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

FEB 2014

New Frontiers in...

… Neuroscience

Welcome to the 3rd Neuro-Newsletter published by the Göttingen International Master/PhD/MD-PhD Program and International Max Planck Research School (IMPRS) for Neurosciences.

The past 2 years mark another period of success for the community of neuroscientists in Göttingen. Both major grant applications in the field of the neurosciences in the framework of the federal excellence initiative were selected for funding again: The Cluster of Excellence Nanoscale Microscopy / DFG Research Center Molecular Physiology of the Brain (CNMPB) and the Göttingen Graduate School for Neurosciences, Biophysics, and Molecular Biosciences (GGNB) secured the federal funding until the end of 2017. Moreover, also the MSc/PhD/MD-PhD Program / International Max Planck Research School (IMPRS) for Neurosciences was evaluated by an international group of reviewers who unanimously proposed a continuation of funding until 2018.

Besides securing funding from different sources, the MSc/PhD/MD-PhD Program for Neurosciences also had to formally renew its accreditation as a degree-awarding program. After quite intense debates, the representatives of the Neuroscience Program were able to convince the reviewers to validate the proven concept of an integrated MSc/PhD school with its intensive 1st year of research-oriented training and 'fast track' option. The existing unique scheme with university and non-university faculty contributing to the English curriculum has been accredited by the Central Evaluation Agency in Hanover without any imposed changes. Fully

CONTENT

NEURIZONS Symposium in May 2013 at the Max Planck Institute for Biophysical Chemistry

accredited and funded, the Neuroscience Program will carry on to substantially contributing to the contents and budget for training of doctoral students in GGNB.

Besides constantly integrating new faculty, the past years also mark a period of 'generation change' with several faculty members leaving the program due to retirement: Namely, Erwin Neher, who was the dean of the IMPRS for Neurosciences since its start in the year 2000 until 2012, and Diethelm Richter, also founding member of the Neuroscience Program and former speaker of the DFG Research Center Molecular Physiology of the Brain. The program wholeheartedly thanks them for their efforts and continuous support which shaped the Neuroscience Program from the very beginning until now over more than a decade.

Meanwhile, the IMPRS for Neurosciences nominated and appointed the new dean Gregor Eichele, currently Managing Director at the Max Planck Institute for Biophysical Chemistry and head of the department of Genes and Behaviour. He successfully guided the school through a critical transition phase during which the above mentioned funding was achieved. The IMPRS warmly welcomes Gregor Eichele, who officially became the dean of the IMPRS in January 2013. Parallel to the continuous changes and adaptations of the training curriculum of the Neuroscience Program reflecting the dynamics of emerging research topics within the neuroscientific community in Göttingen, the new dean will ensure continuity and also help to implement further development of the Neuroscience Program.

Although the contours of future funding schemes from the German federal government are still vague and it remains unclear if the excellence initiative will be continued, the neuroscientific community in Göttingen seems prepared for the next funding calls. Based on the experience of the past years and active cooperation across disciplines and beyond institutional borders embedded in well established European and worldwide research and training partnerships, the members of the Göttingen Research Campus will have to develop convincing concepts in the competition for funding for research and training in the field of the neurosciences and biophysics.

Gregor Eichele
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International Neuroscience

PhD programs in Germany *by Jonas Barth and Michael Hörner*

Currently, the Göttingen Research Campus integrating several university and non-university institutions represents one of the largest neuroscience faculties in Germany. The CNMPB alone comprises more than 60 principal investigators plus 30 postdoctoral fellows and 59 doctoral students. In addition, the European Neuroscience Institute (ENI-G, 7 junior groups), the German Center for Neurodegenerative Diseases (DZNE, 5 groups), the Institute for Multiple Sclerosis Research (IMSF, 4 groups), the Bernstein Focus Neurotechnology (BFNT, 16 groups), 3 Max Planck Institutes, the German Primate Center and the natural science faculties of the university and the faculty of medicine all host research groups in various fields of the neurosciences.

As a result, diverse fields of neuroscience-related research areas, ranging from quantitative studies on molecular and cellular mechanisms including modelling of brain function to the investigation of neurological and neurodegenerative diseases as a basis for clinical studies are represented in Göttingen.

Such given diversity and size of the neurosciences in Göttingen require a continuous recruitment and education of talented young scientists. Presently, the local PhD programs on the Göttingen Research Campus in the various fields of the neurosciences comprise more than 200 doctoral students, thus, one of the largest communities of doctoral students in the field in Germany. Since the foreseeable number of graduates from Germany alone was and will not be sufficient to fill vacant PhD positions, the Neuroscience Program had a clear international perspective ever since it was started. It was among the first international schools in Germany run in English from 'first contact to graduation', providing a comprehensive research-oriented training for international students without prior knowledge of the German language.

Over the last decade, the number of neuro-related study programs significantly increased worldwide – with now more than 30 international PhD programs (see list below) in Germany alone. Despite increasing competition, the Göttingen Neuroscience Program continues to successfully attract high numbers of applicants of good academic quality providing the basis for a selection of excellent candidates. In fact, the MSc/PhD/MD-Program / IMPRS for Neurosciences again received a new record number of applications in 2014 (323 applicants for 20 MSc study places). The Göttingen program now seems to have successfully established its brand name and is visible even after integration into the bigger Graduate School GGNB with more than 430 doctoral students, ca. 200 postdoctoral fellows and 214 faculty members. In Germany it remains to be the almost only neuro-related PhD program for Bachelor degree holders providing an integrated MSc/PhD track with an intensive one year MSc training phase and a fast-track option prior to the PhD phase.

Beyond the accomplished status, international marketing activities will have to be kept up persistently, and will more and more include the increasing number of alumni worldwide. Likewise stronger networking with our partners in the EU involving the implementation of joint training activities such as the ELECTRAIN course will also help to attract the best scholars in the neurosciences to Göttingen in the future.

Neuroscience in Germany...

International PhD programs in the neurosciences as listed in the DAAD database ('PhDGermany')

	NAME OF PHD PROGRAM	UNIVERSITY	ESTABLISHED	PhD STUDENTS
1	Berlin School of Mind and Brain	Berlin	2006	45
2	Helmholtz Intl. Research School Molecular Neurobiology	Berlin	2007	39
3	International Doctoral Programme Computational Neuroscience	Berlin	2007	46
4	International Graduate Programme Medical Neurosciences	Berlin	2002	83
5	International Graduate School Neuroscience IGSN	Bochum	2001	60
6	Theoretical and Experimental Medicine - Medical Neuroscience	Bonn	2012	38
7	iBrain - Graduate School for Brain Research and Translational Neuroscience	Düsseldorf	2012	20
8	IMPRS in Structure and Function of Biological Membranes	Frankfurt	2000	25
9	IMPRS Neural Circuits	Frankfurt	2011	22
10	iCoNet-Intl. PhD Program Computational Neuroscience & Neurotechnology	Freiburg	2010	31
11	MSc/PhD/MD-PhD and IMPRS for Neurosciences	Göttingen	2000	34
12	Molecular Physiology of the Brain	Göttingen	2007	35
13	Sensory and Motor Neuroscience	Göttingen	2007	31
14	Systems Neuroscience	Göttingen	2007	30
15	Theoretical and Computational Neuroscience	Göttingen	2007	15
16	Behavior and Cognition	Göttingen	2012	17
17	Center for Systems Neuroscience	Hannover	2002	60
18	Interdisciplinary Center for Neuroscience	Heidelberg	2004	35
19	IMPRS Organismal Biology	Konstanz	2004	64
20	IMPRS Neuroscience of Communication: Function, Structure, and Plasticity	Leipzig	2009	35
21	MSc/PhD Program Integrative Neuroscience	Magdeburg	1997	80
22	Graduate School of Systemic Neurosciences	München	2006	129
23	IMPRS Molecular and Cellular Life Sciences	München	2005	99
24	Otto Creutzfeldt Center for Cognitive and Behavioral Neuroscience	Münster	2006	21
25	Research Academy Biomed. Eng. and Science of Hearing and Sensory Systems	Oldenburg	2012	20
26	PhD program Neurosensory Science and Systems	Oldenburg	2009	80
27	Cognitive Science PhD Programme	Osnabrück	2002	47
28	International PhD programme Neurobiology	Regensburg	2012	20
29	Graduate School of Cellular & Molecular Neuroscience	Tübingen	2007	62
30	Graduate School of Neural & Behavioural Sciences (IMPRS)	Tübingen	1999	127
31	Graduate School of Neural Information Processing (IMPRS)	Tübingen	2011	15
32	Graduate School of Life Sciences Section Neuroscience	Würzburg	2006	67

The somatosensory system:

Exploration of digit-area somatotopy and feature-based attention *by Meike Schweisfurth*

With behavioral tools and functional magnetic resonance imaging (fMRI), basic questions of touch processing have been explored, focusing on two different aspects of the human sense of touch. First, we explored whether and how the peripheral digit-area topography is reflected in the position of cortical digit and phalanx representations, investigating the presence of across-digit and intra-digit somatotypo. Second, the existence of global feature-based attention in the somatosensory domain is assessed, exploring the issue both with behavioral tools and functional imaging.

Even though the skin is by far the largest sensory organ that we humans possess and immensely important for coping with everyday life, the somatosensory system has been studied far less than the visual system. The somatosensory system can be subdivided into four rather distinct modalities, being proprioception, temperature sensation, pain sensation, as well as the sense of touch, which allows us to explore objects standing in direct contact with our skin. In this research report, I will focus on my work on touch perception which I have conducted during my PhD project carried out jointly at the Biomedizinische NMR Forschungs GmbH at the Max Planck Institute for Biophysical Chemistry and at the Cognitive Neuroscience Laboratory at the German Primate Center (DPZ).

If a specific location at the skin is touched, a signal is transmitted to the brain that ultimately might generate a conscious tactile sensation perceived at the touched location. This kind of localizable perception is possible due to a somatotopic organization of the primary somatosensory cortex (SI), the concept of areas next to each other at the skin generally being also represented next to each other in SI. This somatotopy could first be shown by Penfield and coworkers (Penfield and Boldrey, 1937; Penfield and Rasmussen, 1950) through electrophysiological research on individual epileptic patients. The primary somatosensory cortex of these humans could schematically be described as a sensory homunculus - a little sensory man - in the cortex, presenting with a general somatotopy (despite some across-subject consistent discontinuities) and enlarged representations of those areas most important to touch, as the digits and the lips. Within each hand, a medial-to-lateral succession from the little finger (D5) to the thumb (D1) was observed within contralateral SI. For the fingertips, this succession has also repetitively been confirmed with functional magnetic resonance imaging (fMRI) (e.g. Schweizer et al. 2008; Nelson and Chen, 2008).

Penfield and colleagues did not explore whether such a succession could also be observed within individual digits, i.e. whether there exists an across-subject consistent somatotopy from the fingertip (p1) to its proximal phalanx (p3) or even base (p4) in humans (for notation, see Fig. 1b). Although the question has been explored in several studies, it still remains inconclusive due to disagreement between results both in monkeys (electrophysiological data, e.g. Kaas et al., 1979; Iwamura et al., 1983) and in humans (imaging data, Blankenburg et al., 2003; Overduin and Servos, 2004; Sanchez-Panchuelo et al., 2012). We approached that issue with two studies which are discussed in the following paragraphs.

In a first study (Schweisfurth et al., 2011), we tactilely stimulated (see Fig. 1a for stimulation technique) the right-hand tips and bases of the little and index finger of right-handed subjects undergoing high-resolution fMRI. By stimulating only one location at a time, an activation map could be calculated for each location in individual subjects. Interestingly, we observed similar patterns across subjects between the representations of tip and base of the little finger, whereas highly individual representation patterns were found between the index-finger locations.

To re-validate these results and generalize them to other digits of the dominant hand, we performed a second study in which all phalanges were mapped, comprising the most complete fMRI digit-area mapping ever conducted in human subjects. On the across-digit level, this approach allowed to show for the first time that not only the tips but also the second and third phalanges show a medial-to-lateral D5-to-D1 succession. To explore whether a digit's p1-to-p3 representation patterns were similar across subjects, a novel analysis method based on principal component analysis, t-test, and binomial tests was designed, as the data were too complex to be analyzed by the commonly-used visual inspection pattern-analysis approach. In intriguing agreement with our previous study, we found similar patterns across subjects for the little finger and (in a trend) for the ring finger, whereas very individual patterns

were obtained not only again for the index finger but also for the middle finger and thumb. The results are schematically shown in Fig. 1c.

So far, we can only speculate why some digits of the dominant hand seem to present with a similar cortical-representation pattern across digits while others do not. We think that the individuality of the representation pattern might be related to the individuality of the respective digit's use in everyday life: While the little finger and ring finger mainly serve for stabilization of objects which probably is done similar across subjects, the remaining fingers are involved in highly complex precision tasks as e.g. writing which are solved in a much more individual manner.

The second main focus of my project has addressed the question of feature-based attention in touch. Attention is the selective modulation of sensory signals based on their potential relevance to an individual at a given point in time, allowing for perception of the assumingly most important events at the expense of others. For the visual system, it has been repeatedly shown that attention can be directed to locations (spatial attention), objects, and features (for a review, see Treue, 2003). A very vivid demonstration of feature-based attention (FBA) has been delivered via the stimulus dimension of colors (Simons and Chabris, 1999), where subjects tend to miss the presence of a black gorilla due to entirely concentrating on white objects.

Here, we aim to explore FBA in the tactile modality, which has hardly ever been approached (Forster and Eimer, 2004) despite its relevance for everyday-life situations as e.g. searching for a silk scarf in the dark. So far, we have carried out two studies, both using tactile orientation as stimulus dimension, presented to the fingertips via a custom-built tactile stimulator (see Fig. 2a).

In the first study, we explored whether reaction times to orientations depend on which orientation has been cued and then attended. Slightly simplified, the design was the following: Subjects had to react immediately upon presentation of vertical or horizontal orientations but to ignore other orientations. Before each block of trials, they were informed which target orientation (vertical or horizontal) was more likely to appear (cued orientation). However, this information was only true for one location (cued location), whereas at a second, uncued location both target orientations were equally likely. Interestingly, faster reaction times in response to the cued compared to the uncued orientation were observed not only at the cued but also at the uncued location (Fig. 2b). As subjects should have attended to the cued orientation only at the cued location, the FBA effect must have spread over to the other location (as visualized in Fig. 2c), for the first time revealing a global effect of tactile FBA in a behavioral study.

In a recent pilot study we then aimed for cortical localization of the observed FBA effect in touch, adapting the paradigm to fMRI and keeping as many parameters as possible constant. So far, no cortical correlates of the behaviorally observed FBA effect could be found in the primary (SI) or secondary somatosensory cortex (SII). However, this first study has revealed several useful insights that will be exploit when addressing the issue with further studies.

In conclusion, several controversial and novel issues concerning the human somatosensory system have been

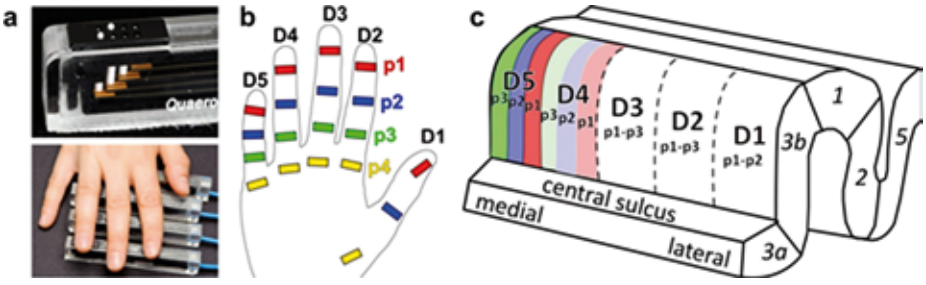
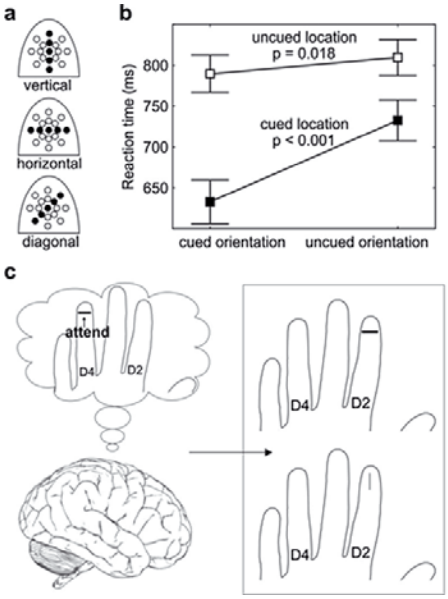


Fig. 1a: Illustration of one tactile eight-pin stimulator (stimulation frequency 32 Hz) as well as of a positioning example (here exemplary for the ring finger).

Fig. 1b: On a hand scheme, the used notation and color code are introduced.

Fig. 1c: Demonstration of the results: While we found a cortical ordering from D5 to D1 for all three phalanges, only the little finger (and in a trend the ring finger) presented with a p1-to-p3 succession similar across subjects (scheme adapted from Fig. 23 7 A, Gardner and Kandel, 2000).



addressed here, focusing on digit-area somatotopy and feature-based attention and emphasizing that more attention should be devoted to the rather special sense of touch.

Fig. 2a: Illustration of fingertip stimulation with different orientations.
Fig. 2b: Results of the reaction-time study: Faster responses were observed for targets with the cued compared to the uncued orientation, at both locations.
Fig. 2c: Visualization of the global feature-based attentional effect: Concentrating at an orientation at one location leads to faster detection at another location.

Meike SCHWEISFURTH did her doctoral thesis jointly in Jens Frahm's department, Max Planck Institute for Biophysical Chemistry, Biomedizinische NMR Forschungs GmbH, and in Stefan Treue's department, German Primate Center, Cognitive Neuroscience Laboratory. Her doctoral thesis and oral defense was rated 'summa cum laude' by a team of internal and external reviewers. She defended her PhD thesis in June 2013.

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Insights into synapse assembly...

... from the fly neuromuscular junction *by David Owald*

Brain function relies on communication between neurons at synaptic contacts. Synapses are comprised of a defined set of specialised proteins that control the release and detection of neurotransmitters in space and time. It thus makes sense that formation of synaptic contacts is highly regulated during development but also during plastic processes, such as learning. I will summarize our recent insights on synapse assembly at the Drosophila melanogaster larval neuromuscular junction.

Neurons communicate with each other via contacts that are either formed by pores (electrical synapses) or by specialized nerve endings and receiving ends (chemical synapses). The majority of synapses in our brain are believed to be chemical. Signals arising at these sites are subject to high degrees of modulation. Communication at chemical synapses has an underlying directionality: information arrives at the presynaptic terminal in the form of electrical signals, such as action potentials, and is then relayed to the postsynaptic cell. The relayed information is encoded in specific molecules (neurotransmitters). These are stored in membranous (synaptic) vesicles that fuse with the presynaptic membrane upon arrival of an action potential. The neurotransmitters are released into the synaptic cleft (the area between the pre- and postsynaptic membranes). After bridging this gap they bind to specialized receptors on the postsynaptic side that subsequently lead to an electrical or a chemical modulation of that cell.

Neurotransmission takes place on a millisecond timescale and the signals regulating it range over nanometer distances. To reach such precision the cells need a sophisticated machinery that allows for tight interplay of the controlling factors.

The site where neurotransmitter release (exocytosis) takes place (the presynaptic active zone (1,2)) harbours several different proteins that help capture synaptic vesicles, bring them into close proximity with the plasma membrane and then prime them to be release-ready upon arrival of a signal (2). This signal is mediated by calcium that enters the active zone compartment via localized calcium channels (2). The molecular machinery regulating exocytosis is organized by scaffold proteins (2). These scaffolds are typically large in size and form large meshworks. At some synapses, these so-called electron-dense bodies can be visualized using electron microscopy (3).

It is conceivable that scaffolds play major roles during synapse formation, maturation and maintenance. Formation of new synapses, along with modification of existing synapses, is widely believed to underlie processes such as learning and memory. But how is synapse assembly regulated?

Genetically modifiable invertebrate model systems (for example of the nemamtode *Caenorhabditis elegans* or the vinegar fly *Drosophila melanogaster*) have widely served scientists to identify genes involved in neural function. This is due to the ease of genetic manipulation and a short generation time, paired with simple behavioural readouts, making it easy to identify mutants in forward genetic screens. Such screens have revealed sets of genes involved in synaptic integrity and have unravelled genes needed for learning and memory (4,5). The degree of conservation between the proteins used at mammalian synapses and those used at invertebrate synapses is remarkable.

Over the last few decades, the *Drosophila* larval neuromuscular junction (NMJ) has proven to be valuable for discovering functional but also structural synaptic abnormalities (6). The NMJ comprises multiple synaptic contacts, formed by presynaptic active zones, which are matched by postsynaptic neurotransmitter receptor fields. The overall architecture is relatively stereotypical but shows structural and functional plasticity at the level of individual synapses. It is specifically useful for studying *de novo* assembly of synapses, because the presynaptic motoneuron terminals are constantly required to match the rapid growth of the larval body wall muscles.

One gene recently discovered to be crucial for nervous system function in *Drosophila* is the active zone protein Bruchpilot (BRP, 7). BRP is a homologue to the mammalian family of CAST/ELKS proteins and mutants for *brp* show decreased evoked neurotransmitter release and delocalized calcium channels (8). Most strikingly, mutants for *brp* lose their electron dense projections (T bars) at the centre of the active zone. We first asked whether BRP regulates the assembly of the T bars, or whether the T bar is directly made up of BRP molecules (9). Using two antibodies, one recognizing an N-terminal and the other

recognizing a C-terminal epitope, and confocal light microscopy or immunoelectron microscopy, we were able to estimate a polarized elongated conformation of the BRP epitopes (9). If the T bar were comprised of BRP, truncated BRP should lead to truncated T bars. To get our hands on truncated BRP, we conducted a chemical mutagenesis screen that allowed us to introduce random mutations into the *Drosophila* genome. Crossing the candidates to a *brp* null allele uncovered novel mutations in the *brp* gene. One allele that we isolated encoded for about 80% of the protein. T bars still formed in these mutants, but their appearance was abnormal and truncated.

If BRP forms the T bar, is it also the factor that initiates active zone assembly? To address this question, we made use of live imaging protocols. We followed the formation of synapses by combining fluorescently-tagged proteins expressed in motoneurons or muscles (previously developed in the Sigrist lab, see 10 or 11). Larvae were anesthetized and identified NMJs were imaged repeatedly, with a delay of minutes or days. To unravel temporal hierarchies, protein composition at individual synapses was scored for each time point.

We found that BRP assembly took place later than that of postsynaptic glutamate receptors, and also later than the arrival of other presynaptic active zone markers, such as Liprin-α. Of note, Liprin-α is a protein previously identified to be needed for proper active zone assembly in *Drosophila* (12). This indicated that BRP played a role at later stages of active zone assembly. In line with this observation, we found that calcium channel localization was not affected in *brp* mutants at smaller (younger) synapses. By contrast, at later stages (as the synapse matures), calcium channel clustering was impaired (9). Interestingly, in follow-up publications, BRP was shown to be involved in tethering of synaptic vesicles (13) and in defining the number of release slots per active zone (14).

If BRP is not responsible for regulating early active zone assembly, which factors are? A genetic screen in *C. elegans* had identified a group of genes needed for proper active zone assembly (synapse defective, *syd* genes, 15). One of these genes, Syd-2, is the orthologue of *Drosophila* Liprin-α. The *Drosophila* orthologue to Syd-1 was identified as an interaction partner of BRP in a proteomics screen conducted by the Sigrist lab (16). Mechanistically, *C. elegans* Syd-1 was found to positively regulate Syd-2 (Liprin-α) during the assembly of en passant synapses (17, 18). We discovered that *Drosophila* Syd-1 localizes to active zones (Fig. 1). Furthermore, when probed with STED microscopy, Syd-1 was revealed to closely surround the BRP core (T bar) in an apparently regular array. At high resolution, Liprin-α localization closely resembled that of Syd-1 (19). Our *in vivo* imaging showed that presynaptic

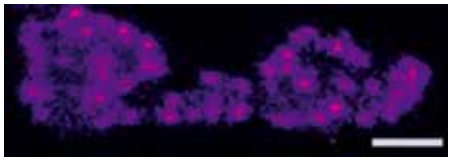

Fig. 1: GFP-tagged Syd-1 marks individual active zones at the *Drosophila* NMJ. Pseudocoloured. Scale bar: 1.5 µm.

Liprin-α also preceded postsynaptic glutamate receptor assembly. Hence, Liprin-α and Syd-1 could function at the top of the temporal hierarchy of synapse assembly. Indeed, Syd-1 arrived at synapses in close temporal proximity to Liprin-α, preceding the arrival of BRP. We further revealed that Liprin-α distribution was abnormal in *syd-1* mutants. By contrast, in *liprin-α* mutants, Syd-1 localized to synapses, thus confirming that Syd-1 functions upstream of Liprin-α. Notably, in both *liprin-α* and *syd-1* mutants, synapses still assembled, although at significantly lower numbers.

The active zones formed in *syd-1* mutants were, however, frequently aberrant in shape: they showed either overgrown or undergrown T bars, as well as ectopic electron dense material. This misdistribution was Liprin-α dependent, as double mutants did not show increased accumulation of BRP at active zones. In summary, Syd-1 functions upstream of BRP and is involved in the appropriate distribution of active zone material (19).

Is Liprin-α the only target of Syd-1? First hints that this is not the case came from simple locomotion experiments in which *syd-1* mutants performed poorly, while *liprin-α* mutants were not gravely affected. Moreover, postsynaptic receptor fields overgrew in *syd-1* mutant, a phenotype not reversed in *syd-1*, *liprin-α* double mutants. We realized that mutants for the cell adhesion protein Neuroligin and its presynaptic binding partner Neurexin exhibited similar pre- and postsynaptic abnormalities as *syd-1* mutants did (20, 21).

In order to probe a potential connection between Neuroligin and Syd-1, we made use of a truncated Neuroligin construct that suppressed NMJ growth in wild type and *liprin*-α mutant larvae (20). Strikingly, this construct had no effect on NMJ growth in *neurexin* or *syd-1* mutants (22), suggesting that the dominant-negative phenotype caused by the overexpression of truncated Neuroligin was dependent on the presence of both Neurexin and Syd-1. In line with these three proteins functioning in a common pathway, Neuroligin and Neurexin immunoreactivity was largely reduced in *syd-1* mutants. Moreover, Neurexin and Syd-1 co-precipitated in the same complex. Indeed, overexpression of Syd-1 changed the distribution of Neurexin at the presynaptic terminal, dragging it into the active zone moiety rather than its perisynaptic distribution. Syd-1 comprises a PDZ domain while Neurexin has a corresponding PDZ-interacting motif. We mutated the PDZ domain of Syd-1, overexpressed this construct in motoneurons, and assayed the distribution of Neurexin. In line with a PDZ-mediated interaction, the mutated Syd-1 no longer recruited Neurexin to the active zone centre. Thus, Syd-1 appears to influence Neurexin localization and, via this link, also the postsynaptic localization of Neuroligin. As a consequence of this, mutants for *syd-1*, *neurexin* and *neuroligin* all exhibited populations of postsynaptic densities with inverted distributions of AMPA receptor subtypes. Finally, in *neuroligin* mutants, Liprin-α and Syd-1 clusters appeared to be highly dynamic, potentially accounting for the presynaptic defects observed. Meanwhile, the protein Trio was identified as an additional substrate of Syd-1 in flies (23), while mammalian Syd-1 (mSYD1A) was shown to interact with Munc18-1 (24).

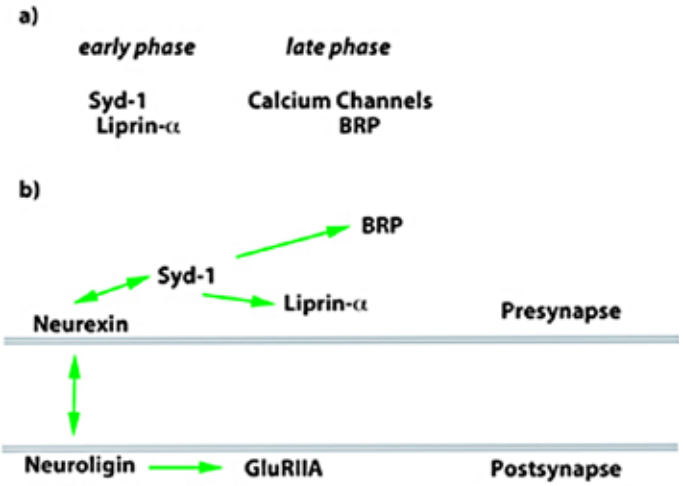

Fig. 2: Scheme of synapse assembly at the *Drosophila* NMJ. a) Markers for early and late phase of active zone assembly. b) Scheme of interactions during synapse assembly.

This leaves us with a model (Fig. 2) where fly Syd-1 interacts with Liprin-α during an early phase of synapse assembly. This interaction is crucial for the proper assembly of active zones, and, potentially, defines the adequate amount of release sites. On the other hand, fly Syd-1 interacts with Neurexin and, via Neuroligin, regulates incorporation of glutamate receptor subtypes. Stability of Syd-1 clusters, however, appears to be dependent on postsynaptic Neuroligin, constituting a bidirectional signalling pathway. Later, development of the release sites is marked by incorporation of BRP, which is needed for calcium channel clustering, synaptic vesicle recruitment and coordination of release sites.

David OWALD did his doctoral thesis in Stephan Sigrist's department, Neuroplasticity group, European Neuroscience Institute Göttingen (ENI-G). His doctoral thesis and oral defense was rated 'summa cum laude' by a team of internal and external reviewers. He was awarded the Otto-Creutzfeldt PhD Award in 2013. He defended his PhD thesis in April 2010.

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The small axe hurls down the big trees

by Hope Agbemenyah

Abstract
Dementia is becoming a concern with increasing global aging population. The need for effective therapeutic strategies to combat it, as aging is most definite risk factor for Alzheimer's disease (AD) the most prevalent form of dementia, requires a detail understanding of the molecular pathways altered. microRNAs are pre-eminent in posttranscriptional regulation of gene expression (mRNA regulation) and have been implicated in a number of conditions including cancers and cognitive function. In this review, we shed light on the microRNA-34c (miR-34c), its role and impact on AD and how it could serve as a key regulator that negatively affects memory formation.

Introduction
Aging is characterized by a decline in daily activity not only restricted to muscles but also brain function. However, one has to dissociate normal cognitive decline from diseased state in which memory formation is largely impaired as seen in situation like neurodegenerative disease like Parkinson's disease (PD), Alzheimer's disease (AD) and Huntington's disease. AD was described over a century and remains largely unresolved due to lack of in-depth understanding of the mechanisms underlying the disease. It is now the focus of attention of lot of laboratories and remains the most prevalent form of dementia. In 2010, about 36 million people were estimated to suffering from dementia globally (http://www.alz.co.uk/research/statistics). Clinically, the definitive diagnostic hallmarks of the disease are aggregates of Amyloid precursor proteins (APP) subunits and hyperphosphorylated tau deposited as amyloid plaques (extracellular) and neurofibrillary tangles (intracellular) respectively (Hardy and Allsop, 1991; Walsh and Selkoe, 2004; Cole and Vassar, 2008). Assessment of these lesions are however largely possible posthumously thereby necessitating the search for biomarkers that could be evaluated in real time either from CSF sampling or measured possibly from other body fluid that can be collected from patients inflicting the minimum damage. In view of this, any effective indicator and target should aim at pre-clinical changes and possibly targeting these modifications.

It is becoming evidently clear that a latent period precedes pathophysiological changes that are seen in AD and other neurodegenerative diseases. With age as a major risk factor for AD therefore dementia, differential gene expression has been shown to precede phenotypic changes (Berthold et al., 2008). In addition, deregulated gene expression has been observed in aging and brain of animal models (Lu et al, 2004; Berchtold et al, 2008; Selwood et al, 2009; Cao et al, 2010; Peleg et al, 2010; Ray and Zhang, 2010). Unfortunately, effective therapeutic regiments to treat or stop the disease upon inception are lacking in part due to the paucity in the understanding of the pathomechanism underlying the disease. A key element in memory coding is gene expression and regulated at different levels including posttranscriptional regulation by miRNAs, and any insult to this mode of regulation can negatively impact on memory formation eventually leading to dementia. We therefore focused on miRNAs and deregulated transcriptome plasticity.

Gene expression profile, learning and brain associated miRNAs
Learning is mediated to a very large extent by de-novo expression of protein to enable persistent coding of information to be learnt. Although it is quite well understood that these mechanisms are key in part for memory formation, it remains to be understood in depth how it is largely regulated. One mode of gene-expression-regulation that remained largely unexplored in the field of neurosciences is regulation of microRNAs (miRNAs) and their impact on memory formation and neurodegenerative diseases. miRNAs are products of RNA hairpins processed by endoribonucleases (Dicer and Drosha) to mature miRNA (Krol et al., 2010). The mature miRNA is the loaded into the RNA induced silencing complex (RISC) which partially or impartially anneal with complementary sites in the 3'-untranslated region of their target mRNAs resulting in inhibition expression of gene expression (He and Hannon, 2004). It is not surprising that it was shown that miRNAs expression of the brain showed the highest profile of tissue specific miRNAs (Babak et al., 2004; Sempere et al., 2004; Schonrock et al., 2010). A miRNA does not only titrate a single mRNA instead it is able to regulate a number of them through imperfect complementarity. Therefore deregulation of a single or few miRNA could have ripple effects that are very devastating.

miRNAs and the brain
To profile specifically miRNAs whose functions are key to memory formation and are expressed in the hippocampus – whose aberrant expression in AD and with aging could impact negatively on

cognitive performance – we undertook a deep sequencing, a method that allows for precise sequencing and quantification of small RNAs with a wide coverage (Metzker 2010). In our analysis, we observed that nearly 488 miRNAs associated with brain function that were expressed specifically by the hippocampus (a site very important in memory formation and largely affected in AD) compared to other brain regions (Zovoilis and Agbemenyah et al., 2011). We further analyzed by comparing our data with miRNAoame data published earlier from whole brain (Chiang et al., 2010) and narrowed down to 12 miRNAs that were enriched in the hippocampus. To further gain insight into the function of these miRNAs we compared these hippocampus-enriched miRNAs with gene ontology data of hippocampus-dependent-associated learning regulated (Peleg et al., 2010) and observed that miRNA-34c (miR-34c) was the highest of the all the miRNAs that targets learning depended genes suggesting a negative effect on these genes and therefore possible negative regulator of memory associated genes. This finding was further corroborated with similar increased levels of miR-34c was also observed in aged mice, APPPS1-21 mouse (Radde et al., 2007) model of AD and human AD patients.

We have thus far showed that miR-34c is increased in aging, mouse models of AD and human AD patients and we then asked if deregulated levels of miR-34c could be detrimental for memory formation. To test this hypothesis whether increased levels of miR-34c negatively impact on memory formation, we surgically implanted microcannulae in young mice (3-4 months old) and upon recovery post-surgery, we administered synthetic miR-34c and subjected the mice to associative learning paradigm. Interestingly, mimicking increased levels of miR-34c led to impaired memory formation in wildtype mice that received miR-34c compared to their littermates that received scrambled oligonucleotide. Molecularly, we observed that impaired memory formation was in part due to the effect of miR-34c on Sirt1 as it led decreased levels of Sirt1 in mice that received miR-34c compared to vehicle group. So far we have shown that miR-34c aberrant expression of miR-34c is detrimental and negatively impact on memory.

To address the question whether miR-34c could be target to enhance memory functions we employed APPPS1-21 mouse model, which we showed to have increased levels of miR-34c expression compared to wildtype and a third group of APPPS1 mice that received scrambled oligonucleotide. Interestingly, inhibition of miR-34c in APPPS1-21 mice using the antisense blocker of miR-34c ameliorated cognitive deficit observed (Fig 1, reproduced from article Zovoilis and Agbemenyah et al., 2011). Again APPPS1-21 mice that received scrambled oligonucleotide showed no cognitive improvement compared to wild type that also received scrambled oligonucleotides further confirming the negative impact of miR-34c on cognitive function. Furthermore, we employed aged mice and showed that again inhibition of miR-34c indeed has a beneficial effect on learning and memory in both aging and APPPS1-21 mouse models (Zovoilis and Agbemenyah et al., 2011).

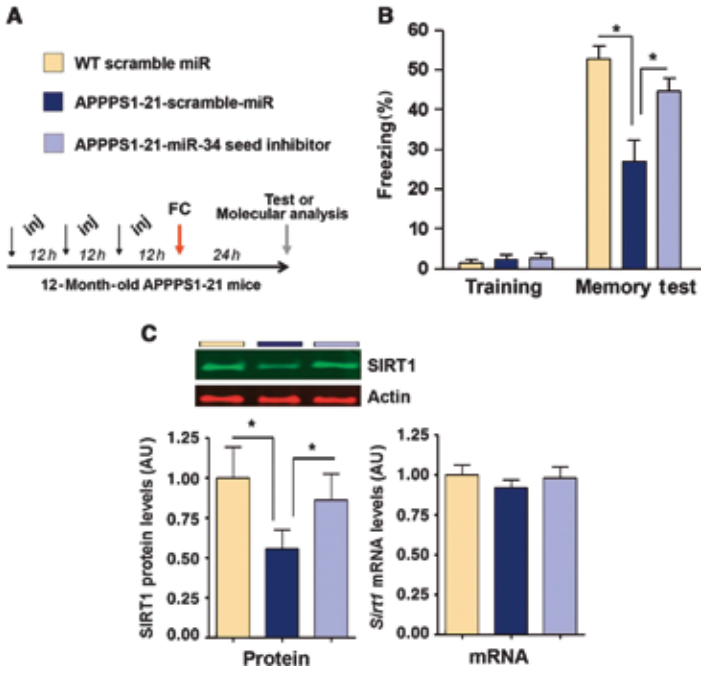

Fig. 1: Targeting miR-34c seed rescues learning impairment in mouse model for AD. (A) Experimental design. (B) Impaired learning of 12- month-old APPPS1-21 mice (*P=0.001) is partially rescued after inhibition of the miR-34c activity (*P=0.04; n=7–8/group). (C) SIRT1 protein (left) and mRNA levels (left) in miR34 seed inhibitor-treated mice (*P<0.05; n = 8). Error bars indicate s.e.m.

Conclusion

Thus we have used varied in-silico analysis backed by experimental evidence to show that miR-34c negatively impact on memory functions by regulation genes essential for memory formation as summarized in figure 2. Inhibition of miR-34c has led to improvement in the learning abilities of APPPS1-21 mice and aged mice on cognitive tasks. In line with this, targeting miR-34 seed rescues learning ability in these mouse models. Our data suggest that miR-34c could be a marker for the onset of cognitive disturbances linked to AD and indicate that targeting miR-34c could be a suitable therapy.

Hope AGBEMENYAH did his doctoral thesis in André Fischer's department, Laboratory for Aging and Cognitive Diseases, European Neuroscience Institute Göttingen (ENI-G). He was awarded the Inge and Fritz Kleekamm Research Price of the Alzheimer Foundation in 2012. He defended his PhD thesis in November 2012.

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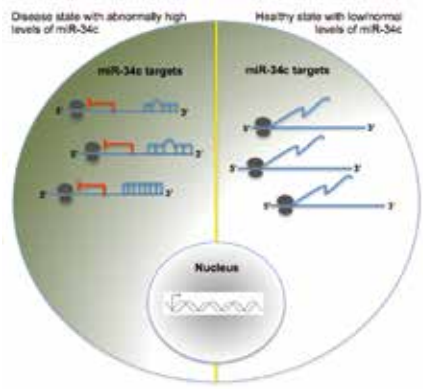

Fig. 2: Effect of miR-34c on its targets under physiological conditions and upon insults with increased expression of miR-34c leading to inhibition of target expression.

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North America 9
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North Africa 15
Central/South Africa 14
Asia / Near East 30
Central Asia / Far East 114
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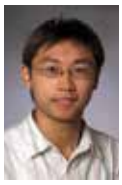

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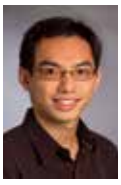
Till Marquardt, Klaus-Armin Nave, Tomas Pieler

Meike Schweisfurth
The somatosensory system: Exploration of digit somatotopy and feature-based attention
Jens Frahm, Stefan Treue, Christiane Thiel / Renate Schweizer

Roman Stilling
The role of Kat2a during memory formation and chromatin plasticity in the aging murine hippocampus
André Fischer, André Fiala, Judith Stegmüller

Benjamin Wilhelm
Stoichiometric Biology of the Synapse
Silvio Rizzoli, Erwin Neher, Michael Hörner



Aaron Wong
Confocal Imaging of Calcium Signal and Exocytosis at Individual Hair Cell Synapses
Tobias Moser, Nils Brose, Erwin Neher

Work- Life Balance in Cologne

by Marija Herholz

Some time ago I had a visit from a friend of mine from the Göttingen Molecular Biology program, Adema Ribic. We reminisced about the old days, the good and the tough of the PhD student times. When I think about the time I graduated in 2009, I honestly had no idea what I wanted to do next. Eight years ago when I first moved to Germany, I thought I had it all planned and figured out. I had a fully worked out five-year plan, and not only to have the "interview answer" ready, but I really believed in it. I was to finish my doctorate, win one of the prestigious scholarships, and continue doing first-class science in a great place and look for a group leader position. But then I realized it's really true when people say that life is what happens while you're busy making other plans. I met so many wonderful people including my future husband, and that shifted my focus. I decided to slow down the pace for a while. I wished to have a good work-life balance and stubborn and spoiled that I am, I wanted to have it right away.

I knew I wanted to stay in science; there was no question about that. But I also wanted to be in a place where I could keep up with my "off-work" life. So I started looking for a postdoc position somewhere in Germany. There were many reasons why I wanted to stay here: for one, the openness and collaborative spirit of the scientific community; the working conditions, including paid vacation days and social protection; the health insurance system. My husband and my friends were also here. The biggest drawback was that I wasn't eligible to apply for almost any postdoctoral grant since most of them are for people moving to or away from Germany. But when I sum all pros and cons, I still think staying in Germany is the right choice, given all the opportunities one has to learn and develop as a scientist.

I now work at the University of Cologne. I work in the lab that studies the influence of mitochondria on aging. What drew me to this lab is how diverse it is: we use two model systems, *C. elegans* (which, of course, I am familiar with from my projects in Göttingen) and mouse. The backgrounds from the people in the lab range from bioinformatics to biochemistry. The seminar discussions are always heated and I've learnt a lot since I came here. I find ageing research particularly exciting because of its interdisciplinarity and the fact that it can take you in any direction. Plus, I can finally explain to my mom what it is that I do without her staring blank at me.

Cologne University is a great place to work. There is quite a number of leading research institutions; the scientific community is extremely friendly and also well connected. There are a lot of young and foreign PIs, so the overall atmosphere is very dynamic and energetic. In addition, as a female scientist, I really like that there is a special attention to making a life of scientists with families much easier. Honestly, researchers are very well taken care of here, and we can focus 100% of our attention to research.

Life in Cologne is quite different from that in Göttingen. I remember how disoriented I felt for the first couple of months, and how even the traffic and honking cars freaked me out. But I got used to it quite fast. Though people may argue how beautiful Cologne is, nobody can deny that it is also a dynamic and vibrant city, with the ability to energize, live in a cosmopolitan spirit, colorful and diverse. How many cities do you know that would refresh you and recharge your batteries if you just

"go down to the river"? Well, Cologne is one of them.

Being here for three years now, I still miss Göttingen. I miss the times, the recklessness, I miss my support group, I miss the endless nights in our dorm in Geiststraße. And I don't know a single person that doesn't. But I love my life here in Cologne too. I found what I wanted, a perfect work-life balance and I am so happy with it.

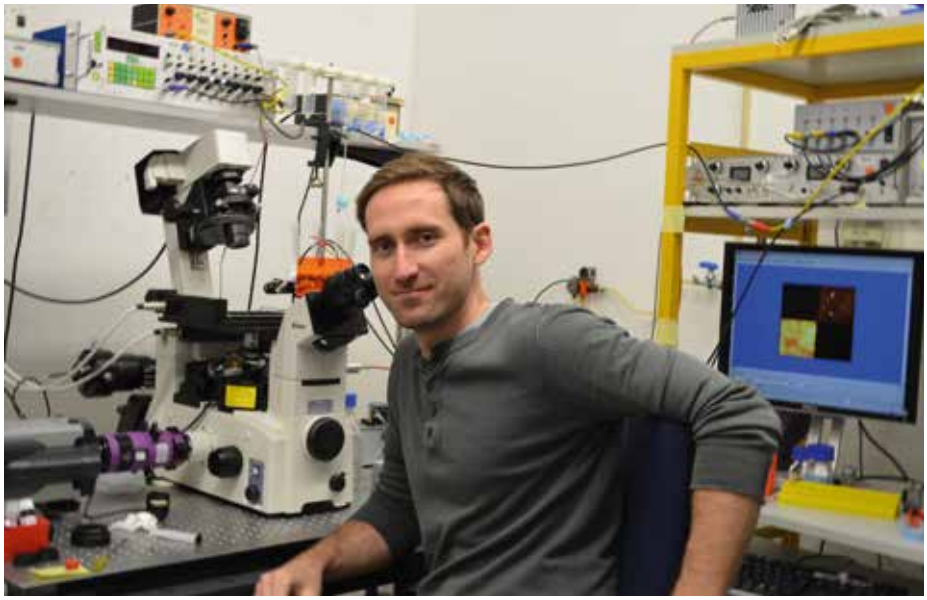
Marija HERHOLZ did her doctoral thesis in Stefan Eimer's department at the European Neuroscience Institute Göttingen (ENI-G). She defended her PhD thesis in November 2009.

Cluster of Excellence, Cellular Stress Responses in Aging-Associated Diseases (CECAD)
at the Institute for Genetics
Zülpicher Str.47a, 50674 Köln

Postdoc in Göttingen

by Andrew Woehler

Usually alumni articles are written with two things in mind. First, for former IMPRS members that may have lost contact after parting ways at the Gänseliesel, they provide an account of the whereabouts and goings-on of their batch-mates. Second, and possibly more important, they serve to inform the current batches of IMPRS students about all the new experiences that await them upon graduating and leaving Göttingen. This account of post-grad life is somewhat different, as my time in Göttingen has lasted a little longer than I had originally expected.



After finishing my PhD work in the Institute of Neuro- and Sensory Physiology in the University Medical Center, where I worked on the development of spectral imaging methods to investigate serotonin receptor dimerization, I followed the words of wisdom passed down through the ages by many wise mentors to "move and change topics". I moved, up the *hill* to the Department of Membrane Biophysics at the MPI for Biophysical Chemistry and began working on the development and application of optical methods to study signaling pathways *downstream* of GPCRs. My current work is focused on using FRET in combination with optical methods for molecular counting to quantify multiple interdependent signaling processes simultaneously. Most

recently I have begun to apply these methods to Wnt/Frizzled signaling pathways and aim to continue this line of investigation to quantify the characteristics of the processes responsible for neurite outgrowth and guidance. This will allow us to better understand the information processing and emergent decision-making that occurs in the molecular networks found in these remote subcellular regions.

I was surprised to find that the decision to stay in Göttingen after my PhD came so easily. After the initial honeymoon experience of moving to a small town from one of the larger cities in the US, Göttingen did quickly begin to feel a bit too small, bit too quiet, and much too cold. This discontent eventually gave way though, to the comfort that comes with such a safe, convenient, and scientifically stimulating environment. In addition to the new found appreciation for an uncomplicated lifestyle, personal friendships made the thought of leaving even less appealing. Scientifically, I had the incredible fortune of being offered the opportunity to continue my work within the Center for Molecular Physiology of the Brain (CMPB) in Göttingen under the guidance of Prof. Erwin Neher. Because he was transitioning to Emeritus Director of the department, the role he assumed was more of a mentor than supervisor. Being a member of the CMPB also put me in direct contact with many of the other PIs in Göttingen working in related fields. This new position afforded me enough independence to develop my own ideas, design my own projects, and establish my own collaborations, all while maintaining close enough contact with a large network of peers to always have a sounding board for new ideas and plenty of sources of invaluable feedback.

Now this new independence hasn't come without a price. While I still enjoy working at the bench and microscope and still perform the vast majority of my own experiments, my day to day responsibilities are more varied than they were during my PhD and beginning of the postdoc. I not only need to think about individual experiments or take care of developing a cohesive story but also I need to manage my own budget and resources, stay on top of deadlines, always be on the lookout for more sources of funding, and more recently, recruit and manage people to contribute to my work. So although I am still able to feel the thrill and excitement of doing experiments, I have found more and more, that at times I need to step back and question myself when feeling the impulse to try new lines of investigation or to establish new methods that may appear exciting. With the additional responsibilities has come the need to be more pragmatic with my time and to take into account the possible return on investment before heading down a path based on pure and wishful curiosity.
Past alumni that have left academia to pursue careers in industry have written that their success after the transition has required them to diversify their skill set, 'wear many hats', and hone their abilities to multitask and meet tight deadlines. I am finding that, at least in these respects, continuing in academia after the PhD is no different. For me, these new challenges have, at times, been stressful but also refreshing and very rewarding. So to those still trudging along towards the end of their PhDs, still really interested in your work but craving some change in your day to day routine, if you are open to more responsibility, be patient, change will happen.

Andrew Woehler did his doctoral thesis in Erwin Neher's department, Max Planck Institute for Biophysical Chemistry, Dept. Membrane Biophysics. He defended his PhD thesis in April 2010.

Max Planck Institute for Biophysical Chemistry
Department of Membrane Biophysics
Am Fassberg 11, 37077 Göttingen

The German adventure continues…

by Shahaf Peleg

One of the beautiful things about Göttingen is the constant fast turnover of its student population on a yearly basis. As I left the program already three years ago, perhaps the best thing to do is to introduce myself first just as Michael and Steffen made us all do during our first orientation week.

I applied to the program by accidently seeing an advertisement in my university's website. Excited by the prospect of returning to Germany (I have been in Bonn as a teenager, in student exchange program), I quickly applied to the Neuroscience program and after half a year found myself coming with two suitcases to a rainy city with fresh forest smell and starting a new chapter in my life.

There were many interesting adjustments in the beginning – meeting many new people, each one with different mentality, having a bicycle as your new best friend, learning German key essential words (ohne Zwiebel, keine Ahnung…) and of course - getting used to the idea it is not smart to leave home without a rain coat EVEN when it is completely sunny outside. But naturally we came here to do science.

One of the first things we had to do upon entering the program was to write the so-called scientific interest and goals. That's partly what I wrote back then:
…'my main interest is the aging process of the brain, the decline of its functions…my goal is to gain a broad perspective from different areas of the aging processes within the brain and find ways to preserve its vitality, delay aging and in essence, cure its damage. In accomplishing these goals, I hope to create and implement major improvements for each person's quality of life'.

After the 'master' year, I started my PhD at a lab of a young group leader (André Fischer, ENI) who just finished his postdoc in the US. The initial concept of the project was that brain of old organisms displayed major shift in gene expression around the time they also displayed decreased cognitive ability. These phenomena suggested that transcriptional regulation might be involved and may drive that process.

The beginning of my PhD project was very intense as I was trying to figure out why middle-aged mice learn worse than younger mice, which involved spending hours in the underground mice facility. By the end of my PhD, after 3 years of combining behavior and molecular approaches, I had a much better idea of what's going on in the older mice' brain. The main result was that a specific chromatin marker is dysregulated in the hippocampus of older mice in response to memory challenge, leading to an impaired memory formation. More specifically, reduced histone acetylation of a lysine residue in older mice has probably led to genome wide deficiency to increase various transcripts that are important for memory formation. This insight also led to a possibility to enhance their cognitive ability. Looking back, I can happily say now that I achieved some of the goals which I (naively) had in my mind before becoming a neuroscientist.

So, Nächster Halt- Being addicted to aging research but also realizing the benefits of 'interdisciplinary scientific' environment I joined a chromatin lab in Munich (Andreas Ladurner lab) which is also interested in aging and behavior in the small Drosophila. After 2.5 years of postdocing I still enjoy it very much here, which implies I made a good choice! (Which is a good sign I guess …)

Munich is very different from Göttingen. Even the Bavarian dialect is taking time to get used to, compared with Gö's Hochdeutsch. The city is much larger, and whereas Gö is dominated by large percentage of students, Munich is mainly a business city…which makes it very expensive to live here. There are many attractions here such as Bayern Munich soccer games, several museums, castles, gardens and much more. In addition, there are many lakes south of Munich inviting for a swim in summer while watching the snowcapped Alps.

But there is also science...! The scientific 'world' here is amazing. There are two universities that belong to the ex-

cellence cluster, several Max Planck, Helmholtz Centers and a couple of large clinics. That means, if I wish to do almost any given experiment and use any kind of machine, it is quite easy to find a local suitable collaboration partner. Indeed, I have physically done experiments in 8 different labs so far.

The main project I have revolves with expending what I have done during my PhD, namely to test the involvement of chromatin remodeling on the aging process. Since mice seem to take forever to age, I switched to the smaller and faster aging fruit fly, *Drosophila*. Another nice thing about the flies is the ability to easily mess up their genome, knocking out specific genes and assess what happens to the chromatin is technically comparably easy. Actually, many labs researching aging currently tend to work with at least two model organisms. Therefore I believe for me it is not a bad idea to gain some more experience in a new model organism.

At the time of writing this I am celebrating the end of my seventh year in Germany. It was one of the best decisions I have made in my life. It's really incredible how a small internet post more than 7 years ago changed my life so thoroughly... and I am confident that my German adventure continues.

Shahaf PELEG did his doctoral thesis in André Fischer's department, Laboratory for Aging and Cognitive Diseases, European Neuroscience Institute Göttingen (ENI-G). He was awarded the Schilling Research Award for young researchers by the German Neuroscience Society for his doctoral thesis in 2011. He defended his PhD thesis in October 2010.

Ludwig-Maximilians-University Munich
Department of Physiological Chemistry
Adolf Butenandt Institute
Butenandtstr. 5, 81377 Munich

Science or medicine? Science and medicine!

by Alonso Barrantes-Freer

My training as a general physician – before I came to Göttingen back in 2007- was a very clinical one. I had a lot of interaction with patients and was exposed to differential diagnosis and treatment across various medical disciplines in a very practical setting. On the other hand, most of the knowledge dealing with the basic underlying mechanisms of disease at the cellular or molecular level was more or less restricted to the content of textbooks and the hands-on experience was rather limited. Nevertheless, I felt fascinated by the great mystery that the central nervous system (CNS) represents and in spite of my little practical experience in research I decided to apply to the Neuroscience program. I guess that I was an idealist. I thought that the tools that science could provide, would give me a greater understanding of many aspects of the CNS and beyond.

It was just later during my time as a PhD student that I realized that science produces more questions than answers. I also became conscious of the complexity that accompanies the study of even the most reductionist systems and the delicate balance that exists between the choice of a biological model and its informative value. Most importantly I learnt that the process of scientific production, however fascinating, is slow and has the inherent uncertainty derived from scientific approximation.

Science turned out to be something rather different from what I originally thought and my initial passion turned into some sort of a more mature affection. It was difficult to decide how to proceed after my PhD since I wanted to continue doing research, but I also started to look at my former medical background from a whole new perspective. I finally realized that medical work and scientific research are just two sides of the same coin. Therefore,

I joined the Neuropathology Department of the University Medical Center in Göttingen UMG as a medical resident and postdoc to continue exploring and learning about the CNS.

When people ask me about my new job, the scientific aspect of it is rather clear: We work with animal models, microscopy, molecular biology techniques, write papers, go to conferences and so on. However, when they ask me about life as a neuropathology resident, I get the impression that people somehow associate pathology with the study of the dead. Although part of my work does include performing autopsies, the major part of it deals with the study of diseases of the central and peripheral nervous systems in the living. It might seem surprising, but very dissimilar entities such as demyelinating, vascular, infectious or neoplastic diseases might pose important diagnostic challenges for the treating physician. Therefore the role of the neuropathologist is to aid in the differential diagnosis by analyzing the histological, biochemical and molecular changes in the brain, nerve or muscle.

It is a very fascinating job and the study of a tissue sample in a clinical context bears a lot of similarities with scientific research: It requires thorough technical optimization, analytical thought, a sound theoretical background and a good amount of experience. In basic scientific questions however, one can repeat experiments, include more controls and try different approaches until a satisfactory degree of confidence is achieved. In neuropathology we need to work with the sample (normally n=1) and the clinical information at hand to make decisions that influence therapeutic approaches and ultimately people´s lives. Also, basic science problems can remain open for a longer period of time, whereas in the clinical setting, the diagnostic challenges should be solved in benefit of the patient with the highest amount of confidence within a reasonable time frame. In practical terms this means a tighter schedule and fast "results".

Fortunately, diagnosis relies on team work where the input of different specialists and experiences (neurosurgeons, neurologists, neuroradiologists and of course neuropathologists) leads to a (in most cases) consensual decision about the better course of action for each individual patient. This is in particular a very rewarding aspect, since it requires an active interaction with colleagues of related disciplines.

I am very glad about my new position and I think that I´ve got the best from two not-so-different worlds.

Alonso BARRANTES-FREER did his doctoral thesis in Walter Stühmer's department at the Max Planck Institute for Experimental Medicine, dept. of Molecular Biology of Neuronal Signals. He defended his PhD thesis in April 2012

University Medicine Göttingen
Dept. Neuropathology
Robert-Koch-Str. 40, 37075 Göttingen

From PhD to scientific publishing

by Natalia Manrique-Hoyos

After I finished my PhD in 2012, I decided I wanted to expand my experience outside of the lab. I had always been interested in publishing and enjoyed the communication aspect of science during my studies, so I started looking for a position where I could use my scientific background while working in media and communication. In May 2013, I started working as an International STM (Scientific Technical and Medical) Trainee at Springer Science+Business Media in Dordrecht, the Netherlands. Springer is one of the leading STM publishers, and publishes more than 2,000 journals yearly, with more than 6,000 new books being launched in 2012 alone. My traineeship will take two years: the first year consists of four 3-month-long rotations in different departments within the company (Editorial, Marketing, Financial and Open Access). The purpose of this, similar to the lab rotations in our Neuroscience Program, is to carry out short projects according to the needs and interest of each department, while learning what the different teams and colleagues do within the company. During the second year, I will develop an interdisciplinary project making use of what I have learned. This program allows me to obtain a broad vision and hands-on experience with the different processes in STM publishing, including development of an editorial vision, production processes, strategic marketing and business development. It has a strong mentorship component, so even though I change projects and departments, my mentor always has an overview of my activities, provides support and advice when needed, and is involved in every important decision regarding the traineeship. Changing departments not only involves moving to a new department but can also mean working at Springer offices in different countries, joining the teams for international meetings as well as visiting clients, so international mobility is a big component and one of my favorite aspects of working at Springer.

Overall, digital media has transformed scientific communication and promises to continue expanding and diversifying the way in which information can be used and shared. I find it exciting and rewarding to be able to contribute to the development of services and products that facilitate the access and use of scientific information. The dissemination of new findings has a direct impact on the support that research receives from the government

and funding agencies, and also serves as a link between the public and the scientific community. Now the industry is increasingly geared towards open access, based on the demands of the scientific community and funding sources. While (Gold) open access might be a desired end goal for some disciplines such as biomedical research and neuroscience, it may be less feasible for others, such as the arts and humanities. Therefore, we are trying to engage in a dialog with all parties to come up with solutions that benefit all – and to offer a service that is valued by our authors and the scientific community, and that also allows us to keep moving forward.

As I am working on short (3-month) projects, my everyday work changes constantly and the topics vary enormously. I need to use data analysis, project management and communication skills to carry them out according to deadlines and deliverables agreed on with my supervisors. Working in teams is a very important aspect at companies, so when you want to develop or implement an idea, you need to involve other colleagues and obtain management's agreement to get the support your project requires. You can see how each team is a small part of a whole, and this allows you to feel that we are working together towards a common goal.

Just as with a PhD project, there is not a general step-by-step protocol to follow in order to develop the projects I am assigned, and to decide which resources to use. It is a process of research, reading literature as well as talking to colleagues and customers, to figure out how to solve the problem at hand by combining different strategies.

Outside Academia

Doing a PhD is very useful for this kind of job because you learn how to work independently, find information on your own and organize your projects with the available time and resources. It also gives you tools to communicate your results and ideas effectively, using a clear and straightforward message. All those GGNB "soft skills" courses (which I personally loved) also come in very handy.

One thing is different from the PhD: due to the nature of the traineeship, I need to learn how to let go of my projects before moving to the next stage. At work, I need to define how deep I actually need to go, taking into consideration deadlines and project goals, and I need to communicate with others constantly along the way. I like the fact that I can work anywhere and anytime as long as I have my PC and an internet connection, and that I don't need to reserve the confocal microscope/ultracentrifuge/microtome slots. I really like to talk to people as part of my job and am glad that publishing has such a significant human and social component to it.
Springer is a very, very international company, comparable to the scientific community. Our official language is English, which makes it very easy for everyone to communicate with each other. People are motivated to do a good job and to contribute wherever there is room for improvement. Innovative ideas are discussed and developed, but of course in a business environment, it is very important to remember that you have to think ahead and evaluate not only if an idea is good, but if it is viable in the long term. If you are thinking about what you want to do in the future, I recommend reaching out to people within your network who have followed a path you feel curious about. Ask about their experiences, the difficulties and the advantages or their job and especially about what motivated them to pursue that type of career. This may tell you about the compatibility of your priorities and personality with the job, as we cannot really see much just by looking from the outside. There are also many resources online, my personal favorites being the Tools and Tips section of the Science Careers portal:
http://sciencecareers.sciencemag.org/tools_tips/outreach/booklets
as well as the career exploration website of Columbia University:
http://www.careereducation.columbia.edu/resources/library/cce-resources/tipsheets.

Probably the most valuable experience for me until now, in addition to having the opportunity to learn about the publishing industry and working at an international scale, has been to be able to step briefly into the shoes of the different roles in the process of scientific communication, and to try to understand at the same time many points of view: that of a scientist, an author, a reader, a marketer, a manager, a salesman, a librarian, a policy maker, a medical doctor and a researcher outside of academia. From within the company, I get the chance to imagine, for instance, how a publishing editor defines which topics are interesting for a new series of books, how a corporate marketing manager defines how to approach potential clients in emerging markets depending on the strength of different industries in the region, or how product developers work to improve the user experience and decide which new features should be included in our services according to our users' needs. I feel like I have gained a broader perspective of what is happening around scientific publishing on a global and regional scale, how different economic, political and social factors can influence research output, and the way these results are broadcasted to the world. In this interface of increasing output of scientific research, new technologies and digital media, in the end it is all about communicating with each other and sharing local knowledge with the rest of the world.

Natalia MANRIQUE-HOYOS did her doctoral thesis in Mikael Simon's department at the Max Planck Institute for Experimental Medicine, Center for Biochemistry and Molecular Cell Biology. She defended her PhD thesis in October 2012.

Springer Science+Business Media B.V.
Van Godewijckstraat 30
3311 GX Dordrecht, the Netherlands

Creutzfeldt Award

Stipends/Honors/Prizes

Ilma Dewiputri PhD stipend from the Ministry of Higher Education Malaysia (MOHE)

Pooja Rao PhD Fellowship by the European Neuroscience Campus Network (ENC Network)

Swathi Srivatsa PhD Fellowship awarded by Boehringer Ingelheim Fonds

Hope Agbemenyah Inge and Fritz Kleekamm Research Price of the Alzheimer Foundation

Shahaf Peleg Schilling Research Award 2011 for young researchers by the German Neuroscience Society

Raunak Sinha Otto Hahn Medal 2011 for young researchers by the Max Planck Society

The following students have been awarded a GGNB Excellence Stipend:
Anthony Tsang (2011),
Siv Vingill (2012),
Tanvi Butola (2013),
Ricardo Merino (2013)

Creutzfeldt PhD Prize

The Creutzfeldt PhD Prize is awarded for the best PhD thesis in memoriam of Prof. Dr. Otto Detlev Creutzfeldt, founding director of the department of Neurobiology at the Max Planck Institute for Biophysical Chemistry in Göttingen. The price is awarded since 2007 to PhD graduates of the Neuroscience program based on excellent achievements during the PhD and the grading of the written dissertation and the oral defense. Since 2011 two winners have been selected for the Creutzfeldt Prize every two years.

The last award ceremony took place on May 22, 2013 during the opening of the NEURIZONS Symposium 2013 in the presence of Gregor Eichele (Dean of the IMPRS for Neurosciences), Dieter Melzner (Sartorius stedim AG) and Mary Creutzfeldt, who presented the book 'Cortex Cerebri' written by her late husband Otto Creutzfeldt to the awardees. The award also includes a gift of 500,- € which is sponsored by the Göttingen company Sartorius stedim biotech AG, which generously supports the Neuroscience program since its foundation.

Dr. Irina DUDANOVA (2007)
Max Planck Institute of Neurobiology
Department of Molecular Neurobiology
Am Klopferspitz 18
D-82152 Martinsried

Dr. Henry LÜTCKE (2009)
Brain Research Institute
University of Zurich
Winterthurerstrasse 190
8057 Zurich, Switzerland

Dr. Ioanna Bethani (2011)
Goethe-Universität Frankfurt
Institute of Cell Biology and Neuroscience Cluster of Excellence
Molecular and Cellular Neuroscience
Macromolecular Complexes (CEF)
Max-von-Laue-Str. 9, 60438 Frankfurt am Main

Dr. Stephan Junek (2011)
Max Planck Institute for Brain Research
Neural Systems and Coding Group
Deutschordenstraße 46
60528 Frankfurt am Main

Sadim JAWHAR, Ph.D. (2013)
Biomedical Research Institute
Doha, Qatar

Dr. David OWALD (2013)
Center for Neural Circuits and Behavior
Oxford University, United Kingdom

Creutzfeldt Award Ceremony during the opening of the NEURIZONS Symposium 2013 (from left to right): Gregor Eichele, David Owald, Sadim Jawhar, Dieter Melzner, Mary Creutzfeldt, Michael Hörner

New Faculty

Joining the program in 2012 and 2013

Thomas Dresbach
has been a professor at the School of Medicine, University of Göttingen since 2010. His group studies aspects of synapse formation with particular focus on the biogenesis of presynaptic nerve terminals and aims at understanding the mechanisms of synaptogenesis to pinpoint molecular causes of synaptopathies. Prof. Dresbach is a member in three programs of GGNB: Neurosciences (IMPRS), Molecular Physiology of the Brain (CMPB), and Sensory and Motor Neuroscience.
Further information: http://www.uni-goettingen.de/en/189463.html

Gregor Eichele
is the new dean of the IMPRS for Neurosciences. Prof. Eichele was director of the Max Planck Institute of Experimental Endocrinology (Dept. of Molecular Embryology) in Hannover. In 2006 he moved to Göttingen and became director at the Max Planck Institute of Biophysical Chemistry (Dept. Genes and Behavior). Prof. Eichele earned his doctoral degree in Basel, Switzerland and spent 17 years as a postdoc, assistant professor, and professor in the USA – among others at Harvard and the Baylor College. His department investigates the dynamic interplay between gene expression, development and behavior with the focus on developmental biology of the nervous system, circadian clocks, and functional genomics of the brain.
Further information: http://www.uni-goettingen.de/en/57934.html

Robert Gütig
came to Göttingen as a group leader at the Max Planck Institute for Experimental Medicine in 2011. The group's research interest is directed towards the identification of the computational principles underlying spike based information processing and learning in central nervous systems and the understanding of how these principles are implemented by biological processes. Dr. Gütig is a member of the IMPRS for Neurosciences as well as in the GGNB programs Theoretical and Computational Neuroscience and Sensory and Motor Neuroscience.
Further information: Further information: http://www.uni-goettingen.de/en/317894.html

Ira Milosevic
moved from Yale University to Göttingen in 2012 where she became an independent group leader in the European Neuroscience Institute (ENI-G). In January 2006 Dr. Milosevic graduated from the IMPRS for Neurosciences. During her PhD she worked on the role of PI(4,5) P2 and SNAREs in exocytosis in the department of Prof. Neher. Thereafter she did her postdoc at Yale University School of Medicine in New Haven, USA. Currently, Dr. Milosevic investigates aspects of synaptic vesicle recycling with respect to neurological and neurodegenerative diseases.
Further information: http://www.uni-goettingen.de/en/419893.html

Manuela Schmidt
earned her doctoral degree from the IMPRS for Neurosciences in Göttingen in 2006. After having spent her postdoc years at the Scripps Research Institute in La Jolla, California, Dr. Schmidt returned to Göttingen in 2012 and became an Emmy Noether Group Leader in the field of somatosensory signaling at the Max Planck Institute for Experimental Medicine. Her research focuses on the comparative and quantitative analysis of somatosensory signaling networks in established mouse models of acute and chronic pain.
Further information: http://www.uni-goettingen.de/en/420505.html

Michael Sereda
became a group leader for Molecular and Translational Neurology at the Max Planck Institute for Experimental Medicine in 2007. In 2010, Dr. Sereda took over a professorship for Neurology and Neurogenetics and obtained the DFG-Heisenberg professorship "Hereditary Neuropathies" in 2012. Prof. Sereda's research focuses on glia cell biology, axon-glia interaction and mechanisms of diseases of the peripheral nervous system (PNS).
Further information: http://www.uni-goettingen.de/en/420005.html

Left the program since 2011

Stefan Eimer
studied biochemistry in Bayreuth and Munich and spent his postdoc time at Ecole Normale Superieure in Paris, France. He came to Göttingen as a group leader at the European Neuroscience Institute (ENI-G) in 2005 working on molecular genetics and neurodegeneration. His group investigates basic mechanisms and rules that control the trafficking and sorting of ligand gated ion channels within the secretory apparatus. Since 2006, Stefan Eimer has been coordinating the Network of European Neuroscience Institutes (ENINET) and the Electron Microscopy Network Goettingen (GöNEM). In 2012, he took over a position as professor for structural cell biology at the University of Freiburg.
Further information: http://www.zbsa.uni-freiburg.de/projects/ag-eimer

Wolfgang Engel
had been a member of the IMPRS for Neurosciences from its beginning. As professor of Human Genetics, at the university medical faculty, he focuses on the molecular analysis of variability and genetic disturbances of development and differentiation with respect to genetically determined malformation syndromes. His group also investigated the structure, expression and function of genes involved in differentiation of male gametes, and isolated spermatogonial stem cells demonstrated to be pluripotent.
Further information: http://www.uni-goettingen.de/en/57938.html

Gabriele Flügge
has been a senior scientist in the Clinical Neurobiology Laboratory at the German Primate Center and became member of the IMPRS for Neurosciences in 2002. She studied central nervous mechanisms in animal models of chronic psychosocial stress with respect to clinical symptoms of depression in humans. Stress-induced changes in gene expression have been described in distinct neurons of the brain and correlated with changes in neurotransmitter systems, receptors, transporters and other molecules. Mechanisms underlying the beneficial effects of antidepressant drugs and molecular factors that might play a role in depression have been investigated by behavioral studies.
Further information: http://www.uni-goettingen.de/en/57946.html

Eberhard Fuchs
was one of the founding members of the IMPRS for Neurosciences. For many years Prof. Fuchs initiated the MSc curriculum with his lectures and ensured a 'flowery' start for the MSc classes, which has become a tradition in the Neuroscience Program ever since. Prof. Fuchs was appointed as Professor for Animal Physiology, heading the Clinical Neurobiology group at the German Primate Center. His major research interest has been to investigate the functioning of the brain in animal models of psychiatric diseases. Behavioral studies including complex social interactions in suitable animal models are used to detect and quantify cognitive, motor and other abnormalities with respect to neurodegenerative and psychiatric diseases.
Further information: http://www.uni-goettingen.de/en/57949.html

Erwin Neher
had been the dean of the IMPRS for Neurosciences since its foundation in the year 2000 until 2012. Prof. Neher came to Göttingen in 1983 when he became Director of the Membrane Biophysics Department at the Max Planck Institute for Biophysical Chemistry. His research focuses on the role of calcium in exocytosis, neurotransmitter release, and short term synaptic plasticity using a variety of electrophysiological and quantitative imaging techniques. He was awarded the Nobel Prize for Medicine in 1991 for his discoveries concerning the function of single ion channels in cells investigated with the patch-clamp technique.
Further information: http://www.uni-goettingen.de/en/420505.html

Diethelm Richter
has been the chair of the Department of Neuro- and Sensory Physiology at the university medical faculty. Besides being a founding member of the IMPRS for Neurosciences, Prof. Richter coordinated the SFB 406 which generated the scientific network in Göttingen which led to the establishment of the DFG Research Center Molecular Physiology of the Brain (CMPB) in 2002 with him as a speaker. Prof. Richter later became speaker of the Cluster of Excellence

Faculty
Leaving

Microscopy at the Nanometer Range (CNMPB). Moreover, Prof. Richter was chairman of the European Neuroscience Institute Göttingen (ENI-G). His research concentrates on the analysis of molecular factors relevant for signal processing and integration in identified neuronal networks, namely respiratory networks with respect to clinical syndromes such as the Rett syndrome.
Further information: http://www.uni-goettingen.de/en/58022.html

Nicole von Steinbüchel-Rheinwall
joined the Neuroscience program in 2007. Prof. Steinbüchel-Rheinwall heads the Institute for Medical Psychology and Medical Sociology at the University Medical Center Göttingen, which is –besides providing other clinical services- responsible for neuropsychological diagnostics of patients. Research projects deal with the investigation of cognitive neuropsychology with respect to child development using functional-imaging techniques (fMRI) and EEG.
Further information: http://www.uni-goettingen.de/en/83751.html

Andreas Stumpner
has been a member of the Neuroscience Program since 2003 as Professor of Zoology at the Johann Friedrich Blumenbach Institute for Zoology and Anthropology. His research focuses on how a small insect nervous system recognizes specific frequencies and temporal patterns in the context of acoustic communication. Understanding these processes bears implications also on signal processing in the vertebrate auditory pathway and with respect to the evolution of auditory communication systems in general. Studies in bushcrickets indicate that frequency-dependent inhibition occurring redundantly on different levels is crucial for frequency tuning.
Further information: http://www.uni-goettingen.de/en/58041.html

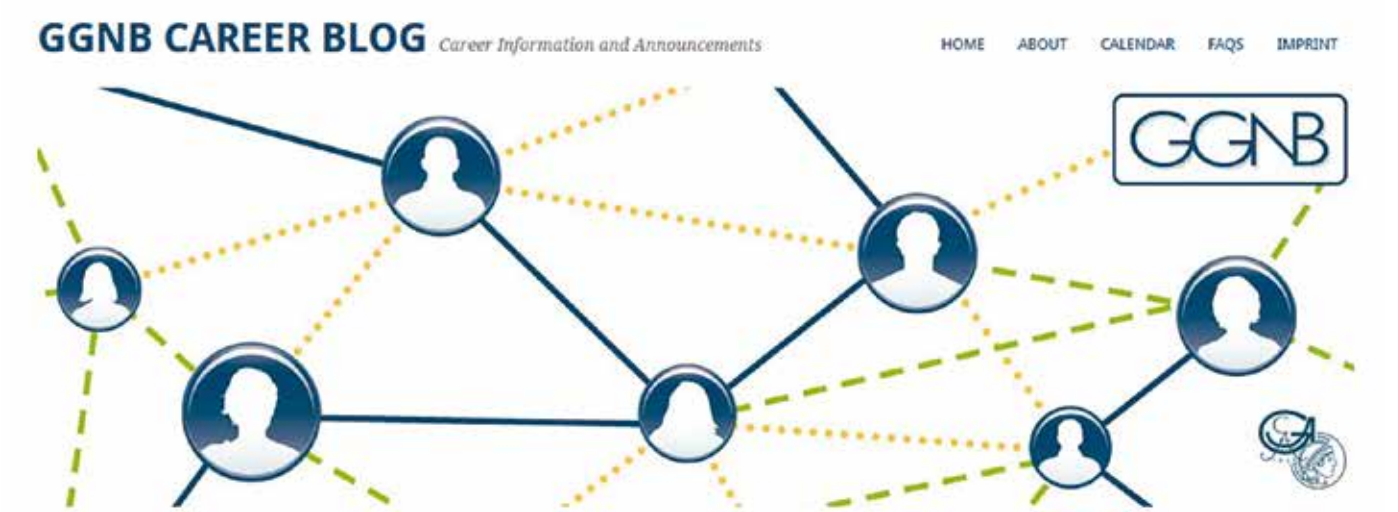
Current Faculty Members

Matthias Bähr
Thomas Bayer
Nils Brose
Wolfgang Brück
Camin Dean
Thomas Dresbach
Hannelore Ehrenreich
Gregor Eichele
André Fiala
André Fischer
Alexander Flügel
Jens Frahm
Tim Friede
Theo Geisel
Martin Göpfert
Robert Gütig
Uwe-Karsten Hanisch
Ralf Heinrich
Stefan Hell
Michael Hörner
Swen Hülsmann
Reinhard Jahn
Hubertus Jarry
Siegrid Löwel
Till Marquardt
Ira Milosevic
Tobias Moser
Klaus-Armin Nave
Luis Pardo
Walter Paulus
Diethelm W. Richter
Michael Rickmann
Silvio Rizzoli
Moritz Rossner
Detlev Schild
Oliver Schlüter
Manuela Schmidt
Michael Sereda
Mikael Simons
Jochen Staiger
Judith Stegmüller
Anastassia Stoykova
Walter Stühmer
Stefan Treue
Andreas Wodarz
Fred Wolf
Fred Wouters

For details regarding the research of all faculty members, please see www.gpneuro.uni-goettingen.de/content/c_faculty.php

GGNB career service

Bridging the gap - shedding (some) light on life after the PhD



Should I apply for a(nother) postdoc? What alternatives are out there? Doubts about PhD's qualification for non-academic jobs are widespread. Doubts about success in an academic career are no less. Since about a year, GGNB offers specific career advice and services for postdocs and late-stage GGNB PhD students in this regard. And I'm the lucky person to establish them.

To give you an impression about me, here a few words about my own career: I studied Psychology at the University of Jena, and completed my Ph.D. at the University of Zurich. The last five years, I carried out research about social psychological and motivational aspects of computer-mediated communication and cooperation, especially in social networks, as postdoc at the Leibniz-Knowledge Media Research Center (KMRC) in Tübingen. Besides research, I was responsible for equal opportunity issues, good scientific practice, and a series of workshops of the graduate program at the KMRC. To see beyond my own nose, I took part in the think tank of the "Stiftung Neue Verantwortung" in Berlin, which aimed at encouraging an intersectional dialogue between science, business, politics, and society, in my case about the challenges and promises of the new digital society. Finally, I'm one of the founders of the group blog wissensdialoge.de on which we discuss and report about psychological research relevant for practitioners in knowledge management and organizational learning.

Based on the feedback and requests I got during first year of the GGNB Career Services, it became clear that the demand to establish such a service also exists in Göttingen. The seven workshops I organized were mostly fully booked; some were even overbooked. Especially the workshops about career opportunities and about job hunting and application skills have been welcomed and will thus take place on a regular basis. I started the so-called Career Impulse Sessions as short 2-hour meetings with various career-related topics and guests, with a specific focus on networking and experience exchange among postdocs and late-stage PhD students. In the first meeting, Dr. Christina Schütte, alumna of the MPI for Biophysical Chemistry, talked about her work as trainer and consultant for grant and scientific writing. Two further sessions dealt with networking, one with a more general input on networking and discussions about own practices, the other with a speed networking among postdocs and discussion about potential further networking events in Göttingen. The fourth session was about doing successful research and being a parent and aimed at facilitating information and experience exchange with the Family Service of the University as well as among parents(-to-be).

For more individual questions, I met with 20 postdocs and late-stage PhD students for a counseling hour. Over all, more than 80 junior scientists took part in at least one of the events. More than 120 are registered to date – and the number constantly grows.

As I already wrote in January 2013 in the Molecular Biology Newsletter, I'm enthusiastic about being the coordinator of the GGNB Career Service Unit. I have even become more enthusiastic over the last months as I met so many passionate, curious and skilled people who want to be prepared as effectively as possible for their envisioned career or who search for a career path to follow their aspirations and interests. Clearly, there are numerous career options within and outside academia; but finding the track that fits best with personal and professional goals is both challenging and exciting. My services hopefully contribute to providing the appropriate basis for making informed decisions whilst the excitement of this process is rather reinforced.

Moreover, I see a big potential in the exchange of information and experiences. For example, it was impressive how intensely parents and parents-to-be exchanged views and experiences with each other; nearly every participant of the respective Career Impulse Session contributed new pieces of information or another perspective. As a peer network provides important information, support, and career resources, I want to further enable a vivid exchange within the postdoc community, hopefully resulting in many creative career-supporting activities organized by the postdocs themselves. Insights from alumnae and alumni may enrich this exchange, because you are now out there. If you would like to share your experience in a Career Impulse Session or any other way, do not hesitate to contact me via e-mail or LinkedIn – it might also be your chance to come back to Göttingen.

You can find further details on the GGNB career services and event as well as career-related information on the GGNB Career Blog www.ggnb-blog.uni-goettingen.de. I hope very much to get to know some of you at an event of the Career Service Unit!

Katrin WODZICKI studied Psychology at the University of Jena and completed her doctoral degree at the University of Zurich in 2007. She then moved to Tübingen and joined the Leibniz Knowledge Media Research Center where she worked as a postdoctoral fellow on social psychological and motivational aspects of computer-mediated communication with respect to social networks. She joined GGNB in 2012 and leads the Career Service Unit which supports postdoctoral researchers in their individual planning for careers inside and outside of academia.

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NEURIZONS 2013

Solving the Brain Puzzle *by Siv Vingill and Mateusz Ambrozkiewicz*

Emotions that come to our minds, when we bring back memories from Neurizons 2013 are above all the soothing feelings of fulfillment and pride disturbingly accompanied by the recollection of an immense back pain, overwhelming stress and a 'next-time-I-will-have-done-everything-in-advance' reproach. Nevertheless, we should definitely admit, organizing a conference is undoubtedly a once-in-a-lifetime experience, that requires time management, extraordinary (at times) social skills, conflict management and assertiveness. As a compensation for our moments of pain however, we – the organizers – were rewarded with pride and glory, because – to say the least – Neurizons 2013 was a blast! Here is a glimpse of not only what was going on backstage, but also on the speakers' pedestal.

It all started with preparatory phone calls, monthly meetings, financial negotiations, arranging all the responsibilities and eating a lot of pizza in parallel. When the conference was knocking at the door, the organizational tête-à-têtes grew longer, tenser and – for the more stressed ones – also became a small source of frustration. Some of us took it for granted that everything will go sway and kept on playing Angry Birds while discussing the speakers' accommodation, the more engaged and devoted ones (that are normally appreciated for their stoical composure and addictive cheerfulness) would impulsively explode with 'Can we please all focus about what we are discussing here?'. After the moment of awkward silence, there was always someone to restore the jolly and inspiring bustle singing 'Uh, that's a snap, girl!' and no fatalities were counted.

As the time went into final countdown, we all started to feel more concerned and worried if everything was really geared up. Each one of us had a moment of ten unanswered phone calls and multiple messages left in the mailbox, not to mention thousands of e-mails from participants, speakers and catering companies (not to mention our organizers-in-chief appealing to our responsibilities). Speaking of the devil – it will be hard to forget desperate Siv considering the possibility of becoming a personal sponsor for the venue…

The final countdown showed 1 day left and 17 extremely excited people started to have a hunch we had it all nailed down. Markus at that point was considering engagement to the GWDG printing center, which resulted in beautiful booklets, ready on time. Chaitali spent the last night sorting through final details regarding participants, but still managed to be the first smiley face you saw at the registration desk in the morning. Zohreh could finally shake hands with the speakers whose secretaries she had developed a close relationship with during the last year and David enjoyed his time as a private chauffeur in a BMW. Everyone was absolutely paranoid about the face photos of the speakers they were supposed to guide from the railway station to the hotel – in the end you don't want to end up asking strangers for their IDs to prove they really were not Franck Polleux.

It was on like Donkey Kong and we were so ready!

The next day started out with a tad of initiation trouble regarding missing nametags, (so if someone still doesn't know their names, the tags are available in our office), but as soon as the opening ceremony started, things went smooth as the hickory wind. First two excellent young researchers from Göttingen, Dr. Sadim Jawhar and Dr. David Owald were awarded with the "Otto Creutzfeldt PhD Award" for their outstanding PhD-research. Then our invited speakers started a four-day block of talks which left us all in a state of newfound inspiration and enthusiasm for neuroscience. Stephan Sigrist launched the finding of Bruchpilot, a master organizer in the presynapse, Robert Edwards enlightened us on his new take on synuclein research through channelrhodopsin injection into mice brains and Rafaella Tonini explained how endocannabinoids can affect not only our habitual, but also our goal-directed behavior. Jeremy Henley then finished off the first day with his entertaining talk on SUMO and its role in synaptic plasticity.

By the next day we got to enjoy Klas Kullander and his trans-species work uniting genetic studies in Icelandic horses with catwalk-analyses in mice to elucidate pathways controlling locomotion in the spinal cord, a thread which was effortlessly picked up again in Martyn Gouldings talk about the "Spinal brain". We have forever been told, it is a good idea to plan ahead and think when it is down to our careers. These days proved it right as three of

our most successful alumni gave their talks. Manuela Schmidt just returned to Göttingen to become a group leader and presented her work on chronic and acute pain, Henry Lütcke gave a thorough introduction to novel imaging approaches used to assess auditory learning and Stephan Junek visualized single neurons in high resolution and with flabbergasting detail. At the end of the day, the pain-guru Alan Basbaum shared knowledge from his long and outstanding career, telling us why and how life can hurt us.

For the imaging enthusiasts the third day was a field day. Not only did our local expert Stefan Hell present his resent STED findings, but Ernst Bamberg showed us the revolutionizing technique, he himself partly unravelled, namely optogenetics. In addition, we were introduced to the latest news on the wave front engineering microscopy by Eirini Papagiakoumou from Valentina Emiliani's lab.

As "ubiquitinists" ourselves some personal highlights consisted of Azad Bonnis lecture on ubiquitination pathways and Franck Polleux' inspiring talk on axon specification. Hans-Ulrich Demut gave us a different career perspective from his position as director of a pharmaceutical company and Akiko Nishiyama contributed novel information on the development of glial cells.
There is no doubt that the best thing about organizing Neurizons is the fact that you get to interact with awesome speakers that you have long dreamt of seeing and the end of this conference just rounded up what had truly been a wonderful row of talks. Heleen Slagter shed light on our cognitive abilities and Nikos Logothetis followed up by showing how MRI can be used to illuminate neural pathways. And for a while we felt like attending a TED-talk when Jeff Lichtman took us through his amazing 3D visualization of our connectome through his "Brainbow"-approach.

With all that said, we were thrilled when the participants could get more personal with the speakers during CoachMe event. Each of the participants had their 15 minutes of uninterrupted conversation with a speaker of their choice. Some of the professors were so enthusiastic about the event, they wouldn't stop talking, which left us and Markus Stahlberg – the CoachMe organizers – in an organizational distress (as the Germans would ask – where did the Ordnung go?). After hunting down people that signed up for CoachMe but forgot to show up, assertively trying to persuade the speakers to end the session (time limits!) and interrupting very vivid and lively discussions, we breathed a sigh of relief, as the event was great fun and a total success!

The Neurizons 2013 Organizing Team

In between lectures, there were times for break entertainment and what better way to stimulate our hard-working neurons than with music. Our own human beatbox David Brockelt literally blew our minds, while Ahmad Nazzal proved that scientists come in all colors with his hard rock performance. And for the audience with a more refined and sophisticated musical palate, Anne Wolfes piano concert was an extra treat. In this respect, it has to be said that the pleasure of having a lecture hall filled with PhDs, post-docs and esteemed speakers singing a happy birthday song to you, was in addition to slightly embarrassing, a wonderful surprise.

It may sound as a fairy tale, but the conference didn't go without a major panic outbreak, when the keynote speaker Susumu Tonegawa didn't arrive until the very last moment before his talk. But from that moment on his talk on false memories kept everyone truly amazed and inspired.

As every conference with any self-respect, we also gave the students a chance to present themselves through two poster sessions. After having spent hours communicating with what felt like all the catering companies of the world about number of forks, sizes of tables and color of tablecloths, it was a

true delight to see that the eager knowledge exchange was accompanied by people digging into wonderful cheese, delicious wine and sausages that could make even the most demanding Bavarian proud. On behalf of every satisfied PhD we thank the Käse-Boucherain and Dette's for their gorgeous catering. After the whole day of talks and scientific exchange, we also planned a conference party. Feeling slightly awkward about offering a dance floor with salsa, Balkan beats and a bottle of good old Astra beer to the world most renowned scientists, we were truly astonished to see that some of them hit the floor without a moment of hesitation.
Nevertheless, as the party was also covered by our budget, some of the organizers did not relax as much as all the others and went nagging about a financial status at the bar in the middle of the party (ehem, Siv, really…). The party was a blast and that couldn't have happened without our scientists-DJs and the crew of Freihafen.

We were supported by so many people, that it is hard to even begin mentioning everyone, but having Michael and Sandra ready to answer even the dumbest questions was beyond doubt the most valuable. In addition we thank Svea Dettmer, who must be considered a living google when it comes to who, where and what in Göttingen. And as we are not exactly technical geniuses, (maybe apart from Bekir who made a thoroughly professional web page in the end), we needed Herr Losel who, together with his staff, seemed to be able to solve every problem in the whole wide Neurizons.

Without our sponsors none of this would have happened and we hope to see these cool salesmen again in conferences both in and out of Göttingen in the future! Thanks to Boehringer Ingelheim Stiftung, Merck Millipore, Multichannel Systems, NPI Electronics, Sartorius, HEKA and World Precision Instruments for an enjoyable cooperation, and a special thanks from our prize winners to Nikon for ensuring that they can capture outstanding images also in their personal life!

The exhausted, but very satisfied and profoundly inspired organizing committee consisted of Bekir Altaş, Mateusz Ambrożkiewicz, Dorota Badowska, Vinita Bharat, David Brockelt, Hugo Cruces Solís, Ilma Dewiputri, Zohreh Farsi, Hung-En Hsia, Ulrike Leipscher, Chaitali Mukherjee, Dennis Nestvogel, Markus Stahlberg, Adam Tomczak, Diana Urrego-Blanco, Siv Vingill, and Man Ho Wong.

Just to sum it all up: 1. If someone asks you to organize a conference, do it! We are forever grateful to have had this opportunity and wish the next year's organizers good luck (and a lot of stamina)! 2. If you get the chance, attend a Neurizons conference! To communicate personally with our times finest brains is a definite moment of inspiration that you'll take with you into your future career.

So from all of us to all of you: May Neurizons 2015 be as fun and rewarding as our May-adventure! **The planning phase is starting soon, and the first planning session is scheduled for Wednesday, April 2, 2014, 19:00 h, seminar room 2.006 in the ENI.**

Joint Training in the Neurosciences

The European Neuroscience Campus Network

The ENC-Network is the organization that hosts both the Erasmus Mundus Master Course (EMMC) and the Erasmus Mundus Joint Doctorate (EMJD) program, in addition to two ITN (BrainTrain and SymBad). The ENC-Network (ENC: http://www.enc-network.eu) was founded in 2009 with EU funding granted in 2010 (doctoral positions, overhead of 1.3 Mio €/year until 2015). New call under the EU funding scheme 'Horizon 2020' is up from January 2014 onwards.

The EU grant application in 2009 was accompanied by the EU Office and the Dean of the Medical Faculty. The Consortium Agreement (signed in 2010) stated that ENC doctoral students in Göttingen will be integrated into GGNB. In addition, ENC partners are asked to implement joint/double degree regulations for ENC doctoral students. As mentioned in the GGNB renewal proposal filed in 2012, GGNB explicitly supports the further development of joint EU research/teaching partnerships, including the ENC Network.

In conjunction with the establishment of the European Neuroscience Campus training network for doctoral candidates, the new European Master Neuroscience program 'NEURASMUS' has been founded in 2010 with the aim to extend exchange and training opportunities also for MSc students. Since 2011 three to five NEURASMUS MSc students join the Göttingen Neuroscience Program per year. They are trained in at least two home institutes of the ENC Network and have the option to enroll in existing and established PhD courses in each of the participating home institutes after successful graduating from the MSc program.

PhD candidates apply to ENC faculty submitted PhD projects competitively selected by the ENC Board. All ENC PhD students are jointly selected by a committee composed of faculty from all ENC partners. PhD students submit an individual training plan approved by the ENC Board and the Thesis Advisory Committee. ENC doctoral projects comprise 3 years at the primary host university plus a mandatory (minimum) mobility stay of 6 months at one partner institution.

PhD students doing their thesis in Göttingen are currently fully integrated in GGNB. ENC-PhD students with Göttingen as their host university are enrolled as doctoral students of the CMPB PhD Program or Neuroscience Program in GGNB. Depending on their mobility scheme and the regulations of their chosen partner institution, they may apply for a joint/double (or cotutelle) degree issued from Göttingen and the partner institution. The procedures follow the GAUSS Doctoral Degree Regulations.

The 'mobility ENC-PhD students' who join research groups in Göttingen as part of their mobility scheme are also enrolled as 'non-degree' doctoral students in the CMPB PhD Program in GGNB. For the time being 'mobility ENC-PhD students' can opt for an individual cotutelle certificate stating project details and time spent in Göttingen. To implement a joint/double degree with the ENC partners in the future, the department 'Studium & Lehre' in Göttingen following the general recommendations of the 'Hochschulrektorenkonferenz' recommends a minimum stay of 9 months for 'mobility ENC-PhD students' in Göttingen.

The ENC partners are joining efforts to establish joint and double degrees within the ENC network universities.

Campus events

PhD student representative election

Siv Vingill and Dennis Nestvogel (deputy) have been elected as the new representatives for the doctoral students of the Neuroscience Program last fall. Siv and Dennis will serve as PhD student representatives for the coming 2 years starting from January 2014. They are now the direct contact persons for any issues related to the doctoral student community of the Neuroscience Program within GGNB. Congratulations to Siv and Dennis from the coordination team, who is looking forward to a fruitful cooperation with the new speakers in the coming years.

The program also wants to thank Benjamin Wilhelm for his commitment to the Neuroscience Program and for his contributions during the past 3 years, which allowed addressing, discussing and solving concerns from the perspective of the student body. Moreover, Benjamin was on board during the application and evaluation of the excellence initiative proposal and the prolongation of the IMPRS for Neurosciences and he certainly substantially contributed to the successful funding renewals.

10th Anniversary for Sandra Drube

Congratulations to Sandra Drube who joined the coordination team in 2003 and is a member of the Neuroscience Program for more than 10 years now. As an almost founding member, she has taken care of all 'people and papers' ever since. She has successfully guided many generations of program members, both students and faculty, over all administrative (and other ..) hurdles. With her open-minded, always friendly and actively helpful attitude Sandra perfectly manages the daily businesses and challenges even in stressful situations. The program thanks Sandra for her dedicated commitment and wishes her to stay on with the 'neuros' for the next decade/s as the program's administrative coordinator.

Sandra then and now

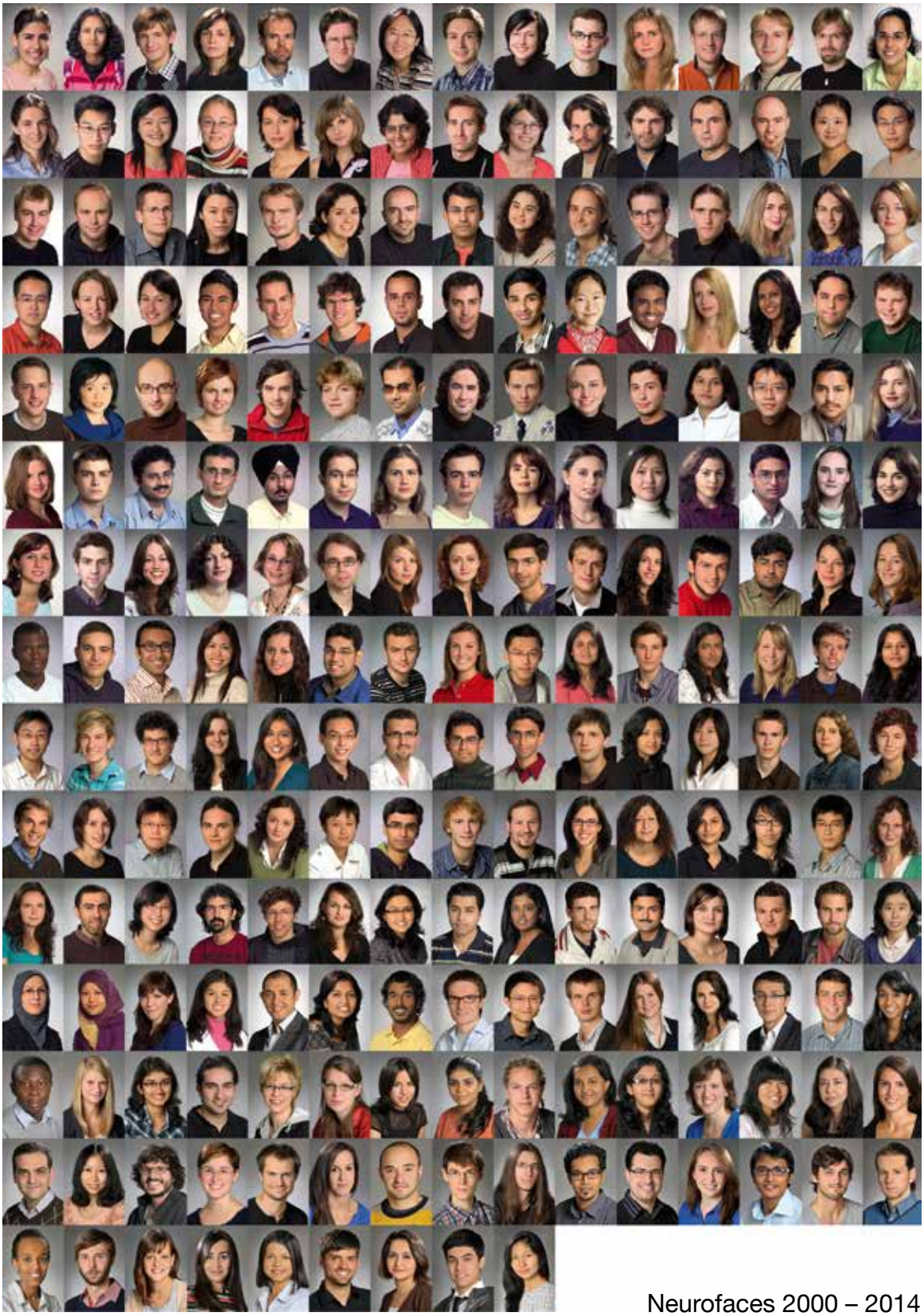
Welcome Mirja Blötz

Mirja Blötz joined the ENI coordination office in August 2013 after graduating as a European Business Assistant from the Institute for International Education & Communication (IBK) in Göttingen. She is responsible for the organization of teaching activities and the administration of the doctoral program of the CNMPB cluster of excellence/DFG research center. She is also involved in the formal supervision and implementation of the doctoral exam regulations during the PhD award procedure.

100. PhD Graduate 2013 / 1. PhD Graduate 2003

Cordelia Imig, who entered the Neuroscience Program in 2008, successfully defended her PhD thesis on October 28, 2013 as the number 100 PhD Graduate. Her written thesis, entitled 'Molecular and Morphological Correlates of Synaptic Vesicle Priming' was graded with highest distinction 'summa cum laude'. Congratulations and all the best for her future career.

10 years earlier on January 29, 2003 the first degree of the Neuroscience Program was awarded to Ivan Manzini. He is currently leading a junior group at the Center for Physiology and Pathophysiology, Institute for Neurophysiology and Cellular Biophysics at the Faculty of Medicine in Göttingen.



Neurofaces 2000 – 2014