JAN 2018

MOLECULAR BIOLOGY
NEWSLETTER

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

Welcome message

Dear alumni, students, friends and colleagues,

This annual issue of the Molbio Newsletter comes with excellent news: Our IMPRS 18-plus proposal, submitted last summer, was successful and funding for our Molbio program has been granted for 2019-2024 with an option to extend. Our proposal was externally evaluated and unanimously supported by the IMPRS Evaluation and Selection Committee composed of members of the Max Planck Society and the German Rectors' Conference. Our future aim is to take our school to challenging but exciting new research directions in Molecular Biology, which have emerged during discussions between the faculty and students and are also reflected by the new recruitments at the MPIs and University. The further development of our IMPRS, while continuing its close collaboration with our sister program in Neurosciences, will also focus on new measures to enhance the career development of our students and alumni.

Of equal importance is the progress made in 2017 regarding the continuation of the GGNB, which will be renamed "Göttingen Graduate Center for Neurosciences, Biophysics and Molecular Biosciences". While funding by the German Excellence Initiative is expected to expire by the end of 2018, the GGNB with its 15 PhD programs and 500 PhD students will be continued as a campus-wide graduate center for international and interdisciplinary PhD programs in the life sciences. It will join forces with GAUSS (Georg-August University School of Science) as the umbrella graduate school in natural sciences (1,500 PhD students in total) by offering an attractive qualification program and career services for late-stage PhD students and early postdocs. Our new colleague Stefanie Klug, heading the newly established GAUSS Career Office, is briefly introducing herself on the last page of this newsletter. In fall 2017, all members of the GAUSS and GGNB Offices were offered permanent positions and Steffen Burkhardt now serves as a Managing Director of GAUSS and GGNB in addition to his coordination of the Molbio Program.

Molbio PhD Career Forum, Harnack Haus, Berlin

Along the line of further developing career support for our students, the first Molecular Biology PhD Career Forum took place at the annual PhD retreat in May 2017 at the Harnack-Haus of the Max Planck Society in Berlin-Dahlem. In two sessions ("Academic Career in the Max Planck Society", "Career Paths in the Private Sector"), seven alumni shared their experience with our PhD students followed by three speed-dating sessions allowing lively discussions in small groups. Confining the invited speakers to our alumni turned out to be particularly valuable, as this allowed them to share their thoughts and ideas in a very personal way, keeping the threshold low for personal questions and concerns by the students. The overwhelmingly positive feedback by all participants and alumni led to the decision that all future retreats will be offered in combination with a Molecular Biology PhD Career Forum to support our students in making informed decisions regarding their career options.

Last but not least, we would like to thank Jörg Stülke for his dedicated work in the Molbio Program Committee, serving as a Program Director for many years. Many thanks also to Claudia Höbartner who contributed many valuable ideas while serving on our Program Committee before she left Göttingen for a professorship in Würzburg. Congratulations to Kai Tittmann and Alexander Stein who were elected as new members of the Program Committee.

P. Rehling, M. Rodnina, S. Burkhardt

CONTENT

Novel players in F_1F_o-ATP synthase assembly

ATP serves as a universal energy supply and is required for literally thousands of processes in the cell. It is mostly produced by mitochondrial F_1F_o-ATP synthase, a highly conserved protein complex that consists of two structurally and functionally distinct modules. The first module, a membrane rotor, functions as a proton-translocating channel and drives the second module, a soluble enzymatic assembly, which catalyzes ATP synthesis.

The rotor consists of two key elements – an oligomer of the Atp9 protein and a single copy of Atp6, which are both encoded by the mitochondrial genome. The rotor is independently competent to translocate protons across the membrane, even if the enzymatic module is not attached to it. However, such a process would only dissipate membrane potential, without ATP synthesis. Therefore, formation of the Atp9-Atp6 complex before its association with the enzymatic module is potentially hazardous to the cell. In theory, this can happen during *de novo* F_1F_o-ATP synthase assembly but,

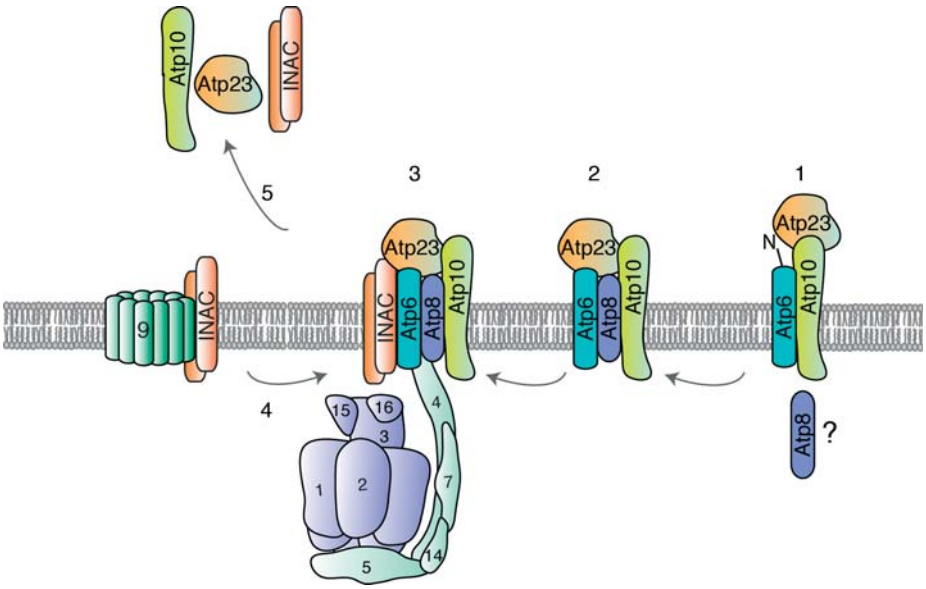


Fig. 1: After insertion into the inner mitochondrial membrane, Atp6 associates with its assembly factors (Atp10 and Atp23) (step 1). Then, an early assembly intermediate is formed, containing Atp6, Atp10 and Atp23 (step 2). Later, this intermediate serves as an assembly platform for the catalytic module (step 3). The INA complex associates with this assembly intermediate and keeps it in a primed state for Atp9 oligomer association (step 4). After the last assembly step, assembly factors are released and recycled (step 5).

PhD-(and MSc-) related publications 2017 (PhD students of the Molecular Biology program in bold type)

Berger H, Breuer M, **Peradziryi H**, Podleschny M, Jacob R, Borchers A (2017) PTK7 localization and protein stability is affected by canonical Wnt ligands. J Cell Sci 130(11), 1890-1903

Bertram K, Agafonov D, **Liu W**, **Dybkov O**, Will C, Hartmuth K, Urlaub H, Kastner B, Stark H, Lührmann R (2017) Cryo-EM structure of a human spliceosome activated for step 2 of splicing. Nature 542(7641), 318-323

Bertram K, Agafonov DE, **Dybkov O**, **Haselbach D**, Leelaram MN, Will CL, Urlaub H, Kastner B, Lührmann R, Stark H (2017) Cryo-EM structure of a pre-catalytic human spliceosome primed for activation. Cell 170(4), 701-713.e.11

Boieri M, Shah P, Jalapothu D, **Zaitseva O**, Walter L, Rolstad B, Naper C, Dressel R, Inngjerdingen M (2017) Rat acute GvHD is Th1 driven and characterized by predominant donor CD4(+) T-cell infiltration of skin and gut. Experimental Hematology 50, 33-45

Buddeweg A, **Sharma K**, Urlaub H, Schmitz R (2017) sRNA41 affects ribosome binding sites within polycistronic mRNAs in Methanosarcina mazei Gö1. Mol Microbiol [accepted]

as studies show, this is not the case. It was therefore speculated that F_1F_o-ATP synthase assembles such that Atp9 interacts with Atp6 only in the final assembly step. However, the underlying mechanism of this crucial assembly step was never defined and in particular it was unclear whether dedicated assembly factors are involved.

In order to answer these questions, we chose *S. cerevisiae* as a model organism. We identified and characterized a novel protein complex that is directly involved in the formation of the proton-conducting channel, which we named INAC (for INner membrane Assembly Complex). The INA complex consists of 2 proteins, Ina17 and Ina22, which directly interact with F_1F_o-ATP synthase components during their assembly. Taking advantage of the ease with which the yeast genome can be manipulated, we genomically tagged INA proteins, which allowed us to study native F_1F_o-ATP synthase assembly intermediates that associate with INAC. Using a combination of native protein complex isolations and chemical crosslinking, we showed that the INA complex physically associates with two novel final intermediates of F_1F_o-ATP synthase assembly, each containing one half of the protein conducting channel – the Atp6 and Atp9 ring, accordingly. Moreover, using native gel electrophoresis, we were able to clearly separate those intermediates for the first time and showed that, upon INAC loss, ATP synthase assembly is stalled right before the final step, namely rotor module formation. Impairment of the final assembly step results in accumulation of assembly intermediates with associated assembly factors and decreases levels of the mature ATP synthase in the mitochondria.

To summarize, our study has shed light on the most crucial step of the ATP synthase assembly pathway and resulted in discovery of a pair of dedicated assembly factors. Interestingly, far less is known about the assembly of human F_1F_o-ATP synthase. Based on our findings, we can speculate that along with the high conservation of the ATP synthase structure and mechanisms of ATP synthesis, assembly of the human complex might follow similar rules. Therefore, functional homologs of the INA complex are likely to be identified in humans.

Nataliia Naumenko worked on her doctoral thesis in the group of Peter Rehling at the University Medical Center Göttingen. She defended her PhD thesis in June 2017.

Results of this work were published in Naumenko N, Morgenstern M, Rucktaschel R, Warscheid B, Rehling P (2017) Nat Commun, 15562

Caliskan N, Wohlgemuth I, **Korniy N**, Pearson M, Peske F, Rodnina MV (2017) Conditional switch between frameshifting regimes upon translation of dnaX mRNA. Mol Cell 66(4), 558-567.e.4

Cantuti-Castelvetri L*, Fitzner D*, Bosch-Queralt M, Weil MT, **Su M**, Sen P, Ruhwedel T, Mitkovski M, Trendelenburg G, Lütjohann D, Möbius W, Simons M (2017) Defective cholesterol clearance limits remyelination in the aged central nervous system. Science [accepted]

Denkert N, **Schendzielorz AB**, Barbot M, Versemann L, **Richter F**, Rehling P, Meinecke M (2017) Cation selectivity of the presequence translocase channel Tim23 is crucial for efficient protein import. eLife 6, e28324

Florin T, Maracci C, Graf M, **Karki P**, Klepacki D, Berninghausen O, Beckmann R, Vazquez-Laslop N, Wilson DN, Rodnina MV, Mankin AS (2017) An antimicrobial peptide that inhibits translation by trapping release factors on the ribosome. Nat Struct Mol Biol 24(9), 752-757

The spliceosome in motion

Conformational Dynamics of the human B^{act} spliceosome revealed by single particle cryo EM

The precise excision of introns from the pre-mRNA is catalyzed by the spliceosome. Chemically, this task involves only two transesterification reactions. However, to bring the right regions of the mRNA together the spliceosome has to remodel significantly during its duty cycle. First, the actual splice sites and the branch site are recognized by the snRNPs U1 and U2 resulting in the so-called A complex. This paves the way for the maturation of the B complex through the addition of the U4/U6, U5 tri-snRNP which harbors all components of the catalytic site, but is still inactive due to the inhibiting U4 RNA. Through the actions of the helicase Brr2 this RNA is removed and the activated B complex (B^{act}) is formed. A newly formed stem loop of the U6 RNA contains the catalytic ions, which are now close to the 5′ splice site.

However, to complete the formation of the catalytic site in humans the action of the helicase aquarius is required, to bring the branch site adenosine, which

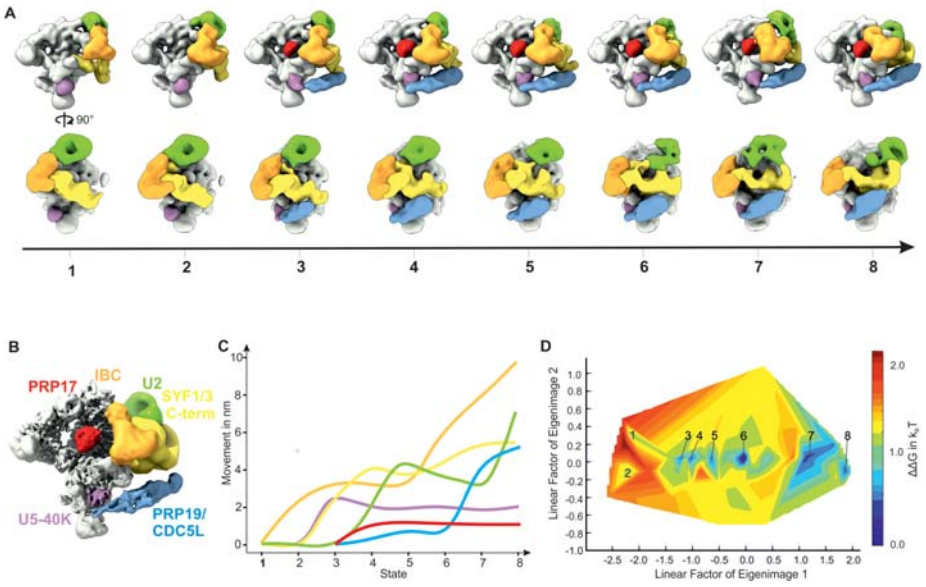


Fig. 1: Conformational Dynamics of the human B^{act} spliceosome. (A) Eight different conformational states of the human B^{act} spliceosome obtained by computational sorting of images. The consecutive conformational states were sorted by principle component analysis. The most significant global conformational changes are described in the panel below. (B) An overview of the entire complex is shown. (C) Quantification of the movements of the individual segments as shown in (A) reveals large motion parameter for all components. (D) The landscape describes the energy differences between all the conformational states found by computational classification. The coordinates describe the most significant modes of motion.

Goebbels S, Wieser G, Pieper A, Spitzer S, Weege B, Yan K, Edgar J, **Yagensky O**, Wichert S, Agarwal A, Karram K, Renier N, Tessier-Lavigne M, Rossner M, Karadottir R, Nave K (2017) A neuronal PI(3,4,5)P-3-dependent program of oligodendrocyte precursor recruitment and myelination. Nat Neurosci 20(1), 10-15

Goettfert F, **Pleiner T**, Heine J, Westphal V, Görlich D, Sahl S, Hell S (2017) Strong signal increase in STED fluorescence microscopy by imaging regions of subdiffraction extent. Proc Natl Acad Sci USA 114(9), 2125-2130

Goyal A, Belardinelli R, Rodnina MV (2017) Non-canonical binding site for bacterial initiation factor 3 on the large ribosomal subunit. Cell Reports 20(13), 3113-3122

Haselbach D, Schrader J, Lambrecht F, Henneberg F, Chari A, Stark H (2017) Long-range allosteric regulation of the human 26S proteasome by 20S proteasome-targeting cancer drugs. Nat Commun 8, 15578

will be the target of the first transesterification reaction, close to the catalytic site. This rearrangement results in the formation of the catalytically active B* complex, that catalyzes the branching reaction leading to an intron lariat structure bound to the C complex which concludes this first step of splicing. Recently, cryo EM structures at high resolution from most of those intermediates have been reported. Still, those are only snapshots of the distinct conformations and the pathway of the necessary remodeling remained elusive.

While the understanding of these conformational changes is certainly the key to the understanding of splicing, the analysis of the dynamic regions of the spliceosome has remained a huge technical challenge for structural investigations. To still gain insights into the dynamic regions we recorded more than 3 million particle images of the human Bact complex. Subsequently, we addressed the dynamic structural changes in a quantitative manner, by a newly developed method based on three-dimensional principal component analysis. We were thereby able to identify the motion patterns of flexible components in a conformational landscape and to describe the key modes of motion of the mobile parts of the spliceosome, that cover almost a conformational continuum consisting of numerous major and minor conformational states.

Counting the particle numbers for each of the observed conformations even allows the calculation of an energy landscape that quantitatively describes the low-energy barriers between the dynamic conformational states sampled by the spliceosome.

Critically, the analysis of these structures revealed that productive progress during active spliceosome formation requires numerous protein and RNA interactions to be accurately fine-tuned, and often in a highly coordinated manner, to enable the stable structural accommodation of functionally relevant protein components. Only the effective interplay of the spliceosome compositional properties and the ability of sampling motions permit the stable integration of protein components required for the formation of the spliceosome. Our data thus reveal how and why the overall conformation flexibility of the spliceosome is required for productive formation of a catalytically active complex.

David Haselbach completed his doctoral thesis in the group of Holger Stark and graduated in October 2014. Currently, he is heading the Cryo EM group as a fellow at the IMP at the Vienna Biocenter.

These results were published in Haselbach D, Komarov I, Agafonov DE, Hartmuth K, Graf B, Dybkov O, Urlaub H, Kastner B, Lührmann R, Stark H (2018) Cell, in press

Hillen HS, Parshin AV, Agaronyan K, Morozov YI, Graber JJ, **Chernev A**, Schwinghammer K, Urlaub H, Anikin M, Cramer P, Temiakov D (2017) Mechanism of transcription anti-termination in human mitochondria. Cell 171(5), 1082-1093

Jakhanwal S, Lee CT, Urlaub H, Jahn R (2017) An activated Q-SNARE/SM protein complex as a possible intermediate in SNARE assembly. EMBO J 36(12), 1788-1802

Kreutzberger AJB, Kiessling V, Liang BY, Seelheim P, **Jakhanwal S**, Jahn R, Castle JD, Tamm LK (2017) Reconstitution of calcium-mediated exocytosis of dense-core vesicles. Science Advances 3(7), e1603208

Krinner S, Butola T, Jung SY, Wichmann C, Moser T (2017) RIM-binding protein 2 promotes a large number of Ca(V)1.3 Ca^{2+}-channels and contributes to fast synaptic vesicle replenishment at hair cell active zones. Front Cell Neurosci 11, 334

Lemus-Diaz N, Boeker K, Rodriguez-Polo I, Mitter M, Preis J, Arlt M, Gruber J (2017) Dissecting miRNA gene repression on single cell level with an advanced fluorescent reporter system. Sci Rep-UK 7, 45197

Munc18-1: Stage for SNARE-complex assembly

Neuronal exocytosis is brought about by the fusion of synaptic vesicles with the plasma membrane causing neurotransmitter release (Puchkov & Haucke, 2013). A superfamily of small proteins called SNAREs are responsible for forming the fusion machinery for this as well as most of the intracellular membrane fusion events (Jahn & Scheller, 2006). Three neuronal SNAREs namely syntaxin, SNAP25 and synaptobrevin form a four helical bundle that pulls the two apposing membranes in close proximity to initiate fusion (Jahn *et al*, 2003). The spatial and temporal control of neurotransmitter release is, however, maintained by four major regulatory proteins namely Munc18-1, Munc13-1, synaptotagmin and complexin (Jahn & Fasshauer, 2012).

This article focuses on the role of Munc18-1, which belongs to a family of proteins called the Sec1/Munc18 (SM) family (Carr & Rizo, 2010). The role of Munc18-1 in regulating SNARE-complex assembly has been highly enigmatic (Rizo & Südhof, 2012). *In vitro* biochemical assays have shown that Munc18-1 enters into a very tight com-

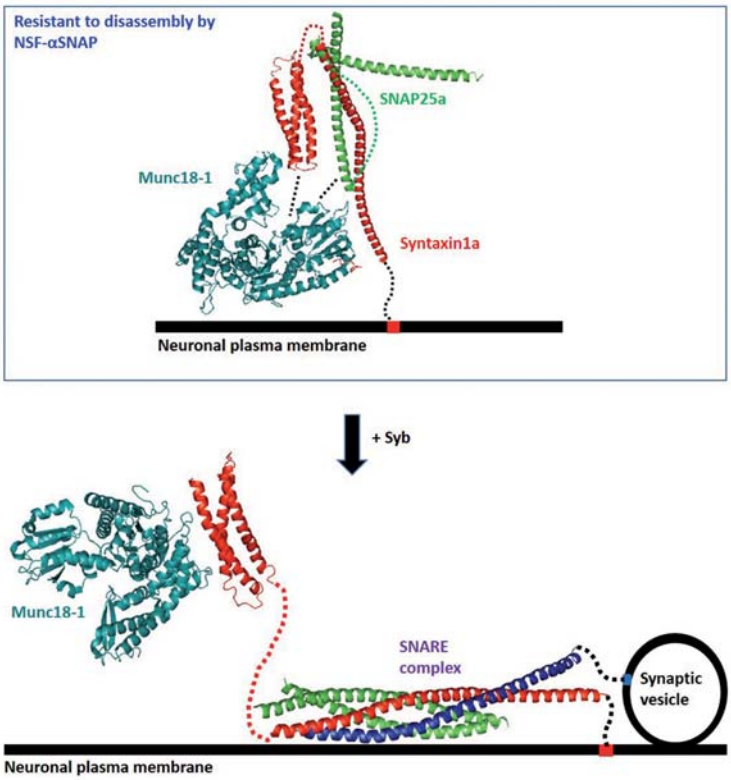


Fig. 1: Proposed model for SNARE-complex assembly. Syntaxin, SNAP25 and Munc18-1 together form a ternary acceptor complex that mediates very fast binding to synaptobrevin. This complex cannot be disrupted by NSF-αSNAP, thereby allowing SNARE-complex assembly to proceed in a disassembly-resistant manner (*top*). Synaptobrevin-binding to the complex results in SNARE-complex assembly, with Munc18-1 being shifted toward the N-terminus of syntaxin (*bottom*). [This figure has been adapted from (Jakhanwal *et al*, 2017). *Syntaxin has been shown in red, SNAP25 in green, synaptobrevin in blue and Munc18-1 in cyan*].

Märtens B, **Sharma K**, Urlaub H, Blasi U (2017) The SmAP2 RNA binding motif in the 3 , UTR affects mRNA stability in the crenarchaeum *Sulfolobus solfataricus*. Nucleic Acids Res 45(15), 8957-8967

Memet I, Doebele C, Sloan KE, Bohnsack MT (2017) The G-patch protein NF-kappa B-repressing factor mediates the recruitment of the exonuclease XRN2 and activation of the RNA helicase DHX15 in human ribosome biogenesis. Nucleic Acids Res 45(9), 5359-5374

Mishra VK, Wegwitz F, Kosinsky RL, **Sen M**, Baumgartner R, Wulff T, Siveke JT, Schildhaus HU, Najafova Z, Kari V, Kohlhof H, Hessmann E, Johnsen SA (2017) Histone deacetylase class-I inhibition promotes epithelial gene expression in pancreatic cancer cells in a BRD4-and MYC-dependent manner. Nucleic Acids Res 45(11), 6334-6349

Naumenko N, Morgenstern M, Rucktaschel R, Warscheid B, Rehling P (2017) INA complex liaises the F1Fo-ATP synthase membrane motor modules. Nat Commun 8, 1237

plex with syntaxin, locking syntaxin in a conformation that is incompatible for SNARE-complex assembly (Misura *et al*, 2000; Burkhardt *et al*, 2008). Studies on hippocampal neurons in mice lacking Munc18-1, however, showed a complete abrogation of neurotransmitter release (Verhage *et al*, 2000), thereby highlighting the critical importance of this protein in activating the process of neuronal exocytosis.

In this study, we have highlighted the role of Munc18-1 in setting up the stage for SNARE-complex assembly. Using in-depth biochemical and biophysical analyses we have established that Munc18-1 interacts with syntaxin and SNAP25 forming a ternary syntaxin/SNAP25/Munc18-1 complex, which serves as an excellent acceptor for synaptobrevin-binding. We propose that Munc18-1 catalyzes SNARE-complex assembly by preventing the formation of the dead-end 2:1 complex of syntaxin1 and SNAP25 (Fasshauer *et al*, 1997). The binding of synaptobrevin to the syntaxin/SNAP25/Munc18-1 complex is accompanied by major conformational rearrangements resulting in the formation of a fully assembled SNARE-complex. This ternary complex is also resistant to disassembly by NSF-αSNAP (the SNARE-disassembly machinery) (Otto *et al*, 1997), thereby allowing SNARE-complex assembly to proceed in a disassembly-resistant manner (see figure for details). With the help of chemical cross-linking and mass spectrometric analyses we have been able to show some architectural differences between this activated ternary complex and the previously reported structure of the binary syntaxin/Munc18-1 complex (Misura *et al*, 2000). The data obtained indicate that the main difference lies in the conformation of syntaxin being shifted from a 'closed' state in the binary complex (Misura *et al*, 2000) toward a more 'open' state in the ternary complex. It is, however, also important to note that the conformation of Munc18-1 is also extremely important for the activity of the resulting complex. In the binary complex with syntaxin, Munc18-1 exists in an auto-inhibited conformation that is incompatible for synaptobrevin-binding (Sitarska *et al*, 2017). In the ternary complex, the conformation of Munc18-1 appears to be altered toward a state that is compatible for synaptobrevin-binding, thereby setting up the stage for SNARE-complex assembly. We hope that this work will help us in getting a step closer to unraveling the molecular details of synaptic vesicle exocytosis.

Shrutee Jakhanwal conducted her doctoral research under the supervision of Reinhard Jahn at the MPI for Biophysical Chemistry. She graduated from the Molecular Biology program in July 2017.

These results were published in Jakhanwal S, Lee CT, Uralub H, Jahn R (2017) EMBO J 36(12):1788-1802

Pyc M, Cia Y, Gidda SK, Yurchenko O, Park S, **Kretzschmar FK**, Ischebeck T, Valerius O, Braus GH, Chapman KD, Dyer JM, Mullen RT (2017) *Arabidopsis* LDAP-Interacting Protein (LDIP) influences lipid droplet size and neutral lipid homeostasis in both leaves and seeds. Plant J 12, 3218-3221

Ranjan A, Mercier E, **Bhatt A**, Wintermeyer W (2017) Signal recognition particle prevents N-terminal processing of bacterial membrane proteins. Nat Commun, 15562

Richter K, Revelo N, **Seitz K**, **Helm M**, Sarkar D, Saleeb R, D'Este E, Eberle J, Wagner E, Vogl C, Lazaro D, **Richter F**, Coy-Vergara J, Coceano G, Boyden E, Duncan R, Hell S, Lauterbach M, Lehnart S, Moser T, Outeiro T, Rehling P, Schwappach B, Testa I, Zapiec B, Rizzoli S (2017) Glyoxal as an alternative fixative to formaldehyde in immunostaining and super-resolution microscopy. EMBO J 37(1), 139-159

A versatile label for HIV-1 Envelope

Productive entry of HIV-1 into target immune cells is mediated by the viral Envelope protein (Env), which is synthesized on the ER and targeted to the plasma membrane. Env is incorporated into the budding particles in the presence of the main structural proteins (Gag and Gag-Pol) or rapidly be endocytosed. In this study, we aimed to provide a versatile and minimally invasive labeling tool for Env in order to study its mobility as well as its nanoscale organisation on plasma membrane.

Conventional protein labeling methods such as antibodies/Fab fragments or autofluorescent proteins add a substantial molecular mass (~25-150 kDa) to the protein of interest, which may result in loss of function. Self-staining tetracysteine (TC) or stainable peptide tags (A1 or Q3) by enyzmatic reactions, on the other hand, are much smaller in size, yet offer either limited versatility in terms of fluorophores or require recombinant enzymes for modification.

Although some of those labeling techniques were successfully applied for

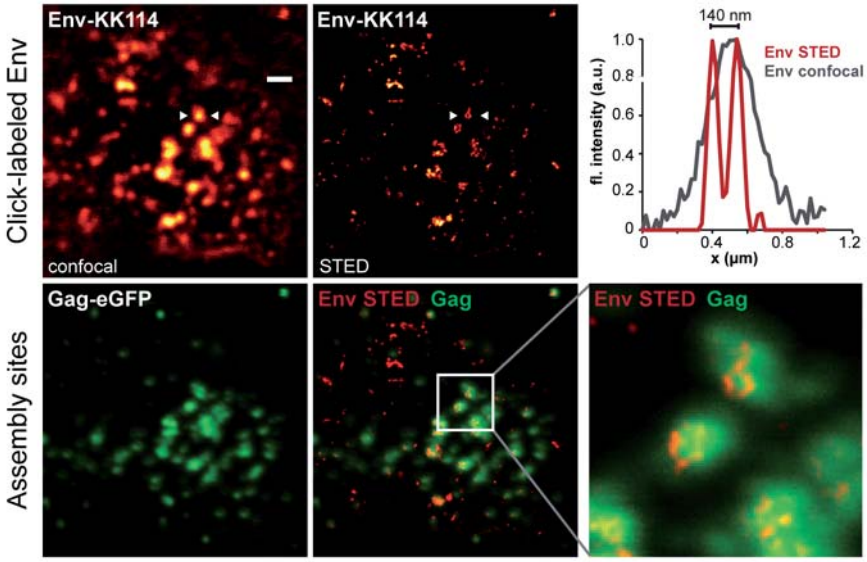


Fig. 1: Visualization of click labeled Env clusters at HIV-1 assembly sites by STED nanoscopy. HEK293T cells were co-transfected with pEnv407^{TAG}, ptRNApyl/pylRS-AF, and peRF1 (E55D), and grown in the presence of 250µM ncAA for amber suppression of Env. Two additional plasmids (pGag and pGag-eGFP) were cotransfected to induce eGFP-labeled viral assembly sites. 40 hpt, cells were labeled with Tet-KK114 and analyzed by STED nanoscopy. Images show confocal and STED micrographs recorded at the ventral membrane of the cells. The enlargement highlights Env clusters detected at Gag assembly sites and visible resolution enhancement. Scale bars, 1 µm and 500 nm. (modified from Sakin *et al.*, 2017, Cell Chemical Biology)

Rivera-Monroy J, **Musiol L**, Unthan-Fechner K, **Farkas A**, Clancy A, Coy-Vergara J, Weill U, Gockel S, Lin SY, Corey DP, Kohl T, Strobel P, Schuldiner M, Schwappach B, Vilardi F (2016) Mice lacking WRB reveal differential biogenesis requirements of tail-anchored proteins *in vivo*. Sci Rep-UK 6, 39464

Schendzielorz A, **Schulz C**, **Lytovchenko O**, Clancy A, Guiard B, Ieva R, van der Laan M, Rehling P (2017) Two distinct membrane potential-dependent steps drive mitochondrial matrix protein translocation. J Cell Biol 216(1), 83-92

Shukla A, Beroun A, Panopoulou M, Neumann P, Grant S, Olive M, Dong Y, Schlueter O (2017) Calcium-permeable AMPA receptors and silent synapses in cocaine-conditioned place preference. EMBO J 36(4), 458-474

Sloan KE, **Warda AS**, Sharma S, Entian KD, Lafontaine DLJ, Bohnsack MT (2017) Tuning the ribosome: The influence of rRNA modification on eukaryotic ribosome biogenesis and function. RNA Biol 14(9), 1138-1152

HIV-1 Env, we aimed to create a site-specific, versatile labeling tool suited for advanced microscopy methods while keeping Env protein as close as possible to its native state. Our method of choice was genetic code expansion followed by click chemistry, which is a two step labeling: In the first step, we inserted TAG codon into the genome of Env at a defined position.

Upon transfection of a plasmid encoding the aminoacyl-tRNA synthetase as well as the tRNAs from *Methanosarcina mazei*, which can recognize the amber stop codon, we managed to insert a non-canonical amino acid (ncAA) in Env, which led to the production of full-length protein. The efficiencies of incorporation of a ncAA in a protein is counteracted by canonical translational termination in eukaryotes, which is regulated by eukaryotic release factor 1 (eRF1).

By utilizing a dominant negative mutant of this factor (eRF1-E55D) we managed to increase efficiencies up to 50-60 % for HIV-1 Env. The engineered Env behaved similar to the wild type in terms of its glycosylation pattern, plasma membrane localization as well as its fusion activity. Moreover, HIV-1 particles with engineered Env retained ~10% infectivity with respect to the particles with wt Env. These results indicated that engineering Env was functional and can be incorporated to budding particles.

In the second-step, we were able to click label the engineered Env on the plasma membrane by using different Tetrazine-coupled (Tet-) fluorophores such as Tet-Cy5 or Tet-KK114, which was proven by microscopy as well as in-gel fluorescence experiments. Labeling Env on the plasma membrane on a single amino acid enabled us to measure the dynamics of the Env by FRAP experiments. Subsequently, being able to switch the dye easily, we could show Env clusters around HIV-1 assembly sites by STED nanoscopy (Fig. 1).

In summary, we believe that this elegant labeling technique will be more commonly used in the future due to its site-specificity, very small size and versatility for the choice of organic dyes. Viruses often have overlapping, compact genomes with multifunctional, small proteins, which are fragile to modifications. Therefore, this strategy seems to be ideal for such viral proteins.

Volkan Sakin completed his doctoral thesis in the group of Frauke Melchior and graduated in 2012. Currently, he is a postdoctoral researcher in the Center for Integrative Infectious Disease Research (CIID), Virology at the University Hospital of Heidelberg.

These results were published in Sakin et al. (2017) Cell Chemical Biology 24(5), 635-645

Tarasenko D, Barbot M, Jans DC, Kroppen B, Sadowski B, Heim G, Möbius W, Jakobs S, Meinecke M (2017) The MICOS component Mic60 displays a conserved membrane-bending activity that is necessary for normal cristae morphology. J Cell Biol 216(4), 889-899

Vanshylla K, Opazo F, Gronke K, Wienands J, Engels N (2017) The extracellular membrane-proximal domain of membrane-bound IgE restricts B cell activation by limiting B cell antigen receptor surface expression. Eur J Immunol [Epup ahead of print]

Warda AS, Kretschmer J, Hackert P, Lenz C, Urlaub H, Höbartner C, Sloan KE, Bohnsack MT (2017) Human METTL16 is a N-6-methyladenosine (m(6)A) methyltransferase that targets pre-mRNAs and various non-coding RNAs. EMBO Rep 18(11), 2004-2014

Witkowska A, Jahn R (2017) Rapid SNARE-mediated fusion of liposomes and chromaffin granules with giant unilamellar vesicles. Biophys J 113(6), 1251-1259

Science Abstracts 2017

Two distinct membrane potential-dependent steps drive mitochondrial matrix protein translocation

Import of nuclear encoded proteins into mitochondria is essential for eukaryotic cells. Around 70% of mitochondrial proteins are targeted by an N-terminal signal peptide called presequence. It directs them across the outer membrane to the translocase of the inner membrane (TIM23) complex, which can insert proteins into the inner membrane or mitochondrial matrix.

Translocation into or across the inner membrane depends on the membrane potential ($\Delta\Psi$) across the inner membrane and an ATP-dependent import motor. In the current model for protein import, $\Delta\Psi$ drives the presequence translocation across the membrane while the Hsp70 based import motor is required for transport of the mature portion of the substrate.

We have shown that presequence substrates display a surprising difference in their $\Delta\Psi$ dependence and that this is not linked to the presequence but to the mature portion of the protein. To support import of particular $\Delta\Psi$ dependent substrates, the presequence receptor protein Tim50 recruits a small membrane protein Pam17 to the import channel, which aids these precursors across the inner membrane.

We have identified a second $\Delta\Psi$-dependent step in mitochondrial protein import, which acts after presequence translocation.

Alexander Schendzielorz completed his doctoral thesis in the group of Peter Rehling at the University Medical Center Göttingen, where he is still working as a postdoctoral research fellow. He graduated from the Molecular Biology program in November 2017.

These results were published in Schendzielorz et al. (2017) J Cell Biol 216(1), 83-92

Insights into human ribosome biogenesis

The biogenesis of ribosomes, which involves the processing, folding and modification of the ribosomal RNAs (rRNAs) and their assembly with ribosomal proteins, is one of the most energy-consuming activities in the cell and requires the assistance of hundreds of trans-acting factors. However, the functions of these ribosome assembly factors are often poorly characterized. In this study, we described a novel nucleolar complex composed of the RNA helicase DHX15, the G-patch protein NKRF and the exonuclease XRN2 that is required for efficient rRNA processing.

We observed that depletion of these factors affects an early cleavage step of the rRNA precursor at a mammalian-specific site, and in line with this, Crosslinking and Analysis of cDNA (CRAC) experiments revealed that NKRF binds to multiple regions of this precursor. RNA helicases often require protein cofactors, such as G-patch proteins, to perform their functions and we further showed that NKRF acts as a cofactor of DHX15 and stimulates its activity, probably to enable an RNA/RNP remodelling event at the cleavage site.

Overall, our results provide insights into the mode of action of key ribosome biogenesis factors and contribute to our understanding of the highly complex pathway of ribosome assembly in humans.

Indira Memet is a PhD student in the group of Markus Bohnsack at the University Medical Center Göttingen.

These results were published in Memet I, Doebele C, Sloan KE, Bohnsack MT (2017) Nucleic Acids Res 45(9), 5359-5374

Calcium-permeable AMPA receptors and silent synapses in cocaine-conditioned place preference

Cocaine exposure generates excitatory synapses in the nucleus accumbens (NAc) – a brain region essential for coding 'reward'. These synapses are 'silent' as they lack AMPA-type receptors (AMPARs) and are therefore non-conducting while the neuron is at rest. These 'silent synapses' eventually mature during withdrawal from cocaine by recruitment of calcium-permeable AMPA-receptors (CP-AMPARs) that have higher conductivity than AMPARs. Prior to our study, the role of this profound remodelling of NAc neuro-circuits based on silent synapse maturation, in acquisition and retention of drug-associated contexts, had remained unclear. Now we have shown that postsynaptic proteins PSD-93, PSD-95 and SAP102 differentially regulate synapse properties in the NAc. By means of acute slice electrophysiology we show that mice deficient for either of these scaffold proteins exhibit distinct maturation patterns of silent synapses.

We employed the behavioral assay of cocaine-conditioned place preference (CPP) for testing the acquisition and retention of the association between drug-reward and drug-contexts. All mice acquired cocaine-CPP, however, the knock-out mice differed in CPP retention and CP-AMPAR incorporation during withdrawal from cocaine. Our results indicate that CP-AMPAR mediated maturation of silent synapses in the NAc is a signature of drug-context association, but this maturation is NOT required for establishing or retaining cocaine-CPP.

Avani Shukla completed her doctoral thesis in the group of Oliver Schlüter and graduated in May 2016. Currently, she works as Assistant Professor at Amity Institute of Biotechnology, Amity University Gurgaon (Manesar), India.

These results were published in Shukla et al. (2017) EMBO J 36(4), 458-474

Mic60 uses ancient mechanism to bend inner mitochondrial membrane at cristae junctions

Mitochondria are double membrane organelles of complex ultrastructure. Relatively flat outer membrane separates the organelles from the rest of the cytosol. Inner membrane possesses much larger surface in comparison to the outer membrane and forms invaginations towards mitochondrial matrix called cristae.

Outer and inner membranes are connected by narrow slot-like membrane openings also known as cristae junctions. The maintenance of cristae junctions' structure is highly important for organization of the inner mitochondrial membrane architecture and cellular physiology. Cristae junctions exhibit high degrees of membrane curvature which is stabilized, at least in part, by mitochondrial contact site and cristae organizing system (MICOS).

In our study we showed that MICOS core component Mic60 has lipid binding properties and is able to actively remodel both artificial membranes *in vitro* as well as biological membranes *in vivo*. We also found out that Mic60 homologs identified in alphaproteobacteria exhibit similar membrane deforming activity and are able to rescue morphological phenotype of Mic60 deletion in eukaryotic cells. These results suggest that Mic60's membrane bending activity is an ancient mechanism important for cristae junction formation, which had arisen in alphaproteobacteria way before the endosymbiotic event, when these bacteria developed into mitochondria, more than 1.5 billion years ago.

Daryna Tarasenko is a PhD student in the group of Michael Meinecke at the University Medical Center Göttingen.

These results were published in Tarasenko et al. (2017) J Cell Biol 216(4), 889-899

New Students

Master's class 2017/18

Julio Abril Garrido, Spain
BSc, University of Córdoba

Sofia Ainatzi, Greece
BSc, National & Kapodistrian University of Athens

Ivan Avilov, Ukraine
BSc, Taras Shevchenko National University of Kyiv

Tiana Sophia Behr, Philippines
BSc, University of Heidelberg

Ekaterina Chukhno, Russian Federation
BSc, Saint Petersburg State University

Polina Derevianko, Russian Federation
BSc, Lomonosov Moscow State University

Anna Dyas, United Kingdom
BA, University of Cambridge

Mariana Eggert Martínez, Germany
BSc, Freie Universität Berlin

Nils Eickhoff, Germany
BSc, University of Göttingen

Matthew Grieshop, USA
BSc, University of Wisconsin-Madison

Antony Grüness, Luxembourg
BSc, Clark University Worcester, USA

Yehor Horokhovskyi, Ukraine
BSc, Taras Shevchenko National University of Kyiv

Mila Ilic, Serbia
BSc, University of Belgrade

Sakshi Jain, India
BSc, University of Delhi, Daulat Ram College

Julia Kurlovich, Belarus
BSc, University of Wroclaw, Poland

Meline Macher, Germany
BSc, University of Göttingen

Wiebke Maurer, Germany
BSc, University of Göttingen

Noah Mottelson, Denmark
BSc, University of Copenhagen

Anastasija Pejkovska, Macedonia
BSc, Jacobs University, Bremen

Valentyn Petrychenko, Ukraine
BSc, Taras Shevchenko National University of Kyiv

Applications 2017

In 2017, 702 students from 68 countries applied.

Germany 22 / West Europe 35
East Europe 51
North America 15
Central/South America 28
North Africa 59
Central/South Africa 102
Asia, Near East 91 / Far East 299

Elsa Rodrigues, Portugal
BSc, University of Lisbon

Debojit Saha, India
MSc, University of Hyderabad

Aikaterini Vrentzou, Greece
BSc, University of Crete

Ka Man Yip, Hong Kong
BSc, Hong Kong University of Science and Technology

PhD projects started in 2017

Rashi Goel
New approaches for studying vesicular neurotransmitter transporters.
Reinhard Jahn, Silvio Rizzoli, Claudia Steinem

Katarina Harasimov
Mechanism of chromosome clustering in mammalian oocyte.
Melina Schuh, Markus Bohnsack, Péter Lénárt

Deniz Kaya
Structure-function studies of human transcription initiation.
Patrick Cramer, Holger Stark, Vladimir Pena

Ana Kutschat
Analysis of the functional roles of the bromo- and extra-terminal (BET) domain family members and their interaction partners in enhancer-mediated gene express
Steven Johnsen, Matthias Dobbelstein, Johannes Söding

Yen-Yun Lu
Functional characterization of yeast Gbp2 and Hrb1 in nonsense-mediated mRNA decay.
Heike Krebber, Jörg Großhans, Reinhard Lührmann

Valentina Manzini
The p53-antagonist Mdm2 as a chromatin modifier.
Matthias Dobbelstein, Steven Johnsen, Roland Dosch

Sofiia Reshetniak
Protein mobility in the synapse and role of the cytoskeleton.
Silvio Rizzoli, Reinhard Jahn, Andreas Janshoff

Salma Sohrabi-Jahromi
Quantitative modeling of RNA-protein interactions using Bayesian statistics.
Johannes Söding, Henning Urlaub, Michael Habeck

Gabriel Jose Villamil
Kinetic modeling of key regulatory pre- and post-transcriptional events by metabolic sequencing of transient RNAs in living human cells.
Patrick Cramer, Steven Johnsen, Achim Tresch

Xizhou Zhang
NMR investigation of transmembrane signaling.
Christian Griesinger, Blanche Schwappach, Bert de Groot

External MSc projects in 2017

Jakob El Kholtei
Zonation of epigenetic features in the mammalian liver lobule.
Shalev Itzkovitz, Weizmann Institute of Science, Rehovot, Israel

Jose Lorenzo Ferrer
Deciphering the role of the AimX non-coding RNA in inhibiting lysogeny.
Rotem Sorek, Weizmann Institute of Science, Rehovot, Israel

Alberto Hernandez Armendáriz
The chromosomal surfactant Ki-67 during mitotic exit and interphase.
Sara Cuyten, EMBL, Heidelberg

Damir Sakhapov
The interactions of CCR5 sulfated tyrosine residues with the HIV-1 envelope protein gp120.
Jacob Anglister, Weizmann Institute of Science, Rehovot, Israel

Students
Graduated

The Masters of 2017

Laura Ahumada Arranz
(*Johannes Söding*)
Exploratory analysis of single-cell datasets with state-of-the-art trajectory inference methods.

Robert Lorenz Chua
(*Steven Johnsen*)
The impact of epigenetic regulation on inflammation and proliferation of colorectal cancer cells.

Hadil El Sammak
(*Didier Stainier, MPI for Heart and Lung Research, Bad Nauheim*)
Metabolic switch during heart regeneration in zebrafish.

Mahmoud Elzayat
(*Stefan Pöhlmann*)
Molecular characterization of functional domains within MERS-S required for host cell entry.

Katharina Glaser
(*Tim Lämmermann, MPI of Immunobiology and Epigenetics, Freiburg*)
Investigating the functional role of GRK2 for dendritic cell maturation and chemotaxis.

Rashi Goel
(*Hiroshi Kawabe*)
Potential link between Nedd4-2 and epileptic photosensitivity via astrocytic Connexin-43 channels.

Bishoy Hanna
(*Thomas Helleday, Karolinska Institutet, Stockholm*)
Functional and molecular characterization of human NUDT22.

Katarina Harasimov
(*Melina Schuh*)
Towards a 4D atlas of oocyte meiosis.

Deniz Kaya
(*Michael Rape, UC Berkeley, CA, USA*)
Dissecting the mechanism of ubiquitin-dependent formation of a ribosome biogenesis platform during neural crest specification.

Miriam Klaus
(*Kai Tittmann*)
Conformational dynamics in transaldolase catalysis.

Yi-Chen Lin
(*Peter Rehling*)
Protein dynamics of the mitochondrial translocase for the precursor protein import.

Yen-Yun Lu
(*Heike Krebber*)
Studies on yeast SR proteins Gbp2 and Hrb1 in nonsense-mediated mRNA decay.

Valentina Manzini
(*Klaus-Armin Nave*)
The role of lactate dehydrogenase in forebrain neurons.

Volodymyr Mykhailiuk
(*Claudia Höbartner*)
In vitro evolution of catalytic DNA for the detection of post-transcriptional RNA modifications.

Sofiia Reshetniak
(*Silvio Rizzoli*)
Differential mobility of synaptic proteins in synapses and axons of primary hippocampal neurons.

Salma Sohrabi-Jahromi
(*Patrick Cramer*)
Monitoring changes in enhancer landscape and gene expression during cellular transdifferentiation.

Kristina Stakyte
(*Patrick Cramer*) Structural survey on the initiation of the human global genome nucleotide excision repair.

The Doctors of 2017

Nora Cascante Estepa
Localization and function of RNases in *Bacillus subtilis*.
Jörg Stülke, Markus Bohnsack, Ivo Feußner

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

Stefanie Krinner
Molecular physiology of synaptic sound encoding at the first auditory synapse.
Tobias Moser, Erwin Neher, Stefan Hell

G. Nicolás Lemus Díaz
Functional characterization of C/D snoRNA-derived microRNAs.
Jens Gruber, Reinhard Lührmann, Halyna Shcherbata

Manuel Maidorn
Development of nanobodies to image synaptic proteins in super-resolution microscopy.
Silvio Rizzoli, Peter Rehling, Mikael Simons

Nataliia Naumenko
Function of the INA complex in assembly of the mitochondrial oxidative phosphorylation system.
Peter Rehling, Blanche Schwappach, Reinhard Lührmann

Alexander Schendzierlorz
Import of proteins along the presequence pathway.
Peter Rehling, Marina Rodnina, Dirk Görlich

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

Arturo Vera Rodriguez
Novel export and import pathways in *S. cerevisiae* identified by an engineered SUMO system.
Dirk Görlich, Marina Rodnina, Heinz Neumann

Ahmed Warda
Characterization of RNA-modifying enzymes and their roles in diseases.
Markus Bohnsack, Dirk Görlich, Jörg Stülke

Splitting off and spinning out

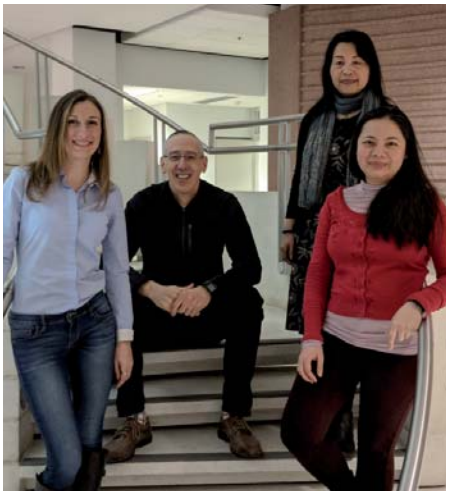
Straying away from academia

A little over a year ago, I was a postdoc facing the situation dreaded by so many other early career researchers in academia: unemployment due to drying up funding. There was nothing shocking about it. A year earlier, funding had started to wither and I was actually working without pay for a while because I still had to complete some experiments we needed to get our revised papers accepted. However, my PI had created such a friendly and enjoyable environment in the lab that even when those experiments were done I preferred to be "volunteering" and furthering the project.

More funding came through, so I continued for another year plugging away at a project I really believed had potential to change people's lives. And then the well of funding went dry for good. I had applied to the major pharmaceutical companies in the Chicago area and received rejections or no reply, which is not exactly helpful for someone who was already suffering from imposter syndrome. And I had to decide whether to stay in Chicago and extend a lease with no job prospects or to move into one of my parents' basements and job search across the US.

One of the things that made me stay without knowing how I would pay for it was an idea my PI and I had been playfully throwing around for a year or so – spinning off our technology we'd been developing in the lab into our own company. We now also had another postdoc in the lab who was extremely intelligent and dedicated. So I decided to stay in Chicago, find employment of one kind or another, and start the adventure of entrepreneurship with my team from the university.

As much as I get anxious talking to new people, when people say networking is everything, it really is so very, very true. I received this advice during a phone call with one of the VPs of Eli Lilly. This contact arose by networking with some new people I met *via* a friend and whilst I was chatting that I have been in science and now at a career crossroads, we figured out that the brother-in-law is a bigwig at Eli Lilly. One of the things the company exec told me was so simple but has proved to be instrumental to me over the past year was just to be flexible and open to new opportunities and let people know it.



Clockwise from far left- Amanda Schalk, Arnon Lavie, Ying Su, Hien Anh Nguyen

Shortly after signing my new lease and financially obligating myself to stay in Chicago, I attended a free startup business seminar at a biotech incubator and while getting coffee I happened to see someone wearing the shirt of a company I had read about and was interested in. With a certain amount of hesitation, but knowing I needed to do it, I just walked up to him, introduced myself, and said I was very interested in learning more about their company and what I could offer them. Luckily, the person wearing the shirt that day was the CEO and shortly after I was hired by his small virtual lab managing business "HappiLabs". This enabled me not only to learn how a small business is run but also how their customers, who are biotech startups across the country, run their companies on a day-to-day basis. I also got on insight on practices in purchasing and accounting that allow them to be most efficient, to save money, and to better meet their milestones with investors.

From going to seminars and networking events I also received two consulting offers in varying capacities. One was from a professor who was also spinning out technology and simply asked for help with all the bureaucracy involved in registrations to apply for federal grants. Another one was in the entirely different realm of political consulting in the city of Chicago; despite having no political experience, when a friend found out I was interested in entrepreneurship and business startups, he was eager to hire me to look after all the administrative tasks involved with setting up his own consultancy after being a partner in a firm for decades. I also received a job offer as a senior scientist from the science startup I had consulted with but I turned it down to continue gaining more experience at "HappiLabs" with biotech startups.

Only a little over a year ago on January 1st, 2017 I am one of the proud co-founders of a biotech/pharmaceutical startup (Enzyme by Design Inc.), which has been established together with my former PI, Dr. Arnon Lavie, a postdoc colleague, Hien Anh Nguyen, and Ying Su, the lab technician

My exodus from academia (continued)

who refused to be left out of this adventure and came on board as a co-founding investor.

The goal in our lab, and now as co-founders of our own company, is to develop safer cancer therapeutics. Chicago is not like the Silicon Valley or Boston, but there are industry experts willing to mentor and it is amazing what I have learned over the past year and the different ways I am now approaching our projects. Now it is not only about "Can I get this to work?", it is much more about "If this works, what are the competitive advantages compared to the current market and its competitors in clinical trials?" or "Will that be enough to make up for its later occurrence on the market and how do you convince key opinion leaders, insurers, and patients, that your drug is worth the risk compared to currently approved and well-accepted drugs?".

I'm learning so much every single day and many days I feel way out of my league. But I have discovered that so many people are willing to help if you just ask them. We were invited to partipate in Chicago Innovation Mentors, a program that pairs biotech startups with a team of four industry experts. A compliment we received from our mentors is that we don't just listen to advice, we also implement it. It sounds simple, but it's not. I know there were several times we were initially resistant to things they have said because we just wanted to act on the science. But the more we learn about business, the more we realize that what our mentors were saying was the difference between doing science for the sake of science and the possibility for that technology to have commercial viability. And since business and translating cancer therapeutics to the clinics is an area outside of our wheelhouse, (we're a team of structural biologists who do enzyme engineering), knowing exactly what we don't know has often proven as important as what we actually know.

I'm very lucky to have a strong team of people who enjoy learning about new things and are willing to leave egos outside when there is a bigger goal in mind. They are all respectful, kind and fair, and although our strengths are sometimes overlapping we are also very complementary given how different our personalities, perspectives and experiences are. Right now, our focus is on writing small federal business grants to get non-dilutive funding. This is necessary to continue and complete our research experiments so that we can apply for an IND (Investigational New Drug) from the FDA without having to reduce our equity whilst still increasing the valuation of the company in parallel. And our Enzyme by Design team has increased in breadth of knowledge and experience through our scientific and business advisory boards: extremey smart, helpful individuals with a wealth of experience in industry (our business advisory board) or toxicology, treating cancer patients in the clinic, and/or conducting clinical trials (our scientific advisory board).

It looks like the fiscal year 2018 may be the year to get us off the ground. We recently got a perfect score for one of our small federal business grants. This would provide us with a year's funding most likely taking effect in the second half of 2018 (the federal budget has not been decided, so no funding has officially been awarded). At that point, Enzyme by Design, where I'm the Chief Operating Officer, will be in business. We are currently and for sure will be still then furiously working to acquire additional funding either through further federal small business grants or through angel investors so that we can keep operations going at Enzyme by Design.

Realistically I am aware that many biotech startups fail and that cancer therapeutics are especially high risk. In addition, as a spinoff from the university, all our current intellectual property - our main asset - is owned by the University of Illinois at Chicago and involves licensing agreements. It is very difficult to say what will become of this business venture over the next few years. But despite the risks, it has been, and I am confident it will be, an extremely exciting adventure - one that I am very glad I have taken.

Amanda Schalk

Amanda Schalk did her PhD research with Karin Kühnel in the Department of Neurobiology, headed by Reinhard Jahn, at the Max Planck Institute for Biophysical Chemistry and graduated in 2011. For the next five years she worked as a postdoctoral research fellow at the University of Illinois at Chicago. Since October 2016, Amanda is Operations Manager / Virtual Lab Manager at HappiLabs.org. Since 2017, Amanda is Co-Founder and Chief Operating Officer of Enzyme by Design Inc.

Reaching out

When networking becomes a full-time job

I was always envious of the lucky people who could strike a casual conversation with every guest speaker at any conference and return home with a bunch of business cards and a dozen of new brilliant ideas. I could not bring myself to introduce myself to a professor even if my life would have depended on it. Hence it is quite ironic that the very essence of the job I landed right after my PhD was to communicate with people - I am a community manager at the European Bioinformatics Institute. Luckily, it appears to be a good fit after all.

As a community manager I am promoting the resource, which my team is developing - Europe PMC literature database. Even though only few of my former lab colleagues have heard of it let alone used it - it is an established partner of PubMed Central. You can imagine how ambitious this aim was for me. I am also responsible for building a community around the service another difficult task. With millions of website users, how do I unite them, reach out to them, and talk to them?

My position is so versatile that sometimes it feels like I am doing ten different jobs at the same time. I run social media accounts, write articles and blog pieces, design posters and T-shirts, make videos, teach courses, present at conferences, organize workshops and hackathons. And these are not even the most impactful tools in my arsenal. Believe it or not, just like in research, it is a lot about collaborations, making connections, talking to people to find synergies and come up with new ideas. Most of the essential skills for this job I have actually acquired during my PhD. Planning a project, writing papers and reports, designing figures, teaching method courses, giving talks or organizing Horizons - all of this is so closely related to what I do now. But by no means is this a piece of cake. Every day I am challenged with the perks of the job that I was never prepared for:

I have no background in marketing or PR. When I started I had no idea how JATS format is different from XML or what DOI stands for. I didn't even have a Twitter account and only got one just before the interview to make sure I understand how it works. I am the only biologist in the team, so I had to master the jargon to be able talk to developers and text-miners. Every day I am learning something new, which is perhaps the most satisfying thing about my job, and it is the one thing that I loved about doing research opening new horizons, never stopping to discover, and questioning everything you know.

Sometimes I am asked if I miss science, but I think this question misses the point that I help to advance science by sharing those amazing tools with the research community and hopefully supporting scientists on their way to the next breakthrough. I feel like I am a part of something bigger and it is very exciting to be in this position.

Not all of us are born to be perfect communicators - I certainly wasn't. But it became an important part of my job and I had to get better at it. Now I know that the coffee break is the most important part of any conference, where new ideas are brought to life, collaborations start, and new colleagues are met. It is now my turn to leave the venue with a dozen business cards in my pocket. I have realized that I don't need to stress myself about approaching people with a concrete goal in my mind as networking requires serendipity; it takes time to grow connections. As you cannot foresee what will come out of a small talk at a poster session, it makes sense to relax and be yourself. The networks you acquire during your PhD and postdoc time might one day be your greatest asset. Take it from me every scientist should be a little bit of a community manager, as science is a communal pursuit.

Mariia Levchenko

Maria Levchenko did her doctoral research 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.

A perfect match

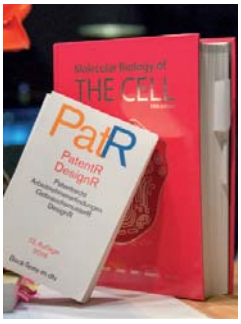
The combination of law and science is a great opportunity for abstract thinking people

When I was looking for my next career step, I read an article in the MolBio Newsletter about the job as a patent attorney and also remembered a seminar for scientists I attended during my MSc studies on how to protect your ideas. I started to inform myself about working in the intellectual property (IP) business and took a course on IP law for one semester. While I was looking for a job in the IP business, I found a less common profession: patent counsel at a law firm. As this is a not well-defined job, there is a huge difference between working in different law firms and also between working in a law firm and, for example, in a pharmaceutical company. So I will write about my experience as a patent counsel in a law firm.

It is my job to support the patent attorneys by preparing drafts for patent applications, forwarding letters from the different patent offices to clients together with comments and recommendations, as well as writing replies to the patent offices to convince them why an invention is really new and inventive. Together with the attorneys I am also taking part in opposition proceedings, thus getting a patent invalidated or, when working for the patentee, preventing just that. My day-to-day work consists mostly of preparing new correspondence to clients, colleagues, or patent offices, or analyzing documents relevant for my current cases.

My new job differs substantially from academia as you need a different way of thinking than you are used to as a scientist. For example, words that appear to be synonyms potentially have very different meanings and hence completely differing consequences for a patent or an alleged infringer. Hence you need to be able to grasp and pay attention to minimal differences in wording and their meaning.

The advantage of working as a patent counsel instead of a patent attorney is that you do not need to have a special training and therefore you can start with your new job straight away. To become a patent attorney in Germany you are required to complete additional three years of studying in parallel to your day-to-day work, whereas you don't need this training to become a patent counsel. However, the course on IP law I attended for one semester certainly helped me to start in my new job. Other advantages are that, as you are an employee, your hours of work are limited and you can take holidays whenever you like giving you more free time. Nonetheless I can still become a European patent attorney, as the requirements are less strict.



What I especially like about my new job is the broad variety of topics ranging from pharmaceuticals, food technology and medical devices to electrochemistry and materials science. Hence, the factual knowledge that I have acquired during my BSc and MSc studies is more useful than that from my PhD studies. Nonetheless, having a PhD is valuable for this job as it is providing me with an in-depth understanding of said factual knowledge as well as of its meaning and importance. What I also like is that there is not necessarily a single definite answer and therefore you need to think about all kind of possibilities, even though patent law is much more based on objective facts than law in general. Summarizing – for me personally – this job is the perfect match of law and science.

I am very happy with my choice of changing careers, leaving academia behind, and starting a new profession in which I need to learn completely new things. Moving to Stuttgart was also a welcome change of environment after living nearly ten years in Göttingen. My new home town is much bigger, reminding me a little bit of New Delhi as the traffic is nearly as bad. I have met new great colleagues and, overall, people in Stuttgart are as nice as in Göttingen and not so different, even though I get sometimes the feeling of being in a foreign country as what people speak as a local dialect sounds like anything but not German.

I would like to encourage every student reading this to speak to other people, for example alumni, about their careers to get to know the different career paths ahead after you graduate. I would also like to thank several people who helped me find my new profession: Mary Osborn for her encouragement, guidance and important feedback, as well as three MolBio alumni Koray Kirli, for his advice to use my spare free time for a course on what I want to do after the PhD, Roland Graf, for his article in the MolBio Newsletter and the opportunity to talk about a career in patent law, and Jennifer Seefeldt for her independent advice to participate in a course and her support during my time as a PhD student.

Bernard Freytag completed his doctoral thesis in the Department of Dirk Görlich at the MPI for Biophysical Chemistry. He graduated from the Molecular Biology Program in June 2016. Currently, he works as *Patentreferent* (patent counsel) in Stuttgart.

Exploring an alternate path…

An article about my underwater photography "passion project"

Just the other day, I was watching an online lecture about storytelling in photography and the speaker was talking about how she has a "passion for photography". Normally I would dismiss this as an overused millennial version of the word "passion" (e.g. I have a "passion" for Quinoa), but this person defined passion as a sum of interest and commitment, which piqued my interest and gave the word a lot more context. Here, I wanted to share with you a short glimpse into how I found my "passion project", what it taught me, and hopefully in turn inspire you to find your own path.

Bleached *Acropora sp*. Staghorn coral.

In 2015 and 2016, the summers in Saudi Arabia was far warmer than the years before. This caused the sea temperature to rise by about one degree C. Corals live at the depth where the temperature is at the tolerance edge of their ideal temperature. Any increase by even half a degree will cause it to eject its symbiotic microalgae whose function is to feed the coral. This event is called bleaching, which if sustained, causes the coral to starve to death. Studying the Red Sea corals are particularly interesting since the water temperature and salinity in the Red Sea is higher than other oceans and therefore could be a used to develop a predictive model for reef ecology and climate change. Or perhaps even in repopulating decimated reefs around the world.

I became interested in photography when I first got my film point-and-shoot camera at the age of 19. I like that meditative state I get into when I detach myself from the world and just become an observer. It's a way for me to gain objectivity and see scenes and people around me with a "fresh set of eyes". After SCUBA diving in the same spots a few dozen times, I wanted to gain a fresh perspective. When you are diving, you tend to ignore the small things around you with the hope of spotting "something special". Photography slowed down my dives significantly and made EVERYTHING special.

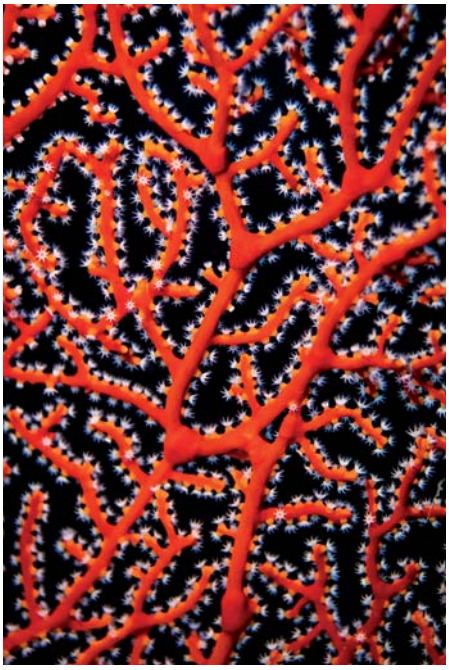
Sepioteuthis lessoniana, bigfin reef squid. Photo was captured during a night dive. This photo was one of the 32 images selected for the National Geographic assignment "Ocean Encounters" (http://yourshot.nationalgeographic.com/stories/ocean-encounters/) in August 2017.

Normally, a single dive lasts about an hour on average, depending on your depth and rate of air consumption. In that hour, you usually swim for a total of about 500 meters, in lateral distance. When I started taking photos, I barely made a hundred meters, in the same time. An analogy to that would be when you travel and end up sitting in a café observing the city flowing

Thysanostoma loriferum. Purple jelly fish

Exploring an alternate path... (continued)

around you. I started to see that every square centimeter of the reef is covered with incredible shapes and colors, making it a living sculpture in constant flux. Taking your time on dives also gives you a chance to observe and learn more about these amazing organisms and appreciate their capacity for survival through adaptation and behavior (and use it against them to position yourself for better photos). For example, after encountering groups of squids in a couple of dives, I learnt that you have to swim above them where they can't see you, to take photos of them (now you know!).



Subergorgia sp. Red sea fan.

Another aspect of underwater photography that was particularly attractive for me is that like most science nerds I love technology. As I progressed deeper into this new genre of photography, I started learning about new types of equipment as well as shooting or lighting techniques that I have never considered. I was learning more about how to illuminate my subjects effectively. I was also learning techniques in post-processing that helped me with my photography in general. I guess, what started as a project became more of an experience. It sucked me in and forced me to grow as a photographer and to develop my own way of looking at my pictures. I also started to see that when you do something you really enjoy or love, recognition isn't as important as transmitting your message clearly and effectively (a big part of this is getting constructive criticism).

Chromodoris annae. Sea slug.

Dendronephthya hemprichi. Soft Coral.

Take-home message: Let your mind wander and start a "passion project". Just be curious and be prepared to commit your time to learning. With some luck, you too will have an amazing adventure.

Anand Radhakrishnan

Anand Radhakrishnan received his MSc degree from the Molecular Biology program in 2003. He continued with a PhD thesis in the group of Reinhard Jahn at the MPI for Biophysical Chemistry and graduated in 2007. Currently he lives and works in the city of Munich. His photography work both underwater and on land can be followed *via* his public Instagram page: @anandkpr77. While his day job currently pays the bill, he dreams for a future when he can stay behind a camera all year round.

Keep calm and watch an episode of Peppa Pig

When I received an email from Steffen asking me whether I would like to contribute to the "Family Careers" section in the Molbio newsletter, my first thought was "oh dear, not sure I'm actually a good candidate for this category at the moment." I'm a postdoc in the group of Sharon Tooze at the newly built Francis Crick Institute, which is a brand new £700 million cathedral of biomedical research in central London. My contract ends in November 2018 and I am currently as certain about my next career step as the Brits are about Brexit. Hopefully I will get a better deal than Theresa May and the other Tory clowns this year.

Martina, her partner Stefan and their son Arthur

When I thought about it for a bit longer, the fact that I am a mom most likely has not made a big difference on my career path so far. However, I would not say that having a child does not affect your life. In fact, it changes your life dramatically! Our son Arthur made himself noticeable already from week 5 of my pregnancy. I was suffering quite badly from morning sickness, so I told my boss rather early that I was pregnant. Sharon was very understanding and it wasn't a problem at all when I was changing my working hours to starting and leaving late in order to avoid "sardines in a can" situations on the London tube during rush hour. Luckily, from the second trimester I felt much better. This might be simply because I finally could enjoy food again and didn't have to fear that I may have to dispose of my last meal into the nearest bin in the lab any moment. Overall, my pregnancy hadn't affected my work very much. Thanks to my lovely colleagues, I still could do experiments as before and they took over tasks (e.g. PFA fixation) that I could no longer do.

In contrast to Germany, the UK does not have any strict regulations, and the latest time point to start your maternity leave is the due date. I didn't have any problems during my pregnancy and therefore I went on maternity leave one week before my due date. There is probably never the perfect point in time to have a child, and when I had to plan my maternity leave, my lab and institute were preparing for the big move into the newly built Francis Crick Institute. For a while I was worried that I had to return already after three months, to be around when my zebrafish lines would have been transferred into the new aquatics facility. Fortunately, my partner Stefan and my boss convinced me that I should take six months off, and as usual there were delays with the completion of the building.

Arthur also totally ignored his due date and was finally born 14th September 2015 (10 days beyond). His arrival was an amazing experience and it's still incredible and sometimes so funny to watch him grow, learn and explore the world. If you haven't had kids before yourself, you totally underestimate the sleep deprivation and hormonal rollercoaster of the first days, weeks and months. Even though in the beginning I thought I would have time to work on my project, I hardly worked or even thought about it and instead tried to enjoy my time with Arthur as much as possible. Time was flying and it was tough to go back to the lab after six months. At that time Arthur was teething and waking a lot during the night, he initially refused to drink from bottles (despite offering a range of bottles carefully selected after extensive research of Amazon reviews) and had to go cold turkey when I was at work. In addition, Arthur was settling in with Yvonne, our childminder, where initially he spent only one day a week gradually increasing it over the next six months. The rest of the week my partner Stefan took over, who is a Reader in Mathematics at Warwick University.

In the beginning it was quite challenging for him, but he soon figured out his own way to take care of Arthur. In the UK, stay at home dads are rather the exception, often Stefan was the only adult man at playgroups and blending in was sometimes hard, when suddenly all the mums were breastfeeding around him. But for most of the time Stefan and Arthur had a lot of fun together and while I was working in the lab they enjoyed the summer in the parks near our home.

From October 2016 Stefan had to teach and we both were working full time again. Although we do not have any

Keep calm and watch an episode of Peppa Pig (continued)

grandparents nearby, sickness hasn't been a big problem. One advantage of childminders is that they take care of a smaller number of kids, the pool of germs is smaller and there have been only a few days I had to take off. In addition, if Stefan isn't teaching he is relatively flexible in his job and can "work from home" and catch up work on the weekend.

One important thing for us is that we share responsibilities equally as far as possible and support each other in a way that stressful times have the smallest impact on Arthur and our work. Overall, I am spending much less time in the lab than before, but I do not think I am less productive. I have become more organized, and especially on days where "I'm on duty" morning and evening I have to plan well as I cannot afford to waste time. Moreover, I think I got more relaxed and better in dealing with frustration, which unfortunately is part of doing science. Now the most important thing for me is that my family is fine. Failed experiments on the other hand can be repeated or the working hypothesis wasn't right in the first place and needs rethinking. When we get home our second job starts. There is a curious two year old exploring our flat and if we do not pay attention (or put on an episode of Peppa Pig) he will climb on our sofa and reach stuff we thought was safe from him until now.

Looking back, we enjoyed a lot our parental leave, but we also realized that entertaining and taking care of a little child is both fun and hard work requiring a lot of patience and creativity. Thus, we also like being back in our jobs and taking a break from childcare at work. Arthur loves playing with the other kids at our childminder's place or playgroups and is speaking more English than German for now. For us the way we have organized our childcare works out nicely and the balance between work and family feels right and we hope this won't change with my next career step.

Martina Wirth

Martina Wirth was a PhD student in the group of Wolfgang Fischle at the MPI for Biophysical Chemistry. After her graduation in November 2010 she joined the group of Sharon Tooze at the Cancer Research UK London Research Institute (now Francis Crick Institute) where she is still working as a postdoctoral reseacher. Her son Arthur was born in 2015.

Former PhD student representives

A big **thank you** from the Molbio Program Committee, faculty members and students to our former PhD student representatives **Shama Sograte Idrissi** and **Frank Richter**, who represented the Molbio PhD community for two years. You did a great job!

New PhD student representatives

We, Claudia and Franziska, are happy to introduce ourselves as the new MolBio PhD student representatives.

I am **Franziska Kretzschmar**, 26 years old and was born and raised in Leipzig. After school I worked as an AuPair in the US for one year. When I returned to Germany, I started studying Molecular Biology at the Universität des Saarlandes, where I also joined their binational Bachelor's program and spent half of my undergraduate time at the Université de Strasbourg. In 2014, I joined the Molbio program. Since May 2016 I am working on my PhD project in the Junior Research Group of Till Ischebeck at the Department of Plant Biochemistry. I am investigating proteins and protein turnover on an organelle called lipid droplets.

I am **Claudia Schmidt**, 25 years old and I am coming from a town close to Munich. I studied biology at the Ludwig-Maximiliarns-Universität in Munich before I joined the Molbio program in 2014. Since April 2016 I am doing my PhD in the research group "Membrane Protein Biochemistry" of Alexander Stein at the MPI for Biophysical Chemistry. I am investigating the pathway of ER-associated protein degradation.

We are excited about our new tasks and responsibilities as student representatives of the Molecular Biology program and are looking forward to representing you. In case you have any questions, ideas or issues you aren't happy with, feel free to contact us!

My way to the National Institutes of Health

Expect the unexpected! That is a slogan that I used a lot during my time as a volunteer for the intercultural exchange organization "Experiment e.V.". We used it to convey the importance of being open to new experiences and opportunities that would arise for German high school students during their upcoming one-year stay in a foreign host family. Consciously or not, I have lived by this motto during my professional career. By being open to new directions and following my scientific discoveries, I am now launching my own research program in the intramural division of the National Institute of Dental and Craniofacial Research (NIDCR), a place I would have never imagined to be at the beginning of my studies.

After receiving my Bachelor's degree from the University of Lübeck, I was accepted into the IMPRS for Molecular Biology in Göttingen in 2005 (see group photo to the right). At the time, I was determined to continue my undergraduate research on structure determination using NMR. However, this changed rapidly after attending the lectures given by Frauke Melchior, one of the pioneers of the field of posttranslational modification with the small ubiquitin-like modifier SUMO. Inspired by her exciting research topic, her talent to conceptualize difficult ideas, and her passion for the scientific discovery process, I decided to join her lab for my graduate work.

My initial project was geared towards identifying the role of how SUMO regulates the poorly characterized ubiquitin E3 ligase complex. Despite the hard work and long hours, I had made little progress two and a half years into my project. Frustrated over this, I started to consider alternate career paths including consulting leading me to join the Capstone mentoring program of McKinsey & Company. However, after switching the focus of my project towards characterizing the ubiquitin E3 ligase complex itself, my project finally started taking off and my scientific curiosity and drive was reignited. Thanks to Frauke's mentorship and everlasting optimism, a bit of luck, and certainly a lot of persistence, I made quick progress and discovered a novel ubiquitin-dependent pathway that regulates actin-based cell-shape changes required for faithful cell cycle progression.

Molbio MSc class 2005/06. Achim is the tallest guy in the back.

Motivated by these findings and fascinated by research centering around ubiquitin and its versatile modes of regulating cellular processes, I decided to join the lab of Michael Rape at UC Berkeley in 2012. Throughout recent years he had become one of the leaders of the ubiquitin field and his laboratory had made seminally contributions to our current understanding of cellular ubiquitin signaling.

I arrived at an exciting time; the group had just discovered pivotal roles for CUL3-based ubiquitin E3 ligases in murine stem cell maintenance. To expand these observations, I first established human embryonic stem cells (hESCs) as a model in Michael's laboratory and revealed that many CUL3-based ubiquitin E3 ligases are tightly regulated during hESC differentiation, strongly pointing to functions of these enzymes in early development. Indeed, I found one particular member of these E3 ligases to be essential for differentiation of hESCs into neural crest stem cells, which are an embryonic cell population that gives rise to a variety of cell types and tissues of the developed organism such as the facial bone structures. To determine candidate targets, through which this E3 ligase complex controls neural crest formation, I applied my knowledge and skills in biochemistry and mass spectrometry gained during my PhD studies. I vividly remember the moment when I finished the first set of proteomic analysis. The two top candidates were two ribosome biogenesis regulators, one of which being frequently mutated in Treacher Collins Syndrome, a disorder of neural crest and craniofacial development. I was thrilled; I knew that I had stumbled across an unknown mechanism involved in an important step in human development.

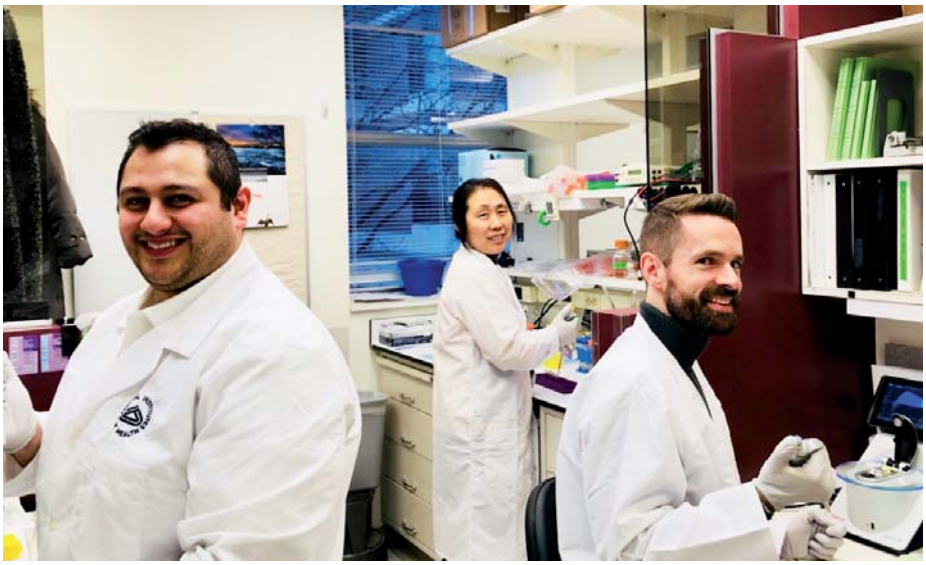
After these initial discoveries it took many long hours in the lab, Michael's guidance, fantastic work by great collaborators, and stimulating discussions with lab members, to uncover the underlying principles of this pathway: differentiating hESCs utilize ubiquitylation to control ribosome biogenesis resulting in production of new and likely modified ribosomes that help reshape the mRNA translation landscape in favor of neural crest formation.

The results from this work were exciting as they uncovered a new principle of how cells make fate decisions during differentiation and opened up many interesting directions for future

My way to the National Institutes of Health (continued)

research. To follow these, I applied for funding from the National Institutes of Health (NIH) and was able to receive a K99/R00 grant in 2015. This career development award is designed to help transition senior postdocs to become independent investigators in an academic setting within the United States. With the generous support and mentorship of Michael, I was therefore able to continue my work on the ubiquitin-dependent regulation of neural crest development and to explore functions of different CUL3-based E3s in other aspects of stem cell biology. This way, I could collect preliminary data for my own independent research program. At the time, with everything having worked out so well in my postdoc laboratory, I felt that I was in a strong position for the upcoming job application process, not quite anticipating how challenging and stressful it would be.

By far the most draining aspect of being in the academic job market was the uncertainty about the future. In addition, it was hard to juggle different responsibilities such as completing experiments and mentoring students while writing and sending out applications. Not hearing back from institutions for weeks or months (or never in some cases) was eroding my self-confidence. I was very relieved when I received my first invitations for interviews. The process of interviewing was definitely exhausting but visiting different research universities and institutions, giving my seminar presentation, and discussing my research plans with faculty in- and outside of my field of study was an incredible learning experience. It taught me a lot about what was actually important for me in my next job: an environment, in which I could build my lab for the long run without too many worries about funding, I would be surrounded by friendly and collaborative colleagues, and I could pursue research that is basic in nature, but has relevance to human disease.



Antony Asmar, Youmei Wu and Achim Werner (left to right)

Since October 2017, I am now a tenure-track investigator at the National Institute of Dental and Craniofacial Research (NIDCR), which is one of the 27 organizational units of the NIH on the main campus in the Washington D.C. area. I am still settling in but I am enjoying the challenge of coordinating my new responsibilities of setting up equipment, interviewing and hiring new personnel, mentoring my growing research team, and managing my budget and the bureaucracy of the US federal government. My lab currently consists of an experienced biologist Youmei Wu, and a postdoctoral researcher Anthony Asmar, who both have been instrumental in setting up the lab and getting the first experiments started (see photo above).

My way to the NIDCR was anything but planned, however in large, it was being open to new directions provided by my discoveries that lead me to where I am today. I am thankful for the warm and friendly welcome from my fellow investigators and I am impressed with the collaborative atmosphere. In fact, I was already approached by clinical colleagues of mine to collaborate on determining how mutation in a Ubiquitin E3 ligase found in their patients leads to an autoimmune disease. I am excited to see where this project will lead us, which other opportunities will arise, how my team will grow, and how my overall research program will develop. I am expecting the unexpected!

Achim Werner completed his doctoral thesis under the supervision of Frauke Melchior and graduated from the Molecular Biology Program in November 2010. After his postdoctoral reseach at UC Berkeley (Rape Lab) he started his own lab as Stadtman Tenure-Track Investigator at the National Institute of Health, National Institute of Dental and Craniofacial Research (NIH/NIDCR) in Washington D.C. in October 2017.

Unknown unknowns

...from a junior PI's perspective

Animal Anatomy 101: after heaving dealt with Hydra's radial symmetrical body plan some two weeks ago, followed by an introduction to bilaterians and the strange and highly disputed concept of Lophotrochozoa the week after, I was now sweating in front of a halfheartedly dissected snail and wondering where to find the cerebral ganglion and whether or not to expect a crossing-over of the extending nerve cords. Such memories of my own undergraduate studies hit me hard when I was starting to prepare my first course and lecture on, you probably guessed it, snail anatomy.

At that time, I had just joined the newly founded Center for Organismal Studies in Heidelberg and started to familiarize myself with life at the university. I had completely forgotten about zoology, botany, cell biology, and molecular biology classes I took as a bachelor student. Instead, I had gotten absorbed with keeping a zoo of different fly species, genes that could act as evolutionary switches, with new methods of *in vivo* imaging, and technical details of where and how to store terabytes of single-cell resolution time lapse recordings of whole embryos. I was excited about the first results coming in as my lab started to settle, and if I had to think of snail, then this was the gene encoding a C_2H_2-type zinc-finger transcription factor that plays a formidable role during *Drosophila* mesoderm formation.

Yet here it was: the chance to experience teaching of first-year students by developing a module on "bauplan"-variation, or, in terms of the biology teaching canon: the anatomy of mollusks. The associated challenges were unexpected and ranged from finding a place where to get enough snails in the middle of winter

Steffen (second from right) and his lab members

(online delicacy store) to deciding how to best balance time for dissecting and sketching snail anatomy. And like the challenges, so were the rewards: unforeseen and only gradually unfolding. Sure, it is nice to have students tell you that they enjoyed the class even though they initially thought the topic would be boring. But what was more is that preparing a very general introduction to animal anatomy and its evolutionary history brought back a sense of the full picture in organismal biology. While this initially ignited flashbacks of my own studies, these and other teaching experiences eventually started to influence my way of thinking about our scientific questions in the lab: how are those connected to the larger phenomena and questions in biology? What I learned here helps me in preparing talks, papers, and grants, and it thus provides repeatedly surprising rewards for something I initially thought was distracting me from my own research.

Like teaching, it may not surprise you that publishing our first papers came with some twists and hurdles, too. And maybe you are a bit quicker in noticing the pattern that took us a while to discover from a set of recurring questions: How do you frame content without having a template? What is the data you want to include, what of this is really needed to follow the story, and what did you actually forget to include because you are so familiar with the topic that you don't even think about it anymore? Most likely I showed a particularly lack of talent, but if our struggles in framing our data and telling our story reflect just a fraction of commonality in publishing, then one thing I acquired over the past years is a high admiration for well-written papers. As a postdoc, I used to think, 'sure, if I just had that wonderful data, of course this is how one has to put it'. Now I am not so sure anymore; and maybe it is one of the hidden secrets in science to learn how to present data so convincingly that everyone feels this is the most exciting and natural story they have read for a while. Either way, I have since come away with a different view on some of the more intense discussions I had with my postdoc advisor, and I would now agree that a paper is more than just a string of results written from beginning to end. If your work does not come with much precedent, finding examples to guide and teach yourself is not always easy, and so we still struggle, sweat, and curse a lot while writing

Steffen Lemke completed his doctoral thesis under the supervision of Urs Schmidt-Ott and graduated from the Molecular Biology Program in June 2006. After his postdoctoral research at the University of Chicago he became Emmy Noether Research Group Leader at the University of Heidelberg. Since 2017 he is Junior Professor at the Center for Organismal Studies (COS) Heidelberg.

A guest lecture after retirement

Return from Hyderabad with beautiful memories

When I was asked more than a year ago if I would be willing to give a 2-week course on "Glycoconjugates: Role in Biology and Biomedical Relevance" at the School of Life Sciences and the School of Chemistry at the University of Hyderabad, it was obvious that this would not be an easy task. Since I have retired I devoted my time to other things and therefore a lot of precognition got lost resulting in a complete re-preparation of each lecture. I saw this as an opportunity to refresh the knowledge that had already begun to fade away in recent years and agreed to give the course. Intensive preparations began, which, in addition to the lack of specialized knowledge, brought back many beautiful memories of my previous work. For a long time I haven't been thinking about it too much but now refreshing it was on its own a really gratifying experience even before travelling to Hyderabad.

Kundan and Irena at the Haldi Ceremony

After returning from Hyderabad beginning of December, I can confirm that the lectures were very rewarding, too. Unlike the lectures on the fundamentals of biochemistry, which are more or less beloved compulsory lectures for medical students as part of their pre-clinical studies, they offered me the opportunity to comprehensively and systematically cover an area of my own research field. With their intense and at times persistent questions, the approximately 35 participants (MSc/PhD students and postdocs; mostly

Unknown unknowns... (continued)

our manuscripts. But, as a team, we also learned how to structure and ultimately enjoy the adventure.

As happened for paper writing, so did team efforts help in other instances ranging from uncounted moves of lab, office, and fly room in a building under constant reconstruction to repeatedly winning a very competitive COS costume contest. And I need to admit that I have been incredibly lucky with the students and postdocs who decided to join our team. I am still amazed to see how they collectively pushed the lab into areas that are way beyond my initial background, e.g. when they analyze terabyte-sized 5D datasets by writing their own matlab scripts, or when they come back from a hackathon just to tell me that they got offers to join various start-ups because "the detection of signals for medical heart issues in collected smart watch data was conceptually the same as identifying specific features in millions of cell shapes". Watching my team mates grow this way, and thus grow together with them, has turned out to be another unforeseen side effect of my time as a PI. I fully realized this only recently, when my first graduate student left the lab to take up a new position as postdoc in Leuven: to see her graduate, and then loosen herself from the lab, step by step, through application, reference letter, skype interview, and visiting the new lab to eventually continue with a self-chosen scientific vision has been one of the most gratifying experiences so far.

Obviously, the development of our group was possible only because of an extremely supporting and inspiring environment at the Center for Organismal Studies in Heidelberg. When my Emmy-Noether Funding ended two years ago, I was extremely fortunate that this coincided with an opening for a junior professorship at COS, and I am grateful that the successful application to this position has allowed me to continue with the most rewarding and exciting work I could imagine.

Steffen Lemke

A guest lecture after retirement (continued)

from the universities of Hyderabad), gave me the feeling that my course had aroused their interest in the slightly remote area of glycoconjugates. The fact that in this regard the course proved to be so successful was an enjoyable reward for all the time, which had gone into the preparation.

Kurt von Figura (center) together with his host Nadimpalli SIva Kumar (left) and a PhD student

The course required a great deal of perseverance from the students: Four lectures per day, followed by equally long question and discussion sessions, interrupted by two course days with biochemical and biophysical experiments. I was impressed by their consistent attention right to the very last lecture, their desire to understand things and their interest in the often intricate, surprising and sometimes elegant ways leading to discoveries.

Via the Global Initiative of Academic Networks (GIAN), the Indian government has for some years been promoting the contact of Indian students and young researchers with international scientists in the form of such courses. I am grateful to all who have supported and organized the course, especially the local coordinators Prof N. Siva Kumar and Prof M. J. Swamy. I hope that it became quite obvious how much I personally benefited from this course as well as the preceding preparations.

A subsequent 10-day trip to villages of the Adivasi in the borderlands of Andra Pradesh, Chhattisgarh and Odisha, which one of the students spontaneously joined, completed my all-round beautiful memories of Hyderabad.

Kurt von Figura

The University of Hyderabad

Classified as one of India's top 5 universities in 2016.

Approx. 3,500 Master students, 1,650 PhD students and 400 professors.

Organized in 12 "schools" that cover the natural and life sciences (excluding medicine), the humanities and social sciences, and engineering.

The very large campus area, which is partially covered in jungle, houses not only all institutes and central facilities, but also 22 residential homes accommodating nearly 5,000 students and visiting scientists. It is completely isolated from the daily routine of an Indian metropolis.

Nadimpalli Siva Kumar is Professor in the Biochemistry Department, School of Life Sciences at the University of Hyderabad. Several current and former students of the Göttingen Molecular Biology Program studied at the University of Hyderbad, many under his supervision: **Madhumati Sevvana** (now Purdue University), **Nirmala Padmanabhan** (now University of Manitoba), **Gajula Balija Madhu Babu** (returned to Hyderabad to become an assistant professor), **Reejuana Parveen** (now biotech company Banlagore), **Upadhyayula Sai Srinivas** (now Singapore National University), **Debojit Saha** (currently Molbio Master student).

Kurt von Figura is a founder member of the Molecular Biology program and a key driver in getting the program successfully established. As head of the Biochemistry Department at the University Medical Center Göttingen his research focused on the biogenesis of lysosomes and how their function is stimulated by several human congenital disorders. From 2005 to 2010 he was President of the University of Göttingen. He is married and has four children.

3C or Challenge, Contest and Cooperation

Last October Natalia and I traveled to Augsburg where we took part in the PhD student presentation contest organized by the German-Ukrainian Academic Society. Our journey to the meeting was supposed to be a pleasant four-hour trip by ICE train. However, nature decided to bring a little unexpected twist to our journey throwing a hurricane over northern Germany resulting in the cancelation of all trains connecting the North and South. Using buses, cars, regional trains, power of the Internet and, most importantly, suddenly sharpened German skills, we could make it to Augsburg on time. The first challenge was behind us.

The PhD contest was held in conjunction with the annual meeting of the German-Ukrainian Academic Society. This society is a non-profit organization and its main goals are to foster bilateral academic cooperation between Germany and Ukraine, to increase the visibility of Ukrainian researchers, and to support reforms in Ukrainian science. It was great to meet fellow scientists of all ages, ranks and fields who care not only about their own career but are willing to invest their time and effort to help aspiring Ukrainian scientists to succeed. During the meeting many interesting ideas were brought to the table such as creating a unit that would help researchers with drafting proposals for collaborative grants, organization of numerous workshops for young scientists in Ukraine and promotion of tighter collaboration between German and Ukrainian institutions.

The concluding part of the meeting was the PhD student presentation contest. Any PhD student who is involved in a collaborative German-Ukrainian project or is doing his or her thesis in the respective country could participate. Natalia and I were among the six finalists who were selected to present their research in Augsburg. Each participant had only five minutes and in this short time we had to describe the challenge, the approach and the key results of our thesis, make the presentation scientifically relevant, and at the same time understandable for anybody outside our field. The topics were very diverse and covered scientific areas from European trade policy to the properties of ferroelectric films. We, of course, brought the flavor of molecular biology to the mix. Our presentations resonated well with the jury as we got the first (Oleksandr) and the third (Natalia) prizes.

For me personally, participation in such a contest was a great experience as it allowed me to look at my project from a different perspective. Rather than thinking about the next experiment reviewers would like to see in my publication, I took a step back to re-think where my PhD project fits in the grand scheme of science. But even more than that, I was happy to join the network of scientists that in little steps helps to shape a better research landscape in my home country.

Oleksandr Yagensky

Yarema Okhrin (Head of the PhD Contest Committee), Oleksandr Yagensky, Natalia Korniy, Olga Garaschuk (President of the German-Ukrainian Academic Society), and Bohdan Tokarskyj (second place) (from left). (Photo: German-Ukrainian Academic Society)

Oleksandr Yagensky is currently a PhD student in the group of John Chua in the Department of Neurobiology (Reinhard Jahn) at the Max Planck Institute for Biophysical Chemistry.

Natalia Korniy is currently a PhD student in the Department of Physical Biochemistry (Marina Rodina) at the Max Planck Institute for Biophysical Chemistry.

"Spread the word about curiosity"

A report of the 67th Lindau Nobel Laureate Meeting on 25 – 30 June 2017

Every year at the end of June on the shores of Lake Constance (Bodensee) the Lindau Nobel Laureate meeting takes place, which is dedicated to one of the natural sciences disciplines - physics, chemistry or medicine. This year a group of students from the IMPRS Molecular Biology program had the opportunity to take part in a meeting dedicated to chemistry.

Group photo at the Lindau venue

The Lindau Nobel meetings set out on a threefold mission to Educate, Inspire and Connect investigators across generations and disciplines, which is achieved through a thoughtful scientific and social program of the meeting. Plenary lectures are where the Nobel laureates present topics to instruct and educate the participants, afternoon discussions and social events facilitate exchange between young scientists, Nobel laureates and Lindau foundation partners.

One of the topics that captured everyone's attention was the power of online preprints. It was passionately introduced in one of the very first sessions by Martin Chalfie and it continued to be reexamined in private discussions with students throughout the conference. Prof Chalfie advocates putting scientific article preprints online in a biorxiv server. Prof. Chalfie's view is that preprints speed up science as papers are not "held hostage by the journals reviewing them". Furthermore it makes research universally available regardless of the financial capabilities of your institution or country or as he put it a preprint "evens out the playing field for everybody". A researcher can make their work accessible as soon as they deem that it is ready for the world to see, thus putting a timestamp on the work and making all of your research available for consideration in grant proposals, promotions and hiring. Many Nobel Laureates were willing advocates of the online preprint, including Stefan Hell who said "I like putting it (research) on the archive, then you see the unbiased thought".

The Lindau meetings are normally not political, however this year it was clear from the outset that neither the organizers, nor laureates or participants were content to ignore the tumultuous events in the political landscapes of US and EU.

Kai-Hsin Chan, Sinem Saka, Marija Liutkute, Goran Kokic (from left to right)

The sweeping distrust of the scientific process and climate change denial was addressed by Steven Chu in his keynote speech delivered by William Moerner. The questionable politics of Donald Trump were criticized by Mario Molina, and John Walker was dismayed by the United Kingdom's decision to leave the European Union. This resulted in some interesting and dynamic discussions throughout the conference about the importance of outreach, successful translation of scientific discoveries to public policy and science literacy in the broader context of society. As so eloquently put by Aaron Ciechanover "Science is not an independent entity. It should always be looked at in the context of society". These sentiments were echoed throughout by Nobel Laureates and every young scientist we had the chance to meet during the meeting.

It is impossible to faithfully recount the many ways that the Lindau Nobel Laureate meeting inspires and motivates young scientists. One of the highlights was the inspirational talk from Ben Feringa, who received the Nobel prize in

"Spread the word about curiosity" (continued)+

2016 for the design and synthesis of molecular machines. Prof Feringa in his "Joy of Discovery" talk discussed his career path, ideas and questions that inspire him, happy science accidents, rewards of perseverance, and provided valuable and actionable advice that was appreciated by many young scientists. He said that as a researcher you must "walk on two feet" - meaning that if you are working on an extremely tough and complicated problem that cannot be solved anytime soon you must not give up, but it is not a bad idea to have a more manageable and less daring problem "on the side". While you are tackling your big questions, you also ensure yourself publications and grants that will be crucial to the advancement of your career.

Marija Liutkute at her poster. Kai-Hsin Chan with Mario Molina

One of the unexpected treats of the Lindau Nobel Laureate meeting were the many interactions between young scientists there. Not only were the young scientists representing many countries worldwide but also the wide array of chemistry topics currently studied in science - from theoretical chemistry, polymer chemistry, astrochemistry, materials chemistry, biochemistry, medicinal chemistry and everything in between. The kaleidoscope of scientists creates a fantastic atmosphere of exchange where everyone is interested and curious about each other's work and all are keen to learn more. While you might have to condense your research to an articulate synopsis it will serve you as a springboard to many interesting discussions about the fundamental problems that you face in your research and the omnipresent rewards that motivate you to pursue science in the first place.

Our week of scientific delights culminated with a boat trip to the garden island of Mainau. The Nobel Laureates, distinguished guests, sponsors and all the young scientists took the scenic trip together. Here, the final scientific discussion on the "Ethics of Science" took place, and during the science picnic students took the final chance to cement new connections, ask any burning questions of the Laureates and get that final "selfie".

The shared interests, common goals and all round positive encouragement from other young scientists and all Lindau guests created a wonderful feeling of community. The overarching theme of the meeting was the power and belief in science as a worthy and important tool to be used for the benefit of society. The biggest takeaway from almost every laureate was that to be a successful scientist you must thirst for knowledge and discovery. If you are truly driven by your curiosity then a Nobel prize can be a meaningful accolade to have, but the purest trophy of research will always be that moment of scientific discovery.

Marija Liutkute

Current and former Molbio students at the 67th Lindau Nobel Laureate Meeting

Kai-Hsin (Cathie) Chan is currently a PhD student in the group of Marina Rodnina at the MPI for Biophysical Chemistry.

Goran Kokic is currently a PhD student in the group of Patrick Cramer at the MPI for Biophysical Chemistry.

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

Sinem Saka was a PhD student in the group of Silvio Rizzoli at the University Medical Center Göttingen and is now a postdoctoral researcher at Harvard University (Peng Yin Lab).

Alexander Schendzielorz was a PhD student in the group of Peter Rehling at the University Medical Center Göttingen, where he is currently continuing his research as a postdoctoral fellow.

The Scientific Odyssey of 2017

The 14th annual Horizons in Molecular Biology PhD Student Symposium

For the past 13 years, the "Horizons in Molecular Biology symposium" has been a vital part of the IMPRS Molecular Biology program and this year's student-organized scientific extravaganza took place on September 11-14, 2017. More than 250 scientists from 15 different countries came together to witness the four-day science tour and to listen to some of the leading scientists in the world.

The 11th Career Fair was the kick-off event of Horizons and took place on the first day with many different career related presentations and workshops. Ranging from a variety of fields like science journalism, consulting, patenting and industry, the talks provided the audience with multiple options and opportunities to be considered after their PhD. The keynote talk by Dr Rosa Veguilla, Associate Director at iBiology, gave an inspiring perspective on communicating science in an effective and understandable way. The scientific sessions of Horizons were opened by Kathy Niakan with her talk on deeper insight in the mechanisms of lineage specification in human embryos and stem cells. The day was concluded with a great talk by Vivek Malhotra whose journey from Spain to Göttingen was quite eventful. Despite his flight being delayed and cancelled, he made it to the conference just in time for his extremely refreshing presentation on novel mechanisms of collagen secretion.

The second day of Horizons showcased cutting edge science with Cigall Kadoch's talk on epigenetics in cancer, David Jones' lecture about applying artificial intelligence for predicting the gene function, and Saul Kato's exciting presentation on how the nervous system computes behavior.

Of course, what makes Horizons so special is not only the highly enlightening talks, but also the possibility to discuss science while enjoying food and sipping wine. The poster session opened with an overwhelming selection of cheese and wine, placed alongside over 35 posters presented by students. After careful reviewing, the prize for the best poster was awarded to Pritesh Krishnakumar, who proudly returned to the lab with a brand new set of pipettes, signed by Nobel laureates. Well done, Pritesh!

Over the course of the final two days, fascinating talks proceeded to broaden the audience's horizons and perspectives. At the interface of ecology and genomics, Detlef Weigel talked about the epigenetics dependent adaptation to the environment of *A. thaliana*. Deniz Delkara shared her groundbreaking research in AAV technology as a treatment for hereditary blindness and Ileana Cristea's cheerful and positive outlook was able to warm up the audience as she described her work

Horizons 2017 (continued)

in proteomics methods developed to study virus-host protein interactions. Young scientists from all over the city came along to listen to the pioneering research of Ed Boyden introducing the audience to his revolutionary technique of expansion microscopy. Hiroaki Suga's inspiring presentation on pseudo-natural peptides for therapeutic uses left everyone filled with amazement. The heart-felt talk by Maria Grazia Roncarolo regarding her work on the first pre-birth stem cell transplant was inspirational from both, the scientific and human perspective.

The panel discussion gave our participants insight into ways to identify opportunities in science and industry. The session, which was moderated by Prof Mary Osborn, provided the students with the opportunity to get a better idea of future perspectives by the speakers' personal experiences.

In addition to exciting research and scientific discussions, Horizons was filled with social events, such as the "Join us for beer" get-together and the conference party. The participants had the chance to meet the speakers in an informal setting, and taste some typical German cuisine and beers. A word of recognition has to be given to Marina Gebert, a career fair speaker who rocked the well-known beer holding contest and was the last person to leave the conference party.

The vibrant and stimulating atmosphere at Horizons gives everybody an opportunity to appreciate the world of science in a bigger context. We hope to see a fresh batch of science enthusiasts again next year, so please, save the date for the 15th Horizons in Molecular Biology which will take place on September 10-13, 2018!

Rashi Goel and Valentina Manzini

Horizons speakers 2017

Jean Beggs, Ed Boyden, Irene Chiolo, Ileana Cristea, Deniz Dalkara, Alex Faesen, Maria Grazia Roncarolo, David Jones, Cigall Kadoch, Saul Kato, Vivek Malhotra, Kathy Niakan, Juri Rappsilber, Benjamin Simons, Hiroaki Suga, Detlef Weigel, Saeko Yanaka

Joining the program in 2017

Fabian Commichau received his PhD from the University of Göttingen in 2006. After three years as a postdoctoral researcher in Göttingen and at the Biozentrum of the University of Basel he worked as a scientists for a biotech company. In 2011 Fabian returned to the Department of General Microbiology as a group leader. His current research addresses the question how the bacteria sense the need to change their genetic make-up to maintain glutamate homoeostasis, glutamate being the most abundant metabolite that delivers the majority of nitrogen for synthesis of vital building blocks in any living cell. His group is also interested in the control of the transcription factor PrfA in Listeria monocytogenes, a soil bacterium that, when ingested by contaminated food, may cause gastroenteritis and abortions in pregnant women with a high mortality rate. Fabian will contribute to the Molecular Biology lecture series for Master's students with a lecture on molecular evolution.

http://www.uni-goettingen.de/en/413008.html

Honors and Awards

Faculty Members
(current and former)

Stefan Hell has been awarded the Honorary Professorship of the University of Heidelberg, Faculty of Physics and Astronomy.

Tobias Moser received the Gottfried Wilhelm Leibniz Award 2017 of the German Research Foundation (DFG) and the Lower Saxony State Award of Science.

Erwin Neher has been appointed as an Honorary Member of the Royal Academy of Doctors, Barcelona, Spain.

Vladimir Pena received a Young Investigator Grant of the European Molecular Biology Organization (EMBO).

Students
(current and former)

Mohamed El Brolosy has been awarded a PhD fellowship of the Boehringer Ingelheim Fonds.

Natalia Korniy was awarded the 3rd prize in a PhD presentation contest by the German-Ukrainian Academic Society.

Franziska Kretzschmar has been awarded a PhD stipend of the Studienstiftung des Deutschen Volkes (German National Merit Foundation) and the Reinhold-von-Sengbusch Preis for her poster at the Molecular Biology of the Plant conference.

Michael Mitter has been awarded a PhD fellowship of the Boehringer Ingelheim Fonds.

Patrick Müller received a Young Investigator Grant of the European Molecular Biology Organization (EMBO).

Sara Osman was winner of the Naturejobs' writing competition about open publication in scientific research.

Oleh Rymarenko has been awarded a PhD fellowship of the Boehringer Ingelheim Fonds.

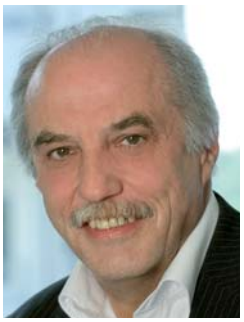
Kanika Vanshylla received a poster prize at the 47th Annual Meeting of the German Society for Immunology and travel grants from the German Society for Immunology (DGFI) and the Transregional Collaborative Research Center "B cells: Immunity and Autoimmunity" (TRR130).

Oleksandr Yagensky was awarded the 1st prize in a PhD presentation contest by the German-Ukrainian Academic Society.

Summa cum laude distinctions for outstanding PhD theses have been awarded in 2017 to **Alexander Schendzielorz** and **Ahmed Warda**. Congratulations!

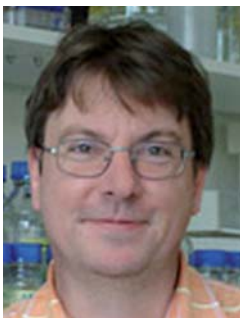
Leaving the program in 2017

Herbert Jäckle belongs to the founder members of the Molecular Biology program and contributed to the MSc curriculum with lectures on transcription and developmental biology of *Drosophila* as well as methods courses on the purification and electrophoresis of nucleic acids. His experience and advice was always greatly appreciated particularly in the starting phase of the program, when he was not only the director of the Department of Developmental Biology at the MPI for Biophysical Chemistry but also the managing director of the institute. Herbert remained faculty member of the Molecular Biology while he served as a vice president of the Max Planck Society from 2002 to 2014. He received numerous prizes and awards, including the Gottfried Wilhelm Leibniz Prize (1986), the Feldberg Prize (1990), the Otto Bayer Prize (1992), the Louis Jeantet Prize for Medicine (1999), the Deutsche Zukunftspreis (1999) and the Federal Cross of Merit, First Class. His research focused on molecular processes and the mechanisms involved in the phenomenon of biological pattern formation during *Drosophila* embryogenesis. His studies aimed a better understanding of the biochemical pathways and the molecular characterization of the regulatory networks leading to the establishment of the segmental organization of the embryo, organ formation and cell behavior underlying morphogenesis, as well as the genetic basis for energy homeostasis in cells. We thank Herbert for his dedicated support of our program throughout the years.



Ahmed Mansouri has been a faculty member of the Molecular Biology program from the first hour. His lecture on mouse genetics, transgenic technologies, animal models for human disease and the importance of stem cells was well appreciated by the students throughout the years. He also offered a methods course for cell culture for more than a decade, served as a member of the admissions board for several years and as an examiner. After his doctorate at the Technical University Braunschweig and postdocs in Göttingen (Institute of Human Genetics), Tübingen (Miescher Institute) and Freiburg (MPI for Immunobiology) he joined the Department of Molecular Cell Biology at the MPI for Biophysical Chemistry as a group leader. In 2005, he received the Dr. Helmut Storz Stiftungsprofessur for dopaminergic stem cell therapy at the Department of Clinical Neurophysiology at the University Medical Center Göttingen, while continuing at the MPI as head of the Research Group Molecular Cell Differentiation. His group was using mouse genetics to study the role of transcription factors during cell differentiation in the endocrine pancreas and in the ventral midbrain. In the pancreas, he was interested in molecules that control the endocrine cell subtype specification. In addition, he was studying animal models to uncover molecular pathways promoting beta-cell regeneration in the adult pancreas. We thank Ahmed Mansouri for his continuous commitment and invaluable contributions to the success of our program.

Reinhard Schuh joined the Molecular Biology faculty in 2005, when he took over the lecture of Herbert Jäckle on *Drosophila* as a model system for many aspects of developmental biology. After his doctorate at the University of Tübingen and postdocs in Tübingen (MPI for Developmental Biology) and Munich (LMU) he joined the Department of Developmental Biology at the MPI for Biophysical Chemistry (MPI-bpc) as a group leader. In 2001 he completed his habilitation in Cellular and Molecular Biology at the Technical University of Braunschweig, Since 2005 he leads the Research Group Molecular Organogenesis at the MPI-bpc. Since 2008 he is teaching as an adjunct professor of the Faculty of Biology and Psychology at the University of Göttingen. Beyond the Molecular Biology program, Reinhard is also an active faculty member of the GGNB doctoral program "Genes and Development" where he is still supervises PhD students and has served on numerous thesis advisory committees. His group investigates the development of the *Drosophila* tracheal (respiratory) system since it provides an ideal model to address such questions, because of its simple stereotypic architecture, accessible genetics and molecular tools. Thank you very much, Reinhard, for your participation in our Molecular Biology program for more than a decade.



GAUSS Career Service and Alumni Networks

After nearly eight years abroad I am very enthusiastic about being the coordinator of the GAUSS Career Service and Alumni Network in this vibrant and versatile research environment. Briefly introducing myself – as a trained geologist with a PhD in Paleobiology I spent most of my postdoc years as an EU and DFG fellow in the UK before I joined the University of Manchester as a Strategic Funding Manager in 2015. One of my first challenges is to roll out the well-established GGNB Career Service for postdocs and late PhDs across all life and natural science disciplines at the Göttingen Campus. I am very keen to continue what proved to be successful, but I am also working on expanding our portfolio tailored to different needs. We are offering a variety of workshops, information events and individual counseling concerning career development and opportunities in- and outside of academia. We are also expanding our web and social media profile to increase our visibility. Keeping close relationships to our Alumni students was always high on our agenda but now we are planning to extend this to our Alumni postdocs. It is getting increasingly important to build and keep up excellent networks and there is a huge potential of experience and knowledge you can share with peers, current and future students. I am very much looking forward to my new responsibilities and getting to know some of you during my Alumni work in Göttingen.

Stefanie Klug

Current profession and location of our PhD alumni

Profession

Academia / Research (54%)
Professor, PI, academic staff (permanent): 16%
Group leader, senior scientist (non-permanent): 2%
Postdoc: 34%
Science management: 3%

Private Sector (36%)
Scientist, team leader, manager R&D: 14%
Staff, team leader, manager non-R&D: 17%
Consulting: 4%

Other Profession (6%)
Media, publishing: 3%
Patent attorney: 2%
Scientific software development: 1%

Other (4%)
other professions, internships, job applications, family management: 4%

Country Distribution

Europe (75%)
Germany: 53%
United Kingdom: 8%
Switzerland: 5%
France: 1%
Netherlands: 1%
Poland: 1%
Sweden: 1%
Turkey: 1%
Austria: 1%
Belgium: 1%
Denmark: 1%
Norway: 1%
Spain: 1%

North America (20%)
United States: 16%
Canada: 4%

Asia / Australia (5%)
Australia: 1%
China: 1%
India: 1%
Iran: 1%
Qatar: 1%
Singapore: 1%

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