Hannke K, Boretius S, Zeug A, Höschen C, Dandekar T, Dere E, Neher E, Rizzoli S, Nave K-A, Sirén A, Ehrenreich H (2016) Revisiting adult neurogenesis and the role of erythropoietin for neuronal and oligodendroglial differentiation in the hippocampus. *Mol Psychiatry* 21(12):1752-1767

SNARE proteins in the plasma membrane

In the early seventies, Singer and Nicolson argued that plasma membrane is a sea of lipids where proteins float like icebergs. In addition to fluidity, plasma membrane is a mosaic structure composed of numerous different protein and lipid species. In fact, another important property of the plasma membrane is the existence of local hotspots where many specific biological reactions occur. Furthermore, plasma membrane is often coupled to scaffolding proteins in the cytoplasm and decorated by carbohydrates on the extracellular side.

Biochemical methods to extract the plasma membrane (or its domains) as well as the development of membrane reconstitution strategies opened up an opportunity to dissect the role of specific lipids and proteins as markers of functional hotspots in the membrane. Several mechanisms have emerged that aim to explain the generation of these local hotspots: protein-protein interactions at the cell surface, specific protein-lipid and lipid-lipid interactions at the membrane (Fig. 1). Below we focus how analyses of the presynaptic mem-

brane helped to shed the light on some of these mechanisms.

Presynaptic membranes undergo constant remodeling during the exo/endocytic cycle. Among the most abundant proteins in the presynaptic membrane are SNAREs (soluble NSF-attached protein receptor) – membrane proteins known as the engines for vesicle fusion. SNAREs are enriched in particular domains at the plasma membrane and analyses of mechanisms behind this domain formation have served as an excellent system for studying the mechanisms that underlie the plasma membrane organization. Initially, cholesterol was shown to be necessary for the functional existence of SNARE domains. However, these domains were different from so-called detergent resistant membranes (sometimes also referred to as “lipid rafts”) because they were not enriched with sphingomyelin and

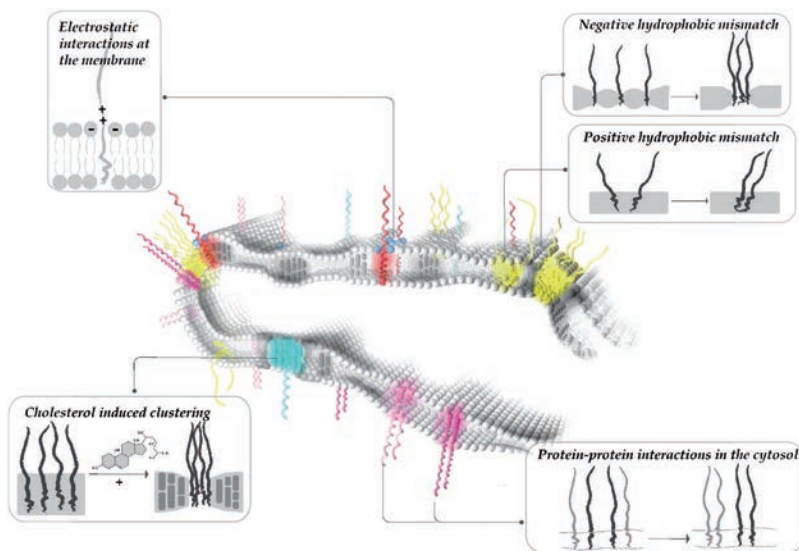


Fig. 1: Multiple mechanisms simultaneously affect the organization of proteins and lipids in the plasma membrane, leading to dynamic reorganization of protein clusters (modified from Milovanovic and Jahn, 2015).

Heininger A, Hackert P, **Andreou A**, Boon K, **Memet I**, Prior M, Clancy A, Schmidt B, Urlaub H, Schleiff E, Sloan K, Deckers M, Lührmann R, Enderlein J, Klostermeier D, Rehling P, Bohnsack M (2016) Protein cofactor competition regulates the action of a multifunctional RNA helicase in different pathways. *RNA Biol* 13(3):320-330

Hiragami-Hamada K, Soeroes S, **Nikolov M**, Wilkins B, Kreuz S, Chen C, De La Rosa-Velazquez I, Zenn H, Kost N, Pohl W, **Chernev A**, Schwarzer D, Jenuwein T, Lorincz M, Zimmermann B, Walla P, Neumann H, Baubec T, Urlaub H, Fischle W (2016) Dynamic and flexible H3K9me3 bridging via HP1 beta dimerization establishes a plastic state of condensed chromatin. *Nat Commun* 7:11310

Javadi-Zarnaghi F, Höbartner C (2016) Functional hallmarks of a catalytic DNA that makes lariat RNA. *Chem Eur J* 22(11):3720-3728

Klusmann I, Rodewald S, Müller L, Friedrich M, Wienken M, Li Y, Schulz-Heddergott R, Döbelstein M (2016) p53 activity results in DNA replication fork processivity. *Cell Reports* 17(7):1845-1857

Kohansal-Nodehi M, Chua J, Urlaub H, Jahn R, Czernik D (2016) Analysis of protein phosphorylation in nerve terminal reveals extensive changes in active zone proteins upon exocytosis. *eLife* 5:e14530

glycosylphosphatidylinositol-anchored peripheral proteins. Next, the specific protein-protein interactions between the cytosolic domains of SNAREs were shown to be critical for their segregation into discreet regions.

Interestingly, some of SNARE proteins such as syntaxins have a polybasic patch juxtaposed to their transmembrane domain (TMD). Polyphosphoinositides such as phosphatidylinositol 4,5-bisphosphate (PI(4,5)P₂) are specifically enriched in certain plasma membrane domains and specifically interact with the polybasic patch of syntaxin 1. Functionally, these syntaxin 1/PI(4,5)P₂ domains are shown to act as molecular beacons for vesicle recruitment. Calcium can additionally act as a charge bridge that can bring together smaller syntaxin 1/PI(4,5)P₂ complexes into larger, mesoscale domains.

Additionally, we have shown that hydrophobic mismatch at the membrane suffices to induce clustering of proteins. Hydrophobic mismatch occurs when the TMD of the protein is longer (positive mismatch) or shorter (negative mismatch) than the surrounding lipid envi-

ronment. It is critical to emphasize that plasma membrane does not have a uniform thickness, but it rather encompasses a range of thicknesses (i.e. between 3.5 and 4.5 nm) depending on the lipids and proteins at the particular domain. Even a slight difference in the length of TMDs (e.g. two amino acids) contributes to segregation of syntaxin isoforms into distinct domains in the plasma membrane. Since the incorporation of cholesterol affects the thickness of the membrane, this study also provides an alternative view on the cholesterol effect on membrane domain formation: increasing the thickness of the membrane locally generates hydrophobic mismatch that drives protein clustering. As illustrated by these ana-

lyses of distribution and the dynamics of SNARE proteins in the membrane, it is too simplistic to assign a single mechanism to membrane patterning. It is rather tempting to suggest that many of these mechanisms compete thereby generating transient, dynamic domains.

Finally, my road during graduate studies, from observing the protein-lipid domains in living cells to biochemically reconstituting these domains in model membranes, was all but solitary: the cutting-edge technology available on Göttingen Campus (e.g. STED nanoscopy, AFM, ellipsometry) was necessary for comprehensive analyses of the underlying mechanisms.

Dragomir Milovanovic completed his doctoral thesis in the group of Reinhard Jahn and graduated in October 2015. Currently, he works as a postdoc at Yale University (De Camilli Lab).

Part of the results in this article are based on his contributions to Honigmann et al., *Nat Struct Mol Biol* 20, 679-86 (2013), Milovanovic et al., *Nat Commun* 6, 5984 (2015), Milovanovic et al., *Front Physiol* 6 (2015) and Milovanovic et al., *J Biol Chem* 291, 7868-76 (2016)



Kühn J, Wong L, **Pirkuliyeva S**, Schulz K, Schwiegl C, **Fünfgeld K**, Keppler S, Batista F, Urlaub H, Habeck M, Becker S, Griesinger C, Wienands J (2016) The adaptor protein CIN85 assembles intracellular signaling clusters for B cell activation. *Science Signaling* 9(434):ra66

Levchenko M, Wuttke J, Römpler K, Schmidt B, Neifer K, Juris L, Wissel M, Rehling P, Deckers M (2016) Cox26 is a novel stoichiometric subunit of the yeast cytochrome c oxidase. *Biochim Biophys Acta* 1863(7):1624-1632

Ludolphs M, Schneeberger D, **Soykan T**, Schäfer J, Papadopoulos T, Brose N, Schindelin H, Steinem C (2016) Specificity of collybistin-phosphoinositide interactions: Impact of the individual protein domains. *J Biol Chem* 291(1):244-254

Maidorn M, Rizzoli S, Opazo F (2016) Tools and limitations to study the molecular composition of synapses by fluorescence microscopy. *Biochem J* 473(20):3385-3399

Maj E, Kunneke L, Loesch E, Grund A, Melchert J, Pieler T, Aspelmeier T, Borchers A (2016) Controlled levels of canonical Wnt signaling are required for neural crest migration. *Dev Biol* 417(1):77-90

Presynaptic protein phosphorylation dynamics

During the past decades, the synaptic vesicle (SV) recycling pathway in the presynapse has been studied in a great detail. Many proteins that are involved in exocytosis and endocytosis were identified and their functions have been studied extensively. But what is much less known is how the synaptic vesicle cycle is regulated. Identification of kinases, phosphatases and many phosphoproteins in the presynapse suggests protein phosphorylation as a regulatory mechanism in neurotransmission.

While classical approaches to study protein phosphorylation focus on individual proteins, the modern screening methods have considerably enlarged the coverage of phosphoproteins. In this study, we took advantage of mass spectrometry-based phosphoproteomics as a powerful tool to identify novel phosphosites in the nerve terminal. More importantly, combining dimethyl labeling method with the phosphoproteomics workflow, we investigated how and to what extent phosphorylation of proteins is changed upon arrival of action potential to the presynapse. In our study, nerve terminals (synap-

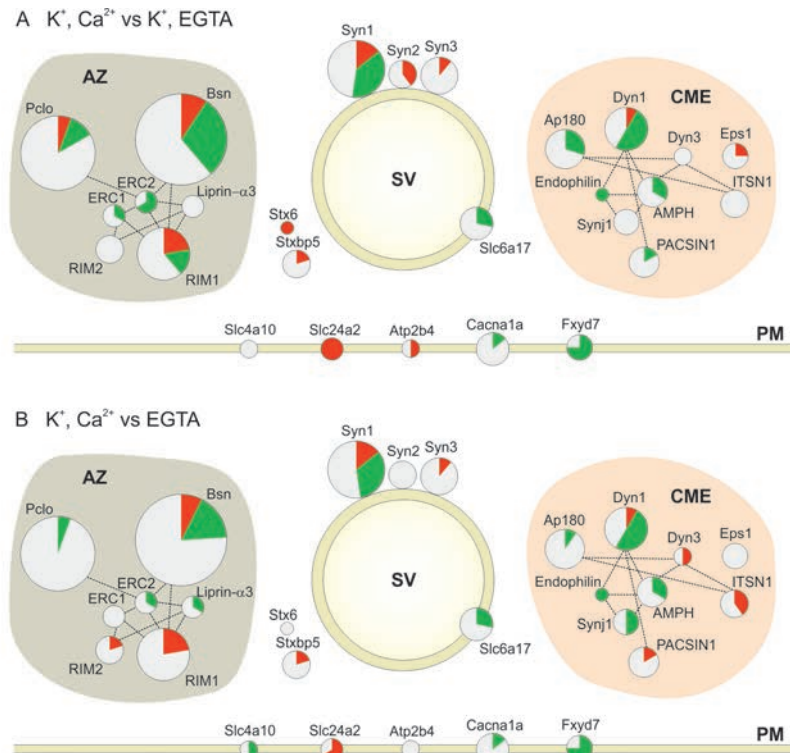


Fig. 1: Overview of changes in the phosphorylation status of active zone proteins (AZ), synaptic vesicle proteins (SV), proteins involved in clathrin mediated endocytosis (CME) and Plasma Membrane proteins (PM) in the two pair-wise comparisons: (A) depolarization with Ca^{2+} versus depolarization without Ca^{2+} (K^+ , Ca^{2+} versus K^+ , EGTA) (B) depolarization with Ca^{2+} versus no depolarization (K^+ , Ca^{2+} versus EGTA). Each circle represents a protein (determined by gene name). The circles are proportional to the number of quantified phosphosites. The red, green and white areas in each circle are proportional to the number of up, down and non-regulated phosphosites, respectively.

Manno B, Oellerich T, Schnyder T, Corso J, Lösing M, Neumann K, Urlaub H, Batista F, Engelke M, Wienands J (2016) The Dok-3/Grb2 adaptor module promotes inducible association of the lipid phosphatase SHIP with the BCR in a coreceptor-independent manner. *Eur J Immunol* 46(11):2520-2539

Milovanovic D, Platen M, Junius M, Diederichsen U, Schaap I, Honigsmann A, Jahn R, van den Bogaart G (2016) Calcium promotes the formation of syntaxin 1 mesoscale domains through phosphatidylinositol 4,5-bisphosphate. *J Biol Chem* 291(15):7868-7876

Narayanan P, Sondermann J, Rouwette T, **Karaca S,** Urlaub H, Mitkovski M, Gomez-Varela D, Schmidt M (2016) Native Piezo2 interactomics identifies pericentrin as a novel regulator of Piezo2 in somatosensory neurons. *J Proteome Res* 15(8):2676-2687

Newie J, **Andreou A,** Neumann P, Einsle O, Feussner I, Ficner R (2016) Crystal structure of a lipoxygenase from *Cyanospora* sp may reveal novel features for substrate acquisition. *J Lipid Res* 57(2):276-287

tosomes) were isolated from the rat brain. To mimic the action potential, we have applied KCl buffer. The arrival of action potential leads to the influx of calcium into the nerve terminals. Therefore, to investigate the role of calcium on protein phosphorylation, the phosphoproteome of synaptosomes was measured in three different stimulation conditions: depolarization with calcium (K^+ , Ca^{2+}), depolarization without calcium (K^+ , EGTA), and no depolarization (EGTA). To quantify changes of phosphorylation sites under different incubation conditions, we compared the phosphoproteome in the respective stimulation conditions: K^+ , Ca^{2+} vs K^+ , EGTA and K^+ , Ca^{2+} vs EGTA.

Interestingly, a substantial overlap in regulated phosphosites between the comparisons was observed with identical tendency of regulation and similar fold changes, documenting that influx of calcium into the nerve terminal upon stimulation is the main regulator of protein phosphorylation and membrane depolarization has a minor effect. Functional categorization of regulated phosphosites revealed the most affected groups upon stimulation

as follows: (I) active zone proteins, (II) SV protein and exocytosis proteins, (III) cytoskeleton, (IV) endocytosis and (V) kinases and phosphatases. Active zone proteins are involved in docking and priming of SVs to the plasma membrane. Among 7 proteins of this group, bassoon was the most affected protein with 5 upregulated and 16 downregulated phosphosites.

Next, we asked which kinases are responsible for the phosphorylation changes upon stimulation. To answer this question, we used Motif-X, the software that investigates which sequence motifs are enriched among the up and downregulated phosphosites. It was revealed that 'RXXS' and 'SP' motifs are enriched among the up and

downregulated phosphosites, respectively. 'RXXS' motif is known to be the consensus motif of CaMKII, PKC and PKA. Therefore, we concluded that these kinases are activated upon stimulation. 'SP' motif is known to be the consensus motif of proline-directed kinases (such as Cdk5 and GSK3), suggesting that these kinases are deactivated upon stimulation.

Overall, our findings provide first systematic analysis of the regulatory networks that control nerve terminal proteins. The next challenge is to investigate the role of these modifications in interaction of proteins that are involved in neurotransmitter release and trafficking of synaptic vesicles.

Mahdokht Kohansal Nodehi conducted her doctoral research under the supervision of Reinhard Jahn at the MPI for Biophysical Chemistry. She graduated from the Molecular Biology program in October 2016.

These results were published in Kohansal-Nodehi et al. (2016) eLife 5:e14530.



Qiao R, Weissmann F, Yamaguchi M, Brown N, VanderLinden R, Imre R, Jarvis M, Brunner M, Davidson I, Litos G, **Haselbach D**, Mechtler K, Stark H, Schulman B, Peters J (2016) Mechanism of APC/C-CDC20 activation by mitotic phosphorylation. Proc Natl Acad Sci USA 113(19):E2570-E2578

Richter-Dennerlein R, Oeljeklaus S, Lorenzi I, Ronsör C, Bareth B, **Schendzierlorz A**, Wang C, Warscheid B, Rehling P, Dennerlein S (2016) Mitochondrial protein synthesis adapts to influx of nuclear-encoded protein. Cell 167(2):471-483

Sadek M, Berndt D, **Milovanovic D**, Jahn R, Diederichsen U (2016) Distance regulated vesicle fusion and docking mediated by γ -peptide nucleic acid SNARE protein analogues. Chembiochem 17(6):479-485

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Shao Y, Richter H, Sun S, **Sharma K**, Urlaub H, Randau L, Li H (2016) A non-stem-loop CRISPR RNA is processed by dual binding Cas6. Structure 24(4):547-554

Studying specific human T helper cell responses

MHC tetramers are an essential tool to characterize antigen-specific T cells, including rare human CD4+ T helper cell responses. However, such stainings require large samples and existing protocols only resolve a limited number of specificities in parallel. Therefore, we developed a combinatorial staining protocol for the simultaneous analysis of multiple CD4+ T cell responses from limited clinical samples.

Hannes Uchtenhagen

graduated from the Molecular Biology Master's program in 2007 and completed his PhD research at the Karolinska Institutet in Stockholm, Sweden in 2012. After three years as a postdoctoral research associate at the Benaroya Research Institute in Seattle, WA, USA he returned to Sweden in 2016 as senior scientist at the biotech company Anocca AB in Stockholm.

These results were published in Uchtenhagen et al. (2016) *Nat Commun* 7, 12614

As proof of principle, we analyzed T helper cells specific to a range of epitopes from the often-changed seasonal influenza vaccine. Measuring T cells specific to several epitopes at once and directly *ex vivo*, we were able to describe a consistent frequency hierarchy that was largely conserved between subjects despite varying HLA backgrounds and history of infections. Using cord-blood samples we then showed for the first time that frequency hierarchies found in adults appear to be built on differences in thymic output observed already in the unborn child. Furthermore, we applied the combinatorial staining approach as a discovery tool for T cell receptor cross-

reactivity and demonstrate that it can be used to study the impact of immune-modulatory therapy on specific immunity.

Large human cohorts and technological advances have turned the immense human diversity from an obstacle into a platform for discovery in immunology. Our approach makes it possible to now extend this to address diversity in very specific T helper responses. Additionally, our study will hopefully contribute to finally make the consistently-ignored T helper responses a valued player in rational vaccine design.

<http://www.nature.com/articles/ncomms12614>

Molecular organization of the human splicing factor SF3b

SF3b is a multimeric component of the U2 small nuclear ribonucleoprotein (snRNP) that plays an essential role in branch site (BS) recognition during pre-mRNA splicing. Mutations in the largest SF3b subunit, SF3b1/SF3b155 have been linked to several forms of cancer and lead, via an unknown mechanism, to the erroneous selection of alternative BS. To gain structural insight into how cancer-related

alleles of SF3b155 alter splicing fidelity, we used a hybrid approach. First, we determined the crystal structure of a human SF3b core complex at 3.1 Å resolution. The structure revealed a unique topology of the HEAT domain of SF3b155, whose specific geometry is maintained by multiple contacts with the other subunits, which act as a scaffold. Next, by combining protein-protein and protein-RNA

Sharma H, Adio S, Senyushkina T, Belardinelli R, Peske F, Rodnina M (2016) Kinetics of spontaneous and EF-G-accelerated rotation of ribosomal subunits. *Cell Reports* 16(8):2187-2196

Shi X, Halder P, **Yavuz H**, Jahn R, Shuman H (2016) Direct targeting of membrane fusion by SNARE mimicry: Convergent evolution of Legionella effectors. *Proc Natl Acad Sci USA* 113(31):8807-8812

Shukla A*, Beroun A*, Panopoulou M, Neumann PA, Grant SGN, Olive MF, Dong Y, Schlüter OM (2016) Calcium-permeable AMPA receptors and silent synapses in cocaine-conditioned place preference. *EMBO J* [Epub ahead of print] *Authors contributed equally

Steshenko O, Andrade D, Honigmann A, Mueller V, Schneider F, Sezgin E, Hell S, Simons M, Eggeling C (2016) Reorganization of lipid diffusion by myelin basic protein as revealed by STED nanoscopy. *Biophys J* 110(11):2441-2450

Veit J, Sachsenberg T, **Chernev A**, Aicheler F, Urlaub H, Kohlbacher O (2016) LFQProfiler and RNPxl: Open-source tools for label-free quantification and protein-RNA cross-linking integrated into proteome discoverer. *J Proteome Res* 15(9):3441-3448

Sf3b (continued)

crosslinking with mass-spectrometry we showed that the BS-interacting proteins SF3b14a/p14 and U2AF65 are positioned within the SF3b155 HEAT superhelix, as part of a composite RNA-binding platform. Most residues mutated in cancer cells contribute to the tertiary structure of SF3b155's HEAT domain and are clustered in the vicinity of U2AF65 and of p14. Our analyses suggest that substitution of these residues induces changes in the conformation and specific curvature of the HEAT superhelix. This in turn diminishes the interaction of SF3b155 with pre-mRNA and, likely, with other spliceosomal proteins leading to the selection of alternative BS sequences that exhibit greater complementarity to the U2 snRNA and are thus less dependent on the stabilizing effect of SF3b.

Constantin Cretu is a PhD student in the group of Vladimir Pena at the MPI for Biophysical Chemistry.

These results were published in Cretu et al. (2016) *Mol Cell* 64, 307-319

Mechanistic details of Xpo4-dependent export

Nucleocytoplasmic exchange is essential for eukaryotic cells. It is largely mediated by shuttling nuclear transport receptors (NTRs), which are classified according to the direction of transport as importins or exportins. Exportin 4 (Xpo4) is a bidirectional NTR that mediates nuclear export of the eukaryotic translation initiation factor 5A (eIF5A) and Smad3 as well as nuclear import of transcription factors such as Sox2 and SRY.

Prior to our study, there was no structural information on Xpo4; therefore, it had been unclear how Xpo4 facilitated transport of structurally diverse cargoes. Now, we have elucidated the crystal structure of RanGTP•Xpo4•eIF5A export complex.

The structure reveals an unusual cargo recognition mode, with Xpo4 contacting both globular domains of eIF5A simultaneously. eIF5A contains hypusine, a unique amino acid with two positive charges, that is essential for cell viability and eIF5A function in translation. The hypusine docks into a deep, acidic pocket of Xpo4 and is thus a critical element of eIF5A's com-

plex export signature. This suggests that Xpo4 recognizes other cargoes differently, and illustrates how Xpo4 suppresses – in an inhibitor-like manner – undesired interactions of eIF5A inside the nucleus. The structure also reveals that Ran promotes eIF5A binding through conformational changes in Xpo4, including the stabilization of a conserved acidic loop. Similar acidic loops in unidirectional importins have a critical role in cargo assembly and disassembly processes. This detail gives mechanistic hints about how Xpo4 can act as a bidirectional NTR.

Metin Aksu completed his doctoral thesis in the Department of Dirk Görlich at the MPI for Biophysical Chemistry, where he is still working as a postdoctoral research fellow. He graduated from the Molecular Biology program in November 2015.

These results were published in Aksu M, Trakhanov S, Görlich D (2016) *Nat Commun* 7, 11952

Warda A, Freytag B, Haag S, Sloan K, Görlich D, Bohnsack M (2016) Effects of the Bowen-Conradi syndrome mutation in EMG1 on its nuclear import, stability and nucleolar recruitment. *Hum Mol Genet* [Epub ahead of print]

Wienken M, Dickmanns A, Nemajerova A, Kramer D, Najafova Z, **Weiss M, Karpiuk O, Kassem M, Zhang Y, Lozano G, Johnsen S, Moll U, Zhang X, Dobbelstein M** (2016) MDM2 Associates with polycomb repressor complex 2 and enhances stemness-promoting chromatin modifications independent of p53. *Mol Cell* 61(1):68-83

Yagensky O, Kalantary Dehaghi T, Chua J (2016) The roles of microtubule-based transport at presynaptic nerve terminals. *Front Synaptic Neurosci* 3:3

Yamaguchi M, VanderLinden R, Weissmann F, Qiao R, Dube P, Brown N, **Haselbach D, Zhang W, Sidhu S, Peters J, Stark H, Schulman B** (2016) Cryo-EM of mitotic checkpoint complex-bound APC/C reveals reciprocal and conformational regulation of ubiquitin ligation. *Mol Cell* 63(4):593-607

Students

Master's class 2016/17

Gerrit Altmepfen, Germany
BSc, University of Heidelberg

Oleksandr Dovgusha, Ukraine
BSc, Taras Shevchenko National
University of Kyiv

Jako El Kholtei, Germany
BSc, University of Heidelberg

Jose Lorenzo Ferrer, Philippines
BSc, University of the Philippines Diliman

Gaurika Garg, India
BSc, Sri Venkateswara College,
University of Delhi

Alberto Hernández Armendáriz,
Mexico, B Tech Eng, National
Polytechnic Institute, Mexico City

Ida Jentoft, Norway
BSc, University of Copenhagen &
McGill University, Montreal

Anubhav Kaphle, Nepal
BE, Siddaganga Institute of
Technology, Tumkur, India

Ana Patricia Kutschat, Brazil
BSc, University of Michigan,
Ann Arbor, USA

Kseniia Lysakovskaia, Russian Federation
BSc, Lomonosov Moscow State
University

Vitalii Mudryi, Ukraine
BSc, Taras Shevchenko National
University of Kyiv

Dilantha Perera, Sri Lanka
BSc, Jacobs University Bremen

Panagiotis Poulis, Greece
BSc, National and Kapodistrian
University of Athens

Martin Daniel Qui, Philippines
BSc, University of the Philippines Diliman

Damir Sakhapov, Russian Federation
BSc, Kazan Federal University

Ninadini Sharma, India
BSc, Miranda House, University of Delhi

Anuruti Swarnkar, India
BSc, Institute of Home Economics,
University of Delhi

Liesel Tamon, Philippines
BSc, University of the Philippines Diliman



Cole Townsend, USA
BSc, University of Oklahoma

Taras Velychko, Ukraine
BSc, Taras Shevchenko National
University of Kyiv

Gabriel Jose Villamil, Philippines
BSc, University of the Philippines Diliman

Meile Wiegand, India
BSc, Technische Universität Darmstadt

Applications 2016

In 2016, 747 students from 77
countries applied.

Germany 23 / West Europe 22
East Europe 56
North America 25
Central/South America 21
North Africa 72
Central/South Africa 97
Asia, Near East 96 / Far East 334
Australia 1

Roya Yousefi, Iran
BSc, University of Tehran

Xizhou Zhang, P.R. China
BSc, Jacobs University Bremen

Zhenwei Zhang, P.R. China
BSc, University of Electronic Science
and Technology of China

Valentyna Zinchenko, Ukraine
BSc, Taras Shevchenko National
University of Kyiv

PhD projects started in 2016



Gerald Ryan Aquino
Remodelling of pre-ribosomal complexes during ribosome assembly.
Markus Bohnsack, Ralf Ficner, Henning Urlaub



Franziska Kretzschmar
Protein degradation on plant lipid droplets.
Till Ischebeck, Alexander Stein, Christiane Gatz



Oleh Rymarenko
Structural and biochemical studies of the nuclear transport machinery.
Dirk Görlich, Vladimir Pena, Markus Bohnsack



Kai-Hsin Chan
The role of non-canonical release in ribosome rescue.
Marina Rodnina, Kai Tittmann, Markus Bohnsack



Yi-Tse Liu
The role of plasma membrane lipids in plant stresses adaptation.
Ivo Feußner, Blanche Schwappach, Volker Lipka



Claudia Schmidt
Reconstitution of Doa10p-mediated ER-associated protein degradation with purified components.
Alexander Stein, Blanche Schwappach, Holger Stark



Isaac Fianu
Structural characterization of the integrator complex.
Patrick Cramer, Kai Tittmann, Dirk Görlich



Marija Liutkute
Monitoring the co-translational folding in real time.
Marina Rodnina, Patrick Cramer, Kai Tittmann



Madhobi Sen
Investigation of deregulated epigenetic regulation as an Achilles heel of tumorigenesis.
Steven Johnsen, Matthias Dobbelsstein, Melina Schuh



Mohammad Ghaem Maghami
Development and characterization of RNA catalysts for in situ labeling of target RNA molecules.
Claudia Höbartner, Marina Rodnina, Stefan Jakobs



Vindhya Pillai
Characterization of ER-associated degradation of protein in *S. pombe*.
Alexander Stein, Marina Rodnina, Blanche Schwappach



Swati Subramanian
Permissive and inhibiting roles of myelin on neuronal circuit plasticity.
Klaus-Armin Nave, Silvio Rizzoli, Nils Brose

External MSc projects

Hadil El Sammak

Metabolic switch during heart regeneration in zebrafish.
Didier Stainier, MPI for Heart and Lung Research, Marburg

Katharina Glaser

Investigating the functional role of GRK2 in dendritic cell maturation and migration.
T. Lämmermann, MPI of Immunobiology & Epigenetics, Freiburg

Bishoy Hanna

Functional and molecular characterization of human NUDT22.
Thomas Helleday, Karolinska Institutet, Stockholm, Sweden

Deniz Kaya

Dissecting the mechanism of ubiquitin-dependent formation of a ribosome biogenesis platform during neural crest specification.
Michael Rape, UC Berkeley, USA



Sung-Hui Yi

Kinetic analysis of translation initiation in higher eukaryotes.
Marina Rodnina, Markus Bohnsack, Kai Tittmann

Students

Graduated

The Masters of 2016

Charlotte Blessing (*Markus Bohnsack*)
The role of methylated residues in cellular tRNAs.

Kai-Hsin Chan (*Marina Rodnina*)
Mechanisms of ribosome rescue by ArfB.

Mohamed El-Brolosy (*Didier Stainier, MPI for Heart and Lung Research*)
Investigating the regulation of endothelial pyruvate kinase-M2 (PKM2) and its role in the proliferation of endothelial cells.

Isaac Fianu (*Patrick Cramer*)
Expression and purification of RNA polymerase II general transcription factor IID sub-complex in yeast.

Mohammad Ghaem Maghami (*Claudia Höbartner*)
Development and optimization of fluorescently labeled aptamer based probes for application in PAINT microscopy.

Zivojin Jevtic (*Henning Urlaub*)
Quantitative proteome analysis of the haloarchaeon *Haloferax volcanii* under exposure to environmental stress by SWATH-MS.

Adrian Kovac (*Jörg Stülke*)
Genomic defragmentation and metabolic analysis in *Minibacillus*.

Franziska Kretzschmar (*Ivo Feußner*)
Root exudates of *Arabidopsis thaliana* ecotypes.

Matija Kronic (*Ira Milosevic*)
Measuring the pH and transmembrane potential of clathrin-coated vesicles using a novel single vesicle assay.

David Kuhs (*Rolf Daniel*)
Expansion and optimization of functional metagenomic screenings for alternative biotin-synthesizing enzymes.

Marija Liutkute (*Marina Rodnina*)
Monitoring the co-translational folding of RnaseH in real time.

Matthew Logsdon (*Yosef Yarden, Weizmann Institute of Science*)
Using ChIP-seq to study the function of the putative transcription factor TSHZ2.

Claudia Schmidt (*Alexander Stein*)
In vitro analysis of the function of the ubiquitin-conjugated enzyme Ubc6p in Doa10p-mediated ER-associated protein degradation.

Julia Schröder (*Christiane Gatz*)
Development and application of an assay to examine the role of COI1 in a functional unit with JAZ and JA-Ile.

Madhobi Sen (*Steven Johnsen*)
Epigenetic deregulation in colorectal cancer.



Michael Mitter (*Wolfgang Fischle*)
Effects of RNA from the Fab7 PRE on PRC2 function.

Vindhya Pillai (*Wolfgang Wintermeyer*)
Structural and functional dynamics of the bacterial SecYEG translocon.

Oleh Rymarenko (*Patrick Cramer*)
Structural studies of the negative elongation factor.

Shama Sograte Idrissi (*Silvio Rizzoli*)
ELISA as a prescreening tool for the high-throughput selection of single domain antibodies.

Swati Subramanian (*Tobias Moser*)
Optimizing membrane expression of the fast channelrhodopsin Chronos.

Harald Vöhringer (*Johannes Söding*)
Merging Domain Fragments for the Universal Protein Domain Database.

The Doctors of 2016



Irena Andreeva

Kinetic models of sequential initiation events upon polysome formation.

*Marina Rodnina,
Heinz Neumann,
Holger Stark*



Bernard Freytag

Functional and structural studies of importins in complex with polycationic substrates.

*Dirk Görlich,
Christian Griesinger,
Detlef Doenecke*



Mahdokht Kohansal Nodehi

Global analysis of protein phosphorylation regulation upon stimulation of exocytosis in the nerve terminal.

*Reinhard Jahn,
Henning Urlaub,
Jürgen Wienands*



Lena Musiol

The role of the mammalian GET pathway in the mouse liver.

*Blanche Schwappach,
Reinhard Jahn,
Andreas Janshoff*



Tino Pleiner

Rapid nanobody discovery and novel nanobody engineering strategies for the study of the nuclear pore complex.

*Dirk Görlich,
Peter Rehling,
Reinhard Lührmann*



Katja Rust

The Tip60 chromatin remodeling complex is required for maintenance and polarity of *Drosophila* neural stem cells.

*Andreas Wodarz,
Tomas Pieler,
Halyna Shcherbata*



Heena Sharma

Kinetics of subunit rotation of the ribosome during tRNA-mRNA translocation.

*Marina Rodnina,
Kai Tittmann,
Holger Stark*



Avani Shukla

Cocaine-induced synaptic plasticity in the nucleus accumbens and drug-associated behavior - An unexpected dissociation.

*Oliver Schlüter,
Tobias Moser,
Silvio Rizzoli*



Anita Smarandache

Investigation of cpeb1 transcript regulation and potential functions of CPEB1 in germline development in *X. laevis*.

*Tomas Pieler,
Halyna Shcherbata,
Michael Kessel*



Sven Truckenbrodt

Long-term temporal dynamics of synaptic vesicles.

*Silvio Rizzoli,
Reinhard Jahn,
Blanche Schwappach*



Kanika Vanshylla

The membrane IgE tail imparts unique signaling properties to the B cell antigen receptor.

*Jürgen Wienands,
Matthias Dobbelsstein,
Roland Dosch*



Agata Witkowska

Study of SNARE-mediated membrane fusion with a novel single vesicle fusion assay.

*Reinhard Jahn,
Andreas Janshoff,
Stefan Jakobs*



Olena Zaitseva

Analysis of the transcriptome of human NK lymphocytes.

*Lutz Walter,
Jörg Stülke,
Matthias Dobbelsstein*



Living in the world

How science has made me a global citizen

I was born in Colombia in an infamous time, back when drug cartels, bombs and kidnappings were a reality hard to miss. I grew up in the Caribbean coast, surrounded by warm people and even warmer weather, and at some point in my late childhood I decided to become a scientist. Something about the prestige, the respect, the challenges, and above all, the future, resonated strongly with me. Little did I know how much of that awaited me.

I started by moving to Bogotá for my Bachelor in Biology. Bogotá is well known for its massive and busy population, and very gloomy weather. Kind of like a South American London of sorts. The National University, as the best public university in the country, has always attracted keen minds from all corners of Colombia, and so I was suddenly surrounded by representatives from virtually the whole country, not only in its geography, but in its social and cultural dimensions. I understood that our diversity was not just some high-order biological concept, and that it was very present in our realities and our experiences.

Later on, I moved to Göttingen for my Master and PhD. Göttingen was the first city I ever experienced to have such a strong surrounding academic spirit. I joined the IMPRS program, where I met and spent time with people from many countries. This time around, it struck me how similar people could be in distant places with such different histories such as Turkey, Brazil or Germany; and how much we liked the same books, TV, or bad jokes.

It also became evident that my scientific passion had a strong evolutionary



Rafik in New York City, downtown Manhattan

component, and decided to make that the central aspect of my doctoral studies. This resulted in my eventual relocation to the Max Planck Institute for Evolutionary Biology in Plön, in Schleswig-Holstein. My transition from Bogotá (~7 million people) to Göttingen (~100.000 people) was nothing like the transition to Plön (~8000 people, most of them retired). In less than two years I had reduced the population around me by three orders of magnitude, and was effectively exclusively surrounded by scientists from all over the world. I completed my Master's thesis, my Doctoral dissertation and my first postdoc asking questions about how genes appear in nature and by combining the molecular and evolutionary notions of what genes are, and how they come to be.

In the remote, tiny, and very beautiful Plön, most cultural differences were dwarfed in contrast by aspects that lie in the core of how we deal with life. I saw the loners, the talkers, the super-socials, the travelers, the animal lovers,

those who cook to be happy, the ones who drink to keep the sadness away, the nightcrawlers, the early birds, the generous, the paranoids. There, surrounded by lakes, forest and not much more, I met humans.

After almost seven years in Germany, and decided to shake my personal and scientific world once more. I was offered a postdoctoral position in New York (New York!) to understand the evolution of ciliates with scrambled genomes at the lab of Laura Landweber. Laura was in the process of moving the lab from Princeton University (in Princeton, New Jersey) to Columbia University (in uptown Manhattan), so I had a sample of the old (small town Princeton) and the new (vibrant, busy, and super-tall New York City). I made friends at a rate I had never imagined possible, and just by being here I have been visited by more friends in six months than in over six years in Germany. Living in New York has given me a new window to the world, to excellent burgers, to random jazz

Rafik Neme graduated from the Molecular Biology Program in 2011. He did his external Master's thesis project with Diethard Tautz at the Max Planck Institute for Evolutionary Biology in Plön, Germany, where he later did his doctoral research and stayed for his initial postdoc phase. In 2016 he moved to New York as a postdoctoral research fellow at Columbia University Medical Center. He currently works at the Department of Biochemistry and Molecular Biophysics with Laura Landweber in Evolutionary Genomics of ciliates.

My journey with the pancreas

From Göttingen through the Rocky Mountains to the Great Lakes with the pancreas on my mind

My curiosity in the workings of living systems is what led me to study the biosciences. My major in Biochemistry at the University of Ghana offered me exciting glimpses at the molecular basis of life, but also left me with certain unanswered questions. One of the questions I was tossing around in my mind was “how do you go from one cell after fertilization, with a library of genetic information, to such distinctly different cells types in an adult?”

Prior to coming to Göttingen, I had no clue there was a whole field dedicated to answering this question. After hearing lectures from Prof. Herbert Jäckle and Prof. Tomas Pieler on axis determination in embryos, I was certain Developmental

Biology was the way to go for me. This is why I did my first lab rotation on pancreas development in the laboratory of Prof. Pieler, and by the end of my thesis I felt so privileged to have had a front row seat to the show on how a group of cells become set aside to form the pancreas. For me this was a thrill and I wanted to know more. I wanted to understand how cells in the newly formed pancreas become specialized, how do they choose to either become cells that digest food or cells that regulate blood glucose levels. This is when I packed bag and baggage and headed to Denver to join the lab of Dr. Jan Jensen. There, I got involved with cell-cell communication and how that drives the further refinement of cell types in the developing pancreas.

The lab in Denver was situated on the third floor of the Barbara Davis Center for Childhood Diabetes, with a beautiful view of the Rocky Mountains. The first two floors were clinics for children with Type-1 diabetes. Coming to work in this building was a unique experience. As you walked into work in the morning you will often encounter families with children who have been diagnosed with diabetes. This was very humbling and also gave me extra motivation to want to understand how insulin-producing cells in the pancreas form. I guess I got overly motivated in the process. Together with my postdoctoral mentor Dr. Jan Jensen we agreed to extend my project from studying how Notch signaling drive the formation of endocrine cells

continued on next page

Living in the world (continued)

bars, to the weird stuff that happens in subways. I walk the streets I recognize from many of my favorite movies, and recently started noticing how many books have their characters referencing streets or restaurants I regularly visit. On the other hand, I have been able to get to know Princeton, which feels often like an American version of Göttingen (albeit the size of Plön!), with students and professors flooding the streets, cafes and restaurants. And of course,

you can expect more than twenty different nationalities in a single cafe.

Being here has made me miss the German health system – but not the German gastronomic offer – and I can buy and cook most of the food I missed from Colombia. When meet new people, I still recognize the same humans I used to see in Colombia, and in Germany. The funny, the weird, the sharp-minded, the active, the relaxed. Being

in a new place, no matter how familiar or foreign, has the particular effect of reminding you that in our cultural diversities, we have very strong underlying common features as humans. I have my scientific path to thank, for keeping me away from comfort zones, for allowing me to question, observe and interact with people from many places, and for pushing further and deeper into the human experience.

Rafik Neme



Farewell from colleagues at the Max Planck Institute for Evolutionary Biology in Plön, Germany

Alumni Academic Careers

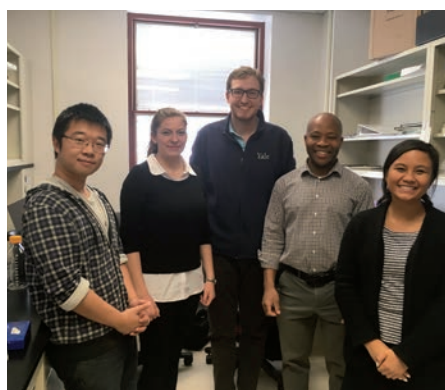
Solomon Afelik (continued)

to cover a whole lot of other signaling pathways that maybe involved in this process. About this time, a year and a half after moving to Denver, the lab moved from the beautiful Rockies to Lake Erie, to the Cleveland Clinic where we embarked on this gargantuan project. We even dubbed it sometime like “the morphogen project on pancreas development”. I went on to create up to 20 different transgenic mouse lines from scratch, each was meant to overexpress a distinct signaling molecule in the embryonic pancreas. Characterizing one or two mouse models can be a daunting task for one person. After several years at it, the 20 different lines eventually got me drown and brought me back to reality. I learned my lessons and went back to complete my project on Notch signaling before moving on to study Wnt signaling in pancreas development.

After a very long postdoctoral period in the same laboratory, I started taking steps to become independent. In the summer of 2013 I submitted a Junior Faculty grant to the American Diabetes Association (ADA), which was not funded. Around the same time I submitted applications to various institutions to become a principal investigator. I did not hear back from most institutions, but a few wrote back to express regret for not being able to consider my application.

I resubmitted my grant to the ADA in February, 2014. I took the next day off from the lab. Then upon my return to the lab my mentor asked to meet with me. In his office he closed the door behind me, we sat down and he broke the news to me. He had ran low on funding and was compelled to downsize the lab, and as such was not going to be able to support me beyond June, 2014. I was due to hear back about my grant in July. My mind started racing, but in the midst of all the

chaos, I just wanted a chance to continue my studies on the pancreas. My department chair arranged for me to switch to another lab where there was funding. This would have meant a complete switch from my line of research. I knew



Left to right: Zhan Yu (technician), Ashton Strother (undergraduate student), Christian Schmidt (technician), Solomon Afelik (PI), Christine Bassig-Santos (technician).

that could dampen my drive, so I politely refused the offer, with the risk that I could end up jobless. By June 2014, my mentor managed to extend my time in the lab to the end of September 2014. This would allow me to hear about the outcome of my grant in July. But when July approached, the ADA announced they had extended their decisions on grants till end of September, and so there I was still in limbo. Then finally in September I had the delightful sight of daylight again, as the ADA granted me the 3-year Junior Faculty Award. I later learned that, in the grant cycle for that year, only two Junior Faculty awards were issued by the ADA, and I was one of the two recipients.

With funding in hand I started applying for faculty positions again. In the spring of 2015, I was offered the Assistant Professorship at the Department of Surgery at the University of Illinois at Chicago. So in May, 2015 I moved to Chicago, right next to Lake Michigan. My labo-

ratory is in the division of transplantation, where islet cells from human donor pancreas are transplanted into type-1 diabetes patients as cell therapy. My research is now focused on regenerating insulin-producing cells from the adult pancreas. In light of what I now know about pancreas development, my research question is “how can we convert other adult pancreatic cells into making insulin?” For this my team investigates how key signaling pathways for pancreas development influence regeneration within the adult pancreas.

My team currently consists of three technicians (two of whom are waiting to go to medical school), one graduate student and two undergraduate students. In my new role as a principal investigator I find myself busy with much more than thinking about scientific questions and how to address and publish them. Now I am also busy with how to balance the budget, get in more funding, and contribute to training and mentoring the next generation of scientists.

Solomon Afelik did his doctoral research under the supervision of Tomas Pieler at the University Medical Center Göttingen. He graduated from the Molecular Biology Program in 2005. Afterwards, he joined the laboratory of Jan Jensen in Denver as a postdoctoral fellow, moving with his lab to the Cleveland Clinic in Ohio. In 2014 he received a 3-year Junior Faculty Award from the American Diabetes Association, leading him to his current position as Assistant Professor at the University of Illinois at Chicago.

Keep on movin'

Why I'm doing a postdoc in industry

Towards the end of my PhD I was, like many, undecided as to what to do next. Having worked in different labs and on various research projects (through lab rotations and previous internships), I realized that what drives me is not interest in a specific biological process, but the thrill of solving a puzzle, answering a question. The traditional group leader/professor path also didn't attract me much, although I was told more than once that it would grow on me. On the other hand, I had never worked outside the academic world, and research in a company setting was something I had been curious about for some time. However, industry positions



On the way to the beach in Katwijk (and proof that the sun also shines in the Netherlands).

in my field are hard to come by, and moving into industry seemed frightening, more so since I have been told I had a good chance in academia and if I moved away it would be hard to come back later. This was my mindset as I was about to start the daunting task of job search.

As chance would have it, very early on I came across a job offer for a three-year postdoc position at ZoBio, a company offering research services on a fee-for-service basis. The position was tied to a project developed in col-



Leiden city center: As expected from a Dutch city, canals are to be found everywhere.

laboration with renowned academic groups. I grabbed this chance to widen my horizon and try research outside academia.

Taking this position meant moving out of my comfort zone, in professional and personal terms – ZoBio is located in the Netherlands. We all know one day we will leave Göttingen, and start over again in a new place, but knowing it before didn't make it easier. And so a new adventure began, with a mixture of excitement and sorrow.

ZoBio is located in Leiden, a beautiful university town filled with canals which is very well located – close to Amsterdam and the beach. We work in a bioscience park, home to many small and medium enterprises, and right next to the Science Faculty of Leiden University. ZoBio's team is composed of 17 people, nearly half of which are expats, and English is spoken by everyone. It sounds a bit like Göttingen, right? Integration in the Netherlands and ZoBio has in fact been very smooth!

My everyday work routine also did not change too dramatically. I primarily work on my postdoc project, focused on the development of new strategies

to determine protein-ligand complex structures using NMR spectroscopy. This is a long-term project (three years), and it keeps me in close connection with academic groups in the field. Additionally, I have already had the opportunity to contribute to several commercial projects. These are tailor-made, shorter research projects for pharmaceutical and biotechnology companies focusing on fragment-based drug discovery. I am also learning how to design, plan, and manage projects involving multiple people.

Undecided as I was when I was finishing my PhD, I did not leave academia because I had to, or because I was fed up with academic research. I moved to industry because I wanted to try it before committing further to something I already knew. I wanted to take up a new challenge. One year into this journey, I can say it has not fallen short of my expectations in any way.

Marta Gião Carneiro

worked on her doctoral thesis in the NMR-based Structural Biology Group of Christian Griessinger at the MPI for Biophysical Chemistry. She graduated from the Molecular Biology Program in November 2015. In February 2016 she assumed the position of a postdoctoral scientist at ZoBio BV, a self-funded spin-off of Leiden University, offering primarily research services on a fee-for-service basis to customers across the pharmaceutical and biotechnology industries.

At the crossroads of science and policy

A traineeship at the European Commission as an unconventional path for careers beyond academia

We thought PhD was the last learning step. It turns out learning is a lifelong process. Right after our graduation we jumped at the opportunity of a traineeship at the European Commission and it has turned our world around.

Maria's story. I became a scientist to make the world a better place. Four years of PhD later I realized that it's not going to be easy. My research contribution was not as great as I hoped. But I still believed that science can change the world. All I had to do was help others to make bigger contributions by improving the way we do research, which for me meant a career in science management. One problem: I had no idea where to begin. What kinds of jobs are available? What skills are required?

is the only requirement. An application is pretty extensive - quite difficult to fill out the whole questionnaire, while also submitting your thesis. It took so long for the final decision to reach me that it caught me completely off-guard - the news arrived during my graduation party. Just one month later I was starting my new role in a new country.

There are about 650 trainees starting at the same time - a huge melting pot

similar to the ones of other policy officers at the Commission. At the ERC Executive Agency you can join the Scientific Management Department to help organize grant application calls, invite reviewers, etc. Or, like me, you can become a part of the Support to the Scientific Council. Statistics and reporting are the major cornerstones in this department. How do you determine if a scientific project was successful? By looking at the number of publications?

Citation index? Impact factors? Patents? I learned a lot about science assessment and how difficult it can be for funding agencies to support the blue skies research.

My Brussels experience has become a turning point for my career. But even if it hadn't - this was a fun and exciting time I will never forget.



Maria and Ingrid (left to right) in front of the Berlaymont building, European Commission, Brussels

Thanks to our newsletter I knew that two alumni had been trainees at the European Commission and got experience with one of the big science funders - the European Research Council (ERC). This traineeship is a unique opportunity to experience the backstage of policy making at one of the biggest European institutions.

A traineeship lasts for five months and is opened for university graduates from all over the globe - language knowledge

of nationalities, languages and cultures. Jump right in and meddle, because connections are everything. If there is one lesson that I learned during my traineeship - it's that networks you build are your major asset. There's plenty of things to do - attend language courses, join organizing committees, attend meetings and conferences at the heart of European politics.

And of course there is work. Although you are a trainee, your tasks are pretty

Ingrid's story. As a child growing up in Romania, I had two aspirations: I wanted to become a scientist and I dreamed my country Romania would join the European Union. Ten years ago, both I and my country embarked on our paths of development: I started my Bachelor in biochemistry and Romania became a member of the EU. I am grateful that I could study for my Masters and PhD in Germany as a European citizen without visa and work permit headaches.

At the crossroads of science and policy (continued)



Maria and Ingrid (left to right) at the Welcome Conference for Blue Book trainees held at the European Parliament hemicycle, Brussels

This motivated me to give something back and see how I can apply the skills I acquired as a PhD in a traineeship at the European Commission. I ended up in a very unexpected place. Being a trainee in the Directorate General for Health and Food Safety (DG SANTE) is not the ordinary path for a PhD graduate in life sciences. The vast majority of my fellow trainees had either a legal, business or European affairs background. And interacting with colleagues having expertise in completely different fields enriched my experience as a trainee and opened up new perspectives for my career.

My main project involved mapping the medical tests that are required across the different EU Member States for blood, tissues and cells donations. My results were published on the Europa website (<http://ec.europa.eu/> - the official website of the European Commission). I also had the opportunity to present my results at the National Competent Authorities meetings and I enjoyed the discussions and feedback. My work in the Unit Medical Products: Safety, Quality and Innovation sparked my interest drug development and made a strong impact on where I am now.

The traineeship at the European Commission influenced my life in so many more ways, though. I started my traineeship in Brussels in a turbulent time for European and international politics, with the migrant crisis looming large in the political landscape. I also witnessed first-hand the Brexit shock and its afterglow. But in spite of all these issues that the European Union is confronted with, the multicultural environment of its capital Brussels enchanted me.

This traineeship made me understand how important the European ideals and values are for me as a person. I experienced first-hand the inner workings of the European institutions and began to grasp how much misinformation circulates in the general public. I attended not only different events organized by trainees but also took part in meetings of the European Council and of the different Committees of the European Parliament in a proactive fashion. What is more, I had the chance to meet and interact with Commissioners and Ambassadors to the EU and directly advocate for the causes I stand up for.

A truly a one-in-a-lifetime experience was to see how a video created by a team of trainees I coordinated made an impact and paved the way for eliminating unpaid internships for graduate students. Of course there is a lot more to be done. Yet this positive outcome gave me hope for the future and that we, as young people, can make a difference if we get involved. So what is stopping us from getting our say in the future of Europe, both scientifically and politically?

Maria Levchenko & Ingrid Gebura-Vreja

Maria Levchenko worked on her doctoral thesis in the group of Peter Rehling at the University Medical Center Göttingen. She graduated from the Molecular Biology program in December 2015. Maria is currently working as a community manager for Europe PMC (PubMed Central) at the European Bioinformatics Institute in Hinxton, UK.

Ingrid Gebura-Vreja worked on her doctoral thesis in the group of Silvio Rizzoli at the University Medical Center Göttingen. She graduated from the Molecular Biology program in October 2015. Ingrid did a traineeship at the European Medicines Agency in London after finishing the traineeship at the European Commission. From January 2017 she will start a post-doc at Bayer GmbH, Leverkusen.

The plastic states of parenthood

It is the first day at work after the Christmas break. I am sitting in my office with a mind full of the year events and tasks in front of me. The grants' season is fast approaching, the new student will have to start soon, a few applications are lined up, the changes in the new curriculum that I have to catch up with and all those new lectures that I have taken on.

This is not the end of the list though. As a mother of two young kids, there has practically never been an end to the list. My first daughter has just turned three and the second one is over one. My days are packed with work-kids-imbalance! The story is familiar to a lot of parents, mothers in particular, as even in the most modern societies, they tend to share most of the load.

Sydney is a great city to raise kids in. In fact, it seems to be very Australian to be fond of kids and be caring for pregnant women. My mum who has visited us a couple of times is of the general idea that in this city women are either pregnant or are pushing a pram of some kind. But even though the sentimental environment is very accommodating its architecture is missing some key practical elements for working mothers. The waiting lists for day cares are terribly long. I was three months into my pregnancy with my first daughter when I got her name into the local day care, and I could only secure three days of care for her when she reached 6 months of age. And, I don't want to even think about how costly this whole hobby is.

I would like to push this text beyond this though. As a stem cell and cancer biologist, I deal a lot with the concept of "plasticity". For stem cells, this is

a state of stretch in their capacities. But it also hovers around interstate conversions and meta-stability. And yes, it is related to the topic. Since I became a mum -and I am sure a lot of you would relate to what I am going to say- I have become plastic. My body, my mind and my soul has been experiencing various levels of



plasticity be it mental, emotional or even physical, when you try to reach that bottle under the driver's seat while driving to make her stop that cry. As parents, our minds are constantly solving algorithms of categorize, prioritize, process, archive, check and re-check. Interestingly, we tend to manage that despite all the distractions and fragmentation of time, not to add the exhaustion.

Our emotions are undergoing quite a stretch as well. Remember that last time you had to give up a cuddle to get to an important meeting at work? Last night I was preparing their bags for daycare, when my older one comes to me with a piece of folded paper and says: "mummy, this is a drawing I have done for you to take to work". I hold her tight and assure her that this is the best thing I have ever held in my hands. I think parenthood involves a large degree of emotional expansi-

on; makes you more compassionate, accommodating, and caring. This is why you burst into tears when you see footage of devastating impacts of war on its victims, in particular children. And you tend to be more loving and caring towards your own parents.

In a way, it is a total transformation and having lived three full years of it, with a lot more years to come, I am sure it is not comparable to any other exercise in life. I am hesitant to say that it makes you more capable, since there is always a big pressure on time, but it definitely does open up your mind to multiple aspects of life. You tend to see things with a totally different pair of glasses, and this is the whole beauty of it. So next time you are crawling into bed after a day full of things that each would have been done better if the others did not exist, that constant feeling of guilt that we as mothers tend to embrace every moment of our lives, pad yourselves on the shoulder and salute yourselves to the best of things you are managing.

Naisana Seyed Asli is a lecturer at the University of Sydney. Naisana did her doctoral research in the group of Michael Kessel at the MPI for Biophysical Chemistry. She graduated from the Molecular Biology Program in September 2008. Naisana has two daughters at the age of three and one.

Live in the moment

When Steffen asked me to write a contribution for the “Family careers” section of this newsletter I started to think about this word. Family careers. What came to my mind was an old TV advertisement for a well-known German vacuum cleaner brand. A woman patronizingly asked by a man about her profession or whether she has a job at all replies that she is running a very successful small family business. While the viewers watch her cooking, ironing, cleaning and settling a dispute between her children, she explains that she works in communications industry as well as organization management and that she deals with youth development and employee motivation.



Birgit, her partner Hannes and their son Max

Ten years ago, being a student without kids I did not like this advertisement. I did not have too high regards for women whose “only” occupation are their children and their household. And even today it is difficult for me to understand that point of view. The reason probably is that I always liked my work and personally do not want to give up that part of my life. What I realized, however, is that I had completely underestimated what it means to run such a “small family business”. When our son Max was born in summer 2014, orga-

nizational talent and time management were needed, just as they are in the lab. He was a relatively self-sufficient child and still it was a change to get along with less sleep and the responsibility you have for a baby all day long. When I started working again, it was a also a relief not having to care about Max for some hours per day but being able to focus entirely on my tasks. Being responsible for someone else is more energy-consuming than I had imagined.

Before Max was born, I worked as an editor in the public relations office of the Helmholtz Center for Infection Research in Braunschweig. After my parental leave I was offered a re-entry

in the scientific strategy department. Fortunately, my boss was very supportive and I was able to work from home whenever necessary. What also helped enormously was that my partner Hannes shares all responsibilities and takes care of our son just as I do. Both grandparents live too far away to just come by for babysitting. Max started to visit day nursery when he was one year old. Day nursery is just seven houses away from where we live and he likes going there. His daycare buddies live in the same quarter and we meet them

on the playground often. Even though on some days I wonder whether we will ever make it to the daycare or the playground at all as developing an own will can also mean that Max is convinced that rubber boots, and only rubber boots, are adequate footwear in high summer. Or that he can only eat his cereals from one specific blue bowl. Or that really everything is more important than brushing his teeth. In these moments I try to remember that children experience different phases and that all phases will eventually pass.

Since this holds true for the good phases as well, it is even more important to enjoy the special moments. And there are many of them with children. Be it that they teach you to live in the moment or that they can be so funny – deliberately or unintentionally – especially when they start talking. As Hannes and I both like going by bike we are happy that Max likes his bicycle trailer and that he has a love for the outdoors. We therefore spent our last two summer holidays on the bike, sleeping in a tent and swimming in lakes – the ideal vacation for the three of us.

In six weeks we will have a new member in our small family and we are curious what our second child will be like. What is for sure is that it will be always surprising.

Birgit Manno was a PhD student in the group of Jürgen Wienands. After her graduation in January 2012 she became an editor in the public relations office of the Helmholtz Center for Infection Research in Braunschweig. Her son Max was born in 2014.

Honors and Awards - Faculty

A new **International Max Planck Research School for Genome Science** (IMPRS-GS) has been approved by the German Research Foundation (DFG). The spokesperson is **Patrick Cramer**. This new PhD program will form another pillar of the Göttingen Graduate School for Neurosciences, Biophysics, and Molecular Biosciences (GGNB).

Bertram Brenig, faculty member of the Molecular Biology program and director of the Institute of Veterinary Medicine has been awarded the **honorary professorship** of the **Jiangxi Agricultural University, Nanchang, China** for his exceptional achievements in the field of molecular genetics and functional genomics of livestock and his contribution to the promotion of German-Chinese collaboration.

Patrick Cramer, faculty member of the Molecular Biology program and director of the Department of Molecular Biology at the MPI for Biophysical Chemistry received the 2016 **Centenary Award** of the **British Biochemical Society**. The Society thereby honors the biochemist's cutting-edge work about an elementary process of life - the transcription of genes. In addition, he successfully applied for a highly competitive **ERC Advanced Grant**.

Christian Griesinger, faculty member of the Molecular Biology program and director of the

Department of NMR-based Structural Biology at the MPI for Biophysical Chemistry, received the 2016 **KMRS Prize** by the **Korean Magnetic Resonance Society**, recognizing his outstanding research in the field of nuclear magnetic resonance-based structural biology and his dedication for the Korean Research Foundation.

Stefan Hell, faculty member of the Molecular Biology program and director of the Department of NanoBiophotonics at the MPI for Biophysical Chemistry was awarded the **Great Cross of Merit of the Federal Republic of Germany with star** (Großes Verdienstkreuz mit Stern der Bundesrepublik Deutschland), together with Thomas Südhof, for their outstanding contributions to German science. In addition, Stefan Hell became **external member** of the **US National Academy of Science (NAS)**, honoring his scientific achievements.

Reinhard Jahn, faculty member of the Molecular Biology program and director of the Department of Neurobiology at the MPI for Biophysical Chemistry was awarded the Swiss-Italian **Balzan Prize** "for his pioneering studies on the molecular characterization of synaptic vesicles and the roles of protein complexes in the process of exocytosis". In addition, he was awarded the **Communitas Prize** of the **Max Planck Society** for his achievements to repeatedly implement structural improvements to science, in particular in the promotion of young researchers.

Herbert Jäckle, faculty member of the Molecular Biology program and director of the Department of Molecular Developmental Biology at the MPI for Biophysical Chemistry was awarded the **honorary doctorate** of the **University of Konstanz**, recognizing his outstanding contributions in the field of developmental biology and his strong engagement in the cooperation between the University and the Max Planck Society.

Erwin Neher, former faculty member of the Molecular Biology program and director of the Department of Membrane Biophysics at the MPI for Biophysical Chemistry was awarded the **honorary doctorate** of the **Macau University of Science and Technology** on the occasion of the university's 16th anniversary.

Peter Rehling, faculty member of the Molecular Biology program and head of the Department of Biochemistry and Molecular Cell Biology at the University Medical Center Göttingen received the **Copernicus Award 2016** for his achievements in the German-Polish science collaboration in molecular cell biology by the DFG and the Foundation for Polish Science (FNP).

Marina Rodnina, faculty member of the Molecular Biology program and director of the Department of Physical Biochemistry at the MPI for Biophysical Chemistry received the **Gottfried Wilhelm Leibniz Award 2016** of the German Research Foundation, honoring her pioneering

Honors and Awards - Faculty (continued)

contribution to the understanding of the functioning of ribosomes.

Melina Schuh, faculty member of the Molecular Biology program and director of the Department of Meiosis at the MPI for Biophysical Chemistry was awarded the **BINDER Innovation Prize** 2016 by the German Society for Cell Biology (DGZ)

for her findings on the development of mammalian eggs. In addition, Melina has been elected as **member to the European Molecular Biology Organization (EMBO)** on the basis of scientific excellence and outstanding research contributions.

Alexander Stein, faculty member of the Molecular Biology program

and head of the Research Group Membrane Protein Biochemistry at the MPI for Biophysical Chemistry received one of the **European Research Council's (ERC) Starting Grants** intended to support young researchers in their independent scientific work.

Congratulations!

Honors and Awards - Students & Alumni

Kolja Eckermann, PhD student in the group of Ernst Wimmer at the University of Göttingen, was awarded the **best student oral presentation** at the TEAM (Tephritid Workers of Europe, Africa and the Middle East) 3rd International Symposium in Stellenbosch, South Africa.

Martin Helm, PhD student in the group of Silvio Rizzoli at the University Medical Center Göttingen was awarded an **EMBO short term fellowship** and a **short-term stipend of the German Academic Exchange Service (DAAD)** for his research project at the University of San Francisco in fall 2016.

Tino Pleiner, PhD student in the group of Dirk Görlich at the MPI for Biophysical Chemistry was awarded a **poster prize** at the 13th Horizons in Molecular Biology PhD student symposium in Göttingen.

Sinem Saka, postdoctoral research fellow at Harvard University and former PhD student in the group of Silvio Rizzoli at the University Medical Center Göttingen was awarded an **EMBO Long-term Postdoctoral Fellowship** and a **Human Frontiers of Science Program (HFSP) Postdoctoral Fellowship**.

Sumana Sharma, PhD student at the Wellcome Trust Sanger Institute, Hinxton, Cambridgeshire, UK and former MSc student of the Molecular Biology program has been awarded the **Sex in Science Best Practice Award** for her work to promote gender equality on the **Wellcome Genome Campus**, recognizing her tireless commitment to encouraging women to get involved in promoting gender equality in science and education, and in reviewing policies around career advancement.

Vedran Vasic, PhD student in the group of Alexander Stein at the MPI for Biophysical Chemistry, was awarded a **PhD fellowship** of the **Boehringer Ingelheim Fonds**.

Summa cum laude distinctions for outstanding PhD theses have been awarded to the following Molecular Biology students: **Tino Pleiner, Katja Rust, Heena Sharma, Sven Truckenbrodt** and **Kanika Vanshylla**.

Congratulations!

Horizons Kickoff Workshop

This year the organizing team of Horizons in Molecular Biology had a chance to kick-off preparations for the 14th annual symposium with a two-day workshop in project management and effective teamwork. The event was lead by two very charismatic and experienced coaches from the Science Leaders team: Dr. Nadine Sinclair and Dr. Thomas Teichler.

Nadine is an alumna of the IMPRS Molecular Biology program and has completed her PhD with Prof. Lührmann in 2008. She has since become a successful strategy consultant, coach and business owner. Nadine also has first hand experience in Horizons organizing as she was part of the team that devised the “Wine and Cheese Poster Session” event which is now a much loved staple of our symposium. Meanwhile, Dr. Thomas Teichler has been a policy consultant in UK and Germany, has counselled national governments, international organizations, and advised the European Commission on research and innovation policies.

The workshop was intense, professional and exclusively tailored for Horizons organizers. Throughout the fully packed two-days we learned how to listen and communicate ideas better, solve problems creatively, lead and manage. The open, encouraging and creative atmosphere allowed us to emerge with a united and compelling vision for the 14th Horizons in Molecular Biology.

This September, our annual symposium, exclusively organized by the IMPRS Molecular Biology students, will have an exciting and more interactive than ever scientific and social program. Keep an eye out for our posters and information online from March onwards. We will let you know how you can register early and get the most out of Horizons. Most importantly mark September 11th to 14th in your calendar, as the organizing team is more motivated than ever to create a fun, interactive, inspiring and informative symposium for all participants!

Marija Liutkute

Networks across generations

The two friendly ladies on the photo below are Gabi and my daughter Elena. Gabi belonged to the first generation of brave students, joining our Molbio program in September 2000. At the time when Gabi wrapped up her first lab report, Elena was born.



Gabriella Ficz (left) and Elena Burkhardt (right) in front of the Barts Cancer Institute in London

Time flies and kids grow quickly. From September to December 2016, Elena spent the autumn term at a secondary school near London. According to UK law, children under 16 staying abroad need a “guardian”, i.e. a person taking parental responsibility. When you try to organize a student’s stay abroad without the organizational support of an exchange service, finding such a guardian can turn into a challenging task.

Fortunately, Gabi and I have always kept in touch even after she graduated from our Molbio program in 2005 and moved to Cambridge for a post-doc position. Friends of our newsletter

Student representatives

Frank Richter and **Shama Sograte Idrissi** were elected as PhD student representatives. **Ninadini Sharma** was elected as the representative of the MSc students of the 2016/17 class. We congratulate our student representatives and thank them for their commitment.

Many thanks also to our former PhD student representatives **Martin Helm** and **Manuel Maidorn**, and to **Laura Ahumada Arranz**, who represented the MSc student community during the previous term.

Marija Liutkute is currently a PhD student in the group of Marina Rodina at the Max Planck Institute for Biophysical Chemistry.

may remember Gabi’s article in the January 2016 edition, in which she described how she started her lab at the Barts Cancer Institute, Queen Mary University of London in 2013.

Together with her husband Shamus, Gabi spontaneously agreed to serve as Elena’s guardian throughout her stay. They did a wonderful job, for which Elena and Steffen are very grateful, feeling the desire of sharing this little anecdote about the true value of alumni networks with you.

Steffen Burkhardt

Networking in the land of the rising sun

Six German and Japanese universities (Heidelberg, Kyoto, Karlsruhe, Tohoku, Göttingen, and Osaka) created an educational network called HeKKSaGOn to promote student exchange, and hence encourage scientific collaborations and intercultural communication. I took part in the HeKKSaGOn winter school called “From Materials to Life: Multidisciplinary Challenges” at Kyoto University in February 2016.

Sightseeing in Kyoto was spectacular. The city is also called the thousand-year capital of Japan due to its long history as an Imperial capital. Kyoto houses 2000 Buddhist temples and Shinto shrines (a Japanese religion) as well as the Imperial Palace of Japanese Emperors and the Nijo Castle of the first samurais’ shogun. The most impressive part of Kyoto is Gion, or geisha (traditional female entertainers) district. Gion hosts traditional sushi restaurants and teahouses, which offer splendid food and amazing performances by geisha who are highly skilled in dancing, playing musical instruments, signing and holding small talk.



Natalia at the Inari shrine

Kyoto is a culinary paradise for fish lovers because of its famous fish and seafood market. It’s also a great place for sweet specialties. We had a master-class in the Kyoto confectionary where

we learned how to make traditional cookies out of raw dough and red bean paste, which are ready to eat without baking. Moreover, we discovered how the Japanese rice wine, sake, is made, and found out that it should be served warm. We did not only satisfy our pellets, but also experienced the spiritual power of a Zen meditation in the Buddhist temple, and enjoyed strolling in the bamboo forest in the pouring rain. On the weekend, I had a chance to visit a neighboring city of Nara. Here you could find the largest bronze statue of Buddha in the world and a fantastic national park right in the city midst surrounding Nara’s magnificent temples.

But back to school. The aim of the school was to bring together PhD students from natural sciences to learn how to tackle complex questions at the interface of multiple disciplines and work in a team of people with different academic backgrounds. In addition, it provided a great opportunity to glimpse into the Japanese society, its customs, history and culture. At the core of the school were scientific lectures, which spanned a variety of topics from basic mathematics and physics to advanced robotics, cancer, stem-cell research, psychiatry and novel nanomaterials. We also had a chance to become familiar with science and education in Japan by visiting scientific institutes, having networking dinners with professors and visiting the Shimadzu Foundation Memorial Hall. A longstanding employee of the Shimadzu corporation, Koichi



After the calligraphy class

Tanaka, won the Nobel prize in Chemistry for developing the method of mass spectrometry.

Throughout the school, we had a wonderful integration course consisting of Japanese classes and calligraphy, where we learned how to introduce ourselves and write our names. I also really liked the lecture about the history of Kyoto and its significance in the political life of the country. But my favorite talk was about the sense of beauty in the Japanese culture and how its reflected in the poetry. It was very interesting to analyze Japanese three-line poems haiku and try to guess the meaning of the metaphors.

I have greatly enjoyed the winter school in Kyoto and I am hoping to come back to the land of the rising sun. If you are interested in the upcoming events of HeKKSaGOn network, you could check the official website www.hekksagon.net.

Natalia Korniy is currently a PhD student in the group of Marina Rodina at the Max Planck Institute for Biophysical Chemistry.

The Sharmas tied the knot in New Delhi

Hindu wedding seen through European eyes and felt from a Balkan soul

When I got the invitation to Kundan and Heena's wedding, I immediately responded: "I knew it". I knew that they are meant for each other and I knew that I will be invited to New Delhi. After all, Kundan had shown me how to dance Bollywood way back in 2011. Knowing both of them, I was extremely happy and honored to attend their celebration and meet their families. Kundan was my fellow neighbor during the intensive Master studies lectures and Heena is my labmate and a close friend. Göttingen and the MolBio program brought them together, even though they both studied at the same university and probably passed by each other in the campus in New Delhi.



Kundan and Irena at the Haldi Ceremony

Our trip to India and celebration venues were carefully planned, however we somehow managed on the first day to end up on the wrong wedding, a professional photographer took our picture and we almost reached the buffet, when we were stopped. Now, someone has a memorable photo of overexcited strangers in their wedding album. In our defense, on that day, there were hundreds of marriage ceremonies in town.



Kundan's pre-wedding ceremony

Indian weddings are sacred events in the Hindu religion full of rituals I had to heavily research prior to my trip. For example, during one of the pre-wedding ceremonies, Sagan, the lucky future bride received wrapped gifts: gold, silver and dresses from the groom's family. The event was followed by a cocktail, delicious food and a series of performances. The families showed respect to Kundan and Heena by dancing lively and funny Bollywood choreographies. Another pre-wedding ceremony was the beautification of



Heena's and Kundan's wedding

The Sharmas tied the knot in New Delhi (continued)

the bride with henna paint (Mehendi). Her arms and legs were decorated from professional artists symbolizing the everlasting love between the bride and the groom. All the guests were also welcomed to try; my henna tattoo lasted more than 5 days. The most amusing of all events was the Haldi ceremony, where a yellow turmeric paste was applied all over the soon-to-be-wed couple. The procedure is making the skin shiny and beautiful.

On the wedding day Kundan, all sparkly and glorious, entered the venue riding a white horse, accompanied by his family and a lot of noise from rattles, drums and trumpets. This was the famous Baraat ceremony. At that moment, Heena was hidden, building up pressure in the 400 guests, waiting to see her. Slowly and gracefully she finally arrived in a beautiful red dress. Even though there were so many people, the open venue felt huge enough and it also accommodated an endless buffet and live music band. The highlight of the wedding was when the couple circled around the fire and said their vows. After that moment they were officially newlyweds. I and my fellow travelers (Alexander Rabe, Bernard and Natalie Freytag, Ewa Maj, Michał Maj, and Michael Zimmermann) were treated during these three magical days with enormous honor and respect.

As curious tourists we also traveled around North India and visited the Taj Mahal in Agra and the Pink City of Jaipur. Time flew in masala tee, spicy food and beautiful architecture. Obviously, foreign to the Indian lifestyle, we also experienced some culturally shocking differences. We bargained on the busy markets for spices



Trip to Taj Mahal

and precious, handmade souvenirs. The traffic and the street noise blew our minds. However, I was told: The chaos works and it was the truth.

My advice is: find an Indian friend, save some time and money and travel. All the best to the MolBios and Neuros who helped us fit in India: Veena, Vinita, Aki, Avani, Mayur and Pawan.

Irena Andreeva

Irena Andreeva completed her doctoral thesis in the group of Marina Rodnina and graduated in May 2016.

Heena Sharma completed her doctoral thesis in the group of Marina Rodnina and graduated in November 2016.

Kundan Sharma completed his doctoral thesis in the group of Henning Urlaub and graduated in April 2015.

All three are still working as post-doctoral research fellows at the MPI for Biophysical Chemistry.

Israel - An academic and cultural exposure

A visit of the Life Sciences Open Day at the Weizmann Institute of Science in September 2016

I could hardly believe that we were going to a place as exotic as Israel for a scientific meeting, when in September 2016 a visit to the Weizmann Institute of Science in Rehovot, Israel was organized. This was in continuation of the ongoing cooperation between the Feinberg Graduate School at the WIS and the IMPRS programs. For several years, the two graduate programs have been in close association, with several IMPRS students conducting their Master's theses at the WIS and the students of the WIS visiting the Neurizons and Horizons meetings every year. The lively exchange has opened up not only channels of communication for scientific ideas but also a means of broadening our cultural horizons.

The group that travelled to Israel this time consisted of people with varied interests - some wanted to explore their Master's thesis lab, some wanted to interact with collaborators, some to present their data in talks and posters, and of course, all of us were interested to explore the iconic heritage sites of one of the oldest places in the world.

We were very warmly welcomed in Tel Aviv by Ami Shalit and excited to learn that we were going to be living right next to the Mediterranean Sea, in which we enjoyed many marvelous swims. In the evening that day, we had dinner with the PhD students and faculty of the Feinberg Graduate School. It was exciting to learn about their lives as PhD students at the WIS.

The next day was the much awaited Life Sciences Open Day which began with a visit to the impressive visitor's



During Life Sciences Open Day of the Feinberg Graduate School on the WIS Campus

center, which - to me at least - was a bit like being in a science fiction movie, with interactive screens everywhere. One of these was the



The excursion to Akko and the Bahai Gardens in Haifa

journal of one of the scientists at the WIS which was fascinating. Along with the other displays, it gave us a glimpse into the inspirations, journeys and achievements of several scientists associated with the WIS and who have contributed in important ways to science. The atmosphere at the open day was festive and truly a presentation and celebration of their highlights. We also had the opportunity to listen to various talks in different fields as well interact with collaborators at the WIS that exposed us to new and interesting ideas.

As it happened, our visit was over a weekend which enabled us to soak in the culture of a place that was poised at the cusp of the ancient and the modern. We were treated to two guided trips, one through Akko and Haifa and one through Jerusalem. Our enthusiastic and witty guide transported us to a time long ago when he described vividly what a meal in the Hospitallers' halls in Akko would be like. The Tunisian synagogue in Akko, through its numerous mosaics, gave us a picture of the history of the land.

In the Bahai gardens of Haifa we travelled through the origins of the modern Bahai faith. Of course, these were interspersed with walks through old markets, during which we sampled hu-

Israel - An academic and cultural exposure (continued)



Group photo with a view on the old city of Jerusalem and the Western Wall (Wailing Wall)

mus and falafel and realized what their authentic versions should taste like. We finished the day on a wonderful note, when we were treated to a meal of the magnificence that we didn't imagine, in a little Arab village on the top of a hill. The meal started with all kinds of salads, hummus and breads whose pace and elaborateness was hard to keep up with. Just when we thought we couldn't eat anymore is when the main meal started, and all kinds of delicious dishes were served.

On the next day, we walked through the ancient neighborhoods of Jerusalem. We went through the famous sites that one hears about: the room of the last supper and the Church of the Holy Sepulchre with its 1,000 year old mosaics, the western wall

and the old city market. At the western wall one writes prayers on paper and places them in the cracks of the wall. I did the same for a friend who wanted some prayers, amusingly, concerning experiments in the lab to be answered and I'm curious to learn if this is also a way to get experiments to work. Climbing further from here we finally got view over Temple Mount, the holy site for three religions that has been the seat of so much conflict.

The same night, some of us wandered off to Jaffa, where we enjoyed our last amazing meal of the trip, some live jazz and lovely conversation. Before we left for Göttingen the next day, we learnt a little more about the research of our fellow students from

both graduate schools during a final visit of the WIS campus. On our trip back we were joined by students of the Feinberg Graduate School, who would attend the upcoming Horizons meeting, thus taking forward the collaboration and exchange of ideas.

Madhobi Sen

A group of twenty members (mainly students) of the International Max Planck Research Schools for Molecular Biology and Neurosciences regularly visit the biennial Life Sciences Open Day of the Feinberg Graduate School at the Weizmann Institute of Science in Rehovot, Israel. In return, PhD students of the Feinberg Graduate School are invited to Göttingen on the occasion of the annual student-organized Horizons and Neurizons meetings to foster scientific exchange and networks between the graduate schools. We would like to thank our host at the Weizmann Institute cordially for their great hospitality and the exciting events in which we had the opportunity to participate.

A science festival

The 13th annual Horizons in Molecular Biology PhD Student Symposium

In the second week of September 2016, around 150 aspiring scientists from more than 30 countries came together in Göttingen for the 13th annual Horizons in Molecular Biology symposium, once again organized by the students of the International Max Planck Research School for Molecular Biology. Four days of science, career perspectives, and general good fun ensued, leaving speakers and participants alike tired but content.

Kicking off Horizons as usual was the 10th Career Fair. Keynote speaker Drew Berry enchanted his audience with stunning animations of cellular processes, setting the tone for a highly interactive and lively conference. Representatives from biotechnology companies, science publishing, consulting, and a funding agency gave talks that provided participants with a plethora of career options to consider, while Patrick Müller, an alumnus of the Molecular Biology program and now research group leader, spoke about possibilities in academia.

The scientific lectures began with an illuminating talk by Karl Deisseroth, who spoke about the development and applications of optogenetics, the 2010 Nature Method of the Year he pioneered. This turned out to be a fitting



The Horizons 2016 group photo

introduction to the conference, as Bernardo Sabatini and Gloria Choi both demonstrated in their talks the power of the method in studying decision-making and the molecular basis of maternal inflammation-induced autism-like behavior, respectively.

This was not the only trailblazing science featured at this year's Horizons. Melina Schuh, newly appointed director at the MPI for Biophysical Chemistry, impressed with her work on the role of actin in meiotic chromosome segregation, Linda Hsieh-Wilson broke down the complex chemistry behind glycosaminoglycan signaling in the brain,

Carolyn McBride traced the Dengue mosquito's odor preference to the molecular level, Maria Barna and Gloria Brar revealed previously unknown paradigms of translational control and peptide synthesis, and Hendrik Dietz presented astonishing advances in self-assembling DNA machines.

The line-up of speakers this year included not only rising stars in the world of molecular biosciences, but also widely respected scientists known for their seminal contributions to the field. Harry Noller, who has recently been awarded the Breakthrough Prize, drew the audience into the intricate dynamics



Horizons audience and panel discussion

Horizons 2016 (continued)

Speakers' Testimonials

Gloria Brar: The Horizons symposium is an exceptional event. The talks were among the best I've seen anywhere and the diversity of topics covered was rare and inspired. This was one of the best meetings I have been to, and that is all the more impressive given that the whole thing was organized by students!

Pietro De Camilli: This was a wonderful meeting. I was especially impressed by the energy and enthusiasm of the students.

Ramanujan Hegde: Horizons 2016 did not disappoint! The students were enthusiastic, and the programme they organised featured world-class research from a diverse array of fields. It was an enjoyable and stimulating three days of science.

Carolyn McBride: I had a wonderful time participating in the 2016 Symposium. The science was fantastic with consistently clear and interesting talks. And the logistics of the meeting were beautifully handled by the grad student organizing committee. Bravo!

David Morgan: Horizons 2016 was a wonderful meeting: a diverse array of outstanding scientific sessions and fun social events, all run smoothly by a talented and lively group of student organizers.

Amy Pasquinelli: The combination of diverse science and scientists with lots of opportunities to interact with students from around the globe makes the Horizons Symposium one of the most impressive and inspiring conferences I have ever attended.

that facilitate precise tRNA and mRNA translocation on the ribosome. David Morgan, Marianne Bienz, and Pietro de Camilli each gave fascinating talks on the cell cycle, Wnt signaling, and lipid signaling to an audience that most likely learned of their work through textbooks.

At the panel discussion on "what makes a good scientist", moderator Prof. Mary Osborn led speakers Amy Pasquinelli, Jue D. Wang, Yifan Cheng, Ramanujan Hegde, and Harry Noller to share valuable insights into the career path of a successful scientist, as well as their own attitude towards science. The inspirational exchange was not

confined to the official program of the conference. Horizons prides itself as a symposium that encourages engagement between leading scientists and students, and this was evident in the many social events throughout the

four days. At poster sessions and the now-famous wine and cheese session, participants discussed their own science with the speakers, and at the conference dinner and party, speakers and participants shared lively conversations and even took part in a Bavarian drinking game.

There are not enough words to descri-



Horizons poster session

be the excitement of Horizons 2016. On the last day of the conference, the speakers were effusive with their praise of the conference and the students they met, while participants left invigorated and motivated to continue their pursuit of science. After all, as Harry Noller said, "in science, you are doing hand-to-hand combat with Mother Nature every day. What's better than that?"

The 14th annual Horizons in Molecular Biology will take place on September 11th-14th, 2017.

Kai-Hsin Chan

Horizons speakers 2016

Molecular Biology & Biochemistry: Pietro De Camilli, Ramanujan Hegde, Linda Hsieh-Wilson, Jue D. Wang

Cell Biology: Gloria Brar, David Morgan, Amy Pasquinelli, Melina Schuh

Structural Biology: Nenad Ban, Yifan Cheng, Harry Noller

Neuroscience & Behavior: Gloria Choi, Karl Deisseroth, Iiris Hovatta, Carolyn McBride, Bernardo Sabatini

Developmental Biology: Maria Barna, Mariann Bienz, Valerie Horsley

Biotechnology: Hendrik Dietz

Joining the program in 2016

Rüdiger Behr joined the German Primate Center DPZ) in 2005 as head of the Stem Cell Biology Junior Research Group (later: Stem Cell Biology Unit). Since 2016 he is heading the Platform Degenerative Diseases at the DPZ. He received his doctorate from the University of Münster in 1998. Between 1999 and 2005 he worked as a postdoctoral research fellow at the University of Münster, the University of Pennsylvania Medical School, and the University of Essen. In the Molecular Biology program, Rüdiger is teaching the stem cells lecture since 2015, becoming a full faculty member in 2016. His current research focuses on the generation, characterization and genetic modification of primate pluripotent stem cells. His group generated embryonic stem cells and induced pluripotent stem cells from the common marmoset monkey to compare these pluripotent stem cell types with natural monkey preimplantation embryos and pre-meiotic germ cells. In addition, they use pluripotent stem cells in combination with gene editing technology to establish genetic disease models and to test cell replacement therapies in pre-clinically relevant settings.

<http://www.uni-goettingen.de/en/538201.html>



Johannes Söding joined the MPI for Biophysical Chemistry as group leader of the Computational Biology Group in 2014. He received his doctorate in physics from the University of Heidelberg in 1996, based on his PhD thesis research with Rudi Grimm at the MPI for Nuclear Physics in Heidelberg. After a two-year postdoc phase at the École Normale Supérieure in Paris, he joined the Boston Consulting Group in Frankfurt, where he worked as strategy management consultant from 1999 to 2002. Subsequently, Johannes became staff scientist at the MPI for Developmental Biology in Tübingen, before he was appointed group leader at the Gene Center and Department of Biochemistry, University of Munich (LMU). His current research focuses on two broad areas of research, the development of computational methods for predicting the structure, function, and evolution of proteins from sequence, and the development of computational methods to analyze regulatory sequences and to detect regulatory motifs in order to understand how transcriptional regulation is encoded in each gene's regulatory regions. His computational biology group collaborates extensively with experimental groups to elucidate the molecular processes regulating transcription initiation, elongation, mRNA processing, and chromatin states.

<http://www.uni-goettingen.de/en/488396.html>



Alexander Stein was appointed as Otto Hahn Group Leader at the MPI for Biophysical Chemistry in 2014, where he is heading the Research Group Membrane Protein Biochemistry since then. He received his doctorate from the Free University Berlin in 2008, based on his PhD thesis research with Reinhard Jahn at the MPI for Biophysical Chemistry, where he continued his research for two more years as a postdoc. From 2010 to 2014, Alexander joined the group of Tom Rapoport at Harvard Medical School, Boston, USA as a postdoctoral research fellow. His current research focuses on the mechanism of ER-associated protein degradation (ERAD). Key questions addressed by Alexander's group include, how misfolded proteins are distinguished from folding intermediates, how proteins are moved across the membrane, how they are extracted from the membrane, and how the energy for membrane translocation is provided. Using *Saccharomyces cerevisiae* as a model system, his group tries to understand the mechanism of ERAD by reconstituting the entire process with purified individual components, complemented by studies in intact yeast cells. In a second project, his group investigates an ERAD-like process that moves proteins into the apicoplast, a plastid-like organelle in unicellular parasites, such as the malaria parasite *Plasmodium falciparum*, being the target of many antimalarial drugs. A better understanding of its cell biology may facilitate the development of new drugs against malaria.

www.uni-goettingen.de/en/527947.html



Leaving the program in 2016

Michael Kessel belongs to the founding fathers of the Molecular Biology, already participating in admission interviews with the first generation of Molbio students in the summer of 2000. For more than 15 years he contributed to the Molbio curriculum with lectures and methods courses, served on countless thesis advisory committees and hosted, together with his colleague Reinhard Jahn, the Master's seminar, running weekly from March till July every year. During the first years of the program, when there was still little expertise with international recruitment of students and video-based interviews were still in their infancy, Michael travelled to Beijing and Shanghai repeatedly for interviews with Chinese applicants, thus giving a larger number of students the opportunity to introduce themselves personally to a

member of the admissions board. Michael hosted the doctoral thesis project of Lingfei Luo, who was the first PhD graduate of the Molecular Biology in the year 2004, resulting in a Nature publication. The research of Michael and his Developmental Biology Group at the MPI for Biophysical Chemistry focused on the coordination between cell cycle and developmental control processes in mice, applying biochemical, genetic and embryological techniques. They previously identified the Geminin protein as a mediator between cell cycle progression and the control of axial specification and discovered an essential role of the Mad2l2 protein, a subunit of translesion DNA polymerase zeta and potential regulator of the cell cycle, for germ cell development during early embryogenesis. More recently, they identified how the

six microRNAs of the miR449/miR34 family function during ciliogenesis (Song et al. (2014) Nature 510, 115-120). Michael retired in fall 2016.



We greatly appreciate his continuous and tireless support of the Molecular Biology program for more than 16 years, being always a reliable partner, a respected scientist, a faculty member favored by many students on their thesis advisory committees, and a good friend and colleague to many of us. Thank you very much, Michael!

<http://www.uni-goettingen.de/en/57991.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 Dobbstein, Roland Dosch, Uwe Groß, Jörg Großhans, Heidi Hahn, Steven Johnsen, Tobias Moser, Tomas Pieler, Peter Rehling, Silvio Rizzoli, Blanche Schwappach, Michael Thumm, Jürgen Wienands

Max Planck Institute for Biophysical Chemistry

Henrik Bringmann, Patrick Cramer, Wolfgang Fischle, Dirk Görlich, Christian Griesinger, Helmut Grubmüller, Stefan Hell, Herbert Jäckle, Reinhard Jahn, Stefan Jakobs, Reinhard Lüthmann, Ahmed Mansouri,

Vladimir Pena, Marina Rodnina, Melina Schuh, Reinhard Schuh, Halyna Shcherbata, Johannes Söding, Holger Stark, Alexander Stein, Henning Urlaub

Max Planck Institute for Experimental Medicine

Nils Brose, Klaus-Armin Nave

German Primate Center

Rüdiger Behr, Stefan Pöhlmann, Lutz Walter

see also

www.gpmolbio.uni-goettingen.de/content/c_faculty.php

Our new Alumni Portal

Are you in touch with your former classmates? Have they pursued an academic career or are they exploring other challenges? Who is working in a profession related to your own plans and interests? Our students and alumni belong to a well-connected group, staying in touch by various social media (including our LinkedIn groups), mutual visits and friendships. Our graduate school is happy to support these lively and steadily growing networks with various alumni-related activities and career advice.

In September 2016 we launched our newly developed GGNB Alumni Portal (alumni.ggnb.gwdg.de), an interactive alumni database for all current and former GGNB members. To test the new portal and get valuable feedback on its features, we invited the alumni of the Molecular Biology and Neuroscience programs as pioneers. This year we intend to open the alumni portal to the entire GGNB community.

With a few entries in the portal, you can ensure that our school is able to stay in touch with you, follow your further career, keep you informed, and invite you to alumni activities. Individual visibility settings enable you to decide which information you would like to share with the other members of the alumni portal. Unlike platforms such as LinkedIn or Research Gate, the Alumni Portal offers advanced search functions which give you the opportunity to learn about the current profession of other GGNB alumni and contact them. Keep in touch with other alumni, take advantage of their experience, and become a role model for our current doctoral students!

Current profession and location of our PhD alumni

Profession

Academia / Research (60%)

Professor, PI, academic staff (permanent): 8%
Group leader, senior scientist (non-permanent): 8%
Postdoc: 40%
Science management: 4%

Private Sector (28%)

Scientist, team leader, manager R&D: 10%
Staff, team leader, manager non-R&D: 15%
Consulting: 3%

Other Profession (5%)

Media, publishing: 3%
Patent attorney: 1%
Scientific software development: 1%

Other (7%)

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

Country Distribution

Europe (74%)

Germany: 54%
United Kingdom: 6%
Switzerland: 5%
Belgium: 1%
Denmark: 1%
France: 1%
Netherlands: 1%
Norway: 1%
Poland: 1%
Spain: 1%
Sweden: 1%
Turkey: 1%

North America (20%)

United States: 16%
Canada: 4%

Asia / Australia (6%)

Australia: 1%
China: 1%
India: 1%
Iran: 1%
Qatar: 1%
Singapore: 1%

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