

# MOLECULAR BIOLOGY NEWSLETTER

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



JAN  
2024

## Welcome message

Dear alumni, students, friends and colleagues,

We are thrilled to announce the approval of our proposal for the permanent establishment of our International Max Planck Research School (IMPRS) for Molecular Biology. Currently funded by the central funds of the Max Planck Society in the fourth funding cycle of six years each, the recent call for proposals in February 2023 provided us with the opportunity to establish our IMPRS permanently from January 2025 onwards.

Our application, submitted in June 2023, underwent a thorough review by external experts on behalf of the IMPRS Commission, comprised of representatives from the German Rectors' Conference (HRK) and the Max Planck Society. Additional details can be found on the back cover of this newsletter. The success of this endeavor is attributed to the dedicated support of all members of our Molbio program, the accomplishments of our students and graduates, and the strength of our unique alumni network. A sincere THANKYOU to everyone who has not only contributed to the international reputation but also to the long-term establishment of our IMPRS.

The visibility of our program is evident in the consistently high application numbers. This year, we received a record

914 applications from 75 countries, representing an impressive nearly 50% increase compared to the application numbers in recent years. To ensure fair competition for the 24 coveted study places, we will continue to apply our well-proven three-stage selection process, which has been conducted entirely online since the onset of the pandemic.



Group photo at the 20<sup>th</sup> Horizons Anniversary

tion of study programs at the University of Göttingen. The focus was on quality assurance and the unique structure of our intensive MSc course program. A plenary discussion with the Dean of Studies of the Faculty of Biology and Psychology, Molbio/Neuro students, and faculty members highlighted the successful implementation of previous recommendations, including preventive stress check-ups and a focus on student health. Transparent recruitment of new students, close monitoring of program progress, and active student participation in decision-making processes were recognized as essential cornerstones of our quality assurance measures.

The enthusiasm and commitment of our student community have allowed our student-organized annual Horizons in Molecular Biology conference to celebrate its 20<sup>th</sup> anniversary in September

In spring 2023, our Molbio program, along with its twin program in Neurosciences, participated in a new cycle of quality review and accredita-

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2023 (see also p. 44 of this newsletter). Additionally, we continued the tradition of our monthly culture night, thanks to generous donations from our alumni in response to last year's fundraising campaign. Our Molbio PhD Retreat to Leipzig in summer and the two-day retreat for Master students after completing the first year of intensive coursework and exams were also highlights. Our annual MSc graduation and commencement ceremony (p. 36) was another memorable event. In November 2023, the 5<sup>th</sup> cycle of our Alumni Mentoring Program was launched with several successful applications by Molbio PhD students.

Last but not least we invite everyone to save the date for our 25<sup>th</sup> anniversary celebrations on 12-14 September 2025. This event will be a great opportunity to foster contacts and friendships.

Peter Rehling, Marina Rodnina, Steffen Burkhardt

## A proximal +1 nucleosome...

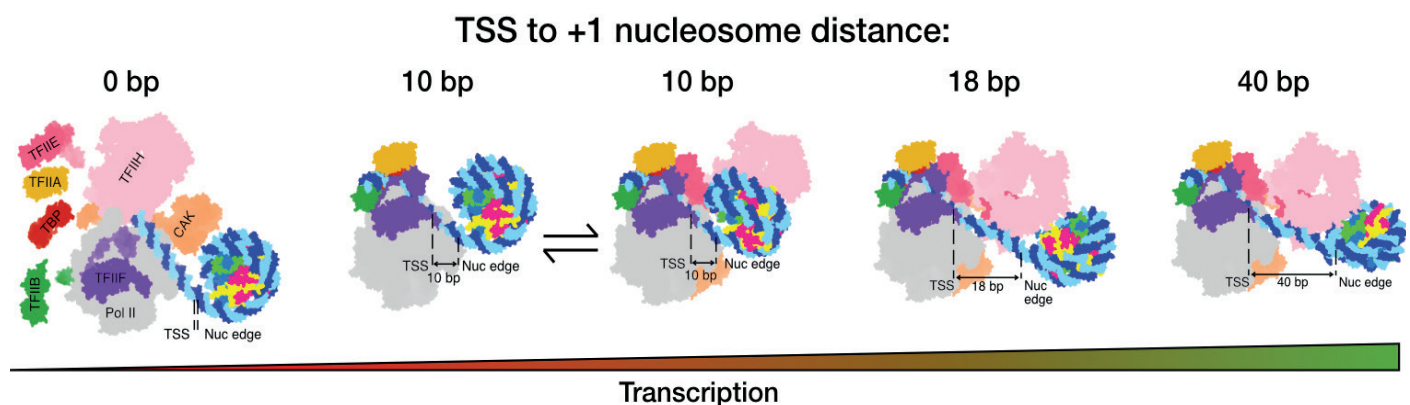
At the heart of gene expression, transcription controls which genes are switched on and off, key in the development of any organism. The initiation of this process is one of the major checkpoints for RNA polymerase II (Pol II) to assemble on the gene promoter and fire transcription. Although we understand how transcription functions on a linear promoter, the DNA information of the cell is hidden by chromatin, which is composed by nucleosomes that arrange

in an irregular fashion at steady-state.

Gene promoters are no less and are surrounded or covered by nucleosomes within the cell. For transcription initiation to occur, Pol II must first identify the right gene to express and, subsequently, recruit transcription factors to assemble the Pol II pre-initiation complex (PIC) at the promoter. The PIC forms close to the +1 nucleosome, which is the first nucleosome positioned downstream of

a gene promoter, and thus the role of this nucleosome in transcription initiation has been subject of scientific debate and biochemical studies.

In the late 1980s, various research groups noticed that Pol II could not initiate transcription on DNA templates covered by nucleosomes. These biochemical experiments suggested that the nucleosome served as an inhibitor of transcription initiation.



**Fig. 1: Model of transcription regulation by a +1 nucleosome.** The position of the +1 nucleosome to the gene promoter distinctly regulates transcription by interfering with PIC assembly. Different gene categories and a gradient showing decreasing RNA synthesis are denoted on the left (green, high synthesis; red, no synthesis).

*PhD- and MSc-related publications 2023 (current and former students of the Molecular Biology program in bold type)*

**Abiril-Garrido J**, Dienemann C, Grabbe F, Velychko T, Lidschreiber M, Wang H, Cramer P (2023) Structural basis of transcription reduction by a promoter-proximal +1 nucleosome. *Mol Cell* 83(11), 1798-1809.e7

Alfaro AJ, Dittner C, Becker J, Loft A, Mhamane A, Maida A, Georgiadi A, Tsokanos FF, Klepac K, Molocea CE, El-Merahbi R, Motzler K, Geppert J, Karikari RA, Szendrödi J, Feuchtinger A, Hofmann S, **Karaca S**, Urlaub H, Díaz MB, Melchior E, Herzig S (2023) Fasting-sensitive SUMO-switch on Prox1 controls hepatic cholesterol metabolism. *EMBO Rep* 24(10), e55981

## ...jams transcription initiation

The model was simple – the nucleosome would impede promoter access to Pol II and transcription factors as a red traffic light signals cars to stop before an intersection. These long-standing *in vitro* observations had an important drawback: the reconstituted nucleosomes did not have a fixed position within the promoter DNA.

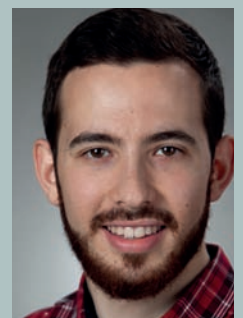
However, does the nucleosome regulate transcription differently depending on its position relative to the promoter? To answer this question, we made use of omics technologies in cells and found out that the +1 nucleosome tends to locate closer to the promoter when transcription is being switched off. At the same time, we also reproduced this effect *in vitro* using purified Pol II and initiation factors – the position of the +1 nucleosome correlated with the levels of transcription in the test tube. Subsequently, we employed electron cryo-microscopy (cryo-EM) to determine structural states that would allow us to decipher the mechanism of the transcription inhibition we observed in cells and *in vitro*.

We discovered that while the PIC assembles normally with a +1 nucleosome positioned 18 bp downstream of the transcription start site (TSS), it assembles in an inhibited state when this nucleosome locates 8 bp closer to the promoter (10 bp downstream of TSS). Here, we observed that the nucleosome occludes promoter DNA, preventing the translocase general transcription factor IIH (TFIIH) from binding DNA. Consequently, TFIIH adopts its closed state, incompatible with DNA opening. We could also determine a structure where the PIC assembled at the promoter without TFIIH in the presence of a promoter-proximal +1 nucleosome, which was tilted towards the position previously occupied by TFIIH.

The structural data corroborated our *in vivo* and biochemical observations, since they showed a reduction of transcription when the +1 nucleosome is as close as 10 bp to the promoter region. This led us to propose that a promoter proximal +1 nucleosome not only inhibits transcription but also interferes with the productive assembly of the PIC (Fig. 1). Therefore, our study comprised the first structural and molecular basis to understand the distance-dependent regulation imposed by the +1 nucleosome on transcription.

**Julio Abril Garrido** completed his doctoral research in December 2023 in the department of Patrick Cramer at the Max Planck Institute for Multidisciplinary Sciences, where he currently works as a postdoctoral researcher.

These results were published in Abril-Garrido J, Diemann C, Grabbe F, Velychko T, Lidschreiber M, Wang H, Cramer P (2023) Mol Cell 83(11), 1798-1809.e7



Depp C, Sun T, Sasmita AO, Spieth L, Berghoff SA, Steixner-Kumar AA, **Subramanian S**, Möbius W, Göbbels S, Saher G, Zampar S, Wirths O, Thalmann M, Saito T, Saido T, Krueger-Burg D, Kawaguchi R, Willem M, Haass C, Geschwind D, Ehrenreich H, Stassart R, Nave K-A (2023) Myelin dysfunction drives amyloid deposition in mouse models of Alzheimer's disease. Nature 618(7964), 349-357

**Esiyok N**, Heide M (2023) The SVZ stem cell niche-components, functions, and in vitro modelling. Front Cell Dev Biol 11, 1332901

**Garg G**, Diemann C, Farnung L, Schwarz J, Linden A, Urlaub H, Cramer P (2023) Structural insights into human co-transcriptional capping. Mol Cell 83(14), 2464



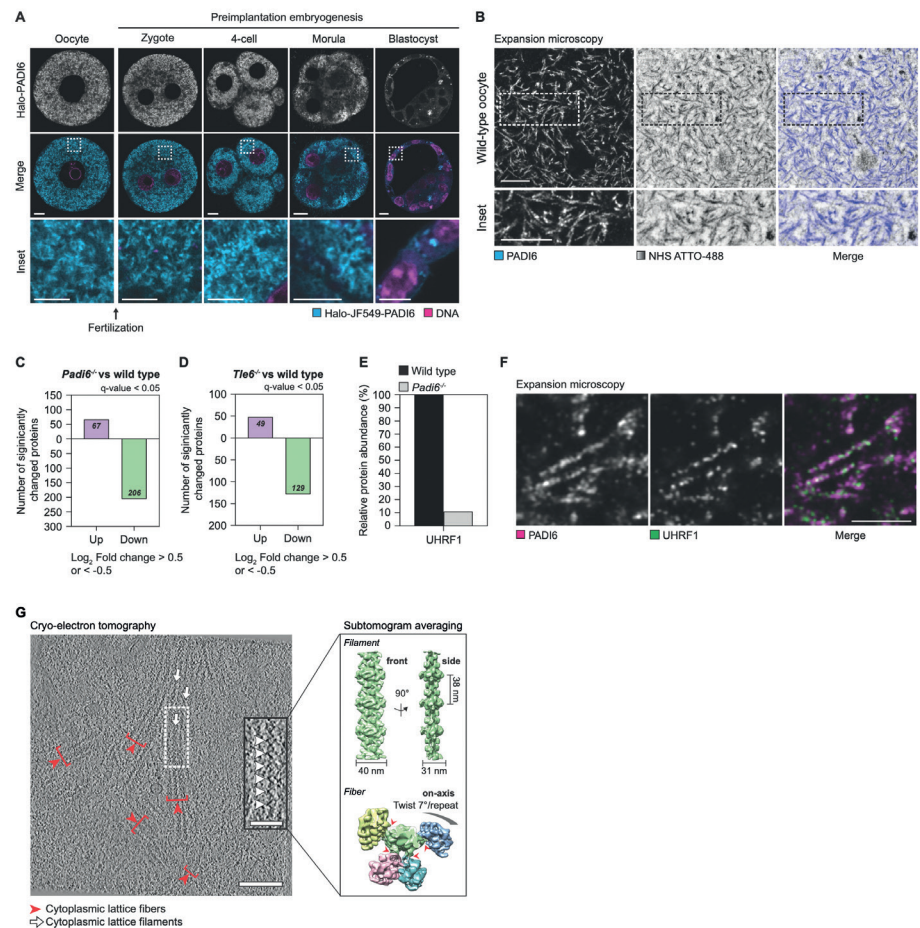
## The oocyte protein pantry

Mammalian oocytes store proteins for the early embryo on cytoplasmic lattices

The egg precursor cell, the oocyte, is the largest cell in the female body and stores maternally deposited factors like mRNA and proteins to support early embryonic development. Despite the fundamental role of maternal storage for the developmental competence of the embryo, it was not known how oocytes store proteins for embryonic development.

The mammalian oocyte cytoplasm contains enigmatic structures called cytoplasmic lattices (CPLs). Scientists first observed CPLs in the 1960s using electron microscopy, but their composition and role in development remained elusive. Previous studies showed that CPL formation depends on the protein PADI6 and proteins of an oocyte-specific protein complex the subcortical maternal complex (SCMC). In *Padi6*/SCMC mutant oocytes, CPLs do not form and embryonic development arrests at the 2-cell stage.

CPLs fill the entire ooplasm, yet PADI6 and the SCMC proteins localize to the oocyte periphery. However, the local-



**Fig. 1: (A)** Mouse oocyte and embryos expressing HaloTag-PADI6 (blue) and stained for DNA (magenta). Scale bars 10  $\mu$ m, and 5  $\mu$ m (insets). **(B)** pan-ExM micrographs; PADI6 (blue) and pan-proteome (inverted gray). **(C-D)** Numeric quantification of depleted proteins in *Padi6*<sup>-/-</sup> and *Tle6*<sup>-/-</sup> oocytes compared to control. **(E)** Abundance of UHRF1 in control versus *Padi6*<sup>-/-</sup> oocytes. **(F)** ExM micrographs of UHRF1 co-localization with PADI6. **(G)** Tomographic slice of mouse oocyte cytoplasm. CPL fibers (red arrowheads) are built up by individual filaments (white arrowheads). Filaments and fibers were analyzed by subtomogram averaging (insert right). Scale bars (B and F) 2  $\mu$ m, (G) 250 nm. Adapted from Jentoft *et al.*, 2023.

Hamdan FH, Abdelrahman AM, **Kutschat AP**, Wang X, Ekstrom TL, Jalan-Sakrikar N, Wippel CW, Taheri N, Tamon L, Kopp W, Aggrey-Fynn J, Bhagwate AV, Alva-Ruiz R, Lynch I, Yonkus J, Kosinsky RL, Gaedcke J, Hahn SA, Siveke JT, Graham R, Najafova Z, Hessmann E, Truty MJ, **Johnsen SA** (2023) Interactive enhancer hubs (iHUBs) mediate transcriptional reprogramming and adaptive resistance in pancreatic cancer. *Gut* 72(6), 1174-1185

Hofmann-Winkler H, Siregar AR, **Esiyok N**, Rodriguez-Polo I, Gärtner S, Behr R, **Pöhlmann S**, Winkler M (2023) Primate simplexviruses differ in tropism for macaque cells. *Microorganisms* 11(1), 26

**Harasimov K**, Uraji J, Moennich EU, Elder K, Blayney M, **Schuh M** (2023) Actin-driven chromosome clustering facilitates fast and complete chromosome capture in mammalian oocytes. *Nat Cell Biol* 25, 439-452



## The oocyte protein pantry (continued)

ization of the proteins was debated. To investigate the localization of PADI6 and the SCMC, we generated a mouse line where a HaloTag-sequence was inserted into the endogenous locus of PADI6. Strikingly, the HaloTag-PADI6 protein showed a uniform distribution throughout the cytoplasm (Figure 1A). Similarly, overexpressed HaloTag-SCMC reporter proteins exhibited a cytoplasmic distribution. The reporter proteins further revealed an organization of PADI6 and the SCMC into short filaments.

Given their uniform cytoplasmic distribution and their requirement for CPL formation, we next asked whether the PADI6/SCMC protein fibers and the CPLs are the same structure. Using pan-expansion microscopy (pan-ExM), we could visualize both CPLs and the PADI6/SCMC proteins using light microscopy at high resolution. This confirmed the previously unappreciated fibrous organization of PADI6/SCMC proteins as well as their localization to CPLs (Figure 1B). Together, these data show that CPLs are composed of PADI6 and SCMC proteins.

To understand why loss of CPLs in the oocyte leads to early embryonic arrest, we compared the proteomes of oocytes with and without CPLs. Mass spectrometry analysis revealed the depletion of

several proteins crucial for early embryonic development in the absence of CPLs (Figure 1C-E). Surprisingly, RNA-sequencing analysis showed no changes in their respective transcript levels, suggesting a potential role of CPLs in protein stabilization or storage. To test this, we next investigated the cellular localization of candidate proteins using ExM. Surprisingly, we found that many of the depleted proteins were enriched on CPLs in wild-type oocytes. An example protein, UHRF1, important for DNA methylation maintenance is shown in Figure 1F.

Furthermore, cryo-electron tomograms of vitrified mouse oocytes revealed that CPL fibers consist of highly regular, stacked filaments. This architecture likely provides a large surface area for

storing maternally provided proteins (Figure 1G). Together, these findings demonstrate that CPLs are required to accumulate and store essential proteins essential for preimplantation embryo development.

In summary, this study unveils a novel maternal protein storage compartment in mammalian oocytes. By stockpiling essential proteins on CPLs, the egg can meet the immediate needs of the early embryo. This research sheds light on poorly understood, fundamental aspects of oocyte biology and emphasizes the importance of oocyte cytoplasmic maturation for the developmental competence of early embryos.

**Ida Jentoft** completed her doctoral research in 2023 in the department of Melina Schuh at the Max Planck Institute for Multidisciplinary Sciences. Recently she joined the Pauli group at the IMP in Vienna as a postdoc.

Jentoft IMA, Bäuerlein FJB, Welp LM, Cooper BH, Petrovic A, So C, Penir SM, Politi AZ, Horokhovskiy Y, Takala I, Eckel H, Moltrecht R, Lenart P, Cavazza T, Liepe L, Brose N, Urlaub H, Fernandez-Busnadiego R, Schuh M (2023) Cell 186, 1-20



**Jain N, Gomkale R, Bernhard O, Rehling P, Cruz-Zaragoza LD** (2023) A quantitative fluorescence-based approach to study mitochondrial protein import. EMBO Rep 24(5), e55760

**Jain S, Koziej L, Poulis P, Kaczmarczyk I, Gaik M, Rawski M, Ranjan N, Glatt S, Rodnina MV** (2023) Modulation of translational decoding by my6A modification of mRNA. Nat Commun 14, 4784

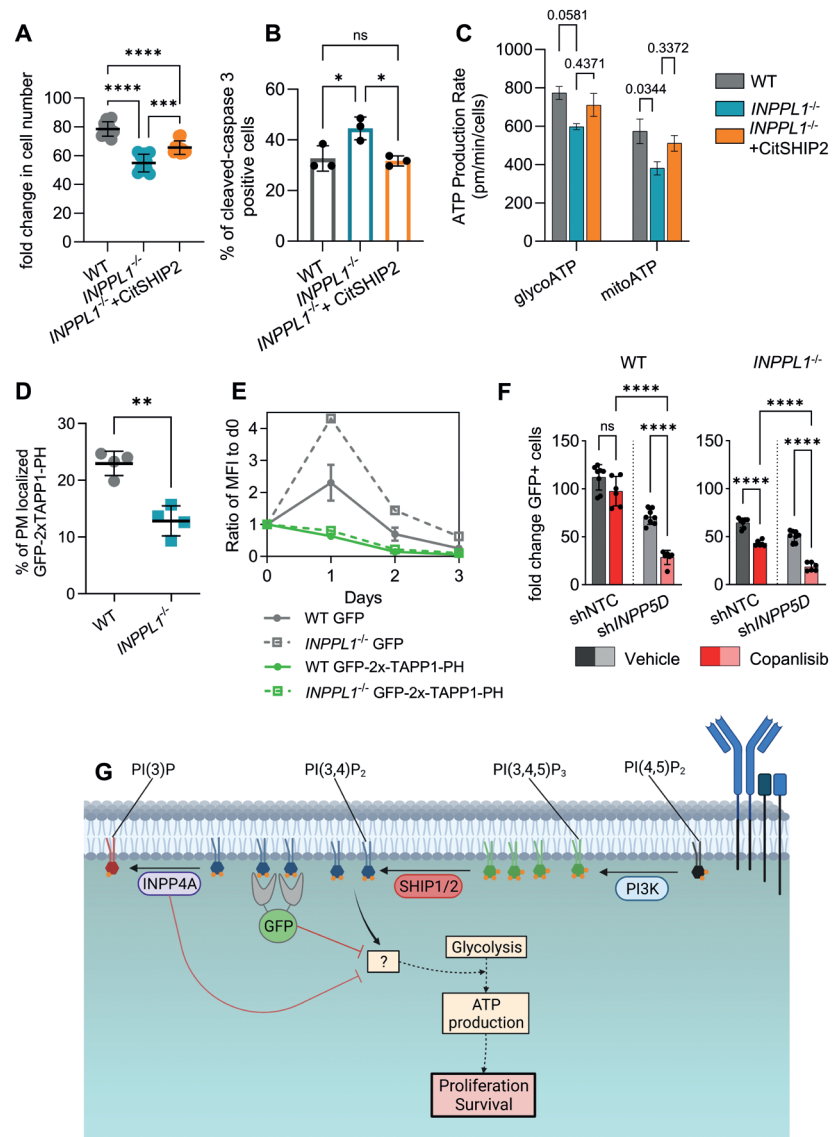
**Jentoft IMA, Bäuerlein FJB, Welp LM, Cooper BH, Petrovic A, So C, Penir SM, Politi AZ, Horokhovskiy Y, Takala I, Eckel H, Moltrecht R, Lenart P, Cavazza T, Liepe L, Brose N, Urlaub H, Fernandez-Busnadiego R, Schuh M** (2023) Mammalian oocytes store proteins for the early embryo on cytoplasmic lattices. Cell 186, 1-20

## SHIP happens

SHIPs contribute to Burkitt lymphoma survival by promoting the energy metabolism

Antigen engagement of the B cell antigen receptor (BCR) of a naïve B cell in a secondary lymphatic organ triggers complicated processes with the aim of generating antibody secreting plasma cells and long-lived memory B cells. Errors in these processes can give rise to malignant neoplasms such as Burkitt lymphoma (BL), which is an aggressively growing B cell lymphoma. The established chemotherapy regiment guarantees a favorable outcome in young children, which are the largest patient group. How-

**Fig. 1:** Proliferation (A.) and percentage of cleaved-caspase 3 positive (B.) Ramos WT, SHIP2-deficient and reconstituted cells. Seahorse assay indicating the ATP production rates of the same Ramos cell lines (C.). Percentage of plasma membrane localized, PI(3,4)P<sub>2</sub> specific biosensor (GFP-2x-TAPP1-PH) (D.) and the effect of induced overexpression of the biosensor compared to GFP only cells (E.). Effects of shRNA induced down-regulation of SHIP1 (sh/*INPP5D*) combined with SHIP2-deficiency and treatment with the PI3K inhibitor copanlisib (F.). Postulated model of the role of SHIP1/2 as contributors to BL cell survival by promoting the energy metabolism (G.). For simplicity, only the results of Ramos cells are shown.



Jia JQ, Hilal T, Bohnsack KE, Chernev A, Tsao N, Bethmann J, Arumugam A, Parmely L, Holton N, Loll B, Mosammamparast N, Bohnsack MT, Urlaub H, Wahl MC (2023) Extended DNA threading through a dual-engine motor module of the activating signal co-integrator 1 complex. Nat Commun 14(1), 1886

Kafian H, Mozaffari-Jovin S, Bagheri M, Shaegh SAM (2023) Light-sheet fluorescent microscopy: fundamentals, developments and applications. Physica Scripta 98 (8), 082001

Liu YT, Senkler J, Herrfurth C, Braun HP, Feussner I (2023) Defining the lipidome of *Arabidopsis* leaf mitochondria: Specific lipid complement and biosynthesis capacity. Plant Physiol 191(4), 2185-2203

## SHIP happens (continued)

ever, due to the associated harshness, the therapy cannot be used in elderly patients or patients without access to sufficient medical care, a particular problem considering that the highest incidence rates of this lymphoma are found in developing countries.

The aggressive growth characteristic of BL is fuelled by an overexpression of the MYC oncogene, which comes with the downside of inducing apoptosis. As a counterweight, a significant portion of BLs exploits the antigen-independent BCR signaling to maintain survival. While it is known that the survival signaling is mediated by the phosphoinositide-3-kinase (PI3K), the details of the rewired BL-specific BCR signaling network remain poorly understood. A small-hairpin RNA (shRNA) based loss of function screen revealed that the SH2 domain-containing 5-inositol phosphatase 2 (SHIP2) potentially influences the survival of BL cells.

Generation and characterization of multiple SHIP2-deficient BL cell lines revealed a perturbed proliferation and increased apoptosis. Furthermore, these effects could not be observed in a surface BCR-negative BL cell line, suggesting that SHIP2 activity is regulated by tonic BCR signaling. SHIP2 is generally described as a negative regu-

lator of AKT activity, yet the phosphorylation levels of AKT remained stable in the absence of SHIP2.

The loss of SHIP2 did not have a major impact on the tonic BCR signaling network as revealed by phosphoproteomics. In contrast, SHIP2 deficiency attenuated the ATP production independently of glucose uptake. Loss of SHIP2 decreased the pool of its enzymatic product, phosphatidylinositol-3,4-bisphosphate ( $PI(3,4)P_2$ ), at the intracellular leaflet of the plasma membrane.  $+PI(3,4)P_2$  is required for an efficient energy metabolism, as shielding or enzymatic conversion of  $PI(3,4)P_2$  at the intracellular leaflet of the plasma membrane strongly decreased BL cell survival. Further, interference with the activity of SHIP1 mirrored the effects observed in SHIP2-deficient cells, in-

dicating a redundant function between the two inositol phosphatases based on the production of  $PI(3,4)P_2$ . Consistently, interruption of SHIP1/2 activity in BL cell lines augmented the susceptibility to inhibition of other effectors of the PI3K signaling pathway, namely mTOR, PI3K, PDK1 but not AKT.

This study provides a molecular basis describing how tonic BCR signals are linked to an efficient energy metabolism, which is particularly necessary to fuel a fast-growing tumor such as BL. Moreover, these discoveries may serve as a basis to potentially enhance the treatment efficiency of BL by targeting the energy supply through the inhibition of SHIP proteins, thus increasing the vulnerability to targeting survival signals.

**Florian Mayr** completed his doctoral research in November 2023 in the Department of Cellular and Molecular Immunology at the University Medical Center Göttingen under the supervision of Michael Engelke.

These results were published in Mayr F, Kruse V, Fuhrmann DC, Wolf S, Löber J, Alsouri S, Paglilla N, Lee K, Chapuy B, Brüne B, Zenz T, Häupl B, Oellerich T, Engelke M (2023) Haematologica, Early view Nov 2, 2023



**Mayr F**, Kruse V, Fuhrmann DC, Wolf S, Löber J, Alsouri S, **Paglilla N**, Lee K, Chapuy B, Brüne B, Zenz T, Häupl B, Oellerich T, **Engelke M** (2023) SH2 domain-containing inositol 5-phosphatases support the survival of Burkitt lymphoma cells by promoting energy metabolism. Haematologica, Early view Nov 2, 2023. doi:10.3324/haematol.2023.283663

Michanski S, **Kapoor R**, Steyer AM, Möbius W, Frühholz I, Ackermann F, Gültas M, Garner CC, Hamra FK, Neef J, Strenzke N, **Moser J**, Wichmann C (2023) Piccolino is required for ribbon architecture at cochlear inner hair cell synapses and for hearing. EMBO Rep 24(9), e56702

Morguies N, Opazo F, **Rizzoli SO**, **Reshetniak S** (2023) trafficking proteins show limited differences in mobility across different post-synaptic spines. iScience 26(2), 105971

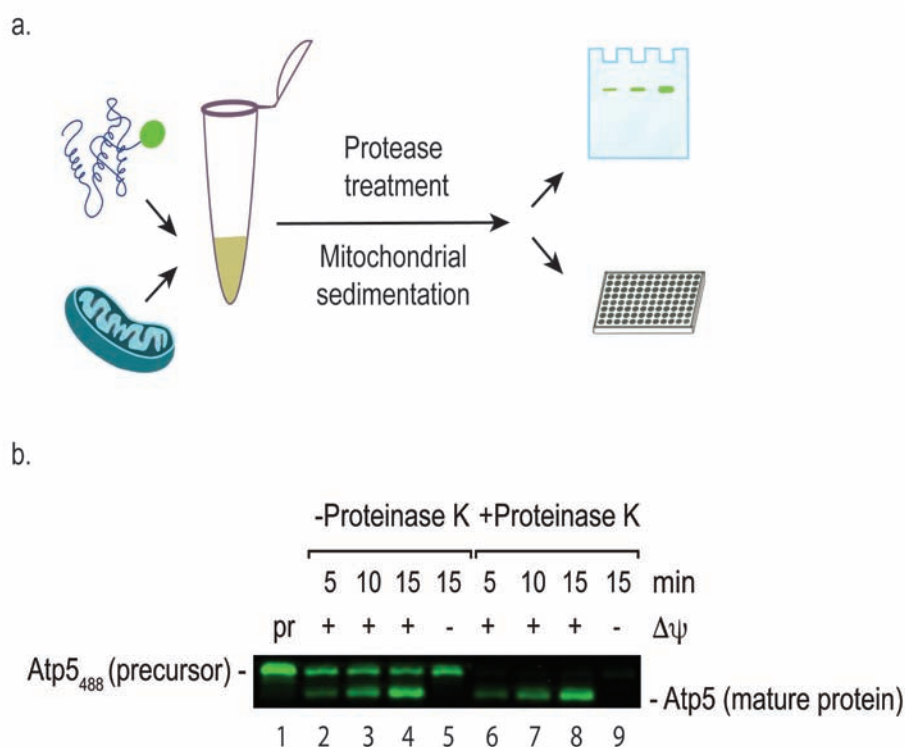


## Lighting up mitochondrial import

A quantitative fluorescence based *in vitro* import assay

Mitochondria are tiny organelles with a fascinating evolutionary tale. The independent “proto-mitochondrion” was engulfed by a eukaryotic ancestor, but retained its own genome and membrane structure. Under evolutionary pressure, it integrated novel proteins into its membranes, transferred the bulk of its genome to the nucleus for efficiency, and bartered its photosynthetic capacity for ATP generation. It can today carry out essential bioenergetic and metabolic reactions in its discrete compartments.

99% of the mitochondrial proteome is cytosolically synthesized and subsequently targeted. Targeting signals direct these proteins to one of five import pathways spanning the outer (OMM) and inner mitochondrial membranes (IMM) for sorting to the OMM, IMM, Intermembrane space (IMS) and the matrix. Most matrix proteins carry an N-terminus amphipathic helix which is recognized by the TOM complex (Translocase for the OMM). The membrane potential across the IMM drives the protein handover to the TIM23 complex (Translocase for the IMM). The protein is then laterally inserted in the membrane or enters the matrix, facilitated by the PAM complex



**Fig. 1: a.** Fluorescent import assay – protein-fluorophore conjugate was incubated with mitochondria under optimal conditions and then treated with proteinase K to ensure only imported, “protease protected” substrate was left in the sample. PMSF was added to inhibit further protease activity and mitochondria were sedimented before resolving the imported protein by PAGE; or fluorescence could also be directly read out from a 96-well plate. **b.** Import of Atp5-DyLight488 into mitochondria for the indicated times in the presence and absence of membrane potential ( $\Delta\psi$ ). Samples were resolved by SDS-PAGE and analyzed by fluorescence scanning.

**Mudryi V**, Peske F, Rodnina MV (2023) Translation factor accelerating peptide bond formation on the ribosome: EF-P and eIF5A as entropic catalysts and a potential drug targets. BBA Advances 3, 100074

Nguyen A, Lugarini F, David C, Hosnani P, **Alagöz Ç**, Friedrich A, Schlütermann D, **Knotkova B**, Patel A, Parfentev I, Urlaub H, Meincke M, Stork B, Faesen AC (2023) Metamorphic proteins at the basis of human autophagy initiation and lipid transfer. Mol Cell S1097-2765(23)00321-0

**Poulis P**, Peske F, Rodnina MV (2023) The many faces of ribosome translocation along the mRNA: reading frame maintenance, ribosome frameshifting and translational bypassing. Biol Chem 404(8-9), 755-767

## Lighting up mitochondrial import (continued)

(Presequence Translocase Associated Motor). Proteases then cleave off the targeting signal for the mature protein to fold functionally. Any defect in the import machineries can lead to mitochondrial dysfunction, oxidative stress and metabolic disorders.

Mitochondrial import is commonly studied using radioactive *in vitro* import assays. Precursor proteins are synthesized and [<sup>35</sup>S]-labelled in reticulocyte lysates. Co-incubation with purified mitochondria under optimum buffer and temperature conditions allows the precursor to cross the mitochondrial envelop, and protease treatment thereafter digests any unimported proteins. End point reactions and negative controls can be studied by disrupting the membrane potential. Samples can be resolved using PAGE and visualized by autoradiography. This sensitive technique providing kinetic resolution has allowed us to understand much about protein translocation. The use of expensive and restricted radioactivity, inadequate quantitative information, and low potential for high throughput are significant limitations.

To address these challenges, we adapted the method described above by replacing the radioactive substrate

with a precursor-fluorophore fusion for a fast and sensitive non-radioactive method. A model protein was engineered with a C-terminal Cysteine which could be attached to a DyLight fluorophore by maleimide-mediated addition. The preprotein was imported in a time- and membrane potential-dependent manner. The output could be measured using PAGE or even a 96-well plate.

The nature and position of the fluorophore did not affect import kinetics. The protein could be titrated and the fluorescence measured for a quantitative output. We could not only perform functional analysis in yeast mutants with impaired import machinery, but could also import chemical amounts which may challenge the system fur-

ther and elucidate mechanistic limitations. As a bonus, we could also track the assembly of complex V of the OXPHOS system by importing and visualising fluorescent Atp5 (a peripheral complex V protein) on a native gel.

Currently restricted to matrix proteins and requiring complex protein purification, this method has its own limitations. However, in complementation with other alternatives published, we now have one more piece of the jigsaw puzzle to help us get a better understanding of mitochondrial import.

**Naintara Jain** is a doctoral researcher in the Department of Cellular Biochemistry (Rehling lab) at the University Medical Center Göttingen.

These results were published in Jain N, Gomkale R, Bernhard O, Rehling P, Cruz-Zaragoza LD (2023) A quantitative fluorescence-based approach to study mitochondrial protein import. *EMBO Rep* 24(5), e55760



**Quililan K**, Oberbeckmann E, Cramer P, Oudelaar AM (2023) *In vitro* reconstitution of chromatin domains. *Nature Genetics* doi:10.1038/s41588-023-01649-8

Schmitzová J, **Cretu C**, Dienemann C, Urlaub H, Pena V (2023) Structural basis of catalytic activation in human splicing. *Nature* 617(7962), 842

Stitzinger SH, **Sohrabi-Jahromi S**, Söding J (2023) Cooperativity boosts affinity and specificity of proteins with multiple RNA-binding domains. *NAR: genomics and bioinformatics* 5 (2), lqad057

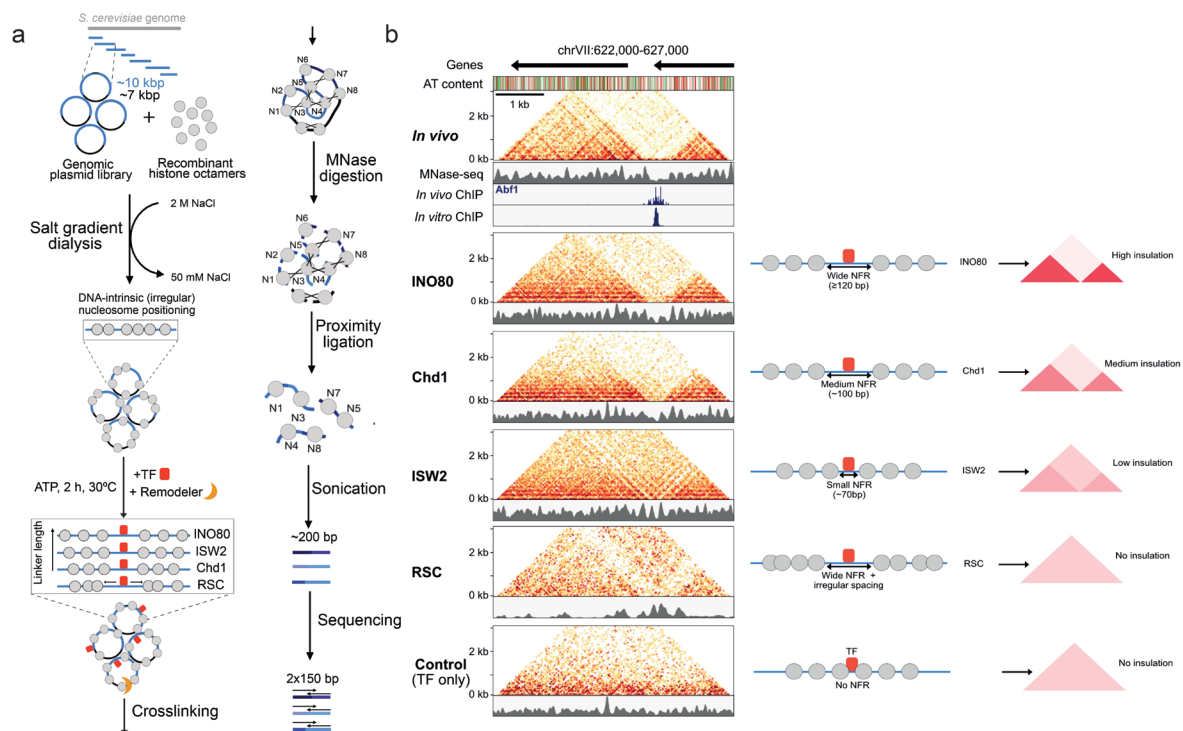
## A basic recipe for chromatin folding

Understanding the core mechanisms that drive higher order genome organization

Eukaryotic genomes are folded into higher-order chromatin structures in a way that allows seamless transcription, replication and DNA repair. However, the molecular mechanisms underlying the spatial organization of the genome still lack clarity. At the primary level of organization lies the nucleosome core

particle, consisting of 147 base pairs of DNA wrapped around a histone octamer. Nucleosome core particles are connected by short DNA “linkers”, creating arrays resembling “beads on a string”. Subsequently, nucleosome arrays fold into more complex higher-order structures. In mammals, they are organized

into self-interacting chromatin domains spanning hundreds of kilobases to a million bases. These domains are conserved in fruit flies and budding yeast, in which their sizes are much smaller. Whether these domains influence the regulatory landscape or *vice versa* is still an open question. To gain a clearer



**Fig. 1:** **a.** Schematic overview of the procedure. **b.** Contact matrices of *in vivo* and *in vitro* chromatin interaction data with corresponding nucleosome occupancy profiles (MNase-seq) plotted at the defined genomic region. Gene and sequence composition annotation are shown at the top and *in vivo* and *in vitro* ChIP-seq data for Abf1 are shown below the *in vivo* data.

Thompson HL, Shen W, Matus R, Kakkar M, Jones C, Dolan D, Grellscheid S, Yang X, Zhang N, **Mozaffari-Jovin S**, Chen C, Zhang X, Topping JF, Lindsey K (2023) MERISTEM-DEFECTIVE regulates the balance between stemness and differentiation in the root meristem through RNA splicing control. *Development* 150 (7), dev201476

**Tynianskaia L**, **Esiyok N**, Huttner WB, **Heide M** (2023) Targeted microinjection and electroporation of primate cerebral organoids for genetic modification. *J Vis Exp* 193, e65176

Vedel IM, Prestel A, **Zhang Z**, Skawinska NT, **Stark H**, Harris P, Kragelund BB, Peters GHJ (2023) Structural characterization of human tryptophan hydroxylase 2 reveals that L-Phe is superior to L-Trp as the regulatory domain ligand. *Structure* 31 (6), 689 - 699.e6



understanding of the relationship between genome structure and function, it is essential to establish a prior understanding of the mechanisms underlying domain formation.

In this study, we used a bottom-up approach to address this question, by reconstituting native chromatin of the budding yeast *Saccharomyces cerevisiae* and assessing its 3D genome structure at very high resolution. We reconstituted chromatin *in vitro* by incubating purified recombinant yeast histone octamers with a plasmid library covering a fraction of the yeast genome (Fig1a). Incubation at high salt conditions and overnight dialysis into low-salt buffer led to spontaneous formation of nucleosomes that are positioned at random and irregular sites. To reconstitute regular nucleosome positioning, we incubated the chromatin thereafter with purified, sequence-specific DNA-binding transcription factors and ATP-dependent chromatin remodelers. As transcription factors (TFs), we used Abf1 and Reb1 that bind promoter regions and act as pioneer factors and transcriptional activators. As chromatin remodelers, we used INO80, ISW2, and Chd1. These remodelers create regularly spaced nucleosome arrays relative to reference sites; in our system these correspond to Abf1 and Reb1 binding sites.

After reconstituting chromatin, we analyzed its folding pattern using a micrococcal nuclease (MNase)-based chromosome conformation capture approach. This relies on digesting chromatin with MNase and subsequent proximity ligation of crosslinked chromatin. This approach allowed us to map interactions between nucleosomes to reconstruct the 3D structure of chromatin using sequencing.

We found that in the presence of both TFs and one of the chromatin remodelers, we could create nucleosome arrays that fold into domains resembling *in vivo* yeast chromatin. The boundaries of these domains are formed by nucleosome free regions (NFR) (Fig1b). This means that regularly phased and spaced arrays of nucleosomes having

a strong NFR serve as minimal ingredients for forming chromatin domains in yeast.

Our observations underline that nucleosome positioning alone is required and sufficient for forming *in vivo*-like chromatin domains. We were able to reconstitute *in vivo*-like chromatin in absence of the transcriptional machinery or SMC proteins for forming loops, a model proposed in previous studies. Our findings suggest that regular nucleosome positioning may be important for forming chromatin boundaries across eukaryotic species. Although this process is sufficient to drive the basic organization of the small budding yeast genome, higher eukaryotes have evolved additional mechanisms, including loop extrusion, to structure their larger genomes.

**Kimberly Quililan** completed her Master thesis in the Lise Meitner Group Genome Organization and Regulation of Marieke Oudelaar at the MPI for Multidisciplinary Sciences before she joined the Francis Crick Institute in London for her PhD.

These results were published in Quililan K, Oberbeckmann E, Cramer P, Oudelaar AM (2024). *In vitro* reconstitution of chromatin domains shows a role for nucleosome positioning in 3D genome organization. Nature Genetics doi:10.1038/s41588-023-01649-8



Wang C, Ulryck N, Herzel L, Pythoud N, **Kleiber N**, Guérineau V, Jactel V, Moritz C, **Bohnsack MT**, Carapito C, Touboul D, **Bohnsack KE**, Graille M (2023) N 2-methylguanosine modifications on human tRNAs and snRNA U6 are important for cell proliferation, protein translation and pre-mRNA splicing. Nucleic Acids Res 51(14), 7496-7519

**Zhang XC**, Xue K, Salvi M, Giller K, Stopp M, Weisenburger S, Sandoghdar V, Unden G, Becker S, Andreas LB, **Griesinger C** (2023) Mechanism of sensor kinase CitA transmembrane signaling. bioRxiv preprint doi:10.1101/2023.02.06.527302

## Master's class of 2023/24



**Fatima Zahra Alkafri**

Syria

University of Sharjah

Bachelor of Science

Biotechnology

<https://www.uni-goettingen.de/en/679309.html>



**Ritabhas Das**

India

St. Xavier's College Kolkata, Tata Institute of  
Fundamental Research (TIFR) Mumbai

Master of Science

Microbiology, Cell Biology, Neurobiology

<https://www.uni-goettingen.de/en/679315.html>



**Fazel Amirvahedi Bonab**

Iran

University of Tehran

Bachelor of Science

Molecular Biology, Genetics, Neuroscience,  
Bioinformatics, Machine Learning

<https://www.uni-goettingen.de/en/679310.html>



**Parisa Dashtestani**

Iran

Kharazmi University

Bachelor of Science

Cell and Molecular Biology

<https://www.uni-goettingen.de/en/679316.html>



**Branimir Ayvazov**

Bulgaria

University of Aberdeen

Bachelor of Science

Molecular Biology, Biochemistry, Molecular  
Microbiology

<https://www.uni-goettingen.de/en/679311.html>



**Katharina Sophia Harms**

Germany

University of Lübeck

Bachelor of Science

Molecular Life Science

<https://www.uni-goettingen.de/en/679317.html>



**Merve Nida Baştürk**

Turkey

Bilkent University

Bachelor of Science

Molecular Biology and Genetics

<https://www.uni-goettingen.de/en/679312.html>



**Khushboo Jain**

India

Indian Institute of Science Education and Research

Master of Science

Biology (Cell Biology, Genetics, Epigenetics,  
Immunology, Microbiology, Biochemistry)

<https://www.uni-goettingen.de/en/679318.html>



**Jona Vivien Brückner**

Germany

University of Bielefeld

Bachelor of Science

Molecular Biology

<https://www.uni-goettingen.de/en/679313.html>



**Elif Ayşenur Karay**

Turkey

Boğaziçi University

Bachelor of Science

Molecular Biology and Genetics

<https://www.uni-goettingen.de/en/679319.html>



**Fatma Chafra**

Turkey, Tunisia

Bilkent University

Bachelor of Science

Molecular Biology and Genetics

<https://www.uni-goettingen.de/en/679314.html>



**Hannah Marie Knerich**

Germany, United Kingdom

Georg-August-University Göttingen

Bachelor of Science

Biochemistry

<https://www.uni-goettingen.de/en/679320.html>

## Master's class of 2023/24

**Kaatje Knüwer**

Germany  
University of Bremen  
Bachelor of Science  
Biology

<https://www.uni-goettingen.de/en/679321.html>

**Gabriel Luke Pisani**

Malta  
University of Malta  
Bachelor of Science  
Biochemistry, Genetics, Cellular Biology

<https://www.uni-goettingen.de/en/679327.html>

**Marta Kolarić**

Croatia  
University of Rijeka  
Bachelor of Science  
Biotechnology and Drug Research

<https://www.uni-goettingen.de/en/679322.html>

**Foad Rommasi**

Iran  
Tarbiat Modares University of Tehran  
Master of Science  
Cell and Molecular Biology, Biochemistry

<https://www.uni-goettingen.de/en/679328.html>

**Arina Kurochkina**

Russian Federation  
Lomonosov Moscow State University  
Bachelor of Science  
Biotechnology, Molecular Biology

<https://www.uni-goettingen.de/en/679323.html>

**Sait Şeyhanlı**

Turkey, Syria  
Middle East Technical University  
Bachelor of Science  
Molecular Biology

<https://www.uni-goettingen.de/en/679329.html>

**Nina Lenarsic**

Slovenia  
University of Aberdeen  
Bachelor of Science  
Molecular Biology, Biochemistry, Cancer Biology

<https://www.uni-goettingen.de/en/679324.html>

**Shruti Thottakara Guruvayurappan**

India  
Shiv Nadar University, Delhi-NCR  
Bachelor of Science  
Molecular Biology, Biochemistry, Immunology, Cell Biology, Microbiology, Bioinformatics, Genetics

<https://www.uni-goettingen.de/en/679330.html>

**Deepa Mehta**

India  
Indian Institute of Technology Mandi (IIT Mandi)  
Master of Technology  
Cell and Molecular Biology, Biochemistry

<https://www.uni-goettingen.de/en/679325.html>

**Natalie Varahram**

Germany  
Maastricht University  
Bachelor of Liberal Arts and Science  
Molecular and Cell Biology

<https://www.uni-goettingen.de/en/679331.html>

**Tashveen Moonian**

Mauritius  
Technische Universität Braunschweig  
Bachelor of Science  
Molecular and Cellular Biology

<https://www.uni-goettingen.de/en/679326.html>



## PhD projects started in 2023



### **Svenja Ahlmann**

Role of the selective autophagy receptor Sm-NBR1 in development of *Sordaria macrospora*.  
*Stefanie Pöggeler,*  
*Kai Heimel,*  
*Henning Urlaub*



### **Zahra Fakhraei Ghazvini**

Chromatin architecture throughout mammalian oocyte development.  
*Marieke Oudelaar,*  
*Henning Urlaub,*  
*Melina Schuh*



### **Saruby Sharma**

Structural and functional characterization of human mitochondrial membrane protein complexes.  
*Hauke Hillen,*  
*Marina Rodnina*  
*Alexander Stein*



### **Florian Aust**

Exploring small molecules as tools to understand and manipulate HECT-type ligases.  
*Sonja Lorenz,*  
*Kai Tittmann,*  
*Henning Urlaub*



### **Maria Groshkova**

Understanding the role and mechanisms of a putative monoamine modulation of synaptic transmission at the endbulb of Held.  
*Tobias Moser,*  
*Silvio Rizzoli,*  
*Erwin Neher*



### **Ana Vuckovic**

Structural and biochemical characterization of non-canonical RNA processing in mitochondria.  
*Hauke Hillen,*  
*Alex Faesen,*  
*Katherine Bohnsack*



### **Subhro Basu**

High-resolution mechanistic studies of Proteasome function by time-resolved cryo-EM.  
*Holger Stark,*  
*Henning Urlaub,*  
*Stefan Jakobs*



### **Neringa Liutikaite**

Roles of ZNF222 and NBP14 in development and evolution of human brain.  
*Michael Heide,*  
*Gregor Bucher,*  
*Lutz Walter*



### **Siyu Wang**

Non-native interactions in the intermediate state driving the HemK NTD co-translational folding.  
*Marina Rodnina,*  
*Kai Tittmann,*  
*Jörg Enderlein*



### **Rhythm Bharti**

Fidelity of mitochondrial translation.  
*Marina Rodnina,*  
*Henning Urlaub,*  
*Ricarda Richter-Dennerlein*



### **Pooja Mehta**

Dynamics of oogenesis in *Clytia hemisphaerica* as analyzed by live lightsheet imaging.  
*Peter Lenart,*  
*Gregor Bucher,*  
*Melina Schuh*



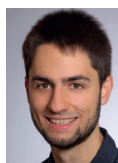
### **Yi Zhu**

High-resolution analysis of higher-order 3D genome structures.  
*Marieke Oudelaar,*  
*Jan de Vries,*  
*Johannes Söding*



### **Mandira Choppella**

Investigation of mitochondrial nucleoid structure and dynamics using super-resolution microscopy.  
*Stefan Jakobs,*  
*Hauke Hillen,*  
*Marieke Oudelaar*



### **Tim Prolingheuer**

Electron cryo-microscopic structural analysis of membrane protein complexes at atomic resolution.  
*Holger Stark,*  
*Henning Urlaub,*  
*Ashwin Chari*

## Honors and Awards

### Faculty Members

**Bertram Brenig** has been re-elected for another term as Senator of the Leopoldina (Class II, Section 6).

**Patrick Cramer** was awarded the Shaw Prize of the Shaw Prize Foundation and the Roentgen Medal 2023 of the German Röntgen Museum Remscheid-Lennep. In June 2023 he took up office as President of the Max Planck Society.

**Ivo Feußner** received the European Lipid Science Award 2023.

**Stefan Hell** received the Medal of Honor "In Publica Commoda" of the University of Göttingen.

**Hauke Hillen** received an ERC Starting Grant and the EMBO Young Investigator Award.

**Tobias Moser** received the ERC Proof of Concept Grant.

**Marieke Oudelaar** was awarded an ERC Starting Grant.

**Melina Schuh** received an Honorary Professorship of the University of Göttingen.

### Students (current and former)

**Ida Jentoft** received the International Birnstiel Award for Doctoral Research in Molecular Life Sciences, awarded by the Max Birnstiel Foundation and the Research Institute of Molecular Pathology (IMP).

**Delong Li** received the GBM Master Award 2023, granted by the Gesellschaft für Biochemie und Molekularbiologie.

**Simone Mayer** was awarded the 15<sup>th</sup> Eva Luise Köhler Research Prize for Rare Diseases by the Eva Luise and Horst Köhler Foundation.

**Dragomir Milovanovic** received an ERC Starting Grant and an HFSP collaborative grant as lead PI.

**Agata Witkowska** was awarded a NeuroCure Research Fellowship and started a project group in her department in January 2024.

**Summa cum laude distinctions** for their doctoral theses and defense in 2023 were awarded to **Ida Jentoft**, **Florian Mayr** and **Valentyn Petrychenko**.

In addition, summa cum laude was awarded for the PhD defenses of **Julio Abril Garrido**, **Sakshi Jain**, **Julia Kurlovich**, **Kseniia Lysakovskaia**, **Debojit Saha**, **Ninadini Sharma** and **Aikaterini Vrentzou**.

Congratulations!

### GBM Master Award for Delong Li

We congratulate Delong Li, who received the GBM Master Award 2023, granted by the *Gesellschaft für Biochemie und Molekularbiologie* and donated jointly with *Springer Verlag*, for his excellent performance in his Master examinations and his Master thesis entitled "Evolutionary conservation of influenza capsid snatching". This award is meant to be a distinction for graduated students who submitted an outstanding Master thesis in the molecular life sciences.

Delong's research was done in the Department of Molecular Biology (Cramer) at the Max Planck Institute for Multidisciplinary Sciences (MPI-NAT) under the supervision of Michael Lidschreiber. The photo was taken in October 2023 at the Molbio MSc graduation ceremony in the Manfred-Eigen Lecture Hall of the MPI-NAT.



# Students

## Graduated

### The Masters of 2023

**Svenja Ahlmann**

(Stefanie Pöggeler)

Role of NBR1-mediated selective autophagy in the filamentous fungus *Sordaria macrospora*.

**Çağla Alagöz**

(Alex Faesen)

Biochemical reconstitution of the lipid transfer unit in human autophagy.

**Florian Aust**

(Alex Faesen)

Biochemical reconstitution and characterization of the human class III phosphatidylinositol-3-kinase complex I.

**Subhro Basu**

(Holger Stark)

Atomic resolution structure determination of *H. pylori* urease by cryo-EM.

**Rhythm Bharti**

(Marina Rodnina)

Mass spectrometric quantification of missense errors in human mitochondrial translation.

**Adil Boolani**

(Melina Schuh)

Mechanisms of material transfer in the mouse embryonic germ cell environment.

**Mandira Choppella**

(Stefan Jakobs)

Investigation of TFAM dynamics in single mitochondrial nucleoids using MINFLUX nanoscopy.

**Joseph Neos Cruz**

(Karla Neugebauer)

Dissecting patterns of microexon splicing during transcriptional elongation.

**Naomi Elbing**

(Michael Engelke)

The role of phosphatidylinositol-3,4-bisphosphate in the fitness of Burkitt's lymphoma B-cells.

**Zahra Fakhraei Ghazvini**

(Marieke Oudelaar)

Mapping enhancer-promoter interactions during lymphoid to myeloid transdifferentiation at base-pair resolution.

**André Fischer**

(Jonathan Weisman)

Exploring the therapeutic potential of transcriptional adaptation using high-throughput functional genomics.

**Maria Groshkova**

(Tobias Moser)

Modulatory neurotransmitter systems in the auditory brainstem.

**Adriel Hernando**

(Marieke Oudelaar)

Characterization of a targeted protein depletion system for investigating the role of CTCF in multiway chromatin interactions.

**Kristin Konopatzki**

(Ivo Feußner)

The role of UDP-dependent glycosyltransferases (UGTs) in jasmonic acid metabolism in wounded *Arabidopsis* leaves.

**Delong Li**

(Michael Lidschreiber)

Evolutionary conservation of Influenza cap-snatching.

**Neringa Liutikaite**

(Michael Heide)

Investigating the cellular localization of NBPF14 in neural progenitor cells.

**Pooja Mehta**

(Sonja Lorenz)

Exploring the susceptibility of the HECT-type ubiquitin ligase HUWE1 to small molecules.

**Felipe Monga Mora**

(Dirk Görlich)

Structural and functional analysis of nanobodies for immunofluorescence and super-resolution microscopy.

**Tim Prolingheuer**

(Holger Stark)

Small molecule inhibition of *Helicobacter pylori* urease visualized by cryo-electron microscopy.

**Saruby Sharma**

(Alexander Stein)

On the role of the Doa10 interactor BC10 in ER associated protein degradation (ERAD).

**Ana Vuckovic**

(Hauke Hillen)

Purification and functional characterization of human mitochondrial FASTK proteins.



### The Masters of 2023 (continued)



#### Siyu Wang

(Marina Rodnina)

Non-native interaction driving co-translational compaction of HemK N-terminal domain



#### Sina Wille

(Thomas Helleday)

Biological profiling of base excision repair proteins using advanced microscopy techniques



#### Yi Zhu

(Johannes Söding)

Modeling the nucleosome organization of eukaryotic genes using cryo-ET data.

## The Doctors of 2023



#### Julio Abril Garrido

Structural and biochemical studies on chromatin-protein complexes in transcription initiation.

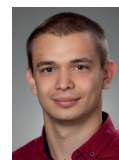
Patrick Cramer,  
Kai Tittmann,  
Argyris Papantonis



#### Ida Jentoft

Functions of cytoplasmic lattices in mammalian oocytes and embryos.

Melina Schuh,  
Peter Rehling,  
Peter Lenart



#### Valentyn Petrychenko

Macromolecules in motion by high-resolution cryo-EM.

Niels Fischer,  
Kai Tittmann,  
Marina Rodnina



#### Sofia Ainzati

Characterization of calcium-triggered (de)ubiquitination events in depolarized synaptosomes by mass spectrometry.

Henning Urlaub,  
Alexander Stein,  
Reinhard Jahn



#### Julia Kurlovich

Characterisation of primate primordial germ cells *in vitro*.

Ufuk Günesdogan,  
Heidi Hahn,  
Melina Schuh



#### Debojit Saha

Mechanisms of chromosome segregation in mammalian oocytes.

Melina Schuh,  
Markus Bohnsack,  
Ufuk Günesdogan



#### Ivan Avilov

Coordination of the cell cycle and the cytoskeleton during oocyte meiosis.

Peter Lenart,  
Henning Urlaub,  
Melina Schuh



#### Kseniia Lysakovskaia

Multi-omics studies of transcription regulatory mechanisms during human cell fate transition.

Patrick Cramer,  
Matthias Dobbstein,  
Gregor Eichele



#### Ninadini Sharma

Mechanisms underlying age-related decline in mammalian female fertility.

Melina Schuh,  
Matthias Dobbstein,  
Alex Faesen



#### Sakshi Jain

Role of internal mRNA modifications in modulating translation elongation.

Marina Rodnina,  
Kai Tittmann,  
Alex Faesen



#### Florian Mayr

The enzymatic product of SH2 domain-containing inositol 5-phosphatases supports the fitness of BCR-dependent Burkitt lymphoma cells by promoting the energy metabolism.

Jürgen Wienands,  
Alex Faesen,  
Lutz Walter



#### Aikaterini Vrentzou

Interplay of proteins and lipids during endoplasmic-reticulum associated protein degradation.

Alexander Stein,  
Blanche Schwappach,  
Ivo Feußner

### Next stop: Systemic Cellular Neurobiology

Professorship at the Karlsruhe Institute of Technology (KIT)

Since my time as a Molbio MSc / PhD student in Göttingen (PhD graduation in 2014), life has sometimes felt a bit like a train ride, in which I get out at many different stops, flavoring the local life and science vibes, learning a lot, hopefully contributing some insights, and making new friends – before moving on to the next stop. After five months in Brussels (Belgium), three years in San Francisco (USA), and five years in Tübingen (Germany), in 2024 it is time for the next stop (again).

In February 2024, I will start my professorship in Systemic Cellular Neurobiology at the Karlsruhe Institute of Technology (KIT). This time, the change is at the same time smaller and bigger. I am moving just over 100 km, staying within the state of Baden-Württemberg, and continuing to be a Principal Investigator with (at least initially) the same research interests. However, the change is also bigger in many ways. Professionally, it is a big shift, as I will be a tenured professor, and will finally be no longer considered scientific “youth” (“Nachwuchs”), employed with limited contracts of a few years. It does feel like a relief to finally have a long-term perspective, not to worry about the possible next stop, and to be able to envisage a long-term research program.

Another difference to the last stops is that this time we are getting out of the train as a family of four. This of course entails that we also have to arrange new childcare and education for Amalia (5) and Matias (2) and make sure that the move is smooth for them. Luckily, my husband, Cadu (Molbio, PhD graduation in 2013), is still working at the European Commission in



Simone Mayer with students in her lab. Source: Andrea Katheder / Eva Luise und Horst Köhler Stiftung

Brussels. Therefore, for him no professional change is luring, instead the commute will be much shorter.

So what will my new life as a professor be like? I am curious to find out, but I can share some expectations. On the one hand, things will likely stay the same. From a basic science PhD, I have gradually shifted towards more and more clinical research questions over the last decade. As my independent research group in Tübingen was at the Hertie Institute for Clinical Brain Research and the Medical Faculty, I have established several collaborations with clinicians, from neurosurgeons to pediatricians. Through these, I have also gotten in touch with a patient organization, and we have established a unique consortium on the rare neurodegenerative disorder pontocerebellar hypoplasia (PCH). Together, we aim to reveal disease mechanisms on the path to a cure over the next years (“PCH2cure”).

**Simone Mayer** completed her doctoral research in 2014 in the Department of Molecular Neuroscience at the former Max Planck Institute for Experimental Medicine. After a 5-month traineeship at the European Research Council in Brussels, Belgium she moved to California as an EMBO- and DFG-funded postdoctoral research fellow at UCSF. In 2018, Simone returned to Germany to start her own group as an independent research group leader at the Hertie Institute for Clinical Brain Research in Tübingen. In February 2024 she will start her professorship in Systemic Cellular Neurobiology at the Karlsruhe Institute of Technology (KIT). Simone is married to the Molbio alumnus Carlos Eduardo (Cadu) Lima da Cunha. They have two children at the age of 2 and 5.

## Next stop: Professor for Systemic Cellular Neurobiology (continued)

This research is extremely stimulating and motivating due to the interdisciplinary perspectives and the relevance for the patients' lives. At the same time, it is also challenging to navigate these rather uncharted territories, where we constantly ask ourselves, how much to share with patient families that are eager to know our progress, but whom we also do not want to give false hopes by sharing preliminary data too early. Overall, being so close to very engaged and knowledgeable patient parents is unique and an asset to my work. I believe it is also extremely beneficial in the education of my trainees.

I am excited to maintain this collaboration moving forward.

I will also continue to establish myself in the field of neurodevelopment and to some extent neurodegeneration, with a focus on the cerebellum, a brain region that has not gained a lot of attention yet. However, with new single-cell transcriptomics datasets as well as progress in stem cell biology to recapitulate cerebellar development *in vitro*, there is now growing interest in this field and a critical mass and need to establish a dedicated research community.

To do so, together with another Molbio alumna, Lena Kutscher (DKFZ Heidelberg), who happens to share some of my research interests, I am currently

organizing a conference for the emerging field of cerebellar development, to be held at the Heidelberg Academy of Sciences and Humanities in September 2024 (<https://www.hadw-bw.de/cere>



Simone at the award ceremony for the Eva Luise Köhler Forschungspreis 2023 together with Federal Health Minister Karl Lauterbach, Chairperson of the Foundation Annette Grütters-Kielich, Eva Luise and Horst Köhler (left to right). Source: Andrea Katheder / Eva Luise und Horst Köhler Stiftung

bellar-development-and-disease-single-cell-resolution). It has been fantastic to reconnect with Lena after so many years and it is great to see how effortlessly we can work together on putting together this conference, given the basis of trust we have established in our MSc year in Göttingen.

On the other hand, some things will change with the new position. Scientifically, I will be back in an interdisciplinary natural science-based organization. I will be part of the excellence cluster "3D Matter Made to Order", in which biologists, chemists, physicists, and engineers work together on a range of different applications of 3D printing. I will also be back in an environment with many molecular biologists, probably with similar

breadth to the molecular biology IMPRS and with a focus on innovation.

The KIT is also an interesting institution as it is both a state-funded university and part of the Helmholtz federal research program. I am curious to explore my new responsibilities in contributing to shaping the research environment of the KIT over the next years having these two parts of the institution in mind.

Last but not least, a professorship comes with ample teaching obligations. As a group leader in Tübingen, I have collected practical experience and theoretical knowledge on teaching, now it will

be the time to execute and innovate on training the next generation of molecular biologists. I am looking forward to exploring new territories and learning new topics by teaching them over the next years. As my professorship is in the Department of Zoology, this might entail excursions to characterize marine animals - sounds cool!

To sum up - I am excited about the new opportunities and the new life ahead and wondering - will this be the last stop?



### Embrace challenges and cherish growth

As I set about to write up my story for this newsletter, I am filled with nostalgia, reflecting on the incredible journey that began in the hallowed halls of Göttingen's Molecular Biology MSc program back in 2003. Fast forward to today, and I find myself humbled and honored to share my career experiences with you, the bright minds currently navigating the same academic waters.

After earning my MSc in Molecular Biology in Göttingen in 2005, my academic pursuits led me to Tübingen, where I completed my PhD in 2009. Post-doctoral studies in Dresden fueled my passion for research, setting the stage for the next chapter. In 2014, I embarked on a challenging yet rewarding adventure. The decision to join the Izmir Biomedicine and Genome Center marked a significant turning point.

The institute, though incomplete upon my arrival, became the canvas for my dreams. Here, I not only had to establish my independent research laboratory but also found a zebrafish facility. As the journey began, the challenges of setting up a new venture became apparent. From navigating bureaucratic hurdles to securing funding and resources, the road was filled with obstacles. The risks were ever-present, with uncertainties looming over the

feasibility and sustainability of the project. However, it was precisely these challenges that fueled the determination to overcome and succeed. In the end, the collective efforts and perseverance resulted in the establishment of

generation using the zebrafish model, and creating zebrafish models for neurodegenerative diseases and cancer. Leading a team of 15 people, including mainly graduate students and a couple of postdoctoral fellows, col-

laboration lies at the heart of our endeavors. In addition to our dedicated work, my laboratory actively engages in collaboration projects with more than 10 different research groups, fostering an environment of knowledge exchange and collective progress and making our work truly interdisciplinary.



Günes and the members of her research group at Izmir Institute of Technology

Türkiye's largest zebrafish facility unit. As the time went by, the lab gradually took shape, and the zebrafish facility, a critical aspect of my work, began to flourish. Returning to Türkiye brought with it a wave of recognition and accolades. The sweet fruits of my labor manifested as prestigious awards – Reintegration Fellowship of TUBITAK, EMBO Installation Grant, L'Oréal For Women in Science award, the Turkish Academy of Science Young Scientist award, and several others. The recognition was akin to flowers blooming in the desert.

My research interests focus on unraveling the regulatory mechanisms of Wnt signaling, exploring tissue re-

**Günes Özhan** received her MSc degree from the Molecular Biology program in 2005. After her PhD at the MPI for Developmental Biology in Tübingen, Germany, she continued as a postdoctoral researcher at Dresden University of Technology. In 2014 she started as Principal Investigator and worked at the izmir Biomedicine and Genome Center, being Assistant and, later, Associate Professor at Dokuz Eylül University, Izmir, Türkiye. Since October 2022, Günes is also full professor at the Izmir Institute of Technology.



## Embrace challenges and cherish growth (continued)

A little over a year ago, a new chapter unfolded as I accepted a full professorship at the Izmir Institute of Technology (IZTECH), Department of Molecular Biology and Genetics. Transitioning from teaching solely graduate students, I embraced the challenge of instructing eager undergraduates. Embarking on the journey of guiding and nurturing budding minds has proven to be an exceptional and fulfilling experience. Witnessing these talented students take their first steps in their career paths is both amazing and lovely, fostering a sense of pride and accomplishment. In our commitment to their growth, we provide an enriching opportunity for select individuals to join our lab during their undergraduate studies, offering them valuable hands-on experience for 2-3 semesters. This immersive learning experience equips them with practical skills and knowledge, laying a strong foundation for their future endeavors. It's heartening to see the fruits of this collaboration as some of these bright minds decide to further pursue their academic journey, transitioning seamlessly into our graduate studies program. Currently, we are proud to have three such dedicated students who have recently embarked on their MSc studies within our lab, exemplifying the success of this early and strategic investment in their academic and professional development.

At IZTECH, I have also been appointed as the Director of the Cellular Imaging Center where I am thrilled to spearhead our endeavors in creating a hub of scientific excellence. In this recently established center, our primary objective is to foster an environment equipped with state-of-the-art imaging technology. Our commitment goes beyond mere support; we aspire

to lead the way in cutting-edge scientific exploration. The Cellular Imaging Center aims to provide researchers with access to top-notch equipment essential for pushing the boundaries of scientific discovery. Together, we aim to create a dynamic space where innovation flourishes, setting the stage for groundbreaking contributions to the scientific community in Türkiye.



The author Günes Özhan

Beyond the lab and lecture halls, my responsibilities extend to leadership roles. As a member of the Scientific and Technological Research Council of Türkiye (TÜBİTAK) advisory board, I contribute to the scientific evaluation of project applications in the chemistry-biology research group. This role demands a significant investment of time and effort, requiring me to be both fair and thorough in assessing the potential impact and feasibility of diverse research proposals. Despite its time-consuming nature, the opportunity to play a part in shaping the future of scientific endeavors is a rewarding responsibility that aligns with my dedication to advancing research and innovation

within the field. Additionally, I serve on the IBG Research Programs Committee and the local ethics committee on animal experiments.

Being a board member of the Molecular Biology Association and the Turkish Biochemical Society (TBS), I actively participate in organizing international scientific congresses, fostering global connections. I am also associate editor of the association's scientific journal, Turkish Journal of Biochemistry. My journey within the TBS society also took me to the international stage as the FEBS member society representative (MSR), representing TBS. I find great joy in contributing to the scientific community through the annual FEBS meetings.

To the current Molecular Biology MSc/PhD students, I would like to encourage you to embrace challenges, overcome obstacles, and cherish the moments of growth. Your journey may be filled with sleepless nights, incomplete buildings, and unforeseen challenges, but each step forward is a step towards success. The quest for understanding the intricacies of molecular biology continues, fueled by a passion for discovery and a commitment to pushing the boundaries of knowledge. In closing, I extend my gratitude to all those who have been part of this journey, and I look forward to the exciting scientific discoveries that lie ahead.

## A founder's perspective:

### The birth of Eisbach Bio GmbH

As the founder of Eisbach Bio GmbH and an alumnus of the MolBio Program, my entrepreneurial journey began with a deep-rooted passion for biotechnology and a vision to innovate in cancer therapy. Founded in 2019, Eisbach emerged from the aspiration to create groundbreaking solutions in the field of oncology, with the power of *in-silico* and *in-vitro* methodologies.

The early days of Eisbach were marked by intense research and development, as we sought to carve a niche in the competitive landscape of biotech innovation. Our focus was clear: to develop therapies that could change the course of cancer treatment. Besides the scientific foundation, we also raised our “seed” round of financing from a couple of private supporters and investors, which enabled us to pursue our near-term scientific goals. However, as we were gaining momentum, the world was hit by the COVID-19 pandemic, presenting us with unforeseen challenges and forcing a strategic re-evaluation.

### The Pandemic Pivot: A Test of Flexibility

Faced with the pandemic, Eisbach had to make crucial decisions. While the first cases emerged near Munich, the potential to expand our research scope to address this new global health threat became apparent. It was not just a response to an external crisis but a strategic move that reflected our core principle of adaptability in the face of change. We embarked on COVID-19 research, applying our expertise in



Adrian (left) and his Eisbach team

helicase inhibitor drug development to a novel context. This period was challenging, requiring us to rapidly acquire new knowledge and adapt our research methodologies. Classical venture capital investors would probably not have endorsed such efforts, but our response to the pandemic and our unwavering commitment to our original mission in cancer research caught the attention of private investors. They were impressed by our ability to adapt and innovate in times of crisis. This led to significant private investments, fueling our growth and enabling us to scale our research initiatives, in Covid and cancer. And we were blessed with grant money from the German and Bavarian governments.

With new funding came the complexities of managing growth. As the founder, I was faced with the task of steering Eisbach through this phase

of expansion while maintaining our commitment to quality research and innovation. We invested in expanding our team, bringing in new talent to bolster our capabilities. Balancing our continued work in oncology with our new ventures in pandemic response was a complex juggling act. We strived to ensure that neither area suffered from a lack of attention or resources. This balancing act was crucial in keeping us aligned with our long-

term vision and immediate goals.

### Adrian Schomburg

graduated from the Molecular Biology Program in 2010. He did his doctoral research at the Max Planck Institute for Biophysical Chemistry in the group of Wolfgang Fischle. After a year at Pfizer and several years at Proteros Biostructures GmbH, Adrian started in 2018 as project leader at LMU and as CEO and founder of Octamer GmbH, both in Munich/Martinsried. In January 2019 he founded Eisbach Bio GmbH which he is leading as CEO. Since January 2022, Adrian is also Managing Director Germany of Volition-Rx. Adrian is married and has 4 children of 14, 11, 5 and 3 years, with #5 expected in March.

## A founder's perspective (continued)

### Building a Culture of Innovation and Resilience

An essential aspect of our journey was cultivating a company culture that embraced innovation and resilience. We encouraged our team to think creatively, to be bold in their research approaches, and to be resilient in the face of challenges. This culture became the backbone of Eisbach, driving our progress and success. There was no single day where the lab was closed, and we were fully operational during the entire pandemic phase. The progress we made was recognized after the pandemic, with many companies still paralyzed by home-office and lockdown consequences. As we navigated through the post-pandemic landscape, we also looked beyond it. We began laying the groundwork for future projects, exploring new areas of research that could benefit from our expertise. This forward-thinking approach ensured that Eisbach was not just reacting to



Work in the Eisbach lab

current challenges but also preparing for future opportunities.

Reflecting on this journey, the lessons I have learned as the founder are manifold. Leading a biotech company through a global crisis taught me the importance of vision, agility, and the ability to make bold decisions. The experience reaffirmed my belief that challenges can be transformed

into opportunities for growth and innovation. Today, we just finished our first Phase 1 study of a drug candidate that was discovered in our lab and are preparing the submission for our second drug candidate, with the objective to bring innovative and well tolerated medicines to humans.

### Inspiring Future Entrepreneurs and Scientists

My experience at Eisbach is a narrative I share with pride, especially with my fellow MolBio Program alumni and the broader scientific community. It is a story of how a vision, coupled with adaptability and resilience, can lead to achievements, even in the face of daunting challenges. As Eisbach continues its journey, our commitment to making a meaningful impact in the world of biotechnology remains steadfast. We are excited about the future, driven by our passion for science, and inspired by the possibilities that lie ahead.

## Transitioning into independence

### A career in science writing and editing

"So, you finally gave up science?"

That was my friend's reaction to the news that I no longer worked in the lab. The other piece of news was that I started working as a science editor.

The decision to quit science was not an easy one for many reasons: how could I abandon all the things I liked about working in academia: experiments, microscopes, new data every day, conferences. How could

I part with all that and leave the cozy academic world?

But ever since I took some time off the bench to write my thesis, I knew that science career wasn't for me. As much as I enjoyed designing experiments, acquiring data, and playing with microscopes, I knew that my true passion was elsewhere. Of all the myriad of tasks we do as researchers, writing was by far my favorite.

(continued on next page)



The author Elena Kardash



### Transitioning into Independence (continued)

Yes, I always loved writing but never thought of it as an occupation. It felt more like another small part of a job of a scientist or a hobby when I wrote creatively in my free time. After submitting my thesis, I continued working in the lab, finishing papers, guiding students, and even starting new projects, but I was already thinking about possible ways to make living with writing. It may sound easy, right? Just apply for a job as a journal editor or write for a popular magazine such as *Scientific American*. But I knew already that if I quit science, I would like to work remotely to have more flexibility to do other things and move around freely. It took 12 years before my dream of earning my living with writing came true.

The solution came naturally shortly before the pandemic hit the world. In the beginning of 2020, I was looking for a new position when I came across an announcement in *NewScientist*. A large company offering language editing services was looking for freelancers. That sounded like a good temporary option back then as I did not see myself as a science editor at that point. I passed the tests and got my first freelance contract! As I signed that contract and started working, I had no idea yet that I am about to begin my new career of a science editor.

Indeed, you may ask me for how long one can read and correct research papers of other scientists, especially when you are used to work on your own projects. I can tell you now. It's been four years and I keep counting. After several month of adaptation to my new role, I realized that I did not want to look for other jobs. I

liked what I was doing. I found myself at the very frontier of science as I was reading about exciting discoveries before the rest of the world



did. I learned myriad of new topics in medicine and basic science I had no chance to read about because of lack of time. I built meaningful relationships with some clients who asked specifically for my editing services for their new projects.

As a science editor, I stay behind the scenes. Nobody knows I exist, and I like this invisibility. I don't get emotionally involved with research, which helps me find the most efficient ways to present a story and suggest improvements in logical flow to my clients. The most enjoyable part is probably the rebuttal letter. I remember too well my own rebuttal letters and crying because of insensitive referees' comments and unrealistic demands for extra experiments in ridiculously short time. The stakes are high, the paper is about

to get published (or rejected!), after years of research patience is wearing thin. This is when I feel I can help the most because I've been there. There is nothing better than receiving a short triumphant email with a subject "my paper got accepted!"

My new career gave me all I was asking for: the freedom, the challenge, the inspiration. I seem to have settled into my new role comfortably. But as humans, we always want more. After years of working for another company, I want to be my own boss. This is how SciEditus was born. My next challenge is to find my own client with whom I will be working directly. It seems I am in a good place in 2024, the year of the dragon!

**Elena Kardash** completed her doctoral research in 2008 in the group of Erez Raz at the Max Planck Institute for Biophysical Chemistry. After positions as postdoctoral researcher at various institutes (ZMBE Münster, Milano University, University of Geneva, CNRS at Gif sur Yvette), Elena started as freelance scientific editor for Cactus Communications and served as medical writer for Integrated Scientific Services (ISS) AG. Recently, Elena founded SciEditus, being her own boss as science editor and medical writer.



## The challenges of a project manager mom

My daily routine as a project manager and mother of two is more or less well-established: every morning I wake up before the alarm to my toddler calling me. I no longer have the excuse that I am late for work because I didn't hear or muted the alarm. My son is indeed the most reliable alarm clock. The sleepless nights are not that far off from me especially as the winter season brings a new virus every week or so. This early wake-up gives me time to prepare for the symphony of getting ready two children for kindergarten and myself for work. Then follows the peaceful ride to work and the many meetings and deadlines during the day. In the evening, the most enjoyable part is seeing the kids after a long day and looking forward to a family dinner. The bedtime routine begins always too soon but never early enough. And what remains at the end of the day is the cycle of chores that accumulate every evening in a never-ending backlog.

This doesn't sound very encouraging for wannabe parents, does it? In fact, I take pleasure in this routine and it is what grounds me. Even though I do see that there are always things to be improved in it.

As an experienced project manager I am well-seasoned in managing multiple projects simultaneously but being a working mother has indeed added a whole new dimension to my understanding of both project ma-

ty to practice calm even in the most harrowing circumstances. The ability to keep my thoughts clear and calm under pressure is something that I could easily apply in my daily work, especially when deadlines and mile-

stones are due. Another communication aspect I feel I could improve thanks to my children is to deliver my message in as few words as possible. I still use complicated phrases and words with them but I can easily read on their faces when I lose them in my explanations. It offers

invaluable practice indeed.

The biggest lesson I learned from my children is not to generalize. After having my daughter I thought I had it all figured out and I could easily map how my experience as a mother of two would be. My son was the one to challenge that and teach me a great lesson: every child is different. I had to find new solutions and sometimes I had to accept that what worked with my first-born does not work for the second-born. Let's take, for example, sleeping: my daughter was trained to sleep through the night by 11 months. With my son, I am still not sure if the current status can be called sleeping through the night. Especially winter with all its colds and flus has not been kind



Larysa, Ingrid, Leon and Myroslav (from left to right) enjoying a walk in the forest nextby during a sunny winter day

nagement and the demanding role as a mother. I am still learning. However, I do feel that I have become much more efficient. At the same time, I do have moments of despair when the difficulty of juggling work and family responsibilities can feel insurmountable. I have great friends and my partner's support that allows me to focus on myself and take care of my mental health. This helps me a lot to deal with the feelings of being stretched thin and the burden of trying to do it all.

### What children can teach you

What my children taught me covers especially communication. I learned to react to cries and tears with calm. They also offered me the opportuni-

# Alumni

## Family Careers

### The challenges of a project manager mom (continued)

to neither of us in terms of night's sleep. It took me more than a year to accept this. I will practice patience until my son will be ready to sleep through the night and wake up after me.

#### The Art of Delegation: will I ever master it?

As a project manager, delegation is a key skill that defines a successful and efficient project manager. However, this implies that there is a team of people who are actively involved in a project. As parents in today's globalized world, we no longer have the system of support of the extended family to back us up. This is why I am very grateful for the crèche system in Luxembourg. We were lucky to find positions in the public kindergarten as soon as my parental leave ended and this allowed me to go back to



Leon, Ingrid and Larysa with presents from Saint Nicholas



Our family of four and after short trips around Luxembourg

work. I appreciate this tremendous support especially on the weekends. It is great fun to be with the kids around the house but there are still a lot of chores to be finished. So on Sunday evenings, I feel more tired than at the end of the work week. This is a great motivation and helps me to prepare for the office and the week about to start.

On the other hand, I still have a lot to learn about delegating my domestic arena tasks, especially as we are only a team of two. Perhaps my perfectionism and fixed ideas about how things should be arranged don't help. Although, with the kids moving everything around and upside down, I have had to mellow on that aspect. I do try to find more time for myself and to spend time with my partner because this replenishes my energy levels and allows me to breathe a little easier.

Planning fun activities for us as a family and meeting friends every other week provide the highlights of our

life as a family. So I actively try to arrange such meetings and outings.

#### Ingrid Vreja Gebura

completed her doctoral research in the group of Silvio Rizzoli at the University Medical Center Göttingen in 2015. After traineeships at the European Commission in Brussels and the European Medicines Agency in London, Ingrid joined Bayer as a project leader in research. In 2018, she moved to Luxembourg to work as a project manager for Fast Track Diagnostics. In 2022, she took up the position of a clinical research project manager at the Luxembourg Institute of Health. In February 2024, she transitioned to an IT project manager position within the same institution. Ingrid is married to Myroslav Gebura, an alumnus of the Göttingen IMPRS for Neurosciences. She has as daughter, Larysa, and a son, Leon.



## The challenges of a project manager mom (continued)



Ingrid organized a family photo session on a beautiful summer day (Copyright: Oleksandr Chystiukhin)

### A journey of growth as a mother and as a professional

I think for a lot of mothers the elephants in the room are burnout and postpartum depression. We try so hard as mothers to take the best care of our children, to help our partners, take care of the house chores and, on top of that, work. So what is there left at the end of the day for ourselves? I have had many days in such a whirlwind routine that weeks would blur into months and even years. I have had many supportive friends and family who have drawn my attention to the risks. I was also lucky to find small hobbies and I took pleasure from simple activities such as a walk in the park and eating spaghetti with the kids.



I understand that it gives me pride to show my children and especially my daughter that it is possible to be a successful professional and have a family. Seeing my children's growth and development is for me a source of immense pride and joy. It strengthens my resolve to continue in this journey. At the same time, I have to consciously leave the word "excel" at the door and just aim to enjoy as much as possible the road ahead.

I was not fully aware of the challenges of being a project manager mom when my partner and I embarked

on this journey. Yet I am grateful and I am doing my best to enjoy the many rewards. Taking a step back,

## Getting prepared for the upcoming career steps

### Sakshi

I was a part of the fourth round of GGNB alumni mentoring program and it has been a rewarding experience. I joined the program in the last year of my PhD where I found myself struggling in trying to decide which career arena would be a perfect fit for me. I was always inclined towards the scientific industrial positions; however, I was practically clueless about what science means outside the (academic) lab. How are projects distributed, how are results presented, how can I develop my skills and keep learning new things? I had no idea about any of these situations. Of course, I could come up with answers from colleagues, friends, or workshops, but I wanted an expert who has been to both academic and non-academic labs and can draw a parallel between them and enlighten me about the world beyond academia. This is when I signed up for the mentoring program and listed out all the descriptions for my ideal mentor. Steffen and Steffi, the coordinators of the mentoring program were very earnest in this process, and they found me my mentor: Dr. Daniel Zwilling. Daniel matched all the criteria that I mentioned in my application form and fortunately, he was also very enthusiastic about the idea of having a mentee.

Daniel is currently a Principal Scientist at MSD (Merck Sharp Dohme), West Point, PA, US. His career trajectory was truly inspiring to me, and it resonated deeply with my own aspirations. Along with this, his personality and choices were very encouraging for me. Soon after getting matched, we decided on having monthly meetings. We came up with a meeting schedule for the entire duration of the mentoring program. This was very motivating for me as I could sense not only my own eagerness for guidance but also his genuine desire to help me suc-

ceed. The mutual commitment created a perfect, positive, and collaborative environment for learning and growth. I always created an agenda for our meeting and shared that with Daniel at least 2-3 days in advance, giving him time to think and prepare. As per my expectation, he was always ready for all my questions and queries with his honest point of views and experiences. After each meeting, I always went back with a little more information. Factors that made the mentoring experience outstanding for me was Daniel's patience and clarity with which he addressed all my doubts.

Going forward, I am now better informed about what to expect and how to apply for industry positions. Although the mentoring program ended, Daniel and I are in touch, and he is helping me along my journey. Overall, this was an extremely enriching experience and I find myself a little better prepared for my upcoming career steps. I would like to recommend this program to all the late-stage PhDs who find themselves struggling to find the adequate information about their chosen career path.

### Daniel

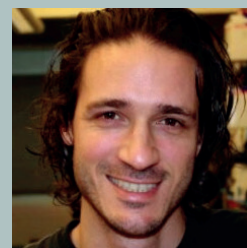
I was truly fortunate to be assigned Sakshi's mentor and it has been (and still is) a pleasure to collaborate with her. I feel that being a mentor to a young professional is a privilege and has at least as many benefits to the mentor as it has to the mentee. The mentor-mentee relationship is a two-way street and I can only encourage seasoned professionals to proactively seek out mentoring opportunities.

For young scientists who want to transition to the industry there are a few things they should consider. What is the motivation to move into an industrial setting? The question to ask yourself is: Am I running away from something or am I running towards something? The important thing is to choose a career path that aligns with their personal values and that they envision a goal. If the goal is to escape academia, then at least they know what they do not want to do. However, they still need to understand what they want to do. Ask yourself: Where do I want to be in 5 years? What specific job would be a viable choice?

**Sakshi Jain** completed her doctoral research in the department of Marina Rodnina at the Max Planck Institute of Multidisciplinary Sciences in October 2023, where she is still working as a postdoctoral research associate.



**Daniel Zwilling** was part of the first ever IMPRS cohort and completed his PhD in Reinhard Jahn's lab in 2005. After his postdoctoral training at UCSF in San Francisco he transitioned to the biotech industry. He lived and worked in Silicon Valley for 5 years before he moved to Philadelphia, PA, USA where he is now Principal Scientist at MSD, West Point, PA, USA.





## Getting prepared for the upcoming career steps (continued)

Most people have no clear idea what types of jobs are available at a biotech/pharma company. The truth is that biotech and pharmaceutical industry have a wide array of jobs to offer. Imagine all the different things that are necessary to develop and manufacture a drug, vaccine, or medical device. While basic science and wet lab research are an integral part, they sit only at the beginning of the process. There are a multitude of disciplines within a company that need motivated, smart, and talented scientists,

including (but not limited to) target discovery, target validation, pharmacology, translational science, biomarker development, clinical trials, safety, and toxicology (pre-clinical and clinical), project management, strategy, legal affairs, IND filing, manufacturing, marketing, clinical writing etc.

The good news is that applicants with a solid scientific training can join a company and move between disciplines if they are willing to learn and are able

to adapt. A PhD training will have prepared you for most of the challenges ahead. During the PhD training students are taught critical thinking, negotiation skills, presentation skill, public speaking, project management etc. These are critical skills that will help you succeed in your future career and are very important for industry jobs as well. Your mentor can help you highlight these skill sets on your resume and prepare you for your first job interview.

## An opportunity to explore career options in R&D

One of the key questions that late-stage PhD students need to think about is the next step in their career. The Alumni Mentoring Program is a perfect platform to better understand what is expected of our future positions. As part of the program, students are paired with an alumnus who has already gone through these stages, to help guide and support them as they transition. Here are some key points to reflect on from the personal experiences of Debojit Saha (the mentee) and Miroslav Nikolov (the mentor).

### Why did you join the alumni mentoring program?

**Debojit:** I decided to become a mentee because I wanted to find out what it was like to work in R&D in the pharmaceutical industry. Towards the end of my PhD, I became interested in working in R&D because I wanted to do research that would impact the lives of a wider population. As part of academia, we often have minimal idea what the requirements are to get into industry. Coming from India, I was also interested in the visa and language requirements to secure a position in Europe or the US. Fortunately, the mentor-

ing program coordinators matched me with Miro who had a similar background and who matched my requirements very well.

**Miroslav:** I was lucky to have a lot of support and crucial advice from friends and former colleagues when I decided to look for an industry R&D position. Once I found it, I promised myself I will pay it forward whenever I can. At the same time, I am extremely grateful for all that

IMPRS gave me and prepared me for in my career. What better opportunity to pay it forward than support a mentee from the MolBio program!

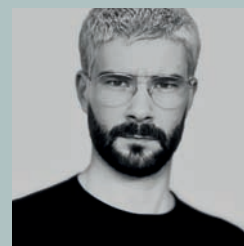
### How did you format your meetings?

**Debojit & Miroslav:** We decided to have our mentoring tandems meet virtually once a month. What I really liked about

**Debojit Saha** completed his doctoral research in the department of Melina Schuh at the Max Planck Institute for Multidisciplinary Sciences in December 2023, where he is still working as a postdoctoral researcher.



**Miroslav Nikolov** completed his doctoral research in October 2012 under the supervision of Henning Urlaub at the Max Planck Institute for Biophysical Chemistry. Currently he works as senior scientist and lab head at Roche Pharma Research and Early Development (pRED) in Penzberg/Munich.



# Alumni Mentoring

## An opportunity to explore career options in R&D (continued)

these meetings was that we could decide how often we wanted to meet, and that Miro was very open to my questions and doubts. For us, setting an agenda for the meetings in advance helped us to discuss different topics related to the application process in a more structured way. This included everything from how to write a concise CV and cover letter for specific positions, to the interview process, to how research is done in the industry, etc.

### How did you benefit from the mentoring program?

**Debojit:** All in all, my experience of the mentoring program has been extremely positive and helpful. Miro really helped me to balance the stressful period during the last year of my PhD with writing the thesis and manuscripts and thinking about future positions. I also had a wonderful time meeting him at Roche in Penzberg, where he organized a tour for me and gave me the opportunity to see the pharma industry from the inside. I am grateful to have worked with such knowledgeable and friendly mentor who has taught me so much about future career aspects and beyond.

**Miroslav:** Regardless of the amount of experience one never stops learning and polishing their skills, that is especially true for mentoring and coaching. I was particularly happy to do that in a setting that is very different from my everyday management tasks at work. It was a pleasure being paired with Debojit in our mentoring tandem, his curious, organized, respectful and diligent way of working and communication made it very easy to follow through. Even if the mentoring period is over, we will keep in touch and work together on his future job applications.

### What is your advice for the participants in the next round?

**Debojit:** I would highly recommend the mentoring program to anyone who is unsure of their future career goals or those who have found a particular career path. The experience will be invaluable for the doctoral candidates in navigating future applications and making decisions in a more informed way. I would encourage mentees to clarify any questions or doubts they may have, while being respectful of the mentor.

**Miroslav:** I would definitely recommend the mentoring program to anyone, regardless of their specific career goals. The careful matching of mentors and mentees makes sure you will have the right sparring partner and receive the support you particularly need. More specifically for our career path - industry R&D, it is not always clear where the differences and similarities to academic R&D lay (and there are many, from both!), so having an insider view is crucial for informed career decisions.

## Current profession and location of our Molbio PhD alumni

### Profession

#### Academia / Research (44%)

Professor 7%  
Group leader, PI 5%  
Staff/senior scientist 3%  
Postdoc 24%  
Science management 5%

#### Private & Public Sector (39%)

Scientist, team leader, manager R&D 20%  
Staff, team leader, manager non-R&D 13%  
Science manager/coordinator 2%  
Consulting 4%

#### Other Profession (10%)

Media, publishing 4%  
Patent attorney 2%  
IT, software development 1%  
Self employment 3%

#### Other (7%)

Other professions, internships, job applications, family management etc. 7%

### Country Distribution

#### Europe (80%)

Austria 1%  
Belgium 1%  
Germany 60%  
Luxembourg 1%  
Malta 1%  
Netherlands 2%  
Norway 1%  
Poland 1%  
Spain 1%  
Sweden 1%  
Switzerland 7%  
Turkey 1%  
United Kingdom 5%

#### North America (14%)

Canada 2%  
United States 12%

#### Asia / Australia (6%)

Australia 1%  
China 1%  
India 2%  
Iran 1%  
Qatar 1%  
Saudi Arabia 1%  
Singapore 1%

## Life finds a road trip

When I started my own lab as a PI, rushing around like a new bumblebee queen trying to establish her nest, I was once asked by a friend, 'How long haven't you appreciated the beauty of a wild plant, or watched the night sky and let your thoughts fly?' As cliché as it sounds, these questions had ghosted around me for a long time and made me want to return to my inner childhood, to that Lindenbaum where I dreamt in its rustle.

And then, COVID-19 happened. While I was trapped inside of my house, my contract ended. I was not a queen bee after all. Suddenly toilet paper and flour seemed scarce but time became abundant. It was funny though, only when we have time to do nothing, we start to notice everything that morphs slowly. I became aware of the ever changing position of the moon between the constellations, and the sunsets moving along on the horizons. I had learnt the facts in school, of course, but seeing

these phenomena with my own eyes really gave me chills.

Life went on. I moved to a new city as I'd got jobs outside of the central dogma of academic career path. But

him, I said yes. I then quitted my permanent position which I liked and decided that we could live and travel in a van for about one year without worries. Life is short and we want to enjoy it. Why should we wait until some day in the future when we might not even be around?

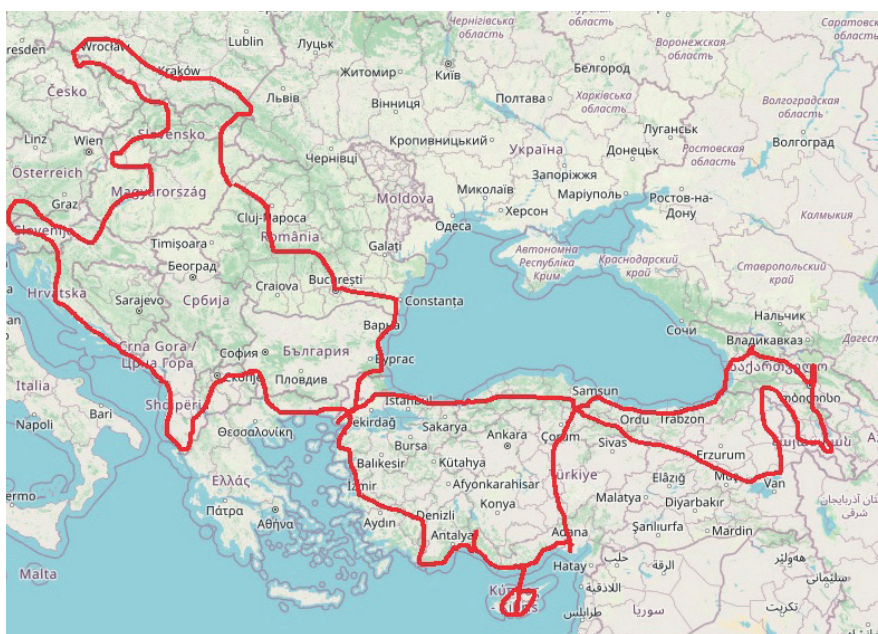
So the trip began. We bought an old van and built our six-square-metre mansion decorated in a Japanese style (or so we imagined). We mounted the solar panels, a gas oven, water tanks and a dry toilet. We briefly checked and repaired this antique van but we were never totally convinced that it would bring us to the Caucasus and back. However, our wise polish friend assured us, 'Jest gwiazda jest jazda' – with the (Mercedes) star it will drive. German engineering, huh?

The van surely drives. We descended to the

river bank of Aaos, not knowing if the slope was too steep for the van to climb back; we woke up many mornings to realised we couldn't



Chieh, Richard, and their van



Route of the trip

I gradually understood time with a new perspective. Therefore, when my partner, Richard, told me that he needs to travel and invites me to join



# Alumni

## Travel

### Life finds a road trip (continued)

start the engine due to diesel leakage; we drove through mountains and lakes in Transylvania whose rocky paths broke bits of its suspension system.

We visited the Blue Eye Spring which pumps tons of clear water that shines as a liquid gem; we passed by the Symphony of the Stones, a gorge between walls of hexagonal stone columns, straight and bend, which resemble the pipes of a giant's organ; we hiked on a dry river, which flooded in that evening and destroyed a pool we bathed in. We found fossils in ancient Greek sarcophagi; we tasted natural sparkling water; we observed astonishing colours of rocks and rivers; we walked through valleys with caves that homed people hundreds of years ago.

In Georgia, a fox carried its cubs one by one passing close to us; a few cows scratched against our van; one goat even jumped onto the van trying to steal some paper bags. We saw free donkeys in Cyprus and wild brown bears in Turkey. And the dogs: there were so many friendly dogs with different personalities we came upon. I hope they are all doing well.

Have I mentioned that I packed a piano? I managed to bring my passion and perform classical piano works at some places where people haven't had a chance to go to the concert hall. Many were also surprised to hear music from Chopin, Debussy, others and myself (pompous comparison) in the middle of nowhere.

Music binds us. How can I forget the car park in Croatia car park where people surrounded my piano until it was too dark? The lake in Italy



A house party in the 6 m<sup>2</sup> 'mansion'



Curious cows

where a motorcyclist stopped by and improvised on the piano? The lawn in Armenia where a young American guy with his Kazakhstani girlfriend listened to my music and told their

love stories? The village centre in Albania where a teacher came to share his musical ideas with school pupils? And the busy cross road in Türkiye where I performed to thank



A friendly dog, who was adopted by a French family later



Sometimes music was the only language we all understood



## Life finds a road trip (continued)

the locals for an unexpected lunch?

The trees, the landscapes, the animals, even the TV interview we had on the trip might one day escape my memory, but the time when we danced around the campfire with the cowherds, when we partied in a fizzy hot spring with the villagers, and when we exchanged good energies with the fellow travellers, will stay in my mind forever.

I am so lucky to be able to connect with these people who filled the moments with warmth and happiness. My time in Molecular Biology in Göttingen did not only gave me professionalism to work in various countries, but, perhaps more importantly, opened the doors for me to befriend those culturally very different. In this trip, I even managed to speak German, the only common language at times, which diminished the barrier immediately and brought us so much closer.

After about 450 days and 20 countries, we came back to where we started, repairing the car and preparing for winter. We are very happy to see old friends again but the house now feels too big and the days too quiet. The clouds look grey and gloomy. I sit in my room writing this article but my thoughts go back to the trip, to our van life and to our encounters. Well, the story has to be continued. In spring, we will start a new trip.



We met these traveller friends in Georgia and managed to reassemble the group in Armenia



Everything becomes extraordinary when you slow down and travel

**Chieh Hsu** did his PhD in 2010 in Mikael Simons' group at the MPI for Experimental Medicine. He was a Principle Investigator at the University of Kent, England before he worked at the pharmaceutical company Almac, Northern Ireland. He and his partner, Richard, are planning their next trip to further enjoy van life.

More on their trip: [https://www.instagram.com/donkeys\\_in\\_the\\_van/](https://www.instagram.com/donkeys_in_the_van/)  
Chieh's music: <https://music.chiehsu.uk/>  
Chieh's career: <https://uk.linkedin.com/in/chieh-hsu-70514154>



# Lindau Nobel Laureate Meeting 2023...

A feast of science, friendship, and fun

In the picturesque town of Lindau, nestled along the shores of Lake Constance, a gathering of some of the world's brightest minds unfolded in the form of the Lindau Nobel Laureate Meeting, dedicated to Physiology and Medicine this year. 39 Nobel Laureates and 600 young scientists worldwide to engage in fruitful discussions and inspiring encounters. The meeting was a week-long scientific fiesta, and an extraordinary journey of discovery, collaboration, and inspiration.

The meeting started a day early for a few of us who participated in the Longevity Luncheon organized by WORLD.MINDS and Lindau in Zurich, Switzerland. The luncheon saw 50 participants, ranging from CEOs, Heads of R&D and Board Members to global pharmaceutical and MedTech companies, investors, Nobel Laureates, as well as a few young scientists like me. We reviewed and discussed the latest scientific breakthroughs within the space of longevity. It was a great melting pot of people bringing different questions and perspectives into focus. For example, Frances Arnold talked about how we need to focus on healthy ageing and not living forever, and investors talked about the difficulties of testing early-stage anti-ageing claims. I shared my views on the link between women's reproductive health and life expectancy. Women who experience early menopause often have shorter lifespans and higher disease risks. It was nice to see scientists, investors and young female entrepreneurs sparking meaningful conversations about enhancing women's health and quality of life. As both a scientist studying aging and a woman championing equality and equity for reproductive health, this exchange left me pro-

foundly gratified. This was a great way to kick off the Lindau meeting!

The Lindau meeting started with exciting talks from various Nobel laureates, often weaving together their transformative science with threads of curiosity, perseverance, and serendipity during their journey. I loved how Emmanuelle Charpentier underscored the importance of fundamental research and



Serendipitous meeting with amazing Molbio alumni - Özge and Lorenz



WORLD.MINDS x Lindau Longevity Luncheon in Zurich

young students (especially the role of a talented MSc student) in discovering innovative CRISPR-Cas technologies. Stefan Hell talked about how important it was to persevere through struggles and gave examples of how he overcame scrutiny from colleagues and proved them wrong. He shared how he became



Lindau and Mars Panel Discussion on healthy ageing with Michael Young and Adam Smith

a "freelance inventor" when he was unemployed as he was always inventing things! Several scientists gave many uplifting tips for a life in science. I'd like to share a few of them: Elizabeth Blackburn told us to be comfortable with being wrong, and Leland Hartwell said to also get comfortable with uncertainty. Randy Schekman recommended to optimize science to your own personality so that it feels like play even when things are tiring. Martin Evans asked us to find and celebrate little joys interspersed in the rich tapestry of life. It was up-



## Lindau 2023: A feast of science, friendship, and fun (continued)

lifting to hear these stories of similar stress and adversity even in the lives of extremely successful laureates. It was comforting and energizing and taught me that one should be willing to take risks and manage them – an honorable failure is better than a mediocre outcome.

Apart from the talks, Lindau also organized several panel discussions on important topics and health and society. I was honored to be selected as a panelist on one such discussion on “Adding Life to Our Years: Healthy Aging, Longevity, and the Potential for Nutrition Science” alongside Nobel Laureate Mike Young and Dr. Hagen Schröter of Mars Edge. Together with our moderator, Adam Smith, we talked about how circadian patterns, nutrition and fertility are closely linked with each other. The hall was completely full even at 7 am, and people asked compelling questions. The lively exchange of ideas and the enthusiastic engagement of the audience reaffirmed my passion for this field and ignited a renewed sense of purpose in my research. I was having an absolute field day! It was also great to later chat with Michael Rosbash (co-laureate with Mike Young, and also a Horizons 2018 speaker) about circadian rhythms, DNA damage and fertility (our common research topics)... and the beautiful city of Göttingen that he fondly remembers.

Beyond the formal sessions, the meeting fostered a spirit of collaboration and camaraderie among attendees. In the bustling corridors and crowded lecture halls, I found myself immersed in a sea of ideas and perspectives. The multidisciplinary nature of the meeting encouraged cross-pollination of ideas, sparking unexpected connections and insights. In these serendipitous moments of exchange, Lindau’s true magic unfolded, transcend-

ing disciplinary boundaries and inspiring a collective pursuit of knowledge. I learned about so many new things, ranging from stem cells and immune therapies to renewable energy – a testament to the vibrancy and diversity of research.

Amidst the whirlwind of presentations and discussions, the personal connections forged at Lindau left the most lasting impression. It was very special to see some familiar faces from Göttingen and Molbio alumni in the meeting too. It was great fun to explore Lindau together – walking down the cobbled streets of the city center, taking boat rides together, playing with butterflies in Mainau island, swimming in *Bodensee* and trying to fit as many talks and sunshine hours in a day! Whether sharing a drink under the moonlight at the BBQ or at a panel discussion at 7 am, I found myself surrounded by a community of like-minded individuals bound together by a shared passion for discovery.

There were a few other moments that made me smile ear to ear – holding the Nobel Prize medal of Bill Kaelin (I think it was fake but fun nevertheless), dancing on a boat with my friends and Peter Agre, having long fruitful conversations about fertility and menopause at the Open exchange with young scientists and Martin Evans, Martin Evans sketching an ovary with an ovulated egg on my book (!), getting to wear an Indian Sari after years, and learning about other people’s wonderful cultures and dresses.



Breakfast chats with young scientists and Michael Rosbash



Bavarian evening with Countess Bernadotte



Young scientists from all over the world at Lindau

As I reflect on my experience at the Lindau Nobel Laureate Meeting, I am filled with a profound sense of gratitude and optimism. Armed with newfound knowledge and a broader perspective, I return to my research endeavors with renewed enthusiasm and a community of friends. I can only recommend this meeting to everyone!

Ninadini Sharma



## The Master Graduation - a journey completed

After successfully submitting our master's theses earlier this year, we eagerly anticipated the MolBio graduation ceremony. On the day of the ceremony, the atmosphere was filled with joy and excitement as our batch reunited. It was incredible that almost all our batchmates were able to attend the ceremony in person, particularly since some of us had chosen to leave Göttingen for the next chapter of our careers. Some of us had fun wearing traditional dresses that represented our respective cultures, which also underlined the diversity of our batch. Additionally, we had the pleasure of meeting some of our batchmate's families in person. The entire ceremony was broadcasted live, enabling our special ones who couldn't join in person, to virtually witness and partake in this significant milestone alongside us.

The ceremony commenced with a speech delivered by Prof. Dr. Peter Rehling, the IMPRS MolBio program director, who shared valuable advice for our future research endeavors. Representing the graduates, we (Neos and Saruby) took the stage and delivered a heartfelt speech, accompanied by captivating slides that evoked both laughter and tears of pride from the audience. This was also an opportunity for us to express our deep gratitude to Steffen and Kerstin for their unwavering guidance and support throughout the program.

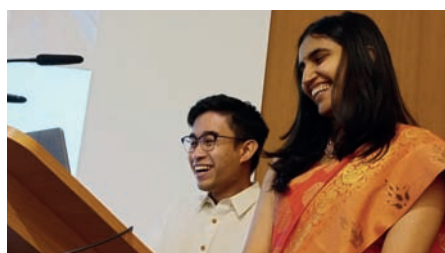
The highlight of the graduation ceremony was the distribution of our diplomas, accompanied by beautifully arranged flower bouquets. Additionally, a „special prize“ was awarded (spoiler alert: it

was an international cookbook) to those who were recognized for their outstanding academic achievements. It was a proud moment for all of us to finally receive our diplomas - the culmination of one and a half years' worth of hard work, perseverance, and dedication!



The Master graduates of the 2021/22 class

Another noteworthy moment of the evening was a soulful musical performance by Aybeg, one of our talented MolBio musicians. Afterwards, Gabriel Luke Pisani gave an innovative and inspiring commencement speech on behalf of the new MolBio batch of 2023. Subsequent-



Neos and Saruby giving the graduation speech

ly, the new batch was invited on stage to introduce themselves. As this diverse and enthusiastic group talked about their countries of origin and scientific interests, it invoked a sense of nostalgia within us. Not long ago, we stood at their place, awkwardly introducing ourselves to the MolBio family and wishing the graduating batch success. We also wish the new batch the very best, as they now commence their MolBio rollercoaster ride!

As the ceremony came to a gracious end, we took the much-awaited group pictures of our batch. Many of us stayed behind to take more pictures with our diplomas in the legendary Manfred-Eigen hall. Meanwhile, most of the audience proceeded to the small reception

consisting of delicious finger food and sekt. A shout-out to Steffen and Kerstin for organizing this wonderful ceremony!

After warming up to music from different parts of the world, we moved our celebrations to an after-party at the Lutterterrassen

dormitory party room. There we continued our celebration with drinks and dances for several hours into the night. Since some of us were catching up with each other after a long time, we continued our discussions the day after over lunch at the Madras Restaurant and indulged in further conversations over coffee at Kaffee Hus.

All in all, the MolBio graduation ceremony was a special and magical evening – not only because we finally reaped the fruit of our hard-earned Master's degree, but also because we were reunited together as a batch, probably for the last time. It was an event filled with happiness and excitement, shared with family, friends, and colleagues. There was nostalgia in the air as memories of fun and fondness were recounted. Wherever we go in the future, we wish our batchmates success, good health, and happiness. Cheers to the MolBio batch of 2021!

Joseph Neos Cruz, Saruby Sharma

## IMPRS goes Harz

In August 2023, the serene surroundings of the Harz mountains provided the backdrop for the annual retreat of the IMPRS Molecular Biology Program, where we were joined by the Neuroscience group. Exhausted but happy, having mastered the exams, we left Göttingen early on 25<sup>th</sup> of August. The train took us to Herzberg am Harz, where we loaded ourselves onto the bus to St. Andreas Berg. After a short rest at Internationales Haus Sonnenberg, amongst the good company and stimulating conversation, we engaged in a series of thought-provoking discussions.

Deliberations centered around cutting-edge science topics reaching from artificial intelligence to Space Biology to Zombie Ants. After researching in small groups, we presented our findings to our intrigued peers. We asked questions, had some good chats, and left feeling smarter and pumped about mysteries of the scientific world.

**Dinner expedition.** The day concluded with a trip to St. Andreasberg with unforeseen obstacles. Being used to the frequent and reliable bus schedule in Göttingen, we did not expect that we would have to call the bus to pick us up. This is why we ended up walking to town, which was an adventure for some but not for others. Over a palate pleasing Italian dinner we caught up with our friends that we couldn't meet that often during our study break. Luckily, we were able to arrange last minute taxis (St. Andreasberg's so called "busses") for the way back. After coming back to the hotel, we got together in the party room to chat,

dance and celebrate the end of a challenging but pleasurable chapter of our life.

### Future endeavors and mine Samson.

We woke up bright and early for breakfast ready for another day. The theme of the morning was to talk about our future

plans. Everyone gave a short pitch on their master/PhD project, techniques and methods to be used and future plans afterwards. After a rainy day on Friday the weather gods were on our side and we were greeted with a beautiful sunny day, which is why we were able to hold most of the session outside to replenish our vitamin D reserves that was suffering from the study period.

However, the next activity on the agenda was not dependent on the weather: We had a tour of the historic mining site "Grube Samson" in St. Andreasberg, an integral part of the Harz mining landscape, contributing to the region's designation as a UNESCO World Heritage Site. The highlight was the wooden man engine that enabled miners beginning from the 17<sup>th</sup> century to enter tunnels and shafts 500 m deep. This unique construction was the first of its kind and was fully powered by the water of the Harz Water Management System. Together with its still running and massive water wheels, the tour gave us an impressive glimpse into the challenges and innovations of historic mining practices.

Our bus and train ride back to Göttingen went smooth and it was time for a farewell. After an intense year of celebrating and laughing together, facing scientific and non-scientific challenges together and making really good friends we all were sad to say goodbye but also looking forward to seeing our family and friends or traveling for four weeks before commencing the Master thesis.

Animan Tripathi, Jaschka Nicol,  
Morten Flieger



Scientific discussions in the seminar room



Waiting for the bus that was a taxi for four people



Exploring Grube Samson



Session about future plans while enjoying the sun of the Harz



## Science with a slice of sunshine

### The 2023 MolBio PhD retreat in Leipzig

With the cold days of winter and the rainy days of spring behind us, it was finally time for the warmth and sunshine of summer, and with it, for the annual MolBio PhD retreat! For many of us, this marked the beginning of our PhDs, and there was no better way to start this exciting journey.

Our destination for the 2023 MolBio retreat was the city of Leipzig. The bus ride was buzzing with anticipation, with some of us looking out at the scenic route and having long conversations about life, while others added finishing touches to their research presentations. We arrived just in time for lunch, and then settled down for the first session of talks from our PhD students. From the mysteries of membrane proteins to the marvels of the mitochondria, from the intricacies of cellular behavior to the enigmas of protein structure, our minds were led to zoom out for a change, and be reminded of all the facets and fascinations of molecular biology. The presentations, as well as the discussions that followed, were a wonderful reminder of the diversity of the MolBio program, both in terms of the students and the kinds of science and research that we all contribute to.

Once the science-sessions ended for the day, we started to explore the city. In the evening, Leipzig was alive – full of lively bars, music at every corner, the

questions, followed by an engaging poster session. The sun was directly overhead, but we were too busy talking about the projects that we held close to our hearts (and our brains). The grassy lawn outside was filled with the hum of discussion and the excitement of sharing our latest findings, troubleshooting, and bouncing new ideas off of each other. Poster sessions with the MolBios are always enriching – a vibrant combination of pride for your friends, fascinating science that is as different from your field as it is interesting, encouragement and feedback, and serendipitous ideas.



Outdoor poster session at the *Alte Essigmanufaktur* in Leipzig

hum of happy conversation, and everyone outside enjoying Golden Hour. We found cozy bars wrapped in string lights, little photo booths that printed black-and-white photographs of our silly poses, and old stores selling antique toys. While many of us followed the music all the way to the Wine Festival happening at the city center, others decided to have a movie night (with lots of junk food) in the hotel. Either way, we know how to wind-down after a long day!

The next morning began with more scientific talks and several rounds of

That afternoon, everyone set out to get to know Leipzig better. While many of us headed towards the bustling city center for the guided tour, others decided to explore the city by boat, or by visiting various museums that offered glimpses into Leipzig's present and past. The guided tour took us through the scientific and artistic history of Leipzig, weaving stories of Bach and Leibniz with the statues, buildings, and churches we saw along the way. We were shown the little Easter-eggs of the old town, such as paintings and statues where we least expected them, and we



## Science with a slice of sunshine (continued)



Visit of the city center of Leipzig

definitely had to make a pit-stop at the city's famous ice cream shop! With the afternoon heat scorching down, the tour ended aptly at a large water fountain in one of the city center squares, and we all cooled down as we dunked our arms into the water. Of course, we had to have a mandatory water fight, and nobody was spared from the splashes of cold water!

Later, as the sun prepared to set, our evening shenanigans included finding parties around the city, hanging out in sprawling parks, and even going on a fascinating night tour through town. Leipzig was as colorful by night as it was by day, with its buildings lit up and the city center filled with the sounds of clinking glasses, music, and conversation. We all tried to take in as much as we could.

The next morning brought with it the much-anticipated alumni talks by some of the MolBio alumni. Informative, personal, and encouraging, the talks spanned topics from careers in consulting and industry to medical writing and academia. The presentation session was followed by enthusiastic rounds of speed-dating, where we got further insights to the ups and downs of their journeys, as they patiently answered our constant flow of

questions and reminded us that we are capable of doing amazing things! We had insightful conversations about balancing family and career, about venturing into unconventional career paths, and about the highs and lows of academia, to name a few topics. We also had important discussions about breaking free from the status quo, being a woman in a male-dominated profession or environment, and sustaining a healthy work-life balance. Needless to say, we ended the speed-dating sessions on a motivated note – we have challenges ahead, but we also have an incredibly supportive community.

All too soon, it was time to head back to Göttingen. As we climbed back into the bus, our brains were buzzing with the energy of the past few days. With the summer afternoon heat chasing us, we stopped for ice-cream and a stretch before making our way back. We were going back to reality – our homes, our research, our often-frustrating experiments – but we now had new sun-tinted memories, new ideas and perspectives for our science, and a little more motivation to do what we loved doing. Besides, we were still taking the best part of the retreat back with us – all the incredible people of the MolBio program!

Mandira Choppella



Lunch breaks and alumni speed dating



## The catalyst for a different type of bond

In September 2023, 23 different people from 11 different countries, each with their own lives and experiences, their own dreams and personalities, were brought together under a shared admiration for molecular biology. However, this group of students has a lot to learn and not a lot of time to do it. Not only have they just moved to a new city, but a whole new country. Fostering a positive environment is paramount to keep spirits high and foster a generation of biologists eager to discover new things. Well, as someone who is currently in the middle of this, I think I am qualified to walk you through the start of the molbio journey. The catalyst for interactions that last not just a couple of seconds but a lifetime.

Let's start at the beginning, the event that began our journey through the



Joint speed-dating sessions at the Horizons Career Fair...



...and exciting scientific lectures.

program: the Horizon's conference. Overall it was a great experience with interesting talks from various people doing incredible work both inside and

out of academia. This also served as the perfect backdrop to the newcomers meeting each other in person, since we were effectively surrounded by the one thing we had in common: biology. It was in this week that we started to get to know each other and appreciate each other's company.

This was aided by many social activities, both organized by the program and privately by us. We held a picnic at the Kiessee lake and even went on a trip to Hamburg to begin to explore Germany together. To help us learn more about the new country we had moved to, the program organized city tours of Göttingen and a trip to the Grenzland-Museum, where we learnt all about the divide between East and West Germany.



Lake-side picnic at Kiessee



Quick vacation to Hamburg



Joint Molbio/Neuro excursion to the Grenzlandmuseum Eichsfeld

Once October came around, the lectures started and delved into all aspects of cellular functioning. That being said, the program still had an ace up its sleeve to really help ensure we saw ourselves as one group: the culture nights. These are nights held once a month as a way to celebrate something about ourselves, from culture to holidays. Our first was the Spooky Game Night, a chance to let loose in a costume to celebrate

Halloween with drinks, games and lots of dancing. It was a new way of learning about ourselves as one by one I saw what each of my course-mates choose as their costume. Next up was the Winter Culture Night, celebrating various winter traditions. With a team quiz, warm drinks and a cookie decorating station, this event really helped the participants, myself included, relax and unwind together as a group.



## The catalyst for a different type of bond (continued)

Speaking of unwinding, now that we had begun to grow closer together as a batch, we became experts at throwing birthday parties. The secret is simple, good company courtesy of our new friends, plenty of music and of course party games. Fun is not something that requires parties though. Now when we can enjoy the beautiful snow that covered our campus to turn it to a wonderland. We may all be over 20 but who can resist sneaking out during breaks to throw some snowballs around or to work together to create the biggest snowman possible? As one of the people who has never seen snow in my life I will never forget all the laughs I shared as I got to experience this new feature of our world with all my new friends.

So far the program has done an excellent job of bridging cultural divides. However, what good is an enzyme that cannot jam its substrates together so that they can react? Apart from spending time together during lectures, methods courses and culture nights, the majority of us also use to public busses together too. Since our course started a few weeks before the regular semester



Spooky culture night



Time enjoying the snow



Winter culture night

in Göttingen, we were able to enjoy the simple pleasure of having a bus almost completely to ourselves. That was until the semester started. Now instead of simply sitting on the bus, we can instead huddle next to each other as we hope that there is enough space for us. Many thanks to the Göttingen bus company, for taking it upon themselves to further increase our bond as a group!

More seriously, from my experience as someone who moved out of their parent's house for the first time, coming here has been a very exciting experience. I have had so many good experiences and made so many new friends. With that I'd like to personally thank Dr. Steffen Burkhardt and Kerstin Grüniger. In keeping with the metaphor of the program as an enzyme, they are the active site and their work has greatly lowered the activation energy needed for moving here. Thank you to you and all my course-mates, it means the world to me to be in this program alongside you.

Gabriel Pisani



## GGNB Summer Games 2023

Between our lectures, lab rotations, retreats, and culture nights, sometimes it becomes easy to forget that our beautiful and tight-knit Molbio (-Neuro) family is part of a wider community of graduate students from 16 different programs, all under the umbrella of GGNB.

Like every other community, our GGNB community also needs interaction, engagement, and exchange to thrive; and exactly that was the motivation behind organizing GGNB Summer Games 2023 – a day where students from all programs in GGNB came to play and compete together last summer.

GGNB Summer Games used to be an annual event organized by PhD students of GGNB and supported by the GGNB office. But the COVID pandemic meant that – like so many other good things that used to be – there were no GGNB Summer Games from 2020 to 2022. This also meant that in 2023, when we finally could have the Summer Games again, most people who knew what the Summer Games were, were gone! With (quite) some help from Kirsten from the GGNB office, though, we assembled an organization team and slowly sketched out the plan for the event. By the end, we had three sports events, quite a few activities, a barbecue, and a potluck party planned. The event was beginning to take shape. Between plan-

ning the schedules, designing posters, figuring out the rules, and working through the checklist of tasks, we – as the Molbio team – had even found time to have beach volleyball practice sessions with the IMPRS Neuroscience and Biomolecules teams.



The IMPRS Molecular Biology and the Molecular Biology of Cells/Biomolecules beach volleyball teams after the final game.

Soon, the day had almost arrived. The day before the Summer Games, the WhatsApp group of the organizing team had an aura of concern and panic: the weather forecast for the 25<sup>th</sup> of August, the day for which we had planned the event, contained words like “strong” and “thunderstorm.” There was not much we could do about that though, so we kept panicking a little but carried on anyway. The morning of the day of the event came with some light rain, but by noon, the rain had reduced to some light drizzle, and we were hopeful. Soon, the people who had volunteered to help us on the day arrived, and we started setting the place up. While we were setting up the equipment, organizing stations for the activities, assigning volunteers, and setting up the bar and the barbecue, more people kept arriving: some with

containers of food, some with their sports bags, and some with friends. By the time we were finished, around a hundred people had gathered, the potluck table was full, and the backyard of MPI-NAT Mensa had become uncharacteristically lively.

And then, it was time for the games. My personal favourite was the game simply named Buffer Preparation, where the participants had to follow a detailed and exact protocol to prepare a buffer for the resuspension of lime, ginger, and mint lysate using bicarbon-

ate-carbonic acid as the buffering agent and sucrose as the osmolarity regulator. Delicious! The other games involved a Morris water maze, a pipetting speed-run, a water bottle distance shooting challenge, and a parafilm stretching challenge – each testing a different essential lab skill as part of the Lab Olympics. As for the sports, we had beach volleyball, table tennis, and round-net. For volleyball, we had four teams – IMPRS Neuroscience, IMPRS PBCS + Microbiology and Biochemistry, Molecular biology of cells + Biomolecules, and IMPRS Molecular Biology – playing each other in a round-robin format. For table tennis, we had planned a one-vs-one single-elimination tournament with participants from all programs. For round-net, we had walk-in two-vs-two matches. The best-scoring participants in each event would win points for their re-

## GGNB Summer Games 2023 (continued)

spective programs, and every event contributed to the program's final score. The program with the highest score would be the winner.

The competition was glorious. The table tennis tournament was won, after fierce competition, by a Molbio – Subhro Basu. In the beach volleyball tournament, the IMPRS Molbio team had won their first game against IMPRS Neuroscience but lost the second against Molecular biology of cells and Biomolecules. The penultimate game against IMPRS PBCS/Microbiology and Biochemistry ended with the narrow final set victory for us, and so, we made it to the finals. It was to be a rematch against the Molecular biology of cells and Biomolecules team, after all. The final game was very closely contested and was only decided in the fifth and final set – in the victory for the Molbio team. After all activities were done, the people had their fill of the barbecue and potluck, and the scores were tallied, Kirsten announced the final results: IMPRS Molbio had won the GGNB Summer Games 2023!!!



IMPRS Molbio students with GGNB Summer Games 2023 Winner's trophy

The day of GGNB Summer Games was a fun and lively day full of interaction, engagement, and excitement (I promise, I am not just saying that because Molbios won). And this event was only possible because students from many different PhD programs within GGNB – including many fellow Molbios – came together, for organization as well as participation. And therefore – despite not knowing what Summer

Games looked like before the COVID years, or the organizational challenges we faced, or even the thunderstorm that eventually did come – we felt that the GGNB Summer Games 2023 had achieved its purpose. We – the Molbios – were happy that we had won, and we – the organizers – were happy that we had organized the event successfully.

Arjun Bhatta

## Our Molbio student representatives

### MSc student representatives



Congratulations to our newly elected MSc student representatives **Hannah Knerich** (left) and **Khushboo Jain** (right).

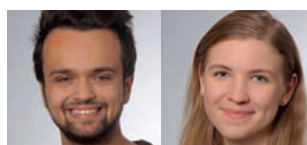


Many thanks to our former MSc student representatives **Juan Tasis Galarza** (left) and **Nicol Jaschka** (right).

### PhD student representatives



Congratulations to our newly elected PhD student representatives **Dimitra Tsouraki** (left) and **Gantavya Arora** (right).



Many thanks to our former PhD student representatives **Aybeg Günenç** (left) and **Yuliia Tereshchenko** (right).



# Horizons is the limit: 20 years and counting!

Ever since its inception in 2000, Horizons in Molecular Biology has held a special place in our hearts as a long-standing tradition and a piece of evidence of what a group of highly motivated students can achieve to promote scientific communication and exchange. After many successful conferences that always brought together scientists and students from all over the world, we were particularly excited to host an anniversary meeting this year, celebrating 20 years of Horizons! The symposium took place from 11<sup>th</sup> to 14<sup>th</sup> September and welcomed researchers from diverse career stages, from Master and PhD students to Post-docs, young PIs and established group leaders, from various backgrounds covering the wide spectrum of Molecular Biology disciplines.

The first day of the conference was once again dedicated to the Career Fair, where distinguished professionals introduced our participants to career options outside of academia, including scientific positions in startups (Jonas Lohse), science illustration and animation (Gloria Fuentes), consulting (Jaime Hibbard) and publishing (Stuart King). During this day, the audience also got to participate in engaging hands-on

workshops focusing on effective CV and cover letter writing for academia and industry and fundraising for scientific research.

From second day on, Horizons became an élite platform for interactions be-

ing field of mitochondrial biology with Hauke Hillen, Eva Kummer Hansong Ma and Joanna Rorbach shedding light on the structural and molecular basis of mitochondrial gene expression and mitoribosome assembly, while Michael Minczuk made everyone curious

about the recent developments in the field of mitochondrial genome editing and its applications in the clinical research. Ramanujan Hegde once again thrilled the protein enthusiasts with his brilliant talk about the quality control mechanisms of orphaned proteins in the cytosol. Yamuna Krishnan presented her novel fluorescent reporter technology to quantitatively map ions within cellular organelles. Z. Hong Zhou talked about his groundbreaking integra-

tive proteomics cryoEM method.

Cutting edge science was showcased by many eminent researchers like Yifat Merbl, who talked about mapping the proteome degradation landscape in diseases, Dimple Notani, who talked about the enhancer code in regulation of transcription and Taekjip Ha who presented his single molecule studies on genome maintenance. Nick Lane, as an evolutionary biochemist, gave a fascinating philosophical talk on the origin of the genetic code in autotrophic protocells, while Hiya Ghosh and Pascal



Group photo with participants and organizers at the 20<sup>th</sup> Horizons in Molecular Biology



Keynote lecture with Peter Walter [all photos for this article have been taken by Irene Boettcher-Gajewski]

tween the students and scientists from diverse scientific backgrounds around the world.

The scientific talks began with the keynote speech from Peter Walter (Altos labs), who enlightened us about targeting cell's stress pathways for therapeutic benefits, in cancer and neurological disorders. Over the course of the next three days, fascinating talks continued to gather widespread interest and expand the horizons of the audience. This year in particular, we witnessed many interesting talks from the emerg-



## Horizons is the limit... (continued)

Kaeser broadened the audience's interest in molecular neurobiology. We had the pleasure to host some of the most distinguished scientists from around the globe who have significantly advanced various fields of research, such as Katrin Karbstein in ribosome remodelling and repair, Naomi Moris in developmental biology, Marius Lemberg in organelle protein homeostasis, Jonathan Pines in mitotic research and Markus Rasler in metabolic networks.

As a Horizons tradition, the budding PhD students were given a chance to present their research work to the audience. We provided an opportunity for three students to give a talk in a segment called "Awarded Student Talk". Awarded student talks included presentations by Ariel Tennenhouse (Weizmann Institute of Science), Elsa Rodrigues (Helmholtz Center Munich/IBMI) and Madhushree Dutta (CSIR). In addition, three students received travel grants from the evaluation committee of the symposium for their travel and stay in Göttingen.

Over 50 scientists got a chance to present a poster during our three-day interactive and vivid poster sessions and got constructive feedback from renowned scientists and peers. These poster sessions came with exciting prizes for the best presenters! Apart from the talks, the organizers' team also arranged many enjoyable dinner parties and a cheese and wine session where students could directly approach and share ideas with the speakers.

The panel discussion this year majorly focussed on the currently most debated topic in scientific community: Artificial Intelligence in Science. The panelists shared their experiences and advice in an hour-long fruitful discussion on



Career workshops and speed-dating



The traditional Wine & Cheese Poster Session

some sensitive topics, which attracted great assortment of questions from the audience too. This also turned out to be a platform where the students could break the formal barrier and share their experiences and troubles with the panelists.

As organization for Horizons 2024 is already under way, stay tuned to find

out will join us for the plenary lectures, Career Fair and workshops! All information will be updated on our website [www.horizons-molbio.de](http://www.horizons-molbio.de). The organizing team looks forward to seeing you at the 21<sup>st</sup> Horizons in Molecular Biology, from 10<sup>th</sup> to 13<sup>th</sup> September 2024 at the MPI-NAT Göttingen!

Dimitra Tsouraki, Gantavya Arora

## Horizons speakers 2023

Hiyaa Ghosh, Taekjip Ha, Ramanujan Hegde, Hauke Hillen, Pascal Kaeser, Katrin Karbstein, Yamuna Krishnan, Eva Kummer, Nick Lane, Marius Lemberg, Hansong Ma, Yifat Merbl, Michal Minczuk, Naomi Moris, Dimple Notani, Jonathon Pines, Markus Rasler, Joanna Rorbach, Peter Walter, Z. Hong Zhou

## Joining the program in 2023

**Gregor Bucher** is Professor heading the Department of Evolutionary Developmental Genetics at the Göttingen Center for Molecular Biosciences, University of Göttingen. He joined the GZMB already as a Junior Group Leader in 2006, followed by positions as Junior Professor (2006-2023) and DFG Heisenberg Professor (2013-2017). The research of Gregor's department focuses on (1) Head Development and Evolution, investigating the formation of the insect head from pattern formation to morphogenesis, (2) Brain Development and Evolution, and (3) Insect Functional Genomics, applying the genome-wide iBeetle RNAi screen to reveal novel gene functions. As a new faculty member of the Molecular Biology program, Gregor contributes to the Master's curriculum with a lecture on the early development of the nervous system. In addition, his department offers lab rotation projects.



<https://www.uni-goettingen.de/en/57924.html>

**Juliane Liepe** earned her PhD in the group of Theoretical Systems Biology at Imperial College London, UK, where she continued her research for several years as a postdoc and NC3Rs David Sainsbury Fellow. In 2017, Juliane joined the Max Planck Institute for Biophysical Chemistry as research group leader in quantitative and systems biology. Her research group employs *in silico* approaches, using *in vitro*, *ex vivo* and *in vivo* experimental data to study the pathways of the proteasome that regulate the human immune response. They have developed a set of mathematical and bioinformatics tools to study the details of proteasome-catalysed hydrolysis and peptide splicing and its importance in the MHC-class I pathway. As a new Molbio faculty member Juliane took over the introductory course on basic statistics for first-year Molbio MSc students.



<https://www.uni-goettingen.de/en/560777.html>

**Ricarda Richter-Dennerlein** has recently been appointed as W2 professor at the University Medical Center Göttingen (UMG), Department of Molecular Biology and has been awarded a Lower Saxony Impulse Professorship by the Lower Saxony Ministry of Science and Culture and the Volkswagen Foundation. Ricarda earned her PhD at the Institute for Ageing and Health, Newcastle University, UK. From 2011 to 2014 she received an EMBO long-term fellowship for her postdoctoral research at the University of Cologne, before she joined the UMG as a postdoc. From 2016 to 2023, she was an Emmy Noether research group leader at UMG. Her research group focuses on the biogenesis and function of the human mitochondrial ribosome. As a new Molbio faculty member Ricarda took over the lecture on DNA Replication and is also offering lab rotation projects.



<https://www.uni-goettingen.de/en/551867.html>

### Current faculty members (University of Göttingen and UMG)

#### Biology

Gerhard Braus, Gregor Bucher, Rolf Daniel, Jan de Vries, Ivo Feußner, Ralf Ficner, Ufuk Günesdogan, Kai Heimel, Heike Krebber, Volker Lipka, Stefanie Pöggeler, Thomas Spallek, Jörg Stülke, Kai Tittmann, Ernst Wimmer

#### Medicine

Mathias Bähr, Holger Bastians, Tim Beißbarth, Markus Bohnsack, Matthias Döbelstein, André Fischer, Uwe Groß, Heidi Hahn, Hauke Hillen, Stefan Jakobs, Tobias Moser, Argyris Papantonis, Peter Rehling, Ricarda Richter-Dennerlein, Silvio Rizzoli, Henning Urlaub, Jürgen Wienands

#### Physics

Jörg Enderlein, Dieter Klopfenstein

#### Agricultural Sciences

Bertram Brenig

## Leaving the program in 2023

In preparation of the recent proposal for a permanent extension of our IMPRS for Molecular Biology, all faculty members were invited to a survey on the continuation of their membership in our program.

The ten faculty members listed below indicated that they would like to take the opportunity to resign their membership for various reasons, including upcoming retirement.

We would like to thank everyone very much for their commitment and dedication, contributing significantly to the success of our program over more than two decades.

### Ralf Ficner

Uni-Bio  
Molecular Structural  
Biology  
since 2001



### Helmut Grubmüller

MPI-NAT  
Theoretical and Com-  
putational Biophysics  
since 2012



### Volker Lipka

Uni-Bio  
Plant Cell Biology  
since 2008



### Christiane Gatz

Uni-Bio  
Molecular Biology  
and Plant Physiol-  
ogy  
since 2000



### Andreas Janshoff

Uni-Che  
Physical Chemistry  
since 2012



### Burkhard Morgenstern

Uni-Bio  
Bioinformatics  
since 2002



### Uwe Groß

UMG  
Medical  
Microbiology  
since 2000



### Wilfried Kramer

Uni-Bio  
Molecular Genetics  
since 2000



### Claudia Steinem

Uni-Che  
Biomolecular  
Chemistry  
since 2012



### Current faculty members (Non-university institutions)

#### Max Planck Institute for Multidisciplinary Sciences

Nils Brose, Patrick Cramer, Alexis Faesen, Dirk Görlich, Christian Griesinger, Helmut Grubmüller, Stefan Hell, Hauke Hillen, Reinhard Jahn, Stefan Jakobs, Oleksiy Kovtun, Peter Lénárt, Julian Liepe, Sonja Lorenz, Klaus-Armin Nave,

Marieke Oudelaar, Jochen Rink, Marina Rodnina, Melina Schuh, Johannes Söding, Holger Stark, Alexander Stein, Henning Urlaub

#### German Primate Center

Rüdiger Behr, Michael Heide, Stefan Pöhlmann, Lutz Walter

### Michael Thumm

UMG  
Molecular Cell  
Biology  
since 2003



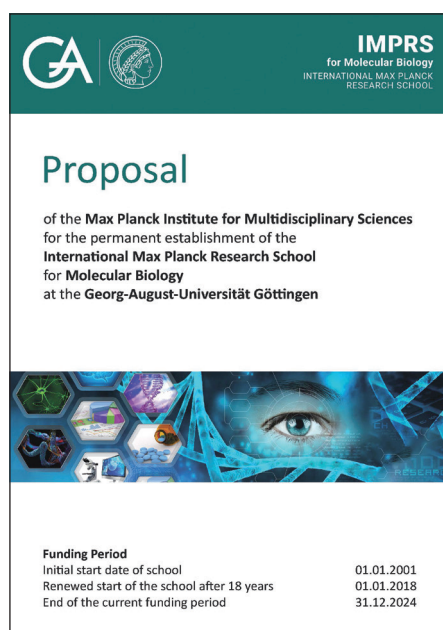


# Permanent extension of the IMPRS MolBio

Our International Max Planck Research School for Molecular Biology (IMPRS MolBio) has been a pioneer and a leader in molecular biology education since the Max Planck Society launched the IMPRS funding program over two decades ago. We teamed up with the University, the University Medical Center, local Max Planck Institutes, and the German Primate Center to create an innovative graduate program that combines Master's and PhD studies, focusing on personalized training and research integration. Since its inception, our IMPRS MolBio is known for its fast-track option into doctoral research, its comprehensive education led by top scientists, tailored support for international students, professional career development opportunities, and numerous opportunities to build both professional and social networks.

A recent reform of the IMPRS concept within the Max Planck Society has provided us with the opportunity to seek permanent funding for our IMPRS MolBio for the first time. To be permanent, it requires sustainable integration of IMPRS guidelines and

doctoral training into local structures, aligned with the research focus of the lead Max Planck Institute, a track record of several years, and a successful external evaluations.



In June 2023, we submitted a proposal for continued funding under the Max Planck Society's scheme, with full support from all participating institutions on the Göttingen Campus, aiming to secure the long-term future of our Molbio program. Securing

stable funding for the IMPRS MolBio is vital for developing its research profile along strategic directions established in recent years, focusing on the structure and function of supramolecular machines, molecular and genetic networks, and the molecular biology of specialized cells.

In December 2023, we received the wonderful news that the Commission for the Selection of International Max Planck Research Schools, formed by the Max Planck Society and the German Rectors' Conference, approved our application for permanent continuation of IMPRS MolBio. The program's longstanding quality, partner commitment, and curriculum design were praised as outstanding. Additionally, establishing IMPRS MolBio permanently at the MPI for Multidisciplinary Sciences was deemed a logical step based on our program's excellent track record.

Encouraged by this long-term perspective, we are eager to continue innovating and improving our graduate training and student support efforts. As we continue IMPRS MolBio, we will further build on the increasingly important and active role of our alumni for career support, networking, and potential future collaborations.

## IMPRINT

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