GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN / GERMANY

International Max Planck Research School

Molecular Biology

MSc/PhD Program

YEARBOOK 2013 / 2014

Yearbook 2013/2014

MSc/PhD Molecular Biology Program

at the University of Göttingen

International Max Planck Research School

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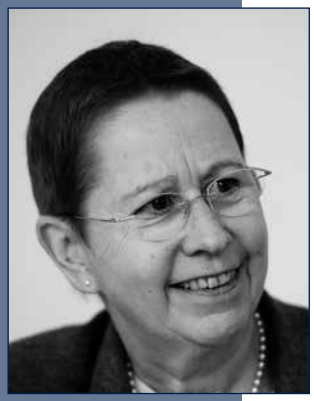


Letter from the President

Success for a comprehensive research university such as our Georg-August University of Göttingen is rooted in excellent science and its integration into an optimal learning environment to educate competent and critical young academics. I am very glad that our university in cooperation with the local Max-Planck Institutes and the German Primate Center has been able to establish conditions, which make top interdisciplinary science possible in an international setting enabling us all to feel the Göttingen Spirit.

The two international MSc/PhD programs in Molecular Biology and Neurosciences truly have contributed to our continued strive for excellence in science-oriented training both by integrating faculty members from university and non-university institutes across institutional borders and by providing comprehensive services especially for international students on the Göttingen Research Campus. Based on the proven concepts and the experience of these programs the Göttingen Graduate School for Neurosciences, Biophysics, and Molecular Biosciences (GGNB) was established, which is continuously supported by the federal Excellence Initiative since 2007.

The Molecular Biology and Neuroscience Biology programs remain unique within the Graduate School GGNB in offering integrated MSc/PhD curricula with a fast track option which allow excellent BSc graduates to directly enter the PhD phase after successfully absolving the initial 1st year training phase. For over a decade these international programs have been particularly successful in attracting high numbers of worldwide applicants of good academic quality providing the basis for the selection of the very best candidates. New ideas introduced by these programs have meanwhile been adopted by the Georg-August University School of Science (GAUSS) and other graduate schools for the benefit of the entire university.

While maintaining their successful structure the content and focus of the training curriculum of the programs has continuously been adapted to the changing research topics. Consequently, new faculty members are integrated to reflect novel developments in research. They will further ensure optimal individual supervision and up-to-date research-oriented training. Beyond academia both programs keep close contact with the relevant industries to enhance the opportunities of the graduates for a successful professional career in the private sector.

I would very much like to thank all colleagues and institutions for their committed support of these international programs and, last but not least, the German Academic Exchange Service (DAAD), the Lower Saxony Ministry of Science and Culture, and the various generous donors. The Georg-August University of Göttingen will continue to support these programs to promote international exchange at all levels and for further interaction with our partners worldwide.

Prof. Dr. Ulrike Beisiegel

(President of the Georg-August University of Göttingen)

Letter from the Max Planck Society

The mission of the Max Planck Society is to conduct basic research in science and humanities at the highest level. More than 80 Max Planck Institutes are located on scientific campuses across Germany, most of them close to universities.

Scientific ties between Max Planck Institutes and universities are traditionally strong. In 1998, during the 50th year celebration of the Max Planck Society in Göttingen, the Max Planck Society, together with the Hochschulrektorenkonferenz, launched the International Max Planck Research Schools as a new joint program to further intensify cooperation.

The goals of the International Max Planck Research Schools are

- to attract excellent students from all around the world to intensive Ph.D. training programs in Germany, preparing them for careers in science,
- to integrate Max Planck scientists in top-level scientific training of junior scientists,

- to intensify the ties to the universities owing to the participation of internationally renowned Max Planck scientists in joint teaching activities, and
- to strengthen international relationships by providing individual support to each student and by exposing foreign students to German culture and the German language.

By now, 63 International Max Planck Research Schools have been established involving 82 Max Planck Institutes, 37 German universities and 25 universities abroad. About 3150 PhD students from 112 countries are presently enrolled.

More than 3200 PhD students have graduated to date from an International Max Planck Research School.

Since their foundation in the year 2000, the Göttingen International Max Planck Research Schools in Molecular Biology and Neuroscience have met with extraordinary success. Every year, the programs receive hundreds of applications, with the quality of the students consistently being very high. Most students graduated so far have moved on to postdoctoral positions, many at prestigious international institutions. In the past years, the Göttingen Schools received unanimous acclaim during external evaluations and won national awards. For instance they are the only Life Science Programs within Germany that were selected for the “Top Ten International Master’s Degree Courses 2006”. The Schools have also re-shaped the local scientific community, strengthening the ties between the participating institutions, and initiated new scientific collaborations that augment the international reputation of Göttingen as a center of scientific excellence. Furthermore, the Schools served as role models and founding members of the Göttingen Graduate School for Neurosciences, Biophysics, and Molecular Biosciences, thus being instrumental for the continued support by the German Excellence Initiative provided to the university. We hope that in the years to come the students of the International Max Planck Research Schools will be successful in their professional careers. We also hope that they will remember their training period in Göttingen as an exciting and stimulating phase in their lives.

Peter Gruss
President
Max Planck Society

Marina Rodnina
Dean of the IMPRS
Molecular Biology

Overview

This yearbook is intended to provide information on the international MSc/PhD Molecular Biology Program in Göttingen, Germany, which was established in 2000 as a joint venture of the University of Göttingen and its non-university partners. It is also supported by the Max Planck Society as an International Max Planck Research School (IMPRS). In addition to general information on the program, the yearbook introduces the MSc students of the 2013/14 class, the faculty members, the program committee and the coordination team.

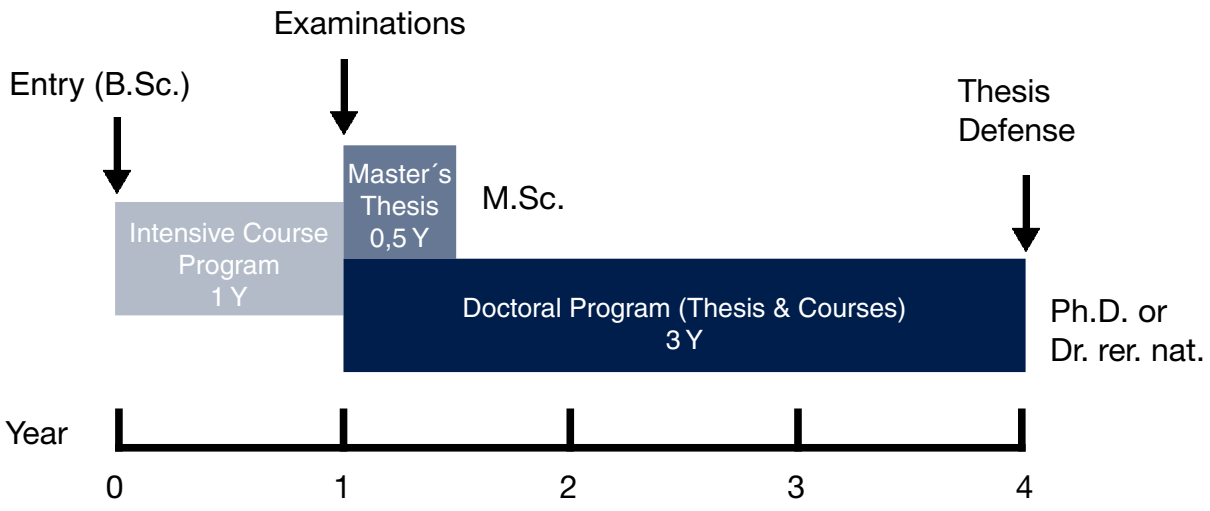
The program belongs to the Göttingen Graduate School for Neurosciences, Biophysics, and Molecular Biosciences (GGNB), which is funded by the Excellence Initiative of the German Federal and State Governments. It is offered by the Göttingen Center for Molecular Biosciences (GZMB), the Max Planck Institute for Biophysical Chemistry, the Max Planck Institute for Experimental Medicine, and the Leibniz Institute of Primate Research (German Primate Center). Further to their active participation in the Molecular Biology Program and the research activities of the GZMB, the above-mentioned partners closely cooperate in several research alliances, collaborative research centers, and interdisciplinary doctoral programs.

The intensive, research-oriented curriculum of the International MSc/PhD Molecular Biology Program qualifies students for professional work in the fields of molecular and cellular biosciences. The program is open to students from Germany and from abroad, who hold a Bachelor‘s degree (or equivalent) in the biosciences, chemistry, medicine, or related fields. Scholarships are available. All courses are held in English. The academic year starts in October and is preceded by a three-week orientation program. Applications may be submitted until January 15 of the year of enrollment. To ensure a high standard of individual training, the number of participants is limited to 20 students per year.

All students initially participate in one year of intensive course work. This first segment of the program comprises lectures, tutorials, seminars, methods courses, and individually supervised research projects (laboratory rotations). The traditional German structure of academic semesters is not followed. The condensed schedule allows students to accumulate 90 credits (ECTS) within one year, which would normally require three semesters.

Subsequently, two separate segments are offered:

- **PhD Program:** Good to excellent results after the first year qualify for direct admission to a three-year doctoral project in one of the participating research groups. The Master's thesis requirement is waived in this case. After successful defense of a doctoral thesis, the degree Doctor of Philosophy (Ph.D.) or the equivalent title *Doctor rerum naturalium* (Dr. rer. nat.) is conferred.
- **MSc Program:** Alternatively, students may conclude the program with a Master's thesis, based on six months of experimental scientific research. The degree Master of Science (MSc) is awarded upon successful completion of the Master's thesis.



Funding of the Program

The Molecular Biology Program thanks the following institutions and funding initiatives, who contributed to the success of the Molecular Biology Program:

DAAD

German Academic Exchange Service (DAAD), Bonn, Germany, http://www.daad.de

International Degree Programs - Auslandsorientierte Studiengänge (AS)

IPP made in Germany

International Postgraduate Programs – Internationale Promotionsprogramme (IPP)

Max Planck Society for the Advancement of Science, Munich, Germany, http://www.mpg.de

International Max Planck Research Schools

Niedersächsisches Ministerium für Wissenschaft und Kultur

Ministry of Lower Saxony for Science and Culture, Hannover, Germany, http://www.mwk.niedersachsen.de/home/

Innovationsoffensive

Doctoral Programs - Promotionsprogramme

Stifterverband für die Deutsche Wissenschaft

Stifterverband für die Deutsche Wissenschaft, Essen, Germany, http://www.stifterverband.org

Exzellenzstiftung zur Förderung der Max-Planck-Gesellschaft, Munich, Germany, http://www.exzellenzstiftung.de

Gemeinnützige Hertie-Stiftung

Gemeinnützige Hertie-Stiftung, Frankfurt am Main, Germany, http://www.ghst.de

Donors

The Molecular Biology Program thanks the following companies for their donations, which were used to financially support students during the first year of studies:

Bayer AG, Leverkusen, Germany

Carl Zeiss Lichtmikroskopie, Göttingen, Germany

Degussa AG, Düsseldorf, Germany

DeveloGen AG, Göttingen, Germany

Heka Elektronik GmbH, Lambrecht / Pfalz, Germany

Hellma GmbH & Co. KG, Müllheim / Baden, Germany

KWS Saat AG, Einbeck, Germany

Leica Microsystems GmbH, Bensheim, Germany

Luigs & Neumann, Ratingen, Germany

Olympus Europa Holding GmbH, Hamburg, Germany

Roche Diagnostics GmbH, Penzberg, Germany

Sartorius stedim AG, Göttingen, Germany

Solvay Pharmaceuticals, Hannover, Germany

Springer Verlag, Heidelberg, Germany

Vossius & Partner, München, Germany

Intensive Course Program (First Year)

Throughout the first year, current topics in molecular biology are covered by

- lectures
- tutorials
- methods courses
- laboratory rotations
- seminars

Lectures and Tutorials

A comprehensive lecture series is offered in a sequence of 7-11 week units. The following topics are taught at an advanced level throughout the first year (36 weeks, 4 hours per week):

A. DNA and Gene Expression

- architecture of the cell, energy metabolism
- DNA and chromatin, epigenetics
- DNA replication and repair
- transcription, RNA splicing, RNA quality control
- RNA-based regulation of prokaryotes and eukaryotes
- translation, protein structures and folding, posttranslational modification

B. Metabolic and Genetic Networks

- basic metabolism, metabolic networks
- enzyme mechanisms and regulation
- biological membranes
- photosynthesis
- signal transduction
- genomics, bioinformatics

C. Functional Organization of the Cell / Immunology / Neuroscience

- biosynthesis of organelles, nucleocytoplasmic transport
- protein sorting and processing, membrane traffic
- ubiquitin, autophagocytosis
- cytoskeleton, cell adhesion
- immunology, infectious diseases, principles of pathogenicity
- cell cycle, apoptosis, cancer
- neurons, synapses, synaptic transmission
- glial cells and brain vasculature
- nervous systems, sensory systems

D. Model Systems of Molecular Biology / Biotechnology

- fungi
- *Arabidopsis*
- *Drosophila, C. elegans*
- *Xenopus*, zebrafish, mouse
- viral systems and their use in primate research
- human genetics
- biotechnology (bacteria, fungi, plants), tissue engineering

Each lecture is accompanied by a tutorial session, where students meet with a tutorial in small groups. Tutorials involve exercises, review of lecture material, and a discussion of related topics.

Methods Courses

During the two first months of the Molecular Biology Program, students participate in a series of methods courses to introduce them to principles and practical aspects of basic scientific techniques and the handling of model organisms. During the first two weeks, two 4-day projects with proteins and nucleic acids introduce various basic and advanced techniques. Week 3-7 comprise 10 two-day experiments on a variety of different methods indicated below. In addition, students are offered a choice of two (out of four) 5-day special courses with an integrated concept of lectures and hands-on experiments as indicated below.

Introductory 4-day methods courses

- Proteins
- DNA

Introductory 2-day methods courses

- gene expression analysis with microarrays or sequencing
- analysis of protein-protein and nucleic acid-protein interaction
- applied bioinformatics
- DNA sequence analysis and bioinformatics / modeling biological networks
- chemical and enzymatic analysis of RNA structure
- spectroscopic characterization of nucleic acids
- light microscopy
- analysis of cellular compartments
- cell culture
- expression analysis

Special 5-day methods courses

- X-ray crystallography
- (3-D-Cryo) Electron microscopy
- NMR spectroscopy
- mass spectrometry / proteomics

Laboratory Rotations

Starting in January, every student conducts three independent research projects (laboratory rotations) in the participating departments. Each project is individually supervised. These involve seven weeks of experimental work, followed by one week for data analysis and presentation. For each project, a report must be completed in the format of a scientific publication. The laboratory rotations must cover three different subjects.

Seminars

Seminars start in March. The class meets weekly for two hours to discuss two student presentations. The presentations are research reports based on work from the laboratory rotations.

Examinations

After the first year of intensive training, all students take one written and two oral Master's examinations. The Master's examinations explore the students' theoretical background in topics covered by lectures and tutorials. Each oral examination investigates the qualification in selected topics of the molecular life sciences.

PhD Program

Students who have passed the Master's examinations with good or excellent results qualify for direct admission to a three-year doctoral project in one of the participating research groups without being required to complete a Master's thesis first.

The PhD program emphasizes independent research on the part of the students. Doctoral students select three faculty members as their thesis advisory committee which closely monitors progress and advises students in their research project. Laboratory work is accompanied by seminars and lecture series, a wide variety of advanced methods courses, training in scientific writing and oral presentation skills, courses in intercultural communication, bioethics and research ethics, elective courses, and participation in international conferences or workshops.

Doctoral students of the program organize the international PhD student symposium "Horizons in Molecular Biology" every year with great success, attracting outstanding speakers and approximately 300 participants from all over the world. The meeting was designed by the students to promote scientific exchange between young researchers from different disciplines. Since 2007, a "Career Fair for Scientists" precedes the annual Horizons meetings. The career fair offers a unique and exciting program of career presentations, CV-Check, workshops and interviews and is also organized by the Molecular Biology students.

At the end of the PhD training program, a doctoral thesis is submitted either in the traditional format, or as a collection of scientific publications in internationally recognized journals along with a general introduction and a discussion of the results. The degree PhD or, alternatively, Dr. rer. nat. is awarded after the successful defense of the doctoral thesis.

Master's Program

After the first year of intensive training, students may conclude the program with a six-month thesis project, leading to a Master of Science degree. The thesis project involves experimental work under the supervision of faculty member of the Molecular Biology Program. Students have the opportunity to conduct their Master's thesis project at a research institution abroad.

Orientation, Language Courses, Social Activities

A three-week orientation prior to the program provides assistance and advice for managing day-to-day life in Germany, including arrangements for bank account, health insurance, residence permit, housing, and enrolment. Students have the opportunity to meet faculty members and visit laboratories of the participating institutions. In addition, the orientation program informs students about computing and library facilities, the city and university of Göttingen, sports facilities, and cultural events.

Prior to the start of lectures and courses, basic knowledge in mathematics, chemistry and physics is refreshed in a one-week crash course, the so-called "Week Zero".

An intensive basic language course in German is offered in cooperation with *Lektorat Deutsch als Fremdsprache* to facilitate the first weeks in Göttingen. Additional language courses and social activities accompany the program.

Application, Selection, and Admission 2013

Applicants must hold a Bachelor's degree or equivalent in biology, biochemistry, chemistry, medicine, or related fields. Applicants who are not native speakers of English should demonstrate adequate competence of the English language by acceptable results in an internationally recognized test.

In the year 2013, the Molecular Biology program received 523 applications from 63 countries.

Continent	Applications	Admissions
Europe (total)	**95**	**12**
Germany	33	8
other West Europe	36	1
East Europe	26	3
America (total)	**35**	**4**
North America	17	4
Central/South America	18	0
Africa (total)	**84**	**1**
North Africa	45	1
Central/South Africa	39	0
Asia (total)	**309**	**6**
Near East	46	0
Central Asia/ Far East	263	6
Australia	**0**	**0**

Students 2013 / 2014

Name		Home Country
Arshiya	Bhatt	India
Marc	Böhning	Germany
H. Alice	Buchner	Germany
Priyanka	Choudhury	India
Ridhima	Gomkale	India
Sebastian	Grosse	Germany
Martin	Helm	Germany
Damian	Hernandez	USA
Prajwal	Karki	Nepal
Ina	Klusmann	Germany
Melina	Köppelmann	Germany
Natalia	Korniy	Ukraine
David	López de la Morena	Spain
Sebastian	Ludwig	Germany
Indira	Memet	Romania
Elizabeth	Miller	USA
Sara	Osman	Egypt
Marija	Radovanovic	Serbia
Frank	Richter	Germany
Alan	Rodríguez	Mexico
Kashish	Singh	India
Minhui	Su	P. R. China
Vedran	Vasic	USA

India

Arshiya Bhatt

EDUCATION

College / University

Sri Venkateswara College, University of Delhi

Highest Degree

Bachelor of Science (Honors) Biochemistry

Major Subjects

Biochemistry, Molecular Biology, Immunology, Genetics, Cell Biology, Membrane Biology, Bioenergetics, Recombinant DNA Technology

Lab Experience

Basic techniques in cell and molecular biology, immunology, enzymology including chromatography, ELISA, PCR, spectrophotometry, cell fractionation, gel electrophoresis, tissue studies, standard techniques used in recombinant DNA technology.

Projects / Research

2012 – 2013 “Screening of Indian population for possible polymorphisms in candidate genes of extracellular matrix proteins that could lead to disc degeneration leading to herniation”. Innovation Project, Dept. of Biochemistry, Sri Venkateswara College

6/2012 – 7/2012 “Study of the effects of administration of a synthetic peptide on the levels of inflammatory cytokines involved in rheumatoid arthritis”. Research intern at CSIR-Institute of Genomics and Integrative Biology, Delhi

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

2012 – 2013 Student trainee stipend for the Innovation Research Project, University of Delhi

Germany

Marc Böhning

EDUCATION

College / University

Technical University of Munich (TUM)

Highest Degree

Bachelor of Science

Major Subjects

Genetics, Molecular Biotechnology, and Protein Biochemistry including Proteomics

Lab Experience

Various techniques in genetics, biochemistry and molecular biology as well as experience in cell culture and mass spectrometry

Projects / Research

5/2013 – 8/2013 “Affinity Determination of Kinases for Nucleotide Cofactors”. Bachelor’s Thesis, Chair of Proteomics and Bioanalytics (Prof. Küster), Technical University Munich, Freising, Germany

7/2012 – 5/2013 “Genetic Regulation of Benzoxazinoid Biosynthesis in *Zea mays*”. Chair of Genetics (Prof. Gierl), Technical University Munich, Freising, Germany

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

4/2013 – present Max Weber Program of the State of Bavaria (German National Merit Foundation)

4/2013 – present E-fellows.net scholarship

Germany

H. Alice Buchner

EDUCATION

College / University

10/2010 – 9/2013 Friedrich-Alexander University Erlangen-Nürnberg

Highest Degree

Bachelor of Science

Major Subjects

Molecular Medicine

Lab Experience

PCR mutagenesis, real-time PCR, cloning plasmids, transformation, cell culture with various transfection protocols, sequencing, gel electrophoresis, SDS-PAGE, western-blotting, luciferase assays, immunocytochemistry and chromatin immunoprecipitation.

Projects / Research

4/2013 – 8/2013 Bachelor's thesis "Functional analysis of a putative Sox10-dependent Olig2 enhancer", Prof. Wegner, chair of biochemistry and patho-biochemistry

3/2013 – 4/2013 Research internship "miRNA involvement in gastrointestinal stromal tumors", Prof. Haller, chair of molecular pathology

8/2009 – 9/2009 Methods internship at the Technische Universität München at the Department of Biochemistry

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

1/2011 – present German National Academic Foundation (Studienstiftung des Deutschen Volkes)

1/2011 – present E-fellows.net scholarship

India

Priyanka Choudhury

EDUCATION

College / University

University of Delhi, India

Highest Degree

M.Sc. in Biochemistry

Major Subjects

Molecular Biology, Recombinant DNA Technology, Immunology, Proteins and Enzymes, Developmental Biology, Cell Biology, Proteomics and Metabolomics

Lab Experience

Broad experience in various molecular biology, proteomics and immunology methods. I have also completed an add-on course in bioinformatics and computational biology, conducted by University of Delhi

Projects / Research

8/2012 – 4/2013 Research project: "Biochemical characterization of a putative UV-B receptor from *C. reinhardtii*"

5/2012 – 7/2012 Research project: "Insights into the potential role of chorismate mutase in the virulence of *Mycobacterium tuberculosis*

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

2013 Qualified the National Eligibility Test for CSIR-UGC – JRF

2013 Qualified GATE 2013 (Life Science)

2011 – 2013 Monsanto scholarship (top two rankers) by University of Delhi

2012 – 2013 Recipient of the Summer Research Fellowship, a national fellowship awarded by Indian Academy of Sciences

Ridhima Gomkale

India

Ridhima Gomkale

EDUCATION

College / University

University of Delhi, India

Highest Degree

M.Sc. Biochemistry

Major Subjects

Molecular Biology, Immunology, Cell Biology, Proteins and Enzymes

Lab Experience

Techniques in molecular biology, cell biology and immunology, including cloning, western blotting, enzyme purification and characterization, spectroscopy (visible, fluorescence and CD), fluorescence microscopy etc.

Projects / Research

7/2012 – 4/2013 Research project: “Multiple putative hemoglobin reductases from *Chlamydomonas reinhardtii* support NO scavenging function of globins”

9/2010 – 11/2010 Microbiology project: “Morphological and biochemical characterization of skin and oral bacterial isolates”

11/2009 – 1/2010 Physiology project: “Relation between Body Mass Index (BMI) and thyroid and lipid profile”

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

2013 Qualified the National Eligibility Test of CSIR-UGC for Junior Research Fellowship

2011 – 2013 All India Post Graduate Scholarship

2008 Scholarship from CSIR

Sebastian Grosse

Germany

Sebastian Grosse

EDUCATION

College / University

Georg-August-Universität Göttingen, Germany

Highest Degree

Bachelor of Science

Major Subjects

Molecular Medicine

Lab Experience

Experience in standard and advanced biochemical techniques of working with DNA, RNA and proteins and working with yeast as well as human cell culture

Projects / Research

6/2013 – 8/2013 Department of Cellular Biochemistry, University of Göttingen Medical Center, Bachelor’s thesis: Protein interactions of human mitochondrial proteins with TIM21 / TIM50 and dynamics in regard to the association with the mitochondrial translocase and the MITRAC complex

7/2012 – 8/2012 Department of Cellular Biochemistry, University of Göttingen Medical Center, internship: Protein manipulation and purification of mitochondrial proteins in yeast

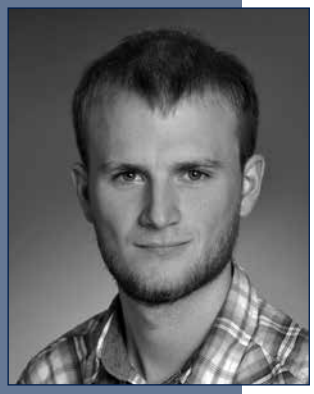
3/2012 – 4/2012 German Primate Center, internship: Gene regulation via small RNA molecules in human cells

2/2012 – 3/2012 Center of Anatomy, University of Göttingen Medical Center, internship: RNA probe generation and in situ hybridization

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

Martin Helm



Germany

Martin Helm

EDUCATION

College / University

Friedrich-Alexander University Erlangen-Nürnberg

Highest Degree

Bachelor of Science

Major Subjects

Integrated Life Sciences – Biology, Biomathematics, Biophysics

Lab Experience

Proficient in all basic molecular techniques, ranging from biochemistry over developmental biology to immunology. Also well versed in bioinformatic applications and programs (Matlab & R) as well as biophysical methods like patch-clamp, optical tweezer or structural elucidation

Projects / Research

5/2013 – 8/2013 Establishment of the CRISPR/Cas9 system in *Tribolium castaneum*

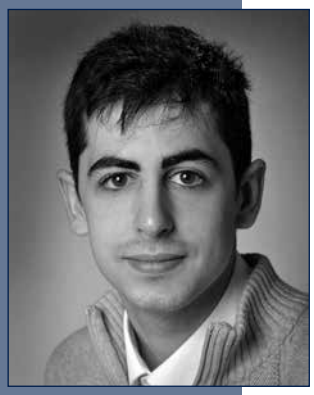
10/2012 – 5/2013 Internship at Novartis Pharma GmbH, Clinical Research Rheumatology

5/2012 – 9/2012 Functionality of Zinc-finger nucleases in the red flour beetle *Tribolium castaneum*

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

Damian Hernandez



USA

Damian Hernandez

EDUCATION

College / University

University of Miami

Highest Degree

Bachelor of Science

Major Subjects

Biochemistry and Molecular Biology

Lab Experience

Basic laboratory techniques in the field of molecular biology, such as fluorescent spectroscopy, PCR, Western Blots, gel electrophoresis, protein purification, etc.

Projects / Research

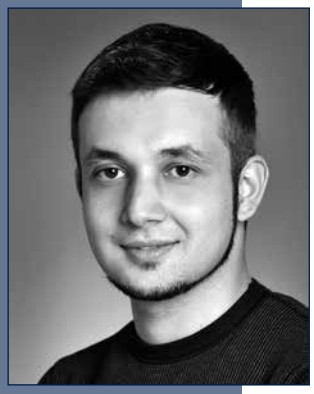
6/2012 – 5/2013 Recognition of YscF as an early substrate of type III secretion in *Yersinia pestis*. Lab of Gregory V. Plano. Department of Microbiology and Immunology. University of Miami

9/2011 – 2/2012 Structural analysis of ERBB2. Lab of Ralf Landgraf. Department of Biochemistry and Molecular Biology. University of Miami

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

8/2009 – 5/2013 Dean's Scholarship of the University of Miami



Nepal

Prajwal Karki

EDUCATION

College / University

Bangalore University, India

University of Mysore, India

Highest Degree

Master of Science

Major Subjects

Biochemistry

Lab Experience

Proficient in standard methods and techniques in the field of biochemistry, molecular cell biology, microbiology and immunology

Projects / Research

1/2012 – 7/2012 Master's Dissertation "Purification of Braun's lipoprotein and characterization of its pro-inflammatory responses in murine models". Dr. Gopal Marathe's Lab, Department of Biochemistry, University of Mysore, India

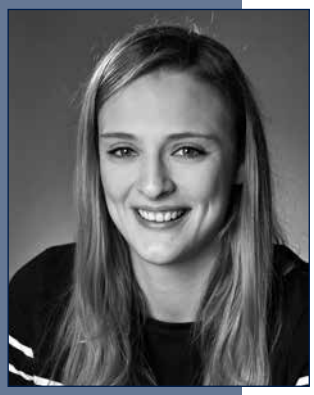
7/2010 "Proficiency Level Course" in Clinical Biochemistry, Genohelix Biolabs, Bangalore, India

2/2008 – 11/2009 Workshops and vocational training programs in "Medical Microbiology" and "Advanced Immunotechniques" from the Institute of Biosciences and Molecular Biology, Bangalore, India

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

7/2013 Gold Medal: First Rank in M.Sc. Biochemistry, University of Mysore



Germany

Ina Klusmann

EDUCATION

College / University

Royal Holloway, University of London, England

Highest Degree

Bachelor of Science (Hons)

Major Subjects

Biomedical Sciences

Lab Experience

Basic techniques in molecular biology, biochemistry and cell biology including protein purification and enzyme assays, ELISA, SDS-PAGE, Western Blot, PCR, RT-PCR, Y2H, molecular cloning techniques, mammalian and non-mammalian cell culture techniques

Projects / Research

9/2012 – 1/2013 "Analysis of *Hes* and *Hey* gene expression during myogenic differentiation *in vitro*". Bachelor's Thesis, School of Biological Sciences, Royal Holloway, University of London, England

6/2011 – 7/2011 "Y2H analysis of RTT107 domains". Internship at the Max Planck Institute of Biochemistry, Martinsried, Germany

7/2009 Internship at the Stem Cell Engineering Laboratory, Max Planck Institute for Molecular Biomedicine, Münster, Germany

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

2013 – present E-fellows.net scholarship

2010 – 2013 School of Biological Sciences Entrance Scholarship (Royal Holloway)

Germany

Melina Köppelmann

EDUCATION

College / University

Georg-August-Universität Göttingen, Germany

Highest Degree

Bachelor of Science

Major Subjects

Genetics, Biochemistry

Lab Experience

Various techniques in molecular biology such as PCR, agarose gel electrophoresis, transformation, Southern Blot, SDS-PAGE, affinity and size-exclusion chromatography

Projects / Research

11/2012 – 4/2013 *In vitro* complex formation of the proteasomal lid subunits Rpn5 and Rpn6 (Bachelor's thesis at the Department of Molecular Microbiology and Genetics, Georg-August University of Göttingen)

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

2011 – 2012 Deutschlandstipendium

Ukraine

Natalia Korniy

EDUCATION

College / University

Ivan Franko National University of L'viv, Ukraine

Highest Degree

Bachelor of Biology

Major Subjects

Biochemistry

Lab Experience

Various techniques in biochemistry and molecular biology

Projects / Research

2009 – 2013 Purification and characterization of abzymes from blood serum of systemic lupus erythematosus patients. Institute of Cell Biology, Ukraine

6/2012 – 8/2012 MicroRNA *miR-980* in development of *Drosophila sp.* Max Planck Research Group of Gene Expression and Signalling, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany

6/2011 – 8/2011 Interaction between molecular chaperone Trigger Factor and the vacant ribosome. Department of Physical Biochemistry, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany

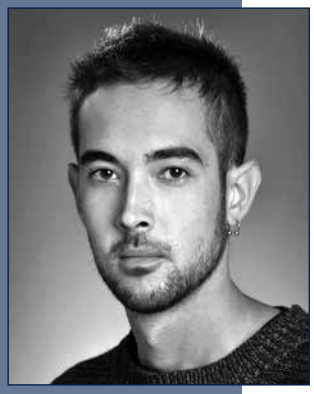
Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

2013 Student scholarship of the Victor Pinchuk Fund "Zavtra.UA"

2012, 2011 DAAD IAESTE scholarships for summer internships in Göttingen, Germany

8/2010 Partial scholarship from XLAB, Göttingen, Germany



Spain

David López de la Morena

EDUCATION

College / University

Universidad Complutense de Madrid, Spain

Highest Degree

Bachelor of Science

Major Subjects

Biotechnology, Cell Biology, Neurosciences

Lab Experience

Molecular biology and biochemistry techniques such as PCR, cloning, immunoprecipitation, immuno- and aptamer-staining and different protein purification methods. Confocal and STED imaging

Projects / Research

3/2013 – 6/2013 Application of aptamers and nanobodies at super-resolution microscopy. STED Microscopy Group, European Neuroscience Institute, Göttingen, Germany

10/2012 – 12/2012 Synaptic physiology of mammalian inner hair cells. STED Microscopy Group, European Neuroscience Institute, Göttingen, Germany

10/2010 – 6/2011 Study of a possible interaction between Tbr1 and KGA in the cytoplasm of mature neurons. Department of Neuroanatomy, University of Göttingen Medical Center, Göttingen, Germany

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

10/2012 – 12/2012 Goya-Mundus Scholarship

2006 – 2007 Excellence Credentials: study aid for outstanding academic achievement

Germany

Sebastian Ludwig

EDUCATION

College / University

Georg-August-Universität Göttingen, Germany

Highest Degree

Bachelor of Science

Major Subjects

Molecular Medicine

Lab Experience

FACS, PCR (qPCR, RT-PCR), gel electrophoresis (Agarose, SDS-PAGE), chromatographic methods, cell culture (eukaryotic and prokaryotic cells), molecular genetics (genotyping, vector design, transfection and transformation), microscopy (light- and fluorescence microscopy), *in situ* hybridization, Western Blot, animal experiments (behavioral, organ isolation), histology (paraffin sections, IHC), organelle extraction (mitochondria), protein-isolation (myelin, membrane proteins)

Projects / Research

05/2013 – 08/2013 Role of Sip1 in myelin homeostasis of the adult brain. Bachelor's thesis at the Max Planck Institute for Experimental Medicine, Göttingen

01/2013 – 03/2013 Establishing of qPCR as a method to quantify APOBEC expression (DKFZ, Heidelberg)

07/2012 – 08/2012 Minocycline treatment study on CNP deficient mice. Max Planck Institute for Experimental Medicine, Göttingen

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

Indira Memet

Romania

Indira Memet

EDUCATION

College / University

University of Bucharest, Faculty of Biology, Romania

Highest Degree

Bachelor of Science

Major Subjects

Biochemistry

Lab Experience

Basic techniques in biochemistry, molecular and cell biology, enzymology

Projects / Research

07/2012 – 06/2013 “Assessment of silicon quantum dots’ toxicity on MRC-5 cell line”

07/2011 – 09/2011 “Evaluation of hyamine and cocamidopropyl betaine toxicity on the oxidative status of *Cyprinus carpio*”

Publications

Memet I, Stan MS, Sima C, Dinischiotu A, “Effects of silicon-based quantum dots on the inflammation process in MRC-5 lung cells”, 5th Internat. Congress of the Romanian Society for Cell Biology, Timisoara (Romania), June 2013 (poster)

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

05/2013 1st prize (B.Sc. and M.Sc. section) at the Scientific Communication Session for Students, Faculty of Biology, University of Bucharest, Romania

Elizabeth Miller

USA

Elizabeth Miller

EDUCATION

College / University

8/2009 – 5/2013 Gettysburg College, Gettysburg, Pennsylvania, USA

3/2012 – 7/2012 Ruprecht-Karls-Universität Heidelberg (semester exchange program)

Highest Degree

Bachelor of Science, Cum Laude

Major Subjects

Biochemistry and Molecular Biology, with honors

Lab Experience

Standard methods of biochemistry and molecular biology.

Projects / Research

8/2011 – 8/2013 Research in the oxidative stress response of *Caenorhabditis elegans* innate immunity, Gettysburg College, Gettysburg, USA

9/2012 – 12/2012 Research in the DNA damage response of *Aspergillus nidulans*, as part of the capstone degree requirements in Biochemistry and Molecular Biology, Gettysburg College, Gettysburg, USA

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

2009 – 2013 Gettysburg College Presidential Scholar – highest academic award, four-year annual $15,000 scholarship, dependent on continued academic merit at Gettysburg College

Egypt

Sara Osman

EDUCATION

College / University

The German University in Cairo (GUC)

Highest Degree

Bachelor of Science

Major Subjects

Pharmaceutical Sciences and Biotechnology

Lab Experience

Cell culture techniques, SDS PAGE, agarose gel electrophoresis, PCR

Projects / Research

8/2011 – 9/2011 Application of the Selective 2'-Hydroxyl Acylation catalyzed by Primer Extension (SHAPE) technique for structural characterization of two RNA sequences; the lysine riboswitch and an artificial ribozyme, Jaeshcke Lab, IPMB, Heidelberg, Germany

7/2011 Pharmacological testing of Nutlin analogue for potential anti-tumour (cytotoxic) activity on different cancer cell lines, Pharmaceutical Biology department, GUC, Cairo, Egypt

1/2011 Genotoxicity testing of magnetite and cobalt nanoparticles to be used in photodynamic/photothermal therapy, Pharmaceutical Biology department, GUC, Cairo, Egypt

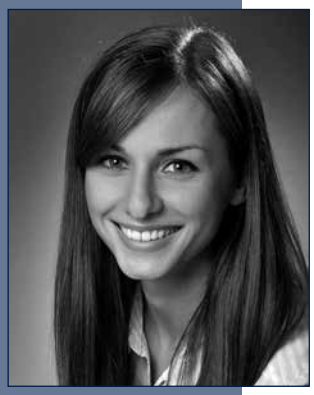
Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

2011, 2009 GUC Academic Excellence Award

2008 GUC Academic Scholarship

2007 Cambridge Award for Outstanding Academic Achievement



Serbia

Marija Radovanovic

EDUCATION

College / University

University of Belgrade, School of Biology

Highest Degree

Bachelor of Science

Major Subjects

Molecular Biology and Physiology

Lab Experience

Transcranial magnetic stimulation. Basics of forensic science

Projects / Research

3/2013 – 8/2013 Practice in forensic science with Oliver Stojkovic, PhD, Institute of Forensic Medicine, School of Medicine, University of Belgrade

11/2012 – 1/2013 Practice in transcranial magnetic stimulation and pharmacochemistry with Tihomir V.Ilić, PhD, Military Medical Academy-Clinic of Neurology, Belgrade, Serbia

8/2012 – 9/2012 Methods on the interface of neurochemistry and electrophysiology, IUPAB sponsored training school, Belgrade

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

2013, 2012, 2011 Scholarship for the best students of University of Belgrade

10/2010 DAAD stipend: Summer School in Physiology and Molecular Biology in Belgrade, Serbia (organized by Serbian Neuroscience Society)

Frank Richter

Germany

Frank Richter

EDUCATION

College / University

Jacobs University Bremen, Germany

Highest Degree

Bachelor of Science

Major Subjects

Biochemistry and Cell Biology

Lab Experience

Trained in cell culture, transfection, RNAi, immunofluorescence, RT-PCR, Luciferase Assay, protein purification and Western Blot

Projects / Research

03/2013 – 06/2013 “The role of heparanase in the regulation of EMT in melanoma”. Università degli Studi di Padova, Padua, Italy

09/2011 – 05/2012 Bachelor’s thesis: “Nuclear enzyme variants in cancer – can a changed distribution and activity promote tumor progression?”. Jacobs University Bremen, Germany

06/2011 – 08/2011 “The role of estrogen in neurotrophin signaling in human neuroblastoma”. Karolinska Institutet, Stockholm, Sweden

Scholarships / Awards

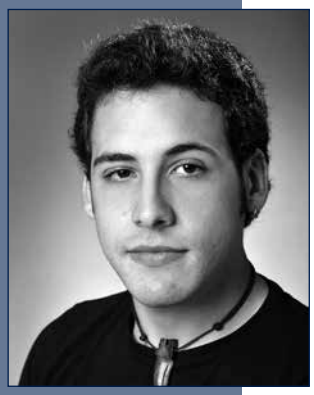
2013 – 2014 Stipend by the International Max Planck Research School

2/2010 – present Studienstiftung des deutschen Volkes (German National Merit Foundation)

9/2009 – 6/2012 Merit Scholarship by Jacobs University Bremen covering tuition fee

6/2011 – 8/2011 Amgen Scholars Program Stipend

Alan Rodríguez



Mexico

Alan Rodríguez

EDUCATION

College / University

University of Swansea, United Kingdom

Highest Degree

Bachelor of Science

Major Subjects

Genetics and Biochemistry

Lab Experience

Chromatin immunoprecipitation, methyl DNA immunoprecipitation, PCR, agarose gel electrophoresis, cell culturing (Ishikawa and Heraklio cells), DNA phenol-chloroform extraction, RNA Trizol extraction

Projects / Research

8/2012 – 4/2013 Study of methylation in the *ESR1* gene in endometrial cancer. Reproductive Biology Research Group, Centre for Nanohealth Swansea University

3/2011 – 5/2011 Biocontrol Agents and Natural Products Group, Swansea University

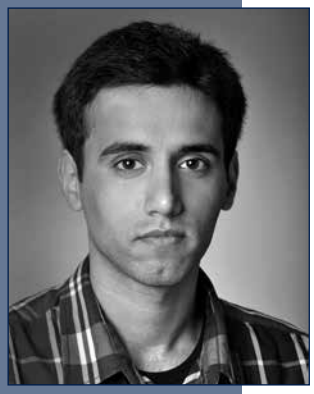
Scholarships / Awards

2012 – 2013 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society

2013 – 2014 Stipend by the International Max Planck Research School

2013 J. A. Beardmore prize in genetics “for production of an outstanding project dissertation in genetics or medical genetics”

Kashish Singh



India

Kashish Singh

EDUCATION

College / University

Sri Venkateswara College, University of Delhi, India

Highest Degree

Bachelor of Science (Honors) Biochemistry

Major Subjects

Biochemistry, Molecular Biology, Cell Biology, Membrane Biology, Immunology, Recombinant DNA Technology, Proteins and Enzymes, Bioenergetics

Lab Experience

Basic molecular biology and immunology techniques, including expression of recombinant protein, protein purification, enzyme assays and inhibition studies, sub-cellular fractionation, electrophoresis, spectrophotometry, PCR, SDS-PAGE, Western Blotting and ELISA

Projects / Research

7/2012 Screening of Indian population for possible polymorphisms in candidate genes of extracellular matrix proteins that could lead to Disc degeneration leading to herniation, Sri Venkateswara College, Delhi University, India

5/2012 – 7/2012 Studying the role of protein phosphorylation in signaling network of *Mycobacterium tuberculosis*, Institute of Genomics and Integrative Biology (IGIB), New Delhi, India

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

2012 – 2013 Delhi University Innovation Project Fellowship

Minhui Su

P. R. China

Minhui Su

EDUCATION

College / University

Hong Kong University of Science and Technology (HKUST), Hong Kong

Highest Degree

BSc in Biochemistry

Major Subjects

Molecular and cell biology, biochemistry

Lab Experience

Basic techniques in molecular biology, cell biology, biochemistry and molecular genetics; acute hippocampal slices preparation; immunohistochemistry

Projects / Research

6/2012-7/2013 Reversing Aβ-induced synaptic dysfunction by inhibiting the signalling of a receptor tyrosine kinase and characterization of small molecule inhibitors of the RTK. Prof. Nancy Ip's lab, HKUST, Hong Kong

8/2012 Identification of new components/regulators of the DNA-damage response using molecular genetics of *Saccharomyces cerevisiae*. Prof. Steve Jackson's lab, University of Cambridge, UK

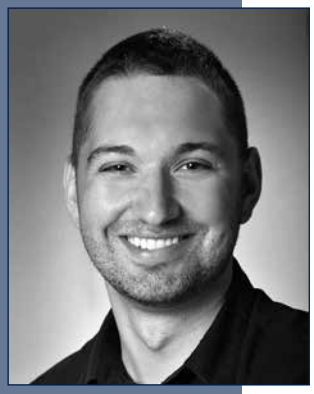
Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

2012 – 2013 HKSAR Government Scholarship

2010 – 2012 HKUST Scholarship Scheme for Continuing UG Students

2009 – 2010 Cheung On Tak Charity Foundation Scholarship



USA

Vedran Vasic

EDUCATION

College / University

University of Wisconsin-Madison, USA

Highest Degree

Bachelor of Science

Major Subjects

Molecular Biology, Biochemistry

Lab Experience

Various techniques in molecular biology and biochemistry including DNA extraction, sequencing, primer design, mutagenic PCR, molecular cloning, cell culture, SDS-PAGE, protein purification, kinetics assays, FRET, flow cytometry, and HPLC

Projects / Research

1/2013 – 9/2013 (i) Beta-cryptoxanthin bioavailability and its metabolism into chicken egg yolks and tissues. (ii) The effects of zinc retention and Vitamin A absorption in Mongolian gerbils. University of Wisconsin-Madison, Dept. of Nutritional Sciences

9/2012 – 12/2012 The functional role of the Tyr-7 residue in Human Carbonic Anhydrase (HCAII). University of Wisconsin-Madison, Dept. of Biochemistry

1/2012 – 12/2012 Cell wall composition and digestibility of whole-stover and stalk-cores of diverse maize lines. University of Wisconsin-Madison, Dept. of Agronomy and Plant Sciences

5/2010 – 9/2010 The antitumorigenic properties of Adenovirus E1A-transformed cancer cells. Internship at the Medical College of Wisconsin, Dept. of Immuno-logy

Scholarships / Awards

2013 – 2014 Stipend by the International Max Planck Research School

8/2012 – 9/2012 Syngenta Plant Science Scholar at the University of Wisconsin-Madison

10/2011 – 8/2012 Baden Württemberg Stipendium at Albert Ludwigs Universität Freiburg

Faculty

Name		Institute	
Mathias	Bähr	Neurology	U Göttingen
Holger	Bastians	Molecular Oncology	U Göttingen
Tim	Beißbarth	Biostatistic	U Göttingen
Markus	Bohnsack	Biochemistry	U Göttingen
Gerhard H.	Braus	Molecular Microbiology and Genetics	U Göttingen
Bertram	Brenig	Molecular Biology of Livestock	U Göttingen
Nils	Brose	Molecular Neurobiology	MPI em
Rolf	Daniel	Genomic and Applied Microbiology	U Göttingen
Matthias	Dobbelstein	Molecular Oncology	U Göttingen
Roland	Dosch	Molecular Control of Zebrafish Oogenesis	U Göttingen
Jörg	Enderlein	Biophysics	U Göttingen
Ivo	Feußner	Plant Biochemistry	U Göttingen
Ralf	Ficner	Molecular Structural Biology	U Göttingen
Wolfgang	Fischle	Chromatin Biochemistry	MPI bpc
Christiane	Gatz	Plant Molecular Biology and Physiology	U Göttingen
Dirk	Görlich	Cellular Logistics	MPI bpc
Christian	Griesinger	NMR-based Structural Biology	MPI bpc
Uwe	Groß	Medical Microbiology	U Göttingen
Jörg	Großhans	Developmental Biochemistry	U Göttingen
Helmut	Grubmüller	Theoretical and Computational Biophysics	MPI bpc
Heidi	Hahn	Human Genetics	U Göttingen
Stefan	Hell	NanoBiophotonics	MPI bpc
Claudia	Höbartner	Nucleic Acid Chemistry	MPI bpc
Herbert	Jäckle	Molecular Developmental Biology	MPI bpc
Reinhard	Jahn	Neurobiology	MPI bpc
Stefan	Jakobs	High Resolution Microscopy in Neurodegenerative Diseases	MPI bpc
Andreas	Janshoff	Biophysical Chemistry	U Göttingen
Michael	Kessel	Developmental Biology	MPI bpc
Dieter	Klopfenstein	Kinesin Motor-Cargo Interactions and Membrane Transport	U Göttingen
Wilfried	Kramer	Molecular Genetics	U Göttingen
Heike	Krebber	Molecular Genetics	U Göttingen
Volker	Lipka	Plant Cell Biology	U Göttingen
Reinhard	Lührmann	Cellular Biochemistry	MPI bpc
Ahmed	Mansouri	Molecular Developmental Genetics	MPI bpc
Till	Marquardt	Developmental Neurobiology	ENI
Burkhard	Morgenstern	Bioinformatics	U Göttingen
Tobias	Moser	Auditory Neuroscience	U Göttingen
Klaus-Armin	Nave	Neurogenetics	MPI em
Heinz	Neumann	Applied Synthetic Biology	U Göttingen
Tomas	Pieler	Developmental Biochemistry	U Göttingen
Stefanie	Pöggeler	Genetics of Eukaryotic Organisms	U Göttingen
Stefan	Pöhlmann	Infection Biology	DPZ
Peter	Rehling	Biochemistry	U Göttingen
Silvio	Rizzoli	STED Microscopy of Synaptic Function	ENI
Marina	Rodnina	Physical Biochemistry	MPI bpc
Moritz	Rossner	Gene Expression	MPI em
Oliver	Schlüter	Molecular Neurobiology	ENI
Reinhard	Schuh	Molecular Organogenesis	MPI bpc
Blanche	Schwappach	Biochemistry	U Göttingen
Halyna	Shcherbata	Gene Expression and Signaling	MPI bpc
Mikael	Simons	Molecular and Cellular Neurobiology	MPI em
Holger	Stark	3D Electron Cryomicroscopy	MPI bpc
Claudia	Steinem	Biomolecular Chemistry	U Göttingen
Jörg	Stülke	General Microbiology	U Göttingen
Michael	Thumm	Molecular Cell Biology	U Göttingen
Kai	Tittmann	Bioanalytics	U Göttingen
Henning	Urlaub	Bioanalytical Mass Spectrometry	MPI bpc
Lutz	Walter	Primate Genetics	DPZ
Jürgen	Wienands	Cellular and Molecular Immunology	U Göttingen
Ernst	Wimmer	Developmental Biology	U Göttingen
Andreas	Wodarz	Stem Cell Biology	U Göttingen

U Göttingen = Georg August University, MPI bpc = Max Planck Institute for Biophysical Chemistry, MPI em = Max Planck Institute for Experimental Medicine, DPZ = German Primate Center

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Further Information

http://www.baehrlab.med.uni-goettingen.de/

Mathias Bähr

Professor of Neurology

- 1985 MD, University of Tübingen Medical School, Training in Neurology at University Hospitals in Tübingen and Düsseldorf
- DFG and Max Planck Fellow at the Max Planck Institute for Developmental Biology Tübingen and at the Department of Anatomy and Cell Biology, Washington University St.Louis
- Schilling-Foundation Professor for Clinical and Experimental Neurology, University of Tübingen
- Director at the Department of Neurology, University of Göttingen since 2001

Major Research Interests

Neuronal cell loss is not only a major feature of human neurodegenerative diseases like Parkinson's disease (PD), Alzheimer's disease (AD) or stroke, but can also be observed in neuroinflammatory conditions like Multiple Sclerosis (MS) or after traumatic lesions, e.g. of the optic nerve. We examine the cellular and molecular mechanisms of neuronal dysfunction and neuronal cell death in animal models of the respective disorders with the ultimate goal to detect new targets for a therapeutic neuroprotective intervention.
In PD for example, a multidisciplinary research team with our participation in the area C2 of the CNMPB examines the role of a-synuclein aggregation for dopaminergic dysfunction and cell death and characterizes other disease related proteins in order to develop new neuroprotective strategies. To that end we use AAV viral gene transfer to express different disease-associated and design mutants of a-synuclein in the nigrostriatal system of rodents and similar tools to develop new treatment strategies in PD and stroke, e.g. by viral vector or fusion-protein mediated delivery of protective molecules.
In the recent years it became also clear that axonal and neuronal loss do not only occur in classical neurodegenerative disorders but also in immune-mediated diseases like MS. To study this issue in more detail we have developed a model system of MS in rodents that reproducibly leads to optic neuritis, one of the most common early manifestations of MS. To monitor disease course we have established electrophysiological measurements like visually evoked potentials (VEP), electroretinogramm (ERG) and optical coherence tomography (OCT) that allow us to correlate onset, course and outcome of disease with and without therapy with histomorphological and molecular analyses. The aim is to describe in detail the molecular pathophysiology that leads to axonal and neuronal loss and to develop new therapeutic strategies, some of which have already been translated into proof of concept studies in human patients.

Selected Recent Publications

Frank T, Klinker F, Falkenburger BH, Laage R, Lühder F, Göricke B, Schneider A, Neurath H, Desel H, Liebetanz D, Bähr M, Weishaupt JH (2012) Pegylated granulocyte colony-stimulating factor conveys long-term neuroprotection and improves functional outcome in a model of Parkinson's disease. Brain 135: 1914-25

Doeppner TR, Mlynarczuk-Bialy I, Kuckelkorn U, Kaltwasser B, Herz J, Hasan MR, Hermann DM, Bähr M (2012) The novel proteasome inhibitor BSc2118 protects against cerebral ischaemia through HIF1A accumulation and enhanced angioneurogenesis. Brain 135: 3282-3297

Koch JC, Knöferle J, Tönges L, Michel U, Bähr M, Lingor P (2011) Imaging of rat optic nerve axons *in vivo*. Nat Protoc 6(12): 1887-96

Knöferle J, Koch JC, Ostendorf T, Michel U, Planchamp V, Vutova P, Tönges L, Stadelmann C, Brück W, Bähr M, Lingor P (2010) Mechanisms of acute axonal degeneration in the optic nerve *in vivo*. Proc Natl Acad Sci USA 107(13): 6064-9

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Further Information

http://www.moloncol.med.uni-goettingen.de/content/researchgroups/101.html

Holger Bastians

Professor of Cellular Oncology

- Professor of Cellular Oncology, University Medical Center, Göttingen (UMG), since 2013
- Heisenberg-Professor of Cellular Oncology, University Medical Center Göttingen (UMG), 2011 – 2013
- Heisenberg fellow, Philipps-University Marburg, 2008 – 2011
- Group leader, Institute for Molecular Biology and Tumor Research (IMT), Philipps-University Marburg, 2000 – 2010
- Postdoctoral fellow with Prof. Joan Ruderman, Harvard Medical School, Boston, USA, 1996 – 1999
- Dr. rer. nat., German Cancer Research Center (DKFZ), Heidelberg, 1996

Major Research Interests

Mitosis represents the key event during the eukaryotic cell cycle during which the DNA is equally distributed onto the two daughter cells. Defects in mitotic signaling pathways are often detected in human cancer and are directly associated with the missegregation of sister chromatids resulting in chromosomal instability (CIN) and aneuploidy. In fact, this is directly linked to tumorigenesis and represents a major characteristic of human cancer. However, the molecular mechanisms underlying CIN and the genetic lesions causing aneuploidy in human cancer are largely unknown.
In addition to its fundamental role for the maintenance of chromosomal stability, mitosis represents an important target for anti-cancer therapy and many anti-mitotic drugs including taxanes and Vinca alkaloids are frequently used in the clinic to treat various malignancies. However, it is still unclear how the interference with the mitotic progression is linked to tumor cell death, the desired outcome of therapy. A knowledge of this cross-talk is required for the development of future therapy concepts.
Based on these key points of cancer research our lab is focusing on the following main questions:
1. What are the molecular mechanisms of chromosome segregation during mitosis and what are genetic lesions in human cancer responsible for chromosomal instability?
2. What are the molecular mechanisms of mitosis associated cell death after chemotherapeutic treatment and waht are the routes of chemotherapy resistance in human cancer?
3. Based on our investigations of mitotic signaling pathways we are aiming to identify novel mitotic drug targets in order to improve current therapies and to develop novel therapeutic concepts.

Selected Recent Publications

Stolz A, Ertych N, Kienitz A, Vogel C, Schneider V, Fritz B, Jacob R, Dittmar G, Weichert W, Petersen I Bastians H (2010) The CHK2-BRCA1 tumor suppressor pathway ensures chromosomal stability in human somatic cells. Nature Cell Biology 12: 492-499

Kaestner P, Stolz A, Bastians H (2009) Determinants for the efficiency of anti-cancer drugs targeting either Aurora-A or Aurora-B kinases. Mol Cancer Ther 8: 2046-2056

Stolz A, Vogel C, Schneider V, Ertych N, Kienitz A, Yu H, Bastians H (2009) Pharmacologic abrogation of the mitotic spindle checkpoint by an indolocarbazole discovered by cellular screening efficiently kills cancer cells. Cancer Research 69: 3874-3883

Vogel C, Hager C, Bastians H (2007) Mechanisms of mitotic cell death induced by chemotherapy mediated G2 checkpoint abrogation. Cancer Research 67: 339-345

Kienitz A, Vogel C, Morales I, Müller R, Bastians H (2005) Partial downregulation of MAD1 causes spindle checkpoint inactivation and aneuploidy, but does not confer resistance towards taxol. Oncogene 24: 4301-4310

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Further Information

http://www.ams.med.uni-goettingen.de/amsneu/index-en.shtml

Tim Beißbarth

Associate Professor of Biostatistics

- Dr. rer. nat, University Heidelberg, 2001
- Postdoctoral fellow, Department Computational Molecular Biology, Max-Planck-Institute for molecular Genetics, Berlin, 2001 – 2002
- Postdoctoral fellow, Department Bioinformatics, WEHI, Melbourne, Australia,
  2002 – 2005
- Group Leader, Bioinformatics & Modeling, Department Molecular Genome Analysis, DKFZ, Heidelberg, 2005 – 2008
- Professor, Statistical Bioinformatics, Department Medical Statistics, University Medical Center, Göttingen, Since 2008

Major Research Interests

The Statistical Bioinformatics group of the department of Medical Statistics is developing statistical applications and methods for biomedical research. We are closely working together with other biostatisticians/bioinformaticists as well as clinical and biological researchers. The focus of the group is the development of methods and tools to analyse biomedical data and to reconstruct biological networks. These methods are implemented mostly in the statistical computing environment of R.

Selected Recent Publications

Bender C, Heyde S, Henjes F, Wiemann S, Korf U, Beißbarth T (2011) Inferring signalling networks from longitudinal data using sampling based approaches in the R-package 'ddepn'. BMC Bioinformatics 2011, 12: 291

Johannes M, Fröhlich H, Sültmann H, Beißbarth T (2011) pathClass: an R-package for integration of pathway knowledge into support vector machines for biomarker discovery. Bioinformatics, 2011, 27(10): 1442-3

Jung K, Becker B, Brunner B, Beißbarth T (2011) Comparison of Global Tests for Functional Gene Sets in Two-Group Designs and Selection of Potentially Effect-causing Genes. Bioinformatics, 2011, 27(10): 1377-83

Bender C, Henjes F, Fröhlich H, Wiemann S, Korf U, Beißbarth T (2010) Dynamic Deterministic Effect Propagation Networks: learning signalling pathways from longitudinal protein array data. Bioinformatics, 2010, 26(18): i596-602

Johannes M, Brase JC, Fröhlich H, Gade S, Gehrman M, Fälth M, Sültmann H, Beißbarth T (2010) Integration Of Pathway Knowledge Into A Reweighted Recursive Feature Elimination Approach For Risk Stratification Of Cancer Patients. Bioinformatics, 2010, 26(17): 2136-44

Jung K, Grade M, Gädcke J, Jo P, Opitz L, Becker H, Ghadimi BM, Beißbarth T (2010) A new sensitivity-preferred strategy to build prediction rules for therapy response of cancer patients using gene expression data. Comput Methods and Programs Biomed, 2010, 100(2): 132-9

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Further Information

http://www.uni-bc.gwdg.de/index.php?id=671

Markus Bohnsack

Professor of Molecular Biology

- Dr. rer. nat. (PhD) at the Centre for Molecular Biology Heidelberg (ZMBH), University of Heidelberg (2005)
- Postdoctoral fellow at the University of Edinburgh, UK (2006 – 2008)
- Group leader at the Goethe University, Frankfurt (2008 – 2012)
- Adjunct Investigator at the Cluster of Excellence Frankfurt (2009 – 2012)
- Professor of Molecular Biology, University Medical Centre (UMG), Göttingen (since 2012)

Major Research Interests

RNA-protein complexes play central roles in many cellular processes, including the regulation of gene expression, translation and chromatin remodelling. Our group is interested in the biogenesis, functions and dynamics of RNA-protein complexes. In particular, we focus on understanding the regulatory role they often play during development, disease and differentiation. A major research theme of the laboratory is ribosome biogenesis, a fundamental process that is required for the production of all proteins and is closely coupled to the cellular growth rate. This highly complex processes involves the co-ordinated action of multiple cofactors proteins and large number of small nucleolar RNAs (snoRNAs), which basepair with and modify the ribosomal RNA. Much of our current knowledge of this complex process is derived from studies in the yeast *Saccharomyces cerevisiae*, where more than 200 cofactors have been identified. Despite the many links between ribosome production and disease, studies into ribosome production in human cells are still in their infancy.
Multiple genetic diseases are caused by mutations in ribosome biogenesis cofactors or ribosomal proteins leading to impaired ribosome production. These diseases, termed ribosomopathies, include Bowen-Conradi syndrome, Treacher Collins syndrome and various haematological disorders. For the Bowen-Conradi syndrome, we have shown that the methyltransferase EMG1 is mis-localised from the nucleolus when it carries the disease mutation, indicating that this mutation changes the interactions of EMG1 with other cofactors. Within the group, a number of projects focus on understanding the molecular mechanisms underlying several such diseases. Other projects in the laboratory concentrate on elucidating the functions of RNA helicases in modulating the structure and dynamics of RNA-protein complexes. In ribosome biogenesis, RNA helicases are proposed to mediate essential structural remodelling of pre-ribosomal complexes and we have shown that helicases also play a critical role in the release of specific snoRNAs from pre-ribosomes. We are successfully using the UV crosslinking and analysis of cDNA (CRAC) method to identify the interaction sites of RNA helicases and other RNA-binding proteins on cellular RNAs. This allows both biochemical characterization and functional analysis of these interactions, enabling us to also understand the regulation of the activity of the proteins. Interestingly, we have recently found that many RNA helicases function in several different cellular processes, indicating that they may be important for cross-regulation of these pathways in RNA metabolism.

Selected Recent Publications

Sloan KE, Bohnsack MT, Watkins NJ (2013) The 5S RNP couples p53 homeostasis to ribosome biogenesis and nucleolar stress. Cell Reports 5: 237-247

Martin R*, Straub A*, Döbele C*, Bohnsack MT (2012) DExD/H-box RNA Helicases in Ribosome Biogenesis. RNA Biol, PMID: 22922795

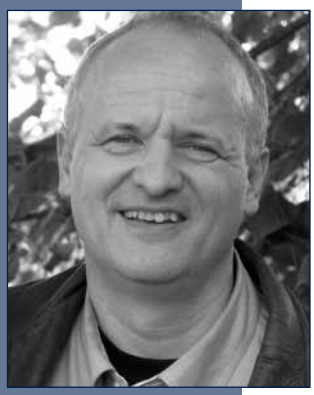
Meyer B, Wurm JP, Kötter P, Leisegang MS, Schilling V, Buchhaupt M, Held M, Bahr U, Karas M, Heckel A, Bohnsack MT, Wöhnert J, Entian KD (2011) The protein mutated in Bowen-Conradi Syndrome, Nep1 (Emg1), is required for a unique modification in 18S rRNA. Nucleic Acids Res 39: 1526-1537

Bohnsack MT, Martin R, Granneman S, Ruprecht M, Schleiff E, Tollervey D (2009) Prp43 bound at different sites on the Pre-rRNA performs distinct functions in ribosome synthesis. Mol Cell 36: 583-592

Bohnsack MT, Kos M, Tollervey D (2008) Quantitative analysis of snoRNA association with pre-ribosomes and release of snR30 by Rok1 helicase. EMBO Rep 9: 1230-1236

Leulliot N*, Bohnsack MT*, Graille M, Tollervey D, Van Tilbeurgh H (2008) The yeast ribosome synthesis factor Emg1 is a novel member of the superfamily of alpha/beta knot fold methyltransferases. Nucleic Acids Res 36: 629-639

* Equal contribution



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Professor of Microbiology and Genetics

- Diploma (Biology), Albert-Ludwig University, Freiburg i. Br. (Germany), 1983
- Dr.sc.nat., Swiss Federal Institute of Technology (ETH), Zürich (Switzer land), 1987
- Habilitation (Microbiology), Swiss Federal Institute of Technology (ETH), Zürich (Switzerland), 1991
- Associate Professor of Biochemistry, Friedrich Alexander University, Erlangen (Germany), 1993 – 1996
- Since 1996 Professor of Microbiology (since 2001 Professor of Microbiology and Genetics) in Göttingen

Major Research Interests

The major focus of the laboratory is on the control of developmental programs, protein turnover, pathogenicity and the interplay between development and primary and secondary metabolism. Our models are eukaryotic microorganisms (yeasts and filamentous fungi): (i) We are interested how light coordinates fungal development with fungal secondary metabolism and toxin production. (ii) Nedd8 is a ubiquitin-like protein which is involved in the control of protein turnover. We study the Nedd8-system including the COP99 signalosome using fungi as model systems. (iii) We are interested in the molecular control (protein turnover and translation) of adhesion as initial step in infection and biofilm formation. (iv) We study fungi as models for Parkinson (yeast), fungi as pathogens of immunocompromised patients (*A. fumigatus*) and as plant pathogens (*V. longisporum*).

Selected Recent Publications

Rachfall N, Heinemeyer I, Morgenstern B, Valerius O, Braus GH (2011) 5'TRU: Identification and analysis of translationally regulative 5' translated regions in amino acid starved yeast cells. Mol Cell Proteomics DOI:10.1074/mcp.M110.0033350

Helmstaedt K, Schwier EU, Christmann M, Nahlik K, Westermann M, Harting, Braus GH (2011) Recruitment of the inhibitor Cand1 to the cullin substrate adaptor site mediates interaction to the neddylaton site. Mol Biol Cell 22: 153-164

Sarikaya ÖB, Bayram Ö, Valerius O, Park HS, Irniger S, Gerke, Braus GH (2010) LaeA control of velvet family regulatory proteins for light-dependent development and fungal cell-type specificity. Plos Genet 6: e1001226

Karpinar DP, Balija MBG, Kügler S, Opazo F, Rezaei-Ghaleh N, Braus GH, Zweckstetter M (2009) Pre-fibrillar a-synuclein variants with impaired b-structure increase neurotoxicity in Parkinson`s disease models. EMBO J 28: 3256-3268

Bayram Ö, Krappmann S, Ni M, Bok JW, Helmstaedt K, Valerius O, Braus-Stromeyer S, Kwon NJ, Keller NP, Yu JH, Braus GH (2008) VelB/VeA/LaeA complex coordinates light signal with fungal development and secondary metabolism. Science 320: 1504-1506

Busch S, Schwier EU, Nahlik K, Bayram Ö, Draht OW, Helmstaedt K, Krappmann S, Valerius O, Lipscomb WN, Braus GH (2007) An eight-subunit COP9 signalosome with an intact JAMM motif is required for fungal fruit body formation. Proc Natl Acad Sci USA 104: 8125-8130

Galagan JE, Calvo SE, Cuomo C, Ma LJ, Wortman J … Braus GH … Birren B (2005) Sequencing of *Aspergillus nidulans* and comparative analysis with A. fumigatus and A. oryzae. Nature 438: 1105-1115

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Bertram Brenig

Full Professor of Molecular Biology of Livestock

- Director of the Institute of Veterinary Medicine
- Dr. med. vet., University of Munich, Munich 1987

Major Research Interests

The main interest of the laboratory is in the structural and functional analysis of mammalian genes and genomes. We are investigating the cause of different economical important genetic traits and defects in livestock and other domestic animals.

Currently we are working on the following projects

- Molecular genetics of Malvoy cataract
- Identification of the polled-locus in cattle
- Leg and feet quality in cattle
- Early embryonal death in cattle
- CNA in canine tumorigenesis

We are using whole genome association studies (WGAS) and next generation sequencing (NGS) techniques for the identification of chromosomal regions that are linked to the traits or disorders. Fine mapping, positional cloning and candidate gene analysis are used for further elucidation.

In recent years we have also focused on the analysis of circulating nucleic acids (CNA). The repertoire of CNAs in man, cattle, and dog has been determined and differences in CNA patterns are analysed regarding different diseases, e.g. canine mamma carcinoma, or performance traits, e.g. bovine early pregnancy determination.

Selected Recent Publications

Brenig B, Beck J, Flore C, Bornemann-Kolatzki K, Wiedemann I, Hennecke S, Swalve H, and Schutz E (2013) Molecular genetics of coat colour variations in White Galloway and White Park cattle. Animal Genetics 44: 450-453

Mayer J, Beck J, Soller JT, Wemheuer W, Schütz E, Brenig B (2013) Analysis of circulating DNA distribution in pregnant and nonpregnant dairy cows. Biology of Reproduction 88: 29

Mayer J, Soller JT, Beck J, Purwins V, Wemheuer W, Schütz E, Brenig B (2013) Early pregnancy diagnosis in dairy cows using circulating nucleic acids. Theriogenology 79: 173-179

Sawitzky M, Zeissler A, Langhammer M, Bielohuby M, Stock P, Hammon HM, Gors S, Metges CC, Stoehr BJ, Bidlingmaier M, Fromm-Dornieden C, Baumgartner BG, Christ B, Brenig B, Binder G, Metzger F, Renne C, Hoeflich A (2012) Phenotype selection reveals coevolution of muscle glycogen and protein and PTEN as a gate keeper for the accretion of muscle mass in adult female mice. PLoS One 7: e39711

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Nils Brose

Professor, Director at the Max Planck Institute for Experimental Medicine

- Undergraduate studies in Biochemistry, Eberhard Karls University, Tübingen, Germany (1981 – 1985)
- MSc in Physiology with Marianne Fillenz, University of Oxford, Oxford, UK (1987)
- PhD in Biology with Reinhard Jahn, Ludwig Maximilians University, Munich, Germany (1990)
- Postdoctoral training with Stephen F. Heinemann (Salk Institute, La Jolla, CA, USA) and Thomas C. Südhof (University of Texas Southwestern Medical Center, Dallas, TX, USA) (1991 – 1995)
- Research Group Leader, Max Planck Institute of Experimental Medicine, Göttingen, Germany (1995 – 2001)
- Director, Department of Molecular Neurobiology, Max Planck Institute of Experimental Medicine, Göttingen, Germany (since 2001)

Major Research Interests

Research in the Department of Molecular Neurobiology focuses on the molecular mechanisms of nerve cell development and synapse formation and function in the vertebrate central nervous system. We combine biochemical, morphological, mouse genetic, behavioral, and physiological methods to elucidate the molecular basis of nerve cell differentiation, synapse formation and transmitter release processes. Our work in the field of nerve cell development focuses on the role of protein ubiqutination and SUMOylation in cell polarity formation, cell migration, and neuritogenesis. The synaptogenesis research in our group concentrates on synaptic cell adhesion proteins, their role in synapse formation, and their dysfunction in neuropsychiatric diseases. Studies on the molecular mechanisms of neurotransmitter release focus on components of the presynaptic active zone and their regulatory function in synaptic vesicle fusion.

Selected Recent Publications

Lipstein N, Sakaba T, Cooper BH, Lin K-H, Strenzke N, Ashery U, Rhee J-S, Taschenberger H, Neher E, Brose N (2013) Dynamic control of synaptic vesicle replenishment and short-term plasticity by Ca^{2+}-Calmodulin-Munc13-1 signaling. Neuron 79: 82-96

Tirard M, Hsiao H-H, Nikolov M, Urlaub H, Melchior F, Brose N (2012) *In vivo* localization and identification of SUMOylated proteins in the brain of His6-HA-SUMO1 knock-in mice. Proc Natl Acad Sci USA 109: 21122-21127

Kawabe H, Neeb A, Dimova K, Young SM Jr, Takeda M, Katsurabayashi S, Mitkovski M, Malakhova OA, Zhang D-E, Umikawa M, Kariya K, Goebbels S, Nave K-A, Rosenmund C, Jahn O, Rhee J-S, Brose N (2010) Regulation of Rap2A by the ubiquitin ligase Nedd4-1 controls neurite development in cortical neurons. Neuron 65: 358-372

Jamain S, Radyushkin K, Hammerschmidt K, Granon S, Boretius S, Varoqueaux F, Ramanantsoa N, Gallego J, Ronnenberg A, Winter D, Frahm J, Fischer J, Bourgeron T, Ehrenreich H, Brose N (2008) Reduced social interaction and ultrasonic communication in a mouse model of monogenic heritable autism. Proc Natl Acad Sci USA 105: 1710-1715

Jockusch W, Speidel D, Sigler A, Sørensen J, Varoqueaux F, Rhee J-S, Brose N (2007) CAPS-1 and CAPS-2 are essential synaptic vesicle priming proteins. Cell 131: 796-808

Varoqueaux F, Aramuni G, Rawson RL, Mohrmann R, Missler M, Gottmann K, Zhang W, Südhof TC, Brose N (2006) Neuroligins determine synapse maturation and function. Neuron 51: 741-754

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- 08/2011 Calling to Georg-August University (Genomic and Applied Microbiology)
- 05/2008 – present Acting Director of the Department of Genomic and Applied Microbiology and Head of the "Göttingen Genomics Laboratory", Georg August University Göttingen
- 06/1996 – 04/2008 Group Leader, Department of Genomic and Applied Microbiology, Georg August University Göttingen
- 06/1995 – 05/1996 Research Fellow, University of California (Berkeley, USA), Institute of Molecular and Cell Biology, Head: Prof. Dr. Randy Schekman
- 05/1994 – 05/1995 Research Fellow, Georg August University Göttingen, Department of General Microbiology

Major Research Interests

One research focus is on metagenomic analysis of complex microbial assemblages and culture-independent recovery of novel genes and gene products from environmental samples. This comprises the development of methods for direct isolation of high-quality nucleic acids from various microbial habitats and the construction of metagenomic libraries. High-throughput function-based as well as sequence-based approaches were performed. This work has led, i.e., to the successful identification and characterization proteases, chitinases, oxidoreductases, B12-dependent dehydratases, lipases, and DNA polymerases from metagenomes. To gain insights into the genomes of the uncultivated microorganisms and to deduce the metabolic potential and to determine key functions of the microbial community present in the studied environments direct sequencing, annotation of metagenomic DNA and mRNA (cDNA), and comparative genomics are carried out.
Other lines of research include whole-genome sequencing, transcriptomics and functional genomics of archaea, bacteria, and microbial communities. The majority of the analyzed organisms was of industrial importance or pathogenic. The latter group comprised, i.e., pathogenic *Escherichia coli*, *Listeria*, *Burkholderia*, and *Staphylococcus* strains as well as *Propionibacterium acnes*. The group also develops novel bioinformatic tools for data analysis and visualization.

Selected Recent Publications

Gardebrecht A, Markert S, Sievert SM, Felbeck H, Thürmer A, Albrecht D, Wollherr A, Kabisch J, Le Bris N, Lehmann R, Daniel R, Liesegang H, Hecker M, Schweder T (2012) Physiological homogeneity among the endosymbionts of *Riftia pachyptila* and T*evnia jerichonana* revealed by proteogenomics. ISME Journal 6: 766-776

Bijtenhoorn P, Mayerhofer H, Müller-Dieckmann J, Utpatel C, Schipper C, Hornung C, Szesny M, Grond S, Thürmer A, Brzuszkiewicz E, Daniel R, Dierking K, Schulenburg H, Streit WR (2011) A Novel metagenomic short-chain dehydrogenase/reductase attenuates *Pseudomonas aeruginosa* biofilm formation and virulence on *Caenorhabditis elegans* PloS ONE 6:326278

Brzuszkiewicz E, Thürmer A, Schuldes J, Leimbach A, Liesegang H, Meyer F-D, Boelter J, Petersen H, Gottschalk G, Daniel R (2011) Genome sequence analyses of two isolates from the recent *Escherichia coli* outbreak in Germany reveal the emergence of a new pathotype: Entero-Aggregative-Haemorrhagic *Escherichia coli* (EAHEC). Arch Microbiol 193: 883-891

Wrede C, Brady S, Rockstroh S, Dreier A, Kokoschka S, Heinzelmann SM, Heller C, Reitner J, Taviani M, Daniel R, Hoppert M (2011) Aerobic and anaerobic methane oxidation in terrestrial mud volcanoes in the Northern Apennines. Sedimentary Geology 263-264: 210-219

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Matthias Dobbelstein

Professor of Molecular Oncology

- Dr. med., University of Munich, 1993
- Postdoctoral fellow, Princeton University, USA, 1993 – 1996
- Group leader, University of Marburg, 1997 – 2004
- Professor of Molecular Oncology, University of Southern Denmark, Odense, 2004 – 2005
- Head of the Department of Molecular Oncology, Georg-August-Universität Göttingen, since 2005

Major Research Interests

We are trying to understand the response of cancer cells to chemotherapy. In particular, we are analyzing the impaired replication of DNA and the damage response that results from injury to DNA. Our focus is on the signaling cascades driven by DNA damage, and on the activation of the tumor suppressor p53. Technologies include the use of large scale siRNA transfection, followed by automated fluorescence microscopy, and the analysis of DNA replication by incorporation of artificial nucleosides. As a disease model, we are investigating the response of colorectal cancer to therapy. On top of classical, DNA damaging chemotherapeutics, we are evaluating other broadly acting, yet non-genotoxic drug candidates, e. g. inhibitors of histone deacetylases and heat shock proteins. On long term, we are aiming at improving the response of tumor cells to chemotherapy by combining traditional and targeted therapeutic approaches.

Selected Recent Publications

Köpper F, Bierwirth C, Schön M, Kunze M, Elvers I, Kranz D, Saini P, Menon M, Walter D, Sørensen CS, Gaestel M, Helleday T, Schön M P, Dobbelstein M (2013) Damage-induced DNA replication stalling relies on MAPK-activated protein kinase 2 activity. Proc. Natl Acad Sci USA 110: 16856-16861

Beyer U, Moll-Rocek J, Moll UM, Dobbelstein M (2011) Endogenous retrovirus drives hitherto unknown proapoptotic p63 isoforms in the male germ line of humans and great apes. Proc Natl Acad Sci USA 108(9): 3624-9

Bug M, Dobbelstein M (2011) Anthracyclines induce the accumulation of mutant p53 through E2F1-dependent and -independent mechanisms. Oncogene 30(33): 3612-24

Lizé M, Pilarski S, Dobbelstein M (2010) E2F1-inducible microRNA 449a/b suppresses cell proliferation and promotes apoptosis. Cell Death Differ 17: 452-8

Braun CJ, Zhang X, Savelyeva I, Wolff S, Moll UM, Schepeler T, Ørntoft TF, Andersen CL, Dobbelstein M (2008) p53-Responsive micrornas 192 and 215 are capable of inducing cell cycle arrest. Cancer Res 68(24): 10094-104

Kranz D, Dohmesen C, Dobbelstein M (2008) BRCA1 and Tip60 determine the cellular response to ultraviolet irradiation through distinct pathways. Journal of Cell Biology 182: 197-213

Kranz D, Dobbelstein M (2006) Non-genotoxic p53 activation protects cells against S phase specific chemotherapy. Cancer Research 66(21): 10274-80

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Roland Dosch

Group Leader at the Dept. of Developmental Biochemistry

- 1994 – 1999 PhD Deutsches Krebsforschungszentrum (DKFZ), Heidelberg, Germany
- 1999 – 2003 Postdoc University of Pennsylvania, Philadelphia, USA
- 2004 – 2010 Junior group leader, University of Geneva, Switzerland
- since 2010 Group leader at the Dept. of Developmental Biochemistry, Georg August University, Göttingen

Major Research Interests

Molecular Control of Zebrafish Oogenesis

Reproduction is a fundamental principle of all biological systems. To produce a new individual, multicellular organisms use specific cells called gametes. Female gametes form during oogenesis, which prepares the egg for fertilization and provides vital gene products for early embryogenesis. Defects in oogenesis lead to sterility and are frequently the genetic cause of human developmental disorders such as Down syndrome.

Our goal is to understand the molecular regulation of oogenesis. To investigate egg development in vertebrates, we take advantage of the molecular resources available in the zebrafish, Danio rerio. Using zebrafish genetics, genomics and bioinformatics, we focus on the identification of key genes crucial for two molecular processes during oogenesis:

I) The formation of germ plasm
II) Vitellogenesis – the endocytosis of yolk protein

Currently, we are applying cell biological and biochemical approaches in combination with embryological methods to molecularly characterize the identified genes. Through these methods we recently discovered the bucky ball gene, which represents the first gene in vertebrates inducing the assembly of germ plasm. Germ plasm describes a specific cytoplasm in the oocyte, which controls the differentiation of gametes in the developing embryo. The long-term aim is to provide important insights into the molecular mechanisms of oogenesis and how its failure leads to sterility and developmental defects.

Selected Recent Publications

Bontems F, Baerlocher L, Mehenni S, Bahechar I, Farinelli L, Dosch R (2011) Efficient mutation identification in zebrafish by microarray capturing and next generation sequencing. BBRC 405(3): 373-376

Fort A, Fish RJ, Attanasio C, Dosch R, Visel A, Neerman-Arbez M. (2011) A liver enhancer in the fibrinogen gene cluster. Blood 117(1): 276-82

Bontems F, Stein A, Marlow F, Lyautey J, Mullins MC, Dosch R (2009) Bucky ball organizes germ plasm assembly in zebrafish. Curr Biol 19 (5): 414-22

Dosch R*, Wagner D S*, Mintzer, KA, Runke G, Wiemelt AP and Mullins MC (2004) Maternal Control of Vertebrate Development before the Midblastula Transition: Mutants from the Zebrafish I. Dev Cell 6(6): 771-780 *equal authorship

Wagner DS*, Dosch R*, Mintzer KA, Wiemelt AP and Mullins MC (2004) Maternal Control of Vertebrate Development at the Midblastula Transition and Beyond: Mutants from the Zebrafish II. Developmental Cell 6(6): 781-790 *equal authorship

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Jörg Enderlein

Professor of Physics

- 1981 – 86 Study of Physics at Ilya-Mechnikov-University Odessa
- 1991 PhD in Physical Chemistry (Humboldt-University Berlin)
- 2000 Habilitation in Physical Chemistry (University of Regensburg)
- 1996 – 97 PostDoc at Los Alamos National Laboratory (USA)
- 1997 – 2000 Assistent Professor (C1) at University of Regensburg
- 2001 – 2006 Heisenberg Fellow of the DFG at Forschungszentrum Jülich
- 2007 – 2008 Professor for Biophysical Chemistry at Eberhard-Karls-University Tübingen
- Since 2008 Professor for Biophysics at Georg-August-University Göttingen

Major Research Interests

Single molecule fluorescence spectroscopy and imaging, protein conformational dynamics and folding

Selected Recent Publications

Chizhik AI, Gregor I, Schleifenbaum F, Müller CB, Röling C, Meixner AJ, Enderlein J (2012) Electrodynamic Coupling of Electric Dipole Emitters to a Fluctuating Mode Density within a Nanocavity. Phys Rev Lett 108: 163002

Pieper C, Enderlein J (2011) Fluorescence correlation spectroscopy as a tool for measuring the rotational diffusion of macromolecules. Chem Phys Lett 516: 1-11

Chizhik AI, Chizhik AM, Khoptyar D, Bär S, Meixner AJ, Enderlein J (2011) Probing the Radiative Transition of Single Molecules with a Tunable Microresonator. Nano Lett 11: 1700-1703

Müller CB, Enderlein J (2010) Image scanning microscopy. Phys Rev Lett 104: 198101

Berndt M, Lorenz M, Enderlein J, Diez S (2010) Axial Nanometer Distances Measured by Fluorescence Lifetime Imaging Microscopy. Nano Lett 10: 1497-1500

Dertinger T, Colyer R, Iyer G, Weiss S, Enderlein J (2009) Fast, background-free, 3D superresolution optical fluctuation imaging (SOFI). PNAS 106: 22287-22292

Chizhik A, Schleifenbaum F, Gutbrod R, Chizhik A, Khoptyar D, Meixner AJ, Enderlein J (2009) Tuning the Fluorescence Emission Spectra of a Single Molecule with a Variable Optical Sub-wavelength Metal Microcavity. Phys Rev Lett 102: 073002-6

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Ivo Feußner

Professor of Biochemistry

- Diploma (Chemistry), Philipps-University, Marburg (Germany), 1990
- Dr. rer. nat., Philipps-University, Marburg (Germany), 1993
- Leader of an independent research group at the Institute for Plant Biochemistry (IPB), Halle/Saale (Germany), 1997 – 1999
- Habilitation (Biochemistry), Martin-Luther-University, Halle/Saale (Germany), 2000
- Leader of an independent research group at Institute for Plant Genetics and Crop Plant Research (IPK), Gatersleben (Germany), 2000 – 2002
- Since 2002 Professor of Biochemistry, Georg-August-University, Göttingen (Germany)
- Awards: Habilitation-Prize of the Ernst Schering Research Foundation (2001), Terry-Galliard Medal (2012)
- Fellow of the Saxonian Academy of Sciences, Leipzig, Germany (2009)
- Fellow of the Academy of Sciences, Göttingen, Germany (2013)

Major Research Interests

The group is currently studying different aspects of the lipid metabolism of plants, algae, mosses and fungi. In this context we are primarily interested in the metabolism of structural lipids and lipid-derived signal transduction processes. For this purpose, we make use of both classical techniques as analytical chemistry and biochemistry as well as of modern approaches in the area of molecular genetics, including the generation of transgenic organisms („gain-of-function“) or mutants („loss-of-function“).
Biochemistry and function of oxylipin metabolism:
We are interested in physiological functions of lipid peroxidation processes. Thus we analyze the function of specific lipoxygenases, i.e. the role of their products, so-called oxylipins (oxygenated fatty acid derivatives), as signals or defence substances during biotic and abiotic stress. Lipid peroxidation reactions are analysed in general by metabolomic approaches and more specifically by studying the biosynthesis of aldehydes (fruit aromas) and hydroxy fatty acids (plant defence). Other studies deal with the role of oxylipins in plants, mosses and algae. In addition the catalytic mechanism of lipoxygenases and related dioxygenases is analysed.
Biochemistry of the biosynthesis of structural lipids:
Even in plants a huge number of different fatty acids are found. We are interested in enzymes which introduce new functionalities (i.e. double bonds at unusual positions or conjugated double bonds) in the fatty acid backbone in order to obtain new seed oils for biotechnological, nutritional and medical purposes. Moreover we study the biochemical pathways or networks that led to an increase in the seed oil content of oilseed crop plants and oleogenous algae. Two other projects deal with the biochemistry and function of sphingolipids in plants and fungi as well as with wax ester forming enzymes. In addition we aim to identify chemical signals by metabolomics approaches that are exchanged during the infection between *Verticillium longisporum* and *Arabidopsis thaliana*.

Selected Recent Publications

Volkov A, Khoshnevis S, Neumann P, Herrfurth C, Wohlwend D,. Ficner R, Feussner I (2013) Crystal structure analysis of a fatty acid double-bond hydratase from *Lactobacillus acidophilus*. Acta Cryst D 69: 648-657

König S, Feussner K, Schwarz M, Kaever A, Iven T, Landesfeind M, Ternes P, Karlovsky P, Lipka V, Feussner I (2012) *Arabidopsis* mutants of sphingolipid fatty acid α-hydroxylases accumulate ceramides and salicylates. New Phytol 196: 1086-1097

Heilmann M, Iven T, Ahmann K, Hornung E, Stymne S, Feussner I (2012) Production of wax esters in plant seed oils by oleosomal co-targeting of biosynthetic enzymes. J Lipid Res 53: 2153-2161

Djamei A, Schipper K, Rabe F, Ghosh A, Vincon V, Kahnt J, Osorio S, Tohge T, Fernie AR, Feussner I, Feussner K, Meinicke P, Stierhof YD, Schwarz H, Macek B, Mann M, Kahmann R (2011) Metabolic priming by a secreted fungal effector. Nature 478: 395-398

Ternes P, Feussner K, Werner S, Lerche J, Iven T, Heilmann I, Riezman H, Feussner I (2011) Disruption of the ceramide synthase LOH1 causes spontaneous cell death in *Arabidopsis thaliana*. New Phytol 192: 841-854

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Ralf Ficner

Professor of Structural Biology

- Dr. rer. nat. (1992) and Postdoc (1993), Max Planck Institute for Biochemistry, Martinsried
- Postdoctoral fellow, EMBL Heidelberg, 1994 – 1996
- Junior Group Leader, University of Marburg, 1997 – 2000
- Appointed 2001 as Head of the Department of Molecular Structural Biology at the University of Göttingen

Major Research Interests

In order to understand the relationship between the three-dimensional structure and the cellular function of biological macromolecules we determine the structures of proteins and protein-RNA complexes by means of X-ray crystallography. Our current projects concern proteins involved in the splicing and modification of RNA and, as well, proteins required for the nucleocytoplasmic transport.

Selected Recent Publications

Monecke T, Haselbach D, Voss B, Russek A, Neumann P, Thomson E, Hurt E, Zachariae U, Stark H, Grubmüller H, Dickmanns A, Ficner R (2013) Structural basis for cooperativity of CRM1 export complex formation. Proc Natl Acad Sci USA 110: 960-965

Khoshnevis S, Hauer F, Milon P, Stark H, Ficner R (2012) Novel insights into the architecture and protein interaction network of yeast eIF3. RNA 18, 2306-2319

Lehwess-Litzmann A, Neumann P, Parthier C, Lüdtke S, Golbik R, Ficner R, Tittmann K (2011) Twisted Schiff base intermediates and substrate locale revise transaldolase mechanism. Nat Chem Biol 7(10): 678-684

Güttler T, Madl T, Neumann P, Deichsel D, Corsini L, Monecke T, Ficner R, Sattler M, Gorlich D (2010) NES consensus redefined by structures of PKI-type and Rev-type nuclear export signals bound to CRM1. Nature Struct Mol Biol 17:1367-1376

Schulz E-C, Dickmanns A, Urlaub H, Schmitt A, Mühlenhoff M, Stummeyer K, Schwarzer D, Gerardy-Schahn R, Ficner R (2010) Crystal structure of a novel intramolecular chaperone mediating triple ß-helix folding. Nature Struct Mol Biol 17: 210-215

Monecke T, Güttler T, Neumann P, Dickmanns A, Görlich D, Ficner R (2009) Crystal structure of the nuclear export receptor CRM1 in complex with Snurportin1 and RanGTP. Science 324(5930): 1087-91

Ficner R (2009) Novel structural insights into class I and II histone deacetylases. Curr Top Med Chem 9(3):235-40

Strasser A, Dickmanns A, Lührmann R, Ficner R (2005) Structural basis for m3G-cap-mediated nuclear import of spliceosomal UsnRNPs by snurportin1. EMBO J 24: 2235-43

Dierks T, Dickmanns A, Preusser-Kunze A, Schmidt B, Mariappan M, von Figura K, Ficner R, Rudolph MG (2005) Molecular basis for multiple sulfatase deficiency and catalytic mechanism for formylglycine generation of the human formylglycine generating enzyme. Cell 121 541-552

Stummeyer K, Dickmanns A, Mühlenhoff M, Gerardy-Schahn R, Ficner R (2005) Crystal structure of endosialidase NF - the polysialic acid degrading tailspike of bacteriophage K1F. Nature Struct Mol Biol 12: 90-96

Wolfgang Fischle

Group Leader at the MPI for Biophysical Chemistry

- Dr. rer. nat. (PhD), University of Tübingen, Germany, 2001
- Graduate Research Fellow, The J. David Gladstone Institute (UCSF), San Francisco, CA, USA, 1997 – 2001
- Postdoctoral Fellow, The Rockefeller University, New York, NY, USA, 2001 – 2005
- Damon Runyon Cancer Research Fellow, 2002 – 2005
- Independent Group Leader, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany, since 2006

Major Research Interests

Chromatin is the physiological template of genetic information controlling the capacity of a cell's genome to store, release, and inherit biological information. The fundamental unit of chromatin is the nucleosome: a stretch of DNA wrapped around a core of histone proteins (H2A, H2B, H3 and H4). Post-translational modifications of histones have emerged as key for regulating chromatin structure and are thought to crucially control chromatin dynamics and genome activity. Whereas more and more histone modification marks are being identified that alone or in combination could mediate distinct biological conditions of a cell and while correlative studies have begun to establish unambiguous links between several states of chromatin, various histone modifications, and diverse biological processes, our knowledge of how certain histone modifications exert their biological effects on a molecular/biochemical level is still very limited.
Due to their long-term stability, histone lysine methyl-marks are of particular interest to us, since they might be involved in establishing and maintaining durable and inheritable gene expression profiles (so called 'epi-genetic' regulation). Current projects include the study of Polycomb, HP1, and MBT proteins that bind to and act as effectors of distinct histone lysine methyl-marks. We are especially interested in the interplay of these factors and their cognate histone marks in regulating chromatin organization and dynamics. Furthermore, we are trying to identify and characterize novel binding proteins of various other histone modifications.
The long-term goal of our research is to gain mechanistic insight(s) into the signaling mechanisms and biological role of single but also combinations of histone modification marks and to understand how certain states of chromatin regulate the functionality of a cells genome. To this end, we aim to reconstitute chromatin-signaling pathways in recombinant and cell free systems and study their epi-genetic regulatory circuits in various biological model systems (i.e. *Xenopus laevis*, mice, tissue culture).

Selected Recent Publications

Munari F, Soeroes S, Zenn HM, Schomburg A, Kost N, Schroeder S, Klingberg R, Rezaei-Ghaleh N, Stuetzer A, Gelato KA, Walla PJ, Becker S, Schwarzer D, Zimmermann B, Fischle W*, Zweckstetter M* (2012) Methylation of K9 in histone H3 directs alternative modes of highly dynamic interaction of heterochromatin protein hHP1β with the nucleosome. J Biol Chem 287: 33756-33765 *co-corresponding authors

Liokatis S, Stützer A, Elsässer SJ, Theillet F-X, Klingberg R, van Rossum B, Schwarzer D, Allis CD, Fischle W, Selenko P (2012) Phosphorylation of histone H3 Serine 10 establishes a hierarchy for subsequent intramolecular modification events. Nat Struct Mol Biol 19: 819-823

Nikolov M, Stützer A, Mosch K, Krasauskas A, Soeroes S, Stark H, Urlaub H, Fischle W (2011) Chromatin Affinity Purification and Quantitative Mass Spectrometry Defining the Interactome of Histone Modification Patterns. Mol Cell Proteomics 10(11): M110.005371

Tsai WW, Wang Z, Yiu TT, Akdemir KC, Xia W, Winter S, Tsai CY, Shi X, Schwarzer D, Plunkett W, Aronow B, Gozani O, Fischle W, Hung MC, Patel DJ, Barton MC (2010) TRIM24 links recognition of a non-canonical histone signature to breast cancer. Nature 468: 927-932

Fischle W (2008) Talk is cheap-cross-talk in establishment, maintenance, and readout of chromatin modifications. Gen Dev 22: 3375-3382

Zhang K, Mosch K, Fischle W, Grewal SI (2008) Roles of the Clr4 methyltransferase complex in nucleation, spreading and maintenance of heterochromatin. Nat Struct Mol Biol 15: 381-388

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Christiane Gatz

Professor of Plant Molecular Biology

- Dr. rer. nat. (1985) at the Institute for Biochemistry, Technical University Darmstadt
- Postdoctoral fellow at the University of Wisconsin, Madison, USA (1985 – 1987)
- Habilitation in Molecular Genetics at the Freie Universität Berlin in 1992
- Professor at the University of Bielefeld (1993 – 1995)
- Alfried Krupp von Bohlen und Halbach-Award for young university professors (1994)
- Professor at the University of Göttingen since 1996

Major Research Interests

Our laboratory is interested in the molecular mechanisms establishing plant innate immunity. We focus on the elucidation of signal transduction mechanisms that lead to transcriptional reprogramming in the course of plant defense responses against bacteria and fungi. Plants have developed multiple layers of defense responses against pathogens. In general, infection of the model plant *Arabidopsis thaliana* with biotrophic pathogens (pathogens that exploit resources of living cells) leads to the activation of salicylic acid (SA)-mediated defense responses, whereas infection with necrotrophic pathogens (pathogens that kill cells to obtain access to nutrients) elicits jasmonic acid/ethylene (JA/ET)-dependent responses. If plants are infected by both types of pathogens, the SA pathway represses the JA/ET pathway (cross-talk). Members of the TGA family of transcription factors that have been identified as essential regulators of both responses. These proteins reside in the cell in an inactive state before pathogen infection. We are interested in the SA-mediated mechanisms that activate the function of TGA factors when they function as activators of the SA response (Fode et al., 2008). Moreover, we analyze, how mediate the negative effect of SA on the JA/ET response (Ndamukong et al., 2007; Zander et al., 2010; Zander et al 2012).
We combine genetic (e.g. analysis of mutants and double mutants), molecular (e.g. gene expression analysis by real-timer RT PCR), cell (subcellular localization and protein-protein interaction studies in living cells) and biochemical (e.g. chromatin immunoprecipitation) strategies to gain novel insights into these complex mechanisms.
A further project analyzes the function of the JA receptor COI1 in the defense against the vascular pathogen *Verticillium longisporum*. Whereas COI1 usually promotes defense responses against necrotrophic fungi when activated by JA, it promotes susceptibility independently from JA in response to infection with *V. longisporum* (Ralhan et al., 2012). Our aim is to understand the activation and the downstream effects of this novel COI1 function.

Selected Recent Publications

Ralhan A, Schottle S, Thurow C, Iven T, Feussner I, Polle A, Gatz C (2012) The vascular pathogen *Verticillium longisporum* requires a jasmonic acid-independent COI1 function in roots to elicit disease symptoms in *Arabidopsis* shoots. Plant Physiol 159: 1192-1203

Zander M, Chen S, Imkampe J, Thurow C, Gatz C (2011) Repression of the *Arabidopsis thaliana* jasmonic acid/ethylene-induced defense pathway by TGA-interacting glutaredoxins depends on their C-Terminal ALWL motif. Mol Plant 5: 831-40

Pape S, Thurow C, Gatz C (2010) The *Arabidopsis thaliana* PR-1 promoter contains multiple integration sites for the co-activator NPR1 and the repressor SNI1. Plant Physiol 154: 1805-1818

Zander M, La Camera S, Lamotte O, Metraux JP, Gatz C (2010) *Arabidopsis* thaliana class-II TGA transcription factors are essential activators of jasmonic acid/ethylene-induced defense responses. Plant J 61: 200-210

Fode B, Siemsen T, Thurow C, Weigel R, Gatz C (2008) The *Arabidopsis* GRAS protein SCL14 interacts with class II TGA transcription factors and is essential for the activation of stress-inducible promoters. Plant Cell 20: 3122-3135

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Dirk Görlich

Professor, Director at the Max Planck Institute for Biophysical Chemistry

- 1989 Diploma (Biochemistry), Martin-Luther-Universität in Halle
- 1990 – 1993 Graduate studies (Laboratory of T.A. Rapoport, Berlin)
- 1993 Dr. rer. nat. (Biochemistry) Humboldt-Universität Berlin
- 1993 – 1995 Postdoc (Laboratory of R.A. Laskey, Cambridge, England)
- 1996 – 2007 Research group leader at the ZMBH Heidelberg
- 2001 – 2007 Professor for Molecular Biology (Universität Heidelberg)
- 2007 – Director, Dept. Cellular Logistics, MPI for Biophysical Chemistry, Göttingen

Major Research Interests

- Nuclear pore complexes, their function and assembly
- Importins and Exportins
- Nuclear actin
- Gametogenesis and meiosis
- Translation
- Protein engineering

Selected Recent Publications

Güttler T, Görlich D (2011) Ran-dependent nuclear export mediators: a structural perspective. EMBO J 30: 3457-3474.

Güttler T, Madl T, Neumann P, Deichsel, D, Corsini, L, Monecke T, Ficner R, Sattler M, Görlich D (2010) NES consensus redefined by structures of PKI-type and Rev-type nuclear export signals bound to CRM1. Nat Struct Mol Biol 17: 1367-1376

Monecke T, Güttler T, Neumann P, Dickmanns A, Görlich D, Ficner R (2009) Crystal Structure of the Nuclear Export Receptor CRM1 in Complex with Snurportin1 and RanGTP. Science 324: 1087-1091.

Mohr D, Frey S, Fischer T, Güttler T, Görlich D (2009) Characterisation of the passive permeability barrier of nuclear pore complexes. EMBO J 28: 2541-2553

Frey S, Görlich D (2009) FG/FxFG as well as GLFG repeats form a selective permeability barrier with self-healing properties. EMBO J 28: 2554-2567

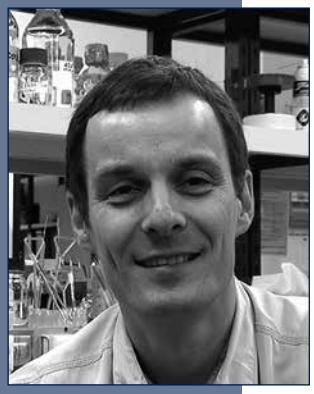
Frey S, Görlich D (2007) A saturated FG-repeat hydrogel can reproduce the permeability properties of nuclear pore complexes. Cell 130: 512-523

Frey S, Richter, RP, Görlich D (2006) FG-rich repeats of nuclear pore proteins form a three-dimensional meshwork with hydrogel-like properties. Science 314: 815-817

Bohnsack MT, Stüven T, Kuhn C, Cordes VC, Görlich D (2006) A selective block of nuclear actin export stabilizes the giant nuclei of Xenopus oocytes. Nat Cell Biol 8: 257-263

Stavru F, Hülsmann BB, Spang A, Hartmann E, Cordes VC, Görlich D (2006) NDC1: a crucial membrane-integral nucleoporin of metazoan nuclear pore complexes. J Cell Biol 173: 509-519

Stavru F, Nautrup-Pedersen G, Cordes VC, Görlich D (2006). Nuclear pore complex assembly and maintenance in POM121- and gp210-deficient cells. J Cell Biol 173: 477-483



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Christian Griesinger

Professor, Director at the Max Planck Institute for Biophysical Chemistry, Göttingen

- Dr. phil. nat. University of Frankfurt (1986, Prof. Dr. H. Kessler)
- Postdoctoral Fellow at Lab. for Physical Chemistry, ETH Zürich (1986 – 1989, Prof. Dr. R. R. Ernst)
- Full Professor for Organic Chemistry at the University of Frankfurt (1990 – 2000)
- Appointed as Director at the Max Planck Institute for Biophysical Chemistry (1999)

Major Research Interests

In the department, we develop NMR spectroscopic methods and apply them to the investigation of water soluble and membrane proteins, nucleic acids and their complexes as well as drug/target complexes. We are specifically focussing on the dynamics of biomolecules. Structural biology projects are performed in the context of signal transduction, ion channels, cytoskeletal proteins, enzymes and drug/target complexes using NMR as well as X-ray crystallography to characterize structure and dynamics. An applied project is the investigation of proteins involved in neurodegenerative diseases that are studied in the context of the CNMPB and involve NMR and other biophysical methods as well as chemical synthesis. Methods developments are aimed at pushing the limits of sensitivity for NMR spectroscopic detection (e.g. DNP), developing the measurement of structurally and dynamically relevant parameters, establishing methods to describe structural ensembles for folded and intrinsically disordered proteins. For solid state NMR investigations, pulse sequences that allow structure determination of uniformly labelled membrane proteins as well as oligomers and fibrils formed from proteins involved in neurodegenerative diseases have been successfully developed.

Selected Recent Publications

Wagner J, Ryazanov S, Leonov A, Levin J, Shi S, Schmidt F, Prix C, Pan-Montojo F, Bertsch U, Mitteregger-Kretzschmar G, Geissen M, Eiden M, Leidel F, Hirschberger T, Deeg AA, Krauth JJ, Zinth W, Tavan P, Pilger J, Zweckstetter M, Frank T, Bähr M, Weishaupt JH, Uhr M, Urlaub H, Teichmann U, Samwer M, Bötzel K, Groschup M, Kretzschmar H, Griesinger C, Giese A (2013) Anle138b: a novel oligomer modulator for disease-modifying therapy of neurodegenerative diseases such as prion and Parkinson's disease. Acta Neuropathol 2013,:125 (6) 795-813

Honndorf V, Coudevylle N, Laufer S, Becker S, Griesinger C, Habeck M (2012) Inferential NMR/X-ray-based structure determination of a dibenzo[a,d]cycloheptenone inhibitor-p38a MAP kinase complex in solution. Angew Chem Int Ed 51: 2359-2362

Ban D, Funk M, Gulich R, Egger D, Sabo TM, Walter KFA, Bryn Fenwick R, Giller K, Pichierri F, de Groot BL, Lange OF, Grubmüller H, Salvatella X, Wolf M, Loidl A, Kree R, Becker S, Lakomek NA, Lee D, Lunkenheimer P, Griesinger C (2011) Kinetics of conformational sampling in ubiquitin. Angew Chem Int Ed 50: 11437-11440

Rodriguez-Castaneda F, Maestre-Martinez M. Coudevylle N, Dimova K, Junge H, Lipstein N, Lee D, Becker S, Brose N, Jahn O, Carlomagno T, Griesinger C (2010) Modular architecture of Munc13/calmodulin complexes: dual recognition by Ca^{2+} and possible function in short-term synaptic plasticity. EMBO J 29: 680-91

Lange O, Lakomek NA, Farès C, Schroeder GF, Walter K, Becker S, Meiler J, Grubmueller H, Griesinger C, de Groot BL (2008) Recognition dynamics up to microseconds revealed from an RDC-derived ubiquitin ensemble in solution. Science 320: 1471-1475

Bayrhuber M, Meins T, Habeck M, Becker S, Giller K, Villinger S, Vonrhein C, Griesinger C, Zweckstetter M, Zeth K (2008) Structure of the human voltage-dependent anion channel. Proc Natl Acad Sci USA 105: 15370-15375

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Uwe Groß

Professor of Medical Microbiology

- M.D., University of Hamburg 1987
- Postdoctoral fellow, UC Los Angeles, California, 1987 – 1989
- Professor of Medical Parasitology, University of Würzburg 1998/1999
- Appointed 1999 as head of the Department of Medical Microbiology, University of Göttingen

Major Research Interests

The protozoan parasite *Toxoplasma gondii* usually causes asymptomatic infections in immunocompetent adults leading to lifelong persistence especially in the brain and in muscle tissue. Life-threatening reactivation of such infection might occur in immuno-compromised individuals (i. e. patients suffering from AIDS). This parasite serves as a model organism for studying evasion mechanisms of intracellular pathogens.

We are interested in the cross-talk between the parasite and its host cell on a molecular level. We could demonstrate that the parasite (i) modulates the host cell capacity for MHC-restricted antigen presentation and (ii) inhibits apoptosis of the infected cell. Both mechanisms allow intracellular persistence. Vice versa, the host´s immune response determines the fate of the parasite by direct interference with differentiation processes of *Toxoplasma gondii*. The precise molecular events for these strategies of intense interplay between both partners are currently under our investigation.

Recently, we also started to investigate host-pathogen interactions of *Campylobacter jejuni*. This pathogen is the most prominent bacterial species that causes diarrhoea followed eventually by the development of neurological complications. Currently, we are focusing on the identification of putative virulence-associated factors. In addition, we are appointed the National Reference Center for Systemic Mycoses. In this respect, we are investigating fungal factors and mechanisms that are involved in pathogenesis of mycoses; i.e. cell wall structure and differentiation processes.

Selected Recent Publications

Hotop A, Hlobil H, Groß U (2012) Efficacy of rapid treatment initiation following primary *Toxoplasma gondii* infection during pregnancy. Clin Infect Dis 54: 1545-52

Bereswill S, Fischer A, Plickert R, Haag LM, Otto B, Kühl AA, Dasti JI, Zautner AE, Muñoz M, Loddenkemper C, Groß U, Göbel UB, Heimesaat MM (2011) Novel Murine Infection Models Provide Deep Insights into the “Ménage à Trois” of *Campylobacter jejuni*, Microbiota and Host Innate Immunity. PLoS One 6(6): e20953

Lin SS, Groß U, Bohne W (2011) Two internal type II NADH dehydrogenases of *Toxoplasma gondii* are both required for optimal tachyzoite growth. Mol Microbiol 82: 209-221

Groß U, Amuzu SK, de Ciman R, Kassimova I, Groß L, Rabsch W, Rosenberg U, Schulze M, Stich A, Zimmermann O (2011) Bacteremia and antibiotic drug resistance over time, Ghana. Emerg Infect Dis 17: 1879-1882

Vutova P, Wirth M, Hippe D, Groß U, Schulze-Osthoff K, Schmitz I, Lüder CGK (2007) *Toxoplasma gondii* inhibits Fas/CD95-triggered cell death by inducing aberrant processing and degradation of caspase 8. Cell Microbiol 9: 1556-1570

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Jörg Großhans

Professor of Developmental Biochemistry

- 1993 Diplom Biochemistry, Tübingen
- 1993 – 1996 Doctoral research with C Nüsslein-Volhard, Max-Planck-Institut für Entwicklungsbiologie, Tübingen
- 1997 – 2001 Post-doc with E Wieschaus, Princeton (USA)
- 2002 – 2008 ZMBH and Emmy-Noether research group, Heidelberg
- since 2009 Professor, Universitätsmedizin Göttingen

Major Research Interests

Biological structure formation and ageing.
Our group is interested in the molecular and cell-biological mechanisms how biological structures are formed. We analyse structure formation in the early *Drosophila* embryo employing genetical, biochemical and embryological experiments as well as live-imaging. Specifically we investigate how nuclear shape is determined and how the farnesylated protein Kugelkern is involved, how the cells are regularly arranged, how apical-basal polarity is established and how the number of synchronous cell divisions is robustly controlled. Based on our studies nuclear shape we have studied the function of the nuclear lamina and lamina proteins, such as lamin and Kugelkern, in ageing and stem cell proliferation and differentiation in the adult fly.

Selected Recent Publications

Yan S, Lv Z, Winterhoff M, Wenzl C, Zobel T, Faix J, Bogdan S, Grosshans J (2013) The F-BAR protein Cip4/Toca-1 antagonizes the formin Diaphanous in membrane stabilization and compartmentalization. J Cell Sci 126: 1796-1805

Sung HW, Spangenberg S, Vogt N, Grosshans J (2013) Number of nuclear divisions in the *Drosophila* blastoderm controlled by onset of zygotic transcription. Curr Biol 23: 133-138

Kanesaki T, Edwards C, Schwarz U, Grosshans J (2011) Dynamic ordering of nuclei in syncytial embryos: a quantitative analysis of the role of cytoskeletal networks. Integ Biol 3: 1112-1119

Albrecht SC, Barata A, Grosshans J, Teleman AA, Dick TP (2011). *In vivo* mapping of hydrogen peroxide and oxidaized glutathione reveals chemical and regional specificity of redox homeostasis. Cell Metab 14: 819-29

Polychronidou M, Hellwig A, Grosshans J (2010) The farnesylated nuclear proteins Kugelkern and LaminDm0 affect nuclear morphology by directly interacting with the nuclear membrane. Mol Biol Cell 21: 3409-3420

Brandt A, Krohne G, Grosshans J (2008) The farnesylated nuclear proteins Kugelkern and Lamin B promote aging-like phenotypes in *Drosophila* flies. Aging Cell 7: 541-551

Grosshans J, Wieschaus E (2000) A genetic link between morphogenesis and cell division during formation of the ventral furrow in *Drosophila*. Cell 101: 523-531

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Helmut Grubmüller

Professor, Director at the Max Planck Institute for Biophysical Chemistry

- 1994 Dr. rer nat. (Physics), Technical University of Munich
- 1997 EMBO fellow at the Institute for Molecular Biology and Biophysics, Federal Institute of Technology (ETH) Zurich, Switzerland
- 1998 – 2003 Head of the Theoretical Molecular Biophysics Group at the Max Planck Institute for Biophysical Chemistry, Göttingen
- 2003 Associate Professor for Biomolecular Sciences at the École Polytechnique Fédérale de Lausanne (EPFL)
- 2003 - Director at the Max Planck Institute for Biophysical Chemistry, Göttingen, Head of the Theoretical and Computational Molecular Biophysics Department
- 2005 - Honorary Professor for Physics at the University of Göttingen

Major Research Interests

The question 'How do proteins work?' is our driving force. We study biomolecular dynamics and function by atomistic molecular dynamics and qm/mm simulations. Emphasis is on protein function, as well as on protein/DNA/RNA interactions.
Available projects address nuclear pore transport, the ribosome, molecular motors such as F-ATPase, protein unfolding as well as the interaction with radiation with a focus at single molecules, typically in close collaboration with experimental groups. The simulation of single molecule AFM experiments by force probe techniques helps us to reveal mechanisms of proteins function involving mechanical stress such as the muscular force sensor titin kinase, and so do improved methods to calculate thermodynamic quantities from simulations. We are continuously advancing our simulation techniques and scalability on massively parallel computers. The group of ca. 20 PhD students and postdocs shares a strong background mainly in physics, and scientific computing, but also in chemistry and biology. We enjoy exclusive access to a high-performance linux cluster of ca. 3000 processor cores.

Selected Recent Publications

Czub J, Grubmüller H (2011) Torsional elasticity and energetics of F1-ATPase. Proc Natl Acad Sci USA 108(18): 7408-7413

Bockmann RA, de Groot BL, Kakorin S, Neumann E, Grubmüller H (2008) Kinetics, statistics, and energetics of lipid membrane electroporation studied by molecular dynamics simulations, Biophys J 95: 1837-1850

Lange OF, Lakomek NA, Fares C, Schröder GF, Walter KFA, Becker S, Meiler J, Grubmüller H, Griesinger C, de Groot BL (2008) Recognition dynamics up to microseconds revealed from an RDC-derived ubiquitin ensemble in solution. Science 320: 1471-1475

Sieber JJ, Willig KI, Kutzner C, Gerding-Reimers C, Harke B, Donnert G, Rammner B, Eggeling C, Hell SW, Grubmüller H, Lang T (2007) Anatomy and dynamics of a supramolecular membrane protein cluster. Science 317: 1072-1076

de Groot BL, Grubmüller H (2001) Water permeation across biological membranes: Mechanism and dynamics of aquaporin-1 and GlpF. Science 294: 2353-2357

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Heidi Hahn

Professor of Molecular Developmental Genetics

- Dr. med., University of Würzburg, 1992
- Postdoctoral Fellow, National Institutes of Health, Bethesda, Maryland, USA (1993 – 1998)
- Junior Group Leader (BioFuture), Technical University of Munich (1999 – 2000)
- Professor of Molecular Developmental Genetics, University of Göttingen since 2001

Major Research Interests

Cancer is a disease that results from inappropriate cell division induced by hyperproliferation. In many cases, the development of cancer is associated with genes or signaling pathways important for patterning during embryogenesis.
We investigate the role of the Hedgehog/Patched (Hh/Ptch) signaling cascade in the development of solid tumors. The focus is on tumors caused by mutations in Ptch, such as medulloblastoma, rhabdomyosarcoma and basal cell carcinoma.
The first aim is the discovery of molecular and cellular events that trigger the initiation of Ptch associated tumors. The second aim is to elucidate the function of Hh/Ptch signaling during tumor progression. The current focus is on the interaction between Hh/Ptch and Wnt signaling during formation, progression and regression of basal cell carcinoma. In addition, we are investigating the role of Hh/Ptch signalling in myeloid or T cells during tumorigenesis. The third goal is the identification of drugs that target solid tumors caused by mutations in Ptch. Currently we are analyzing the anti-tumoral effects of the cytostatic drug doxorubicin and of Vitamin D3 derivatives. To test the anti-tumor activity of the drugs we use tumor-bearing Ptch mutant mice.

Selected Recent Publications

Nitzki F, Zibat A, Frommhold A, Schneider A, Schulz-Schaeffer W, Braun T, Hahn H (2011) Uncommitted precursor cells might contribute to increased incidence of embryonal rhabdomyosarcoma in heterozygous Patched1 mutant mice. Oncogene 30: 4428-36

Nitzki F, Zibat A, König S, Wijgerde M, Rosenberger A, Brembeck F, Carstens PO, Frommhold A, Uhmann A, Klingler S, Reifenberger J, Pukrop T, Aberger F, Schulz-Schaeffer W, Hahn H (2010) Tumor stroma-derived Wnt5a induces differentiation of basal cell carcinoma of Ptch mutant mice via CaMKII. Cancer Research 70: 2739-48

Ecke I, Petry F, Rosenberger A, Tauber S, Mönkemeyer S, Hess I, Dullin C, Kimmina S, Pirngruber J, Johnsen SA, Uhmann A, Nitzki F, Wojnowski L, Schulz-Schaeffer W, Witt O, Hahn H (2009) Antitumor effects of a combined 5-aza-2'deoxycytidine and valproic acid treatment on rhabdomyosarcoma and medulloblastoma in Ptch mutant mice. Cancer Research 69: 887-95

Uhmann A, Dittmann K, Nitzki F, Dressel R, Koleva M, Frommhold A, Zibat A, Binder C, Adham I, Nitsche M, Heller T, Armstrong V, Schulz-Schaeffer W, Wienands J, Hahn H (2007) The Hedgehog receptor Patched controls lymphoid lineage commitment. Blood 110: 1814-23

Hahn H, Wicking C, Zaphiropoulos P, Gailani M, Shanley S, Chidambaram A, Vorechovsky I, Holmberg E, Unden A, Gillies S, Negus K, Smyth I, Pressman C, Leffell D, Gerrard B, Goldstein A, Wainright B, Toftgard R, Chenevix-Trench G, Dean M, Bale A (1996) Mutations of the human homologue of *Drosophila* patched in the nevoid basal cell carcinoma syndrome. Cell 85: 841-51

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Stefan Hell

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- 1987 Diploma in Physics, Univ. of Heidelberg (1.0)
- 1990 Doctorate in Physics, Univ. of Heidelberg (summa cum laude)
- 1991 – 1993 Postdoctoral Researcher, EMBL (European Molecular Biology Laboratory)
- 1993 – 1996 Principal Investigator, Laser Microscopy Group; Univ. of Turku, Finland
- 1996 Habilitation in Physics, Univ. Heidelberg; Physics teaching since 02/1996
- 1997 – 2002 Head, Max-Planck Junior Group High Resolution Optical Microscopy, at the Max-Planck-Institute for Biophysical Chemistry Göttingen, Germany
- since 10/2002 Director at the Max Planck Institute for Biophysical Chemistry, Head of Department of NanoBiophotonics
- since 12/2003 Apl. Prof., Faculty of Physics, Univ. of Heidelberg
- since 12/2003 Head of High Resolution Optical Microscopy Division, DKFZ Heidelberg
- since 01/2004 Hon. Prof., Faculty of Physics, Univ. of Göttingen

Major Research Interests

Optical microscopy beyond the diffraction barrier with far-field optics. Invention of STED, RESOLFT, GSDIM and 4Pi microscopy and related techniques.

Selected Recent Publications

Berning S, Willig KI, Steffens H, Dibaj P, Hell SW (2012) Nanoscopy in a Living Mouse Brain. Science 335:551

Liu KSY, Siebert M, Mertel S, Knoche E, Wegener S, Wichmann C, Matkovic T, Muhammad K, Depner H, Mettke C, Bückers J, Hell SW, Müller M, Davis GW, Schmitz D, Sigrist SJ (2011) RIM-binding protein, a central part of the active zone, is essential for neurotransmitter release. Science 334: 1565-1569

Eggeling C, Ringemann C, Medda R, Schwarzmann G, Sandhoff K, Polyakova S, Belov VN, Hein B, von Middendorff C, Schönle A, Hell SW (2009) Direct observation of the nanoscale dynamics of membrane lipids in a living cell. Nature 457: 1159-1163

Sieber, JJ, Willig KI, Kutzner C, Gerding-Reimers C, Harke B, Donnert G, Rammner B, Eggeling C, Hell SW, Grubmüller H, Lang T (2007) Anatomy and dynamics of a supramolecular membrane protein cluster. Science 317: 1072-1076

Willig KI, Rizzoli SO, Westphal V, Jahn R, Hell SW (2006) STED-microscopy reveals that synaptotagmin remains clustered after synaptic vesicle exocytosis. Nature 440: 935-939

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Claudia Höbartner

Group Leader at the Max Planck Institute for Biophysical Chemistry

- Dr. rer. nat. (PhD), University of Innsbruck, Austria, 2004
- Erwin Schrödinger postdoctoral Fellowship, FWF (Austrian Science Fund),
- University of Illinois at Urbana-Champaign, USA, 2005 – 2007
- Hertha Firnberg Fellowship, funded by FWF & bmwf (federal ministry of science and research), University of Innsbruck, Austria, 2007 – 2008
- Independent Research Group Leader, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany, since 2008

Major Research Interests

The work in our group is focused on the chemistry and biochemistry of natural and artificial nucleic acids, with special emphasis on functional and structural properties of catalytic DNA and modified RNA. Deoxyribozymes, also known as DNA enzymes or DNA catalysts, are single-stranded DNAs that are identified by in vitro selection from random-sequence DNA pools. Most prominent reactions catalyzed by DNA site-specific cleavage and ligation of RNA in different topologies. Catalytically active DNA molecules must fold into complex, three-dimensional structures that form the basis for their sophisticated functions. However, little is known about the molecular details of these structures and the mechanistic principles of DNA catalysis. We seek molecular level insights into the function and mechanism of DNA catalysts and approach these fundamental questions by a variety of chemical and biophysical methods. In this context, we developed reliable probing methods for the identification of critical molecular features for DNA catalysis. Other objectives are to demonstrate that DNA has the potential for novel chemical and biochemical catalysis and to apply deoxyribozymes for practical use. We explore the diversity of DNA-catalyzed reactions in as-yet unaddressed areas and develop nucleic acids as tools for post-synthetic modifications, such as site-specific attachment of fluorescent labels or other biophysical probes in DNA and RNA. We also study natural nucleic modifications, such as nucleobase and ribose methylations, and we use artificial nucleoside analogs, such as spin-labeled, fluorescent and caged nucleosides as probes for the investigation of RNA structure and function. We apply synthetic organic chemistry for generating modified nucleoside building blocks and use solid-phase synthesis, post-synthesis derivatization, enzymatic synthesis of RNA fragments and chemical and enzymatic ligation strategies for the preparation of complex RNA targets. The structural and biophysical properties of highly functionalized RNAs and their interactions with proteins are studied in collaboration with several other research groups at the Max Planck Institute for Biophysical Chemistry.

Selected Recent Publications

Javadi-Zarnaghi F, Höbartner C (2013) Lanthanide cofactors accelerate DNA-catalyzed synthesis of branched RNA. J Am Chem Soc 135: 12839-12848

Büttner L, Seikowski J, Wawrzyniak K, Ochmann A, Höbartner C (2013) Synthesis of spin-labeled riboswitch RNAs using convertible nucleosides and DNA-catalyzed RNA ligation. Bioorg Med Chem 21: 6171-6180

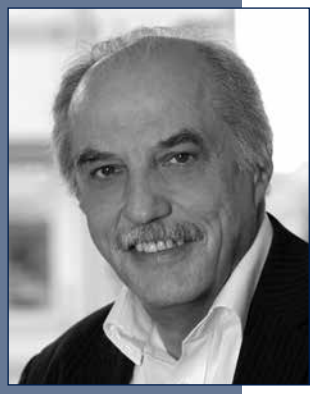
Samanta B, Höbartner C (2013) Combinatorial Nucleoside-Deletion-Scanning Mutagenesis of Functional DNA. Angew Chem Int Ed 52: 2995-2999

Gore KR, Nawale GN, Harikrishna S, Chittoor VG, Pandey SK, Höbartner C, Patankar S, Pradeepkumar PI (2012) Synthesis, Gene Silencing, and Molecular Modeling Studies of 4'-C-Aminomethyl-2'-O-methyl Modified Small Interfering RNAs. J Org Chem 77: 3233-3245

Wachowius F, Höbartner C (2011) Probing essential nucleobase functional groups in aptamers and deoxyribozymes by nucleotide analog interference mapping of DNA, J Am Chem Soc 133: 14888-14891

Wachowius F, JavadiZarnaghi F, Höbartner C (2010) Combinatorial Mutation Interference Analysis reveals functional nucleotides required for DNA catalysis, Angew Chem Int Ed 49: 8504-8508

Sicoli G, Wachowius F, Bennati M, Höbartner C (2010) Secondary Structure Probing of Spin-labeled RNA by Pulsed EPR Spectroscopy, Angew Chem Int Ed 49: 6443-6447



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Herbert Jäckle

Professor, Director at the Max Planck Institute for Biophysical Chemistry

- Faculty member at the EMBL, Heidelberg (1980 – 1982)
- Head of the group (associate professor), Max Planck Institute for Develop mental Biology, Tübingen (1982 – 1988)
- Professor and Chairman, Dept. of Genetics and Microbiology, Univ. of Munich (1988 – 1991)
- Director, Dept. of Molecular Developmental Biology, Max Planck Institute for Biophysical Chemistry, Göttingen
- Vice-President of the Max Planck Society

Major Research Interests

Our research interest is focused on molecular processes and the mechanisms involved in the phenonenon of biological pattern formation during Drosophila embryogenesis. Aim of my studies is a better understanding of the biochemical pathways and the molecular characterization of the regulatory networks leading to the establishment of the segmental organization of the embryo, organ formation and cell behaviour underlying morphogenesis. Recent work concerns the genetic basis for energy homeostasis in cells.

Selected Recent Publications

Beller M, Bulankina AV, Hsiao HH, Urlaub H, Jäckle H, et al. (2010) PERILIPIN-Dependent Control of Lipid Droplet Structure and Fat Storage in *Drosophila*. Cell Metabolism 12: 521-532

Günesdogan U, Jäckle H, Herzig A (2010) A genetic system to assess in vivo the functions of histones and histone modifications in higher eukaryotes. EMBO Rep 11: 772-776

Löhr U, Chung HR, Beller M, Jäckle H (2009) Antagonistic action of Bicoid and the repressor Capicua determines the spatial limits of *Drosophila* head gene expression domains. Proc Nat Acad Sci USA 106: 21695-21700

Karpinar DP, Balija MBG, Kugler S, Opazo F, Rezaei-Ghaleh N, Wender N, Kim HY, Taschenberger G, Falkenburger BH, Heise H, Kumar A, Riedel D, Fichtner L, Voigt A, Braus GH, Giller K, Becker S, Herzig A, Baldus M, Jäckle H, Eimer S, Schulz JB, Griesinger C, Zweckstetter M (2009) Pre-fibrillar alpha-synuclein variants with impaired beta-structure increase neurotoxicity in Parkinson's disease models. EMBO J 28: 3256-3268

Chanana B, Steigemann P, Jäckle H, Vorbrüggen G (2009) Reception of Slit requires only the chondroitin sulphate-modified extracellular domain of Syndecan at the target cell surface. Proc Nat Acad Sci USA 106: 11984-1198

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Reinhard Jahn

Professor, Director at the Max Planck Institute for Biophysical Chemistry

- Dr. rer. nat. 1981, University of Göttingen
- Assistant Professor, The Rockefeller University, New York (USA) 1985
- Junior Group leader, Max Planck Institute for Psychiatry, Martinsried, 1986
- Associate Professor of Pharmacology and Cell Biology, Yale University, and Investigator, Howard Hughes Medical Institute, New Haven (USA) 1991
- Professor of Pharmacology and Cell Biology, Yale University, New Haven, 1995
- Director, Max Planck Institute for Biophysical Chemistry, Göttingen, 1997

Major Research Interests

Our group is interested in the mechanisms of membrane fusion, with the main emphasis on regulated exocytosis in neurons. Intracellular membrane fusion events are mediated by a set of conserved membrane proteins, termed SNAREs. For fusion to occur, complementary sets of SNAREs need to be present on both of the fusing membranes, which then assemble in a zipper-like fashion to initiate membrane merger. The neuronal SNAREs are among the best characterized. They are the targets of the toxins responsible for botulism and tetanus, and they are regulated by several addtional proteins including synaptotagmin, the calcium sensor for neurotransmitter release. To understand how these proteins mediate fusion, we study their properties *in vitro* with biochemical and biophysical approaches using native and artificial membranes.
In a second set of projects, we use modern techniques such as quantitative proteomics to better understand supramolecular protein complexes involved in synaptic function. Using our quantitative description of synaptic vesicles as point of departure we aim at unraveling presynaptic protein networks involved in synaptic vesicle docking and fusion. Furthermore, we are studying regulation of presynaptic function by small GTPases and by protein phosphorylation.

Selected Recent Publications

Honigmann A, van den Bogaart G, Iraheta E, Risselada HJ, Milovanovic D, Mueller V, Müllar S, Diederichsen U, Fasshauer D, Grubmüller H, Hell SW, Eggeling C, Kühnel K, Jahn R (2013) Phosphatidylinositol 4,5-bisphosphate clusters act as molecular beacons for vesicle recruitment. Nat Struct Mol Biol 20: 679-686

Park Y, Hernandez JM, van den Bogaart G, Ahmed S, Holt M, Riedel D, Jahn R (2012) Controlling synaptotagmin activity by electrostatic screening. Nature Struct Mol Biol 19: 991-997

Jahn R, Fasshauer D (2012) Exocytosis of synaptic vesicles – molecular machines, calcium, and beyond (review). Nature 490(7419): 201-7

Hernandez JM, Stein A, Behrmann E, Riedel D, Cypionka A, Farsi Z, Walla PJ, Raunser S, Jahn R (2012) Membrane fusion intermediates via directional and full assembly of the SNARE complex. Science 336: 1581-1584

Chua JJ, Butkevich E, Worseck JM, Kittelmann M, Gronborg M, Behrmann E, Stelzl U, Pavlos NJ, Lalowski M, Eimer S, Wanker EE, Klopfenstein DR*, Jahn R* (2012) Phosphorylation-regulated axonal dependent transport of syntaxin 1 is mediated by a Kinesin-1 adapter. Proc Natl Acad Sci USA 109: 5862-5867

van den Bogaart G, Meyenberg K, Risselada JH, Amin H, Willig KI, Hubrich BE, Dier M, Hell SW, Grubmüller H, Diederichsen U, Jahn R (2011) Membrane protein sequestering by ionic protein-lipid interactions. Nature 479: 552-555

van den Bogaart G, Thutupalli S, Risselada JH, Meyenberg K, Holt M, Riedel D, Diederichsen U, Herminghaus S, Grubmüller H, Jahn R (2011) Synaptotagmin-1 may be a distance regulator acting upstream of SNARE nucleation. Nat Struct Mol Biol 18: 805-812

Stein A, Weber G, Wahl MC, Jahn R (2009) Helical extension of the neuronal SNARE complex into the membrane. Nature 460: 525-528

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Stefan Jakobs

Professor of High Resolution Microscopy in Neurodegenerative Diseases

- 1995 – Diploma, University of Kaiserslautern
- 1995 – 1999 Graduate studies (MPI for Plant Breeding Research, Cologne, Germany and John-Innes-Centre, Norwich, GB)
- 1999 Dr. rer. nat. University of Cologne
- 1999 Postdoc (Laboratory of J. Schell/K. Palme, MPI for Plant Breeding Research, Cologne)
- 1999 – 2005 Postdoc (MPI for Biophysical Chemistry, Laboratory of S.W. Hell)
- 2005 – Research group leader at the MPI for Biophysical Chemistry
- 2007 Habilitation (Botany/Cell Biology) at the Georg-August-University Göttingen
- 2010 – Professor (W2) of High Resolution Microscopy in Neurodegenerative Diseases, University of Göttingen Medical School, Dept. of Neurology

Major Research Interests

Our two major research interests are the investigation of the nanoscale architecture and dynamics of mitochondria and the analysis of reversibly switchable fluorescent proteins (RSFPs) as probes for super-resolution microscopy. Mitochondria are essential organelles in all eukaryotic cells and their dysfunction is involved in many devastating (neurodegenerative) diseases. We want to understand the organization of mitochondria on the nanoscale in healthy and challenged cells and investigate the molecular mechanisms that determine their intricate structure. We utilize a wide array of techniques, including molecular biology, biochemical methods as well as electron and super-resolution microscopy.
RSFPs are fluorescent proteins that may be switched by light between a non-fluorescent and a fluorescent state. Their unique properties open up numerous applications in microscopy and cell biology. We investigate the molecular switching mechanisms and aim to improve the properties of these fascinating proteins as probes for live-cell super-resolution microscopy.

Selected Recent Publications

Jans DC, Wurm CA, Riedel D, Wenzel D, Stagge F, Deckers M, Rehling P, Jakobs S (2013) STED super-resolution microscopy reveals an array of MINOS clusters along human mitochondria. Proc Natl Acad Sci USA 110: 8936-41

Grotjohann T, Testa I, Leutenegger M, Bock H, Urban NT, Lavoie-Cardinal F, Willig KI, Eggeling C, Jakobs S*, Hell SW* (* shared corresponding authors) (2011) Diffraction-unlimited all-optical imaging and writing with a photochromic GFP. Nature 478: 204-208

Brakemann T, Stiel AC, Weber G, Andresen M, Testa I, Grotjohann T, Leutenegger M, Plessmann U, Urlaub H, Eggeling C, Wahl MC, Hell SW, Jakobs S (2011) A reversibly photoswitchable GFP-like protein with fluorescence excitation decoupled from switching. Nature Biotech 29(10): 942-947

Kukat C, Wurm CA, Spåhr H, Falkenberg M, Larsson N, Jakobs S (2011) Super-resolution microscopy reveals that mammalian mitochondrial nucleoids have a uniform size and frequently contain a single copy of mtDNA. Proc Natl Acad Sci USA 108(33): 13534-9

Wurm CA, Neumann D, Lauterbach MA, Harke B, Egner A, Hell SW, Jakobs S (2011) Nanoscale distribution of mitochondrial import receptor Tom20 is adjusted to cellular conditions and exhibits an inner-cellular gradient. Proc Natl Acad Sci USA 108(33): 13546-51

Andresen M, Stiel AC, Fölling J, Wenzel D, Schönle A, Egner A, Eggeling C, Hell SW, Jakobs S (2008) Photoswitchable fluorescent proteins enable monochromatic multilabel imaging and dual color fluorescence nanoscopy. Nature Biotech 26: 1035-1040

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Andreas Janshoff

- 1987 – 1989 Studies of Biology at the University of Münster
- 1989 – 1994 Studies of Chemistry at the University of Münster, with honor
- 1994 – 1997 PhD thesis under supervision of Prof. Dr. H.-J. Galla
- 1997 – 1998 Postdoctoral Researcher at the Scripps Research Institute (La Jolla, CA, USA)
- 1999 – 2001 Habilitation in Biochemistry at the University of Münster in the group of Prof. Dr. H.-J. Galla and Prof. Dr. H. Fuchs
- 2001 – 2006 Associate Professor (C3) for Physical Chemistry at the University of Mainz
- 2006 – 2008 Full Professor (W3) for Biophysical Chemistry at the University of Mainz
- since 2008 Full Professor (W3) for Biophysical Chemistry at the University of Göttingen

Major Research Interests

- Membrane Biophysics
- Cell mechanics
- Sensor design
- Single-molecule force spectroscopy

Selected Recent Publications

Schäfer E, Westendorf C, Bodenschatz E, Beta C, Geil B, Janshoff A (2011) Shape oscillations of *Dictyostelium discoideum* cells on ultramicroelectrodes monitored by impedance analysis. Small 7: 723-726

Tarantola M, Marel A.-K, Sunnick E, Adam H, Wegener J, Janshoff A (2010) Dynamics of human cancer cell lines monitored by electrical and acoustic fluctuation analysis. Int Biol 2: 139-150

Lorenz B, Keller R, Sunnick E, Geil B, Janshoff A (2010) Colloidal Probe Microscopy of Membrane-Membrane Interactions: from Ligand-Receptor Interactions to Fusion Events. Biophys Chem 150: 54-63

Janke M, Rudzevich Y, Molokanova O, Metzroth T, Mey I, Diezemann G, Marszalek PE, Gauss J, Böhmer V, Janshoff A (2009) Mechanically locked nanocapsules under force allow reversible hydrogen bond breakage. Nat Nanotechnol 4: 225-229

Fine T, Mey I, Rommel C, Wegener J, Steinem C, Janshoff A (2009) Elasticity mapping of apical cell membranes. Soft Matter 5: 3262-3265

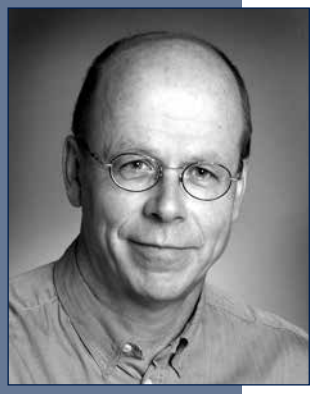
Lorenz B, Mey I, Steltenkamp S, Fine T, Rommel C, Müller MM, Maiwald A, Wegener J, Steinem C, Janshoff A (2009) Elasticity mapping of pore suspending native cell membranes. Small 5: 832-838

Mey I, Stephan M, Schmitt EK, Müller MM, Ben-Amar M, Steinem C, Janshoff A (2009) Local membrane mechanics of pore-spanning bilayers. J Am Chem Soc 131: 7031–7039

Schuy S, Schäfer E, Yoder NC, Vogel R, Kumar K, Janshoff A (2009) Lipopeptides derived from HIV and SIV mimicking the prehairpin intermediate of gp41 on solid supported lipid bilayers. J Struct Biol 168: 126-136

Schuy S, Schäfer E, Yoder NC, Vogel R, Hobe S, Kumar K, Janshoff A (2009) Coiled coil lipopeptides mimicking the prehairpin intermediate of gp41. Angew Chemie Int Ed 48: 751-754

Schuy S, Treutlein B, Pietuch A, Janshoff A (2008) In situ synthesis of lipopeptides as versatile receptors for the specific binding of nanoparticles and liposomes to solid supported membranes. Small 4: 970-982



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Michael Kessel

Professor of Molecular Biology

- Until 1981 Biochemical Institute, Kiel University
- 1981 – 1983 National Cancer Institute, NIH, Bethesda,USA
- 1983 – 1986 Center for Molecular Biology (ZMBH), Heidelberg University
- Since 1987 Max Planck Institute for Biophysical Chemistry, Göttingen

Major Research Interests

The group is interested in the coordination between cell cycle and developmental control processes in mice. We apply biochemical, genetic and embryological techniques.

We previously identified the Geminin protein as a mediator between cell cycle progression and the control of axial specification. Geminin regulates homeodomain proteins of the Hox family both on a transcriptional and a chromatin level. Studying a conditional mouse knock-out model we found that Geminin is essential for the first cell divisions in murine embryos, but not later in development. Geminin is also necessary for the establishment, growth and maintenance of murine embryonic stem cells.

We further analyze the Mad2l2, a regulator of the APC/C complex, and a subunit of translesion DNA polymerase zeta. We study the role of Mad2l2 in cell cycle regulation with particular focus on the development of primordial germ cells. We generated a model where a programming of the germ cell fate is inhibited. On the other hand, we attempt to transdifferentiate somatic cells into a germ cells, following the approach used for induced pluripotency.

Selected Recent Publications

Asli NS, Kessel M (2010) Spatiotemporally restricted regulation of generic motor neuron programs by *miR-196*-mediated repression of Hoxb8. Dev Biol 344: 857-868

Pitulescu ME, Teichmann M, Luo L, Kessel M (2009) TIPT2 and geminin interact with basal transcription factors to synergize in transcriptional regulation. BMC Biochem 10: 16

Wittler L, Saborowski M, Kessel M (2008) Expression of the chick Sizzled gene in progenitors of the cardiac outflow tract. Gene Expr Patterns 8(6): 471-6

Luo L, Uerlings Y, Happel N, Asli NS, Knoetgen H, Kessel M (2007) Regulation of geminin functions by cell cycle dependent nuclear-cytoplasmic shuttling. Mol Cell Biol 27: 4737-4744

Spieler D, Baumer N, Stebler J, Koprunner M, Reichman-Fried M, Teichmann U, Raz E, Kessel M, Wittler L (2004) Involvement of Pax6 and Otx2 in the forebrainspecific regulation of the vertebrate homeobox gene ANF/Hesx1. Dev Biol 269: 567-79

Luo L, Yang X, Takihara Y, Knoetgen H, Kessel M (2004) The cell-cycle regulator geminin inhibits Hox function through direct and polycomb-mediated interactions. Nature 427: 749-53

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Dieter Klopfenstein

Junior Group Leader at the Centre for Molecular Physiology of the Brain, University of Göttingen

- Dr. phil. nat. (Ph.D.) University of Basel, 1999
- Postdoctoral fellow at the University of California San Francisco, 1999 – 2003
- Since 2003 head of an independent Junior Research Group

Major Research Interests

The long-range transport of membrane organelles in neurons depends primarily upon microtubules and motor proteins that move unidirectionally along these tracks. One type of microtubule-based motor proteins powering membrane transport is the kinesin superfamily. We are interested in how these motors achieve specificity in cargo binding, elicit membrane transport, and the regulation of transport activity. One example of a kinesin motor is UNC-104/KIF1A, which specifically transports presynaptic vesicle to the synaptic terminal and binds with its tail domain directly to membrane lipids *in vitro*. This unique cargo-interaction mechanism help us to understand how lipids and their membrane environment contribute to cargo transport, how motor-lipid interaction could be regulating transport, and how accessory proteins contribute to membrane motility. Using fluorescently tagged motor and vesicle markers we investigate these questions in the nervous system of the nematode *C. elegans* serves us as a model system for microscopic tools (confocal, TIRF, FRET FLIM) and biochemical transport assays *in vitro*.

Selected Recent Publications

Chua JJ, Butkevich E, Worseck JM, Kittelmann M, Gronborg M, Behrmann E, Stelzl U, Pavlos NJ, Lalowski M, Eimer S, Wanker EE, Klopfenstein DR, Jahn R (2012) Phosphorylation-regulated axonal dependent transport of syntaxin 1 is mediated by a Kinesin-1 adapter. Proc Natl Acad Sci USA 109(15): 5862-7

Gerson-Gurwitz A, Thiede C, Movshovich N, Fridman V, Podolskaya M, Danieli T, Lakämper S, Klopfenstein DR, Schmidt CF, Gheber L (2011) Directionality of individual kinesin-5 Cin8 motors is modulated by loop 8, ionic strength and microtubule geometry. EMBO J 30(24): 4942-54

Kumar J, Chowdhary B., Metpally R, Ramanathan S, Zheng Q, Nonet ML, Klopfenstein DR, Koushika SP (2010) The C. elegans kinesin motor UNC-104 is degraded upon loss of specific binding to cargo. PLoS Genetics 6(11): e1001200

Krahn MP, Klopfenstein DR, Fischer N, Wodarz A (2010) Membrane targeting of Bazooka/PAR-3 is mediated by direct binding to phosphoinositide lipids. Curr Biol 20(7): 636-42

Wagner OI, Esposito A, Wouters F, Shen K, Wenzel D, Klopfenstein DR. (2009) Active zone protein SYD-2/liprin-alpha regulates kinesin UNC-104/KIF1A motility and motor clustering along axons. Proc Natl Acad Sci USA 106(46): 19605-10

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Wilfried Kramer

Privatdozent Molecular Biology and Genetics

- Diploma (Biology), University of Cologne, Germany, 1982
- Dr. rer. nat., University of Cologne, Germany, 1986
- Postdoctoral Fellow, University of California, Berkeley, USA, 1986 – 1989
- Habilitation in Molecular Biology and Genetics, University of Göttingen, Germany, 2000
- At the Dept. of Molecular Genetics since 1989

Major Research Interests

In the Department of Molecular Genetics, headed by Prof. Dr. H. Krebber, I try to identify new factors that might be involved in the export of mRNA from the nucleus in *Saccharomyces cerevisiae*. To this end, ordered mutants arrays are screened for genetic interactions with selected mutants by the so called SGA technique, which makes use of the genetic features offered by budding yeast to rapidly construct double mutants and compare their growth with that of single mutants. Furthermore, we want to extend these studies in different collaborations to microscopic screenings of those mutant arrays for export defects using automated microscopes. In a collaboration with Prof. Dr. S. Emmert from the medical faculty we want to analyse the function of the yeast *MPH1* gene and of its human homologue *FANCM*. The latter is a determining factor of the hereditary disease Fanconi anemia, which is – besides other symptoms - characterised by chromosome instability and increased incidence of cancer. Both are associated to homologous recombination and at least Mph1 is very likely involved in the error-free bypass of lesions, which are caused by DNA damaging agents and are blocking DNA replication, posing a very serious threat to the survival of the cell. Understanding these cellular responses to DNA damage will allow a better insight into central processes involved in the malignant transformation of cells.

Selected Recent Publications

Ede C, Rudolph CJ, Lehmann S, Schürer KA, Kramer W (2011) Budding yeast Mph1 promotes sister chromatid interactions by a mechanism involving strand invasion. DNA Repair 10: 45-55

Schomacher L, Schürer KA, Ciirdaeva E, McDermott P, Chong J, Kramer W, Fritz HJ (2010) Archaeal DNA uracil repair via direct strand incision: A minimal system reconstituted from purified components. DNA Repair 9: 438-447

Panico ER, Ede C, Schildmann M, Schürer KA, Kramer W (2010) Genetic evidence for a role of *Saccharomyces cerevisiae* Mph1 in recombinational repair under replicative stress. Yeast 27: 11-27

Prakash R, Satory D, Dray E, Papusha A, Scheller J, Kramer W, Krejci L, Klein H, Haber JE, Sung P, Ira G (2009) Yeast Mph1 helicase dissociates Rad51-made D-loops: implications for crossover control in mitotic recombination. Genes Dev 23: 67-79

Schürer KA, Rudolph C, Ulrich HD, Kramer W (2004) Yeast MPH1 gene functions in an error-free DNA damage bypass pathway that requires genes from homologous recombination, but not from postreplication repair. Genetics 166: 1673-1686

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Heike Krebber

Professor for Molecular Genetics

- 1996 Dr. rer. nat., Deutsches Krebsforschungszentrum, DKFZ, Heidelberg (Germany)
- 1996 Visiting Scientist, Weizman Institute of Science, Rehovot (Israel)
- 1996 – 1999 Scientist, Dana-Farber Cancer Institute, Harvard Medical School, Boston (USA)
- 1999 – 2010 Junior group leader, Institute for Molecular Biology and Tumor Research, Philipps-Universität Marburg (Germany)
- 2005 Habilitation in Molecular Biology
- 2006 Heisenberg Fellow
- since 2010 Professor for Molecular Genetics, Georg-August Universität Göttingen (Germany)

Major Research Interests

The compartimentation of eukaryotic cells requires a machinery that is able to transport a great number of molecules into and out of the nucleus in a rapid, accurate and regulated manner. The natural cargos for this machinery are proteins and RNA-protein complexes (RNPs). For the mRNPs it has to be assured that intron containing pre messenger RNAs are retained in the nucleus until processing is completed. Only fully processed and spliced mRNAs are transported into the cytoplasm and translated at the ribosomes. The otherwise resulting gene products can be toxic to cells and harmful to organisms. Several examples exist where not fully processed pre-mRNAs reach the cytoplasm, resulting in diseases like cancer or neurodegenerative diseases. Our projects aim to identify and characterize the requirements for mRNA processing, transport and translation. We want to learn which proteins are associated with the transported RNP, how transport is regulated and how the cell distinguishes between export incompetent and export competent mRNPs. Moreover, we study the principles of mRNA quality control. Saccharomyces cerevisiae has been proven to be a useful model organism for eukaryotic cells and we use a combination of genetics, biochemistry and cell biology to uncover these processes.

Selected Recent Publications

Tieg B, Krebber H (2013) Dbp5 – From nuclear export to translation. Biochem Biophys Acta 1829, 791-798

Hackmann A, Gross T, Baierlein C, Krebber H (2011) The mRNA export factor Npl3 mediates the nuclear export of large ribosomal subunits. EMBO Rep 12(10): 1024-31

Baierlein C, Krebber H (2010) Translation termination: New factors and insights. RNA Biology 7(5): 548-550

Khoshnevis S, Gross T, Rotte C, Baierlein C, Ficner R, Krebber H (2010) The iron-sulfur protein Rli1 functions in translation termination. EMBO Rep 11: 214-219

Gross T, Siepmann A, Sturm D, Windgassen M, Scarelli J, Cole CN, Seedorf M, Krebber H (2007) The DEAD-box RNA-helicase Dbp5 functions in translation termination. Science 315(5812): 646-649

Windgassen M, Sturm D, Cajigas IJ, González CI, Seedorf M, Bastians H, Krebber H (2004) Yeast shuttling SR-proteins Npl3p, Gbp2p and Hrb1p are part of the translated mRNAs and Npl3p can function as a translational repressor. Mol Cell Biol 24(23): 10479-10491

Häcker S, Krebber H (2004) Differential export requirements for shuttling SR-type mRNA binding proteins. J Biol Chem 279(7): 5049-5052

Windgassen M, Krebber H (2003) Identification of Gbp2p as a novel poly(A)+RNA binding protein in yeast involved in the cytoplasmic delivery of mRNAs. EMBO Rep 4(3): 278-283

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Volker Lipka

Professor of Plant Cell Biology

- Dr. rer.nat. at the Department for Plant Molecular Biology, Technical University Aachen, 1999
- Postdoctoral fellow at the SainsburyLaboratory, John Innes Centre, Norwich, UK, 1999 – 2000
- Postdoctoral fellow at the Max-Planck Institute for Plant Breeding Research, Cologne, 2000 – 2004
- Leader of an independent research group at the Department for Plant Biochemistry, Centre for Plant Molecular Biology, University of Tübingen, 2004 – 2007
- Leader of an independent research group at the Sainsbury Laboratory, John Innes Centre, Norwich, UK, 2007 – 2009
- Professor at the University of Göttingen since 2009

Major Research Interests

Our laboratory is interested in the molecular analysis of plant innate immunity. Our research is focused on 1) the molecular dissection of mechanisms that control activation of basal defence in the plant model *Arabidopsis thaliana* 2) the analysis of defence mechanisms that contribute to resistance against fungal pathogens 3) the identification of fungal effector molecules that interfere with the plant defence machinery and allow host plant colonization
In nature, plants are constantly exposed to above- and below-ground attack by a vast array of potential pathogens. However, most plants are immune to the majority of would-be pathogens and susceptible to only a relatively small number of adapted microbes. Using a novel plant-fungus interaction model system we recently identified several molecular components that are required for the activation (Gimenez-Ibanez et al., 2009) and execution of basal plant defence (Collins et al., 2003; Lipka et al., 2005; Stein et al., 2006; Kwon et al., 2008; Lipka et al., 2008). As a consequence, receptor-mediated recognition, pathogen-induced intracellular transport processes, dynamic organelle translocation and cytoskeletal rearrangements represent major research topics in our department. Suppression of these defence mechanisms is a key requirement for adapted pathogens and we recently began studies to identify secreted fungal effector molecules that are likely to be involved. We combine genetic, cell, molecular and biochemical experimental strategies to gain novel insights into these complex mechanisms.

Selected Recent Publications

Willmann R, Lajunen HM, Erbs G, Newman MA, Kolb D, Tsuda K, Katagiri F, Fliegmann J, Bono JJ, Cullimore JV, Jehle AK, Götz F, Kulik A, Molinaro A, Lipka V, Gust AA, Nürnberger T (2011) *Arabidopsis* lysin-motif proteins LYM1 LYM3 CERK1 mediate bacterial peptidoglycan sensing and immunity to bacterial infection. Proc Nat Acad Sci USA 108(49): 19824-19829

Petutschnig EK, Jones AM, Serazetdinova L, Lipka U, Lipka V (2010) The Lysin Motif Receptor-like Kinase (LysM-RLK) CERK1 is a major chitin-binding protein in *Arabidopsis thaliana* and subject to chitin-induced phosphorylation. J Biol Chem 285(37): 28902-28911

Gimenez-Ibanez S, Hann DR, Ntoukakis V, Petutschnig E, Lipka V*, Rathjen JP* (2009) AvrPtoB targets the LysM receptor kinase CERK1 to promote bacterial virulence on plants. Curr Biol 19: 423-429, *co-corresponding authors

Kwon C, Neu C, Pajonk S, Yun HS, Lipka U, Humphry ME, Bau S, Straus M, Rampelt H, El Kasmi F, Jürgens G, Parker J, Panstruga R*, Lipka V*, Schulze-Lefert P* (2008) Co-option of a default secretory pathway for plant immune responses. Nature 451: 835-840, *co-corresponding authors

Lipka V, Dittgen J, Bednarek P, Bhat RA, Stein M, Landtag J, Brandt W, Scheel D, Llorente F, Molina A, Wiermer M, Parker J, Somerville SC, Schulze-Lefert P (2005) Pre- and post-invasion defenses both contribute to non-host resistance in *Arabidopsis*. Science 310: 1180-1183

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Reinhard Lührmann

Professor, Director at the Max Planck Institute for Biophysical Chemistry

- Dr. rer. nat (Ph. D.), University of Münster (1975)
- Research group leader, Max Planck Institute for Molecular Genetics, Berlin (1981 – 1988)
- Professor of Biochemistry and Molecular Biology at the University of Marburg (1988 – 1999)
- Director, Dept. of Cellular Biochemistry, Max Planck Institute for Biophysical Chemistry, Göttingen (since 1999)
- Honorary Professor at the Georg August University of Göttingen

Major Research Interests

Most metazoan pre-mRNAs contain multiple introns and exons. In order to generate mature mRNA, the introns must be excised from the pre-mRNA, a process termed pre-mRNA splicing. In many cases, alternative splicing generates different mRNAs from a single pre-mRNA by the regulated removal of different sections of the RNA, a process which greatly expands the complexity of the repertoire of proteins that can be expressed from relatively small genomes. Splicing is catalysed by a large macromolecular machine, termed the spliceosome which consists of the small nuclear RNAs (U1, U2, U4, U5 and U6) and more than 150 proteins, 50 of which are associated with the snRNAs to form snRNPs.
In our laboratory, intense efforts are focussed on understanding how the spliceosome recognizes and binds the intron ends and discriminates them from exons. This is an especially confounding problem in metazoans because, in contrast to lower eucaryotes such as yeast, pre-mRNA introns are often extremely long (104-105 nucleotides), while exons are generally small (less than 300 nucleotides). Another major goal of our research is the elucidation of the mechanisms by which the spliceosome assembles into a catalytically active machine and catalyses intron excision. None of the building blocks of the spliceosome contains an active site. Instead, the catalytically active domain must be assembled anew on to each intron, a highly dynamic process which entails dramatic structural rearrangements of the RNP structure of the spliceosome, and which is orchestrated by the successive action of more than 10 enzymes such as RNA helicases and GTPases, as well as by posttranslational phosphorylation of a multitude of spliceosomal proteins. Our studies involve a large number of experimental approaches, including biochemical purification of entire spliceosomes or large protein ensembles, and characterization of their proteins by mass spectrometry; RNA biology methods such as enzymatic engineering of RNA molecules, RNA structure probing and RNA interference methods; production of recombinant proteins and antibodies; procedures for the investigation of protein-protein and protein-RNA interactions *in vitro* and *in vivo*; and biophysical methods such as fluorescence spectroscopy.
Finally, we are investigating the 3D structure of purified spliceosomes or major building blocks thereof using electron microscopic approaches and X ray crystallography. Our studies on the regulatory mechanisms of constitutive and alternative pre-mRNA splicing involve mainly mammalian systems. As the basic mechanisms of splicing catalysis appear to be evolutionarily highly conserved, we are also taking advantage of molecular genetic approaches in baker yeast to elucidate the structure and function of the catalytic core domain of the spliceosome.

Selected Recent Publications

Fourmann J B, Schmitzova J, Christian H, Urlaub H, Ficner R, Fabrizio P, Lührmann R (2013) Dissection of the factor requirements for spliceosome disassembly and the elucidation of its dissociation products using a purified splicing system. Genes Dev 27: 413-428

Girard C, Will CL, Peng J, Makarov EM, Kastner B, Lemm I, Urlaub H, Hartmuth K, Lührmann R (2012) Post-transcriptional spliceosomes are retained in nuclear speckles until splicing completion. Nature Commun 3: 994

Golas MM, Sander B, Bessonov S, Grote M, Wolf E, Kastner B, Stark H, Lührmann R (2010) 3D Cryo-EM structure of an active stepI spliceosome and localization of its catalytic core. Mol Cell 40: 927-938

Golas MM, Sander B, Bessonov S, Grote M, Wolf E, Kastner B, Stark H, Lührmann R (2010) 3D Cryo-EM structure of an active step 1 spliceosome and localization of its catalytic core. Mol Cell 40: 927-938

Wahl MC, Will CL, Lührmann R (2009) The spliceosome: design principles of a dynamic RNP machine. Cell 136: 701-718

Warkocki Z, Odenwälder P, Schmitzova J, Platzmann F, Stark H, Urlaub H, Ficner R, Fabrizio P, Lührmann R (2009) Reconstitution of both steps of S. cerevisiae splicing with purified spliceosomal components. Nature Struct Mol Biol 16: 1237-1243

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Ahmed Mansouri

Molecular Developmental Genetics

- Diploma (Chemistry), Technical University, Braunschweig (Germany) 1975
- Dr. rer. nat. Chemical Technology Institute, Technical University, Braunschweig (Germany), 1978
- Postdoc at the Institute of Human Genetics in Göttingen (1982 – 1986)
- Postdoc at the Miescher Institute in Tübingen (MPI) and at the Max Planck
- Institute of Immunbiology in Freiburg (Germany) (1986 – 1989)
- Since 1989 Dept of Molecular Cell Biology at the MPI for Biophysical Chemistry in Göttingen
- Habilitation (Molecular Developmental Genetics), University of Göttingen, Germany, 1999
- Since 2005: Dr. Helmut Storz Stiftungsprofessur for “dopaminerge Stammzelltherapie”, Dept. of Clinical Neurophysiology at the University of Göttingen

Major Research Interests

Studying the molecular mechanisms controlling cell fate destiny and diversity is of fundamental interest for understanding pathological processes and diseases. We are using mouse genetics to study the role of transcription factors during cell differentiation in the endocrine pancreas and in the ventral midbrain.

In the pancreas, we are interested in molecules that control the endocrine cell subtype specification. In addition, we are studying animal models to uncover molecular pathways promoting beta-cell regeneration in the adult pancreas.

In the midbrain the specification of dopaminergic neurons is under the control of several transcription and secreted factors. Specifically, we want to identify factors that interact with Lmx1 a/b in order to promote the generation of functionally distinct dopaminergic neuron populations.

Selected Recent Publications

Kordowich S, Collombat P, Mansouri A, Serup P. (2011). Arx and Nkx2.2 compound deficiency redirects pancreatic alpha- and beta-cell differentiation to a somatostatin/ghrelin co-expressing cell lineage. BMC Dev Biol 11: 52-67

Griesel G, Krug C, Yurlova L, Diaconu M, Mansouri A. (2011). Generation of knockout mice expressing a GFP-reporter under the control of the Lmx1a locus. Gene Expr Patterns 11(5-6): 345-358

Collombat P, Xu X, Ravassard P, Sosa-Pineda B, Dussaud S, Billestrup N, Ole Madsen OD, Serup P, Heimberg H, Mansouri A (2009) The ectopic expression of Pax4 in the mouse pancreas converts progenitor cells into a- and subsequently b-cells. Cell 138: 449-462

Dressel R, Schindehütte J, Kuhlmann T, Elsner L, Novota P, Baier PC, Schillert A, Bickeböller H, Herrmann T, Trenkwalder C, Paulus W, Mansouri A (2008) The tumorigenicity of mouse embryonic stem cells and *in vitro* differentiated neuronal cells is controlled by the recipients’ immune response. PLoS ONE 3(7): e2622

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Till Marquardt

- since 2007: independent research group leader, DFG Emmy Noether group leader at the European Neuroscience Institute, Göttingen
- 2001 – 2006: postdoctoral research associate and staff scientist with Samuel L. Pfaff at the Salk Institute for Biological Studies in La Jolla, California, USA
- 2001: Ph.D. with Peter Gruss at the Max-Planck Institute of Biophysical Chemistry, University of Göttingen

Major Research Interests

Adequate control of body motion and posture depends on elaborate circuitries that connect both motor and sensory neurons with the musculature. The central importance of these connections is illustrated by the debilitating consequences of diseases affecting motor neurons, such as Amyotrophic Lateral Sclerosis (ALS) and diabetic neuropathy. Our research aims at understanding the molecular mechanisms driving the assembly of functional neuromuscular circuitries during embryonic and postnatal development. This includes the study of cell surface-based signaling molecules that control motor and sensory axon connectivity in mice. Another research focus of the lab aims at identifying and characterizing novel mechanisms driving the functional specification of motor neurons within the context of operative neuromuscular circuitry. We extensively take advantage of mouse genetics in order to selectively trace and manipulate specific neuron populations. We combine this genetic approach with live 3D fluorescence (spinning disk) microscopy, as well as electrophysiological methods to elucidate the role of cell surface and nuclear receptor proteins in sensory-motor connectivity and functional neuron specification.

Selected Recent Publications

Wang L, Marquardt T (2012) Live monitoring of heterotypic axonal interactions *in vitro*. Nature Protocols 7: 351-363

Bonanomi D, Chivatakarn O, Bai G, Lettieri K, Abdesselem H, Marquardt T, Pierchala BA, Pfaff SL (2012) Ret is a multifunctional co-receptor that integrates diffusible- and contact-axon guidance signals. Cell 148: 568-582

Wang L, Klein R, Zheng B, Marquardt T (2011) Anatomical coupling of sensory and motor nerve trajectory through axon tracking. Neuron 71: 263-277

Gallarda B, Bonanomi D, Müller D, Brown A, Alaynick WA, Lemke G, Pfaff SL, Marquardt T (2008) Segregation of axial sensory and motor pathways through heterotypic trans-axonal signaling. Science 320: 233-236

Marquardt T, Shirasaki R, Ghosh S, Carter N, Andrews SE, Hunter T, Pfaff SL (2005) Co-expressed EphA receptors and ephrin-A ligands mediate opposing actions on growth cone navigation from distinct membrane sub-domains. Cell 121: 127-139

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Burkhard Morgenstern

Professor of Bioinformatics

- 1993 Diploma (Mathematics), LMU München
- 1996 PhD (Dr. Math.), Universität Bielefeld
- 1997 – 1998 Visiting Scientist, North Carolina State University, Raleigh, NC, USA
- 1998 – 2000 RPR/Aventis, Dagenham, Essex, UK
- 2000 – 2001 MIPS, MPI fuer Biochemie, Martinsried and GSF, Neuherberg
- 2001 – 2002 Group leader and faculty member at International Graduate
- School in Bioinformatics and Genome Research, Univertität Bielefeld
- Since 2002 Professor of Bioinformatics, Universität Göttingen

Major Research Interests

A traditional focus of our research work is on algorithm development for nucleic acid and protein sequence analysis; the multiple-alignment program DIALIGN is developed and maintained in our department. More recently, we started to develop alingment-free approaches to DNA and protein sequence analysis.

Other areas of research in our department include: metabolomics and mass, spectroscopy data analysis, phylogeny reconstruction, metagenomics, motif discovery and remote homology detection using machine learning methods, genome annotation for prokaryotes, recombinations in viral genomes and HIV classification using coalescent theory.

Selected Recent Publications

Al Ait L, Yamak Z, Morgenstern B (2013) DIALIGN at GOBICS - multiple sequence alignment using various sources of external information. Nucleic Acids Res 41: W3-W7

Corel E, Pitschi F, Morgenstern B (2010) A min-cut Algorithm for the Consistency Problem in Multiple Sequence Alignment. Bioinformatics 26: 1015-1021

Philippe et al (2009) Phylogenomics restores traditional views on deep animal relationships. Curr Biol 19: 706-712

Meinicke P, Lingner T, Kaever A, Feussner K, Göbel C, Feussner I, Karlovsky P, Morgenstern B (2008) Metabolite-based clustering and visualization of mass spectrometry data using one-dimensional self-organizing maps. Algorithms Mol Biol 3: 9

Subramanian AR, Kaufmann M, Morgenstern B (2008) DIALIGN-TX: greedy and progressive approaches for segment-based multiple sequence alignment. Algorithms Mol Biol 3: 6

The *Tribolium* Genome Sequencing Consortium (2008) The genome of the beetle developmental model and pest *Tribolium castaneum*. Nature 452: 949-955

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Tobias Moser

Professor of Auditory Neuroscience

- MD University of Jena, 1995
- Postdoct with E. Neher at the MPI for Biophysical Chemistry, 1994 – 1997
- Junior Group Leader at the at the MPI for Biophysical Chemistry, Göttingen 1997 – 2001
- Residency in Otolaryngology, University of Göttingen School of Medicine 1997 – 2002
- Group Leader at the Department of Otolaryngology, University of Göttingen School of Medicine since 2001

Major Research Interests

Our work focuses on the molecular physiology and pathophysiology of sound encoding at the hair cell ribbon synapse and its restoration. We have physiologically and morphologically characterized synapses of wild-type and mutant mice with defects in hair cell synaptic coding from the molecular to the systems level. This way we have contributed to the understanding of structure and function of the hair cell ribbon synapse and co-initiated the concept of auditory synaptopathy. Molecular dissection and detailed physiological characterization of ribbon synapse function employ a spectrum of molecular, biophysical, physiological, psychophysical and clinical approaches. Towards restoration of hearing we pursue the optogenetic stimulation of cochlea and gene replacement therapy.

Selected Recent Publications

Schrauwen I, Helfmann S, Inagaki A, Predoehl F, Tabatabaiefar MA, Picher MM, Sommen M, Seco CZ, Oostrik J, Kremer H, Dheedene A, Claes C, Fransen E, Chaleshtori MH, Coucke P, Lee A, Moser T, Van Camp G (2012) A Mutation in CABP2, Expressed in Cochlear Hair Cells, Causes Autosomal-Recessive Hearing Impairment. Am J Hum Genet 91: 636-45

Nouvian R, Neef J, Bulankina AV, Reisinger E, Pangršic T, Frank T, Sikorra S, Brose N, Binz T, Moser T (2011) Exocytosis at the hair cell ribbon synapse apparently operates without neuronal SNARE proteins. Nat Neurosci 14: 411-413

Frank T, Rutherford MA, Strenzke N, Pangrsic T, Khimich D, Fejtova A, Gundelfinger ED, Liberman MC, Harke B, Bryan KE, Lee A, Egner A, Riedel D, Moser T (2010). Bassoon and the synaptic ribbon organize Ca^{2+} channels and vesicles to add release sites and promote refilling. Neuron 68: 724-738

Pangrsic T, Lasarow L, Reuter K, Takago H, Schwander M, Riedel D, Frank T, Tarantino LM, Bailey JS, Strenzke N, Müller U, Brose N, Reisinger E*, Moser T* (2010) Hearing requires otoferlin-dependent efficient replenishment of synaptic vesicles in hair cells. Nat Neurosci 13: 869-876

Meyer AC, Frank T, Khimich D, Hoch G, Riedel D, Chapochnikov, NM, Yarin YM, Harke B, Hell S, Egner A, Moser T (2009) Tuning of Synapse Number, Structure and Function in the Cochlea, Nat Neurosci 12: 444-534

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Klaus-Armin Nave

Professor of Molecular Biology, Director at the Max Planck Institute of Experimental Medicine

- 1987 PhD, University of California, San Diego
- 1987 – 1991 Postdoc, The Salk Institute, la Jolla, California
- 1991 Junior Group Leader, ZMBH, University of Heidelberg
- 1998 Professor of Molecular Biology (C4), ZMBH, University of Heidelberg
- 2000 Director, Department of Neurogenetics, Max Planck Institute for Experimental Medicine Göttingen and Professor of Biology, University of Heidelberg

Major Research Interests

We are interested in the mechanisms of neuron-glia interactions in the higher nervous system, and in the genes that are required for normal glial cell function. Here, transgenic and mutant mice have become important to study developmental processes as well as genetic diseases. For example, oligodendrocytes are glial cells highly specialized for enwrapping CNS axons with multiple layers of membranes, known to provide electrical insulation for rapid impulse propagation. We found that oligodendrocytes are also essential for maintaining the long-term integrity of myelinated axons, independent of the myelin function itself. The mechanisms by which oligodendrocytes support long-term axonal survival are still under investigation. The importance of glial cells as the “first line of neuroprotection”, however, is illustrated by several myelin-associated diseases in which axonal neurodegeneration contribute to progressive disability. These range in humans from peripheral neuropathies (CMT1) to spastic paraplegia (SPG2), and presumably multiple sclerosis (MS) and certain forms of psychiatric disorders. We are developing transgenic animal models for some of these diseases, in order to dissect the underlying disease mechanisms and, in the case of CMT1A, have used these models to design novel therapeutic strategies.
The glial “decision” to myelinate an axonal segment is partly controlled by the axon itself, but the signaling mechanism is not understood. We have found that axonal neuregulin-1 (NRG1) is the major determinant of myelination in the peripheral nervous system. We are now investigating NRG1 dysregulation also in CNS myelination, using quantifiable behavioural functions in mice. By combining genetics with enviromental risk factors for schizophrenia (in collaboration with H. Ehrenreich) we will explore the hypothesis that NRG1, a known human schizophrenia susceptibility gene, points to an important role of myelinating glia in some psychiatric disorders.

Selected Recent Publications

Stassart RM, Fledrich R, Velanac V, Brinkmann BG, Schwab MH, Meijer D, Sereda MW, Nave K-A (2013) A role for Schwann cell derived neuregulin-1 in remyelination. Nat Neurosci 16: 48-54

Saher G, Rudolphi F, Corthals K, Ruhwedel T, Schmidt KF, Löwel S, Dibaj P, Barrette B, Möbius W, Nave K-A (2012) Therapy of Pelizaeus-Merzbacher disease in mice by feeding a cholesterol-enriched diet. Nat Med 18: 1130-1135

Fünfschilling U, Supplie LM, Mahad D, Boretius S, Saab AS, Edgar J, Brinkmann BG, Kassmann CM, Tzvetanova ID, Möbius W, Diaz F, Meijer D, Suter U, Hamprecht B, Sereda MW, Moraes CT, Frahm J, Goebbels S, Nave K-A (2012). Glycolytic oligodendrocytes maintain myelin and long-term axonal integrity. Nature 485: 517-521

Goebbels S, Oltrogge JH, Wolfer S, Wieser GL, Nientiedt T, Pieper A. Ruhwedel T, Groszer M, Sereda MW, Nave K-A (2012) Genetic disruption of Pten in a novel mouse model of tomaculous neuropathy. EMBO Mol Med 4: 486-499

Dhaunchak AS, Colman DR, Nave K-A (2011) Misalignment of PLP/DM20 transmembrane domains determines protein misfolding in Pelizaeus-Merzbacher disease. J Neurosci 31: 14961-14971

Nave K-A (2010) Myelination and support of axonal integrity by glia. Nature 468: 244-252

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Heinz Neumann

Professor of Biochemistry

- 2000: Degree in Chemistry, University of Tübingen
- 2001 – 2005: Doctoral Student, Universities of Tübingen, GER and Lausanne, CH
- 2005 PhD thesis “Structure and function of the VTC complex of *S. cerevisiae*”, with Prof. Dr. Andreas Mayer, Universities of Tübingen and Lausanne, CH
- 2006 – 09: Postdoctoral fellowship with Dr. Jason Chin at the Medical Research Council, Laboratory of Molecular Biology (MRC-LMB) Cambridge, UK
- Since 2009: Junior Research Group Leader, University of Göttingen, Göttingen

Major Research Interests

Applied Synthetic Biology
Synthetic Biology is a new, actively growing field of the life sciences that combines elements from biology and engineering with the aim to design and create life forms with new, unprecedented properties and functions. Synthetic biologists have increased the coding potential of several organisms to allow genetic incorporation of additional “unnatural” amino acids into proteins. These unnatural amino acids have unique chemical or biophysical properties or carry naturally occurring (post-translational) modifications and are therefore fascinating new tools to investigate cellular processes.
Using these tools we develop new strategies to introduce spectroscopic probes into proteins to study the dynamic properties of chromatin. We are also interested in the effect of the post-translational acetylation of lysine residues on protein structure and function.

Selected Recent Publications

Neumann H*, Wang K*, Davis L, Garcia-Alai M, Chin J W (2010) Encoding Multiple Unnatural Amino Acids via Evolution of a Quadruplet Decoding Ribosome. Nature 464: 441-444

Neumann H, Slusarczyk A L, Chin J W (2010) De novo generation of mutually orthogonal aminoacyl-tRNA synthetase/tRNA pairs. J Am Chem Soc 132: 2142-44

Neumann H, Hancock S, Buning R, Routh A, Chapman L, Somers J, Owen-Hughes T, van Noort J, Rhodes D, Chin J W (2009) A method for genetically installing site-specific acetylation in recombinant histones defines the effects of H3 K56 acetylation. Mol Cell 36:153-63

Neumann H, Peak-Chew S Y, Chin J W (2008) Genetically encoding N(epsilon)-acetyllysine in recombinant proteins. Nat Chem Biol 4: 232-4

Neumann H, Hazen J L, Weinstein J, Mehl R A, Chin J W (2008) Genetically encoding protein oxidative damage. J Am Chem Soc 130: 4028-33

Wang K*, Neumann H*, Peak-Chew S Y, Chin J W (2007) Evolved orthogonal ribosomes enhance the efficiency of synthetic genetic code expansion. Nat Biotechnol 25: 770-7

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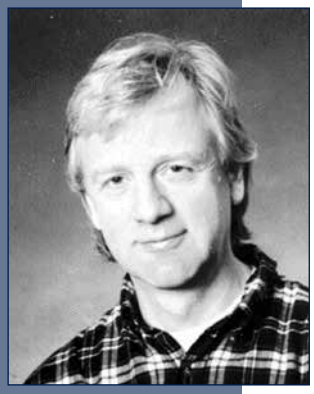

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Tomas Pieler

Professor of Biochemistry

- Dr. rer. nat. Biochemistry, Freie Universität Berlin, 1984
- Guest Investigator, Rockefeller University, New York (1985/86)
- Heisenberg fellow, Freie Universität Berlin and Rockefeller University, New York (1986/87)
- Junior group leader, Max-Planck-Institut für Molekulare Genetik, Berlin (1988 – 1992)
- Professor of Biochemistry, Georg-August-Universität Göttingen (since 1992)
- Head of the Department of Developmental Biochemistry, Georg-August-Universität Göttingen

Major Research Interests

The differentiation of complex organisms has its origin in the asymmetric distribution of regulatory proteins or of the corresponding mRNAs in the egg, as well as in a complex system of cell/cell communication events via extracellular signalling molecules during early stages of embryogenesis. The genes that encode for these different activities form functional networks which provide the basis for the genetic programming of embryonic development. Our primary research interest is in the identification of such regulatory genes and networks in vertebrates, as well as in the definition of their regulation and function on the molecular level. For this purpose, we use *Xenopus laevis*, a frog from South Africa, as a model system. As a traditional object in experimental embryology and in comparison with other experimental systems such as the mouse, use of *Xenopus* offers a number of practical advantages. Oocytes and embryos are easy to collect in large numbers, they are easy to manipulate by relatively simple techniques, also because embryonic development proceeds in the petridish, and, more recently, it has even become possible to generate hundreds of transgenic frogs within a single experimental day. The research topics that we are focussing on are:

- Transport and function of vegetally localized maternal mRNAs
- Organogenesis: formation of pancreas and liver in vertebrate embryos
- Early neural development: primary neurogenesis
- Germ cell specification and migration

Selected Recent Publications

Afelik S, Chen Y, Pieler T (2006) Combined ectopic expression of Pdx1 and Ptfa/ p48 results in the stable conversion of posterior endoderm into endo- and exocrine pancreatic tissue. Genes Dev 20: 1441-1446

Souopgui J, Rust B, Vanhomwegen J, Heasman J, Henningfeld KA, Bellefroid E, Pieler T (2008) The RNA-binding protein XSeb4R: a positive regulator of VegT mRNA stability and translation that is required for germ layer formation in *Xenopus*. Genes Dev 22(17): 2347-52

Arthur PK, Claussen M, Koch S, Tarbashevich K, Jahn O, Pieler T (2009) Participation of *Xenopus* Elr-type proteins in vegetal mRNA localization during oogenesis. J Biol Chem 284(30): 19982-92

Koebernick K, Löber J, Arthur P, Tarbashevich K, Pieler T (2010) Elr-type proteins protect *Xenopus* Dead end mRNA from miR-18-mediated clearance in the soma. Proc Nat Acad Sci 107: 16148-16153

Tarbashevich K, Dzementsei A, Pieler T (2011) A novel function for KiF13B in germ cell migration. Dev Biol 349: 169-178

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Stefanie Pöggeler

Professor of Genetics of Eukaryotic Microorganisms

- 1993 Dr. rer. nat., Ruhr-Universität Bochum
- 1993 – 1995 Research associate
- 1995 – 2001 Postdoctoral research fellow and group leader
- 1997 Visiting Scientist, Institut de Génétique et Microbiologie, Laboratory of Dr. D. Zickler, Université Paris-Sud, Orsay, France
- 2000 Habilitation (Botany), Ruhr-Universität Bochum
- 2001 – 2003 Associate Professor of Botany (stand-in), University of Münster
- 2003 – 2006 University lecturer (Hochschuldozentin) and group leader, Ruhr-Universität Bochum
- since 2006 Associate Professor of Genetics of Eukaryotic Microorganisms, Georg-August-Universität Göttingen

Major Research Interests

Fruiting-body development in filamentous ascomycetes
Fruiting-body development in filamentous ascomycetes is a complex cellular differentiation process that requires special environmental conditions and is controlled by many developmentally regulated genes. We are interested in the genes regulating this development process. We use the homothallic (self-fertile) ascomycete *Sordaria macrospora* as a model organism. Numerous mutants which are blocked at various stages of fruiting-body development have been generated and molecular genetic procedures have been applied to isolate genes involved in fruiting-body development. In addition to mutants generated by chemical mutagenesis, several mutants affecting fruiting-body development were produced by knock-out of mating-type genes, pheromone and receptor genes, as well as genes involved in autophagy and bicarbonate metabolism.

Fungal inteins
An intein is a self-catalytic protein-intervening sequence that catalyses its precise excision from a host protein and the ligation of its flanking sequences, termed N- and C-exteins, to produce the mature spliced product. Protein splicing is a post-translational event that releases an internal intein sequence from a protein precursor. Projects in the lab aim to analyse the splicing activity of inteins detected in the prp8 gene of fungi. Because of their compactness and high splicing activity inside foreign proteins, fungal *PRP8* inteins may be used for the development of new intein-mediated protein-engineering applications such as protein purification, addition of fluorescent biosensors and expression of cytotoxic proteins.

Selected Recent Publications

Voigt O, Pöggeler S (2013) Autophagy genes Smatg8 and Smatg4 are required for fruiting-body development, vegetative growth and ascospore germination in the filamentous ascomycete *Sordaria macrospora*. Autophagy 9: 33-49

Bloemendal S, Bernhards Y, Bartho K, Dettmann A, Voigt O, Seiler S, Wolters DA, Pöggeler S, Kück U (2012) A homolog of the human STRIPAK complex controls sexual development in fungi. Mol Microbiol 84: 310-323

Klix V, Nowrousian M, Ringelberg C, Lorros JJ, Dunlap JC, Pöggeler S (2010) Functional characterization of MAT1-1-specific mating type genes in the homothallic ascomycete Sordaria macrospora provides new insights into essential and non-essential sexual regulators. Eukaryotic Cell 9: 894-905

Elleuche S, Pöggeler S (2009) β-Carbonic anhydrases play a role in fruiting body development and ascospore germination in the filamentous fungus *Sordaria macrospora*. PloS One 4:e5177

Storlazzi A, Tesse S, Ruprich-Robert G, Gargano S, Pöggeler S, Kleckner N, Zickler D (2008) Coupling meiotic chromosome axis integrity to recombination. Genes Dev 15: 796-809

Elleuche S, Pöggeler S (2007) Trans-splicing of an artificially split fungal mini-intein. Biochem Biophys Res Com 355: 830-834

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Stefan Pöhlmann

Professor, Head of the Infection Biology Unit, German Primate Center

- 2000: Ph.D., Friedrich-Alexander-University Erlangen-Nürnberg
- 2000 – 2003: Postdoctoral Fellow, University of Pennsylvania
- 2003 – 2007: Head of a SFB Junior Research Group, Institute of Clinical and Molecular Virology, Friedrich-Alexander-University Erlangen-Nürnberg
- 2007 – 2010: Professor for Experimental Virology, Hannover Medical School
- 2010: Professor and Head of the Infection Biology Unit of the German Primate Center

Major Research Interests

The Infection Biology Unit investigates virus host cell interactions with a focus on the first step of the infection process, viral entry into target cells.
Emerging viruses, like the Middle East Respiratory Syndrome (MERS) coronavirus, can pose a serious threat to public health. Activation by host cell proteases is essential for infectivity of many emerging viruses. We are elucidating which proteolytic systems are hijacked by emerging corona-, filo-, bunya- and influenza viruses for activation. On the basis of this information we will identify inhibitors and evaluate their antiviral activity in cell culture and animal models. Moreover, we are interested in defining which host cell receptors are used by emerging viruses for cellular entry. Finally, we are investigating how interferon-induced antiviral effector molecules inhibit infection by emerging viruses.
Human immunodeficiency virus (HIV) is the causative agent of the acquired immunodeficiency syndrome (AIDS), a major global health crisis. We seek to understand how the composition of the glycan coat of the HIV envelope protein modulates viral spread in and between individuals. This question will be addressed by employing simian immunodeficiency virus (SIV) infection of macaques as model system for HIV infection of human molecules of the innate immune system.

Selected Recent Publications

Solomon Tsegaye T, Gnirß K, Rahe-Meyer N, Kiene M, Krämer-Kühl A, Behrens G, Münch J, Pöhlmann S (2013) Platelet activation suppresses HIV-1 infection of T cells. Retrovirology 10: 48

Hofmann H, Li X, Zhang X, Liu W, Kühl A, Kaup F, Soldan SS, González-Scarano F, Weber F, He X, Pöhlmann S (2013) Severe Fever with Thrombocytopenia Virus Glycoproteins Are Targeted by Neutralizing Antibodies and Can Use DC-SIGN as a Receptor for pH-Dependent Entry into Human and Animal Cell Lines. J Virol 87: 4384-94

Gierer S, Bertram S, Kaup F, Wrensch F, Heurich A, Krämer-Kühl A, Welsch K, Winkler M, Meyer B, Drosten C, Dittmer U, von Hahn T, Simmons G, Hofmann H, Pöhlmann S (2013) The spike-protein of the emerging betacoronavirus EMC uses a novel coronavirus receptor for entry, can be activated by TMPRSS2 and is targeted by neutralizing antibodies. J Virol 87: 5502-11

Bertram S, Dijkman R, Habjan M, Heurich A, Gierer S, Glowacka I, Welsch K, Winkler M, Schneider H, Hofmann-Winkler H, Thiel V, Pöhlmann S (2013) TMPRSS2 activates the human coronavirus 229E for cathepsin-independent host cell entry and is expressed in viral target cells in the respiratory epithelium. J Virol 87: 6150-60

Kühl A, Münch J, Sauter D, Bertram S, Glowacka I, Steffen I, Specht A, Hofmann H, Schneider H, Behrens G, Pöhlmann S (2010) Calcium-modulating cyclophilin ligand does not restrict retrovirus release. Nat Med 16: 155-6

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Peter Rehling

Professor, Director of the Dept. of Cellular Biochemistry

- 1996 Dr. rer. nat. (Biology), University of Bochum
- 1996 – 1998 Postdoctoral fellow (Laboratory of W.-H. Kunau, Bochum)
- 1998 – 2000 Postdoctoral fellow (S.D. Emr, HHMI, University of California San Diego, USA)
- 2000 – 2004 Research Group leader at the Institute for Biochemistry and Molecular Biology, Freiburg
- 2003 Habilitation (Biochemistry and Molecular Biology), University of Freiburg
- 2004 – 2007 Assistant Professor Institute for Biochemistry and Molecular Biology, Freiburg
- Since 2007 Professor of Biochemistry and Director of the Dept. of Biochemistry II University of Göttingen
- Since 2009 Speaker of the Study Section “Molecular Cell Biology” of the German Society for Biochemistry and Molecular Biology (GBM)
- Since 2010 Group associated with the Max Planck Institute for Biophysical Chemistry

Major Research Interests

We are interested in understanding the molecular mechanisms by which proteins are transported across the mitochondrial membranes and to find out how multi-protein complexes in the inner membrane (TIM complexes; translocation machineries of the inner membrane) mediate this task. In another aspect of our work we addresses the question how newly imported proteins assemble into multi-protein complexes in the inner membrane. In case of the respiratory chain complexes the assembly process is especially demanding since central subunits of the complexes are made within mitochondria. Dedicated chaperone- like factors are required to assist and regulate assembly and translation in mitochondria. The analysis of the principles of the biogenesis process and the activities of the assembly factors is of central importance for our understanding of the molecular basis of human mitochondrial disorders.

Selected Recent Publications

Lytovchenko O, Melin J, Schulz C, Kilisch M, Hutu DP, Rehling P (2013) Signal recognition initiates reorganization of the presequence translocase during protein import. EMBO J 32: 886-898

Mick DU, Dennerlein S, Wiese H, Reinhold R, Pacheu-Grau D, Lorenzi I, Sasarman F, Weraarpachai W, Shoubridge EA, Warscheid B, Rehling P (2012) MITRAC Links Mitochondrial Protein Translocation to Respiratory-Chain Assembly and Translational Regulation. Cell 151: 1528–1541

Vukotic M, Oeljeklaus S, Wiese S, Vögtle FN, Meisinger C, Meyer HE, Zieseniss A, Katschinski DM, Jans DC, Jakobs S, Warscheid B, Rehling P*, Deckers M (2012) Rcf1 mediates cytochrome oxidase assembly and respirasome formation, revealing heterogeneity of the enzyme complex. Cell Metab 7: 336-347 (*corresponding author)

Schulz C, Lytovchenko O, Melin J, Chacinska A, Guiard B, Neumann P, Ficner R, Jahn O, Schmidt B, Rehling P (2011) Tim50’s presequence receptor domain is essential for signal driven transport across the TIM23 complex. J Cell Biol 195: 643-656

Mick DU, Vukotic M, Piechura H, Meyer HE, Warscheid B, Deckers M, Rehling P (2010) Coa3 and Cox14 are essential for negative feedback regulation of COX1 translation in mitochondria. J Cell Biol 191: 141-154

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Silvio Rizzoli

Group Leader STED Microscopy of Synaptic Function

- 2000 – 2004 Research assistant with William Betz at the Dep. of Physiology and Biophysics, University of Colorado Health Sciences Center (USA)
- 08/2004 PhD degree (Physiology) awarded by the University of Colorado
- 2004 – 2007 Post doctoral fellow with Reinhard Jahn at the Neurobiology
- Department of the Max Planck Institute for Biophysical Chemistry in Göttingen (Germany)
- since 2007 Group Leader (STED Microscopy) at the European Neuroscience Institute Göttingen (ENI-G)

Major Research Interests

Conventional fluorescence microscopy is limited by the diffraction of light: fluorescent objects that are close together cannot be discerned. Stimulated emission depletion (STED) is a recent advancement in optical physics that breaks the diffraction barrier, allowing microscopes to obtain much clearer images. The diffraction barrier has been particularly problematic for imaging synaptic vesicles, which are among the smallest known organelles (30-50 nm in diameter). They are located in small areas in the synapses (about 1 micron in diameter). The group takes advantage of the increased imaging resolution provided by STED to investigate synaptic vesicle function, with an emphasis on synaptic vesicle recycling. Since STED microscopy also allows imaging of protein domains, the group aims at studying the patterning of protein domains in the synapse, in order to understand its molecular architecture.

Selected Recent Publications

Opazo F, Levy M, Byrom M, Schäfer C, Geisler C, Groemer TW, Ellington AD, Rizzoli SO (2012) Aptamers as potential tools for super-resolution microscopy. Nat Methods 9: 938-939

Denker A, Bethani I, Kröhnert K, Körber C, Horstmann H, Wilhelm BG, Barysch SV, Kuner T, Neher E, Rizzoli SO (2011a) A small pool of vesicles maintains synaptic activity *in vivo*. Proc Natl Acad Sci USA 108: 17177-17182

Denker A, Kröhnert K, Bückers J, Neher E, Rizzoli SO (2011b) The reserve pool of synaptic vesicles acts as a buffer for proteins involved in synaptic vesicle recycling. Proc Natl Acad Sci USA 108: 17183-17188

Wilhelm BG, Groemer TW, Rizzoli SO (2010) The same synaptic vesicles drive active and spontaneous release. Nat Neurosci 13: 1454-1456

Hoopmann P, Punge A, Barysch SV, Westphal V, Bückers J, Opazo F, Bethani I, Lauterbach MA, Hell SW, Rizzoli SO (2010) Endosomal sorting of readily releasable synaptic vesicles. Proc Natl Acad Sci USA 107: 19055-19060

Kamin D, Lauterbach MA, Westphal V, Keller J, Schönle A, Hell SW, Rizzoli SO (2010) High- and low-mobility stages in the synaptic vesicle cycle. Biophys J 99: 675-684

Barysch SV, Jahn R, Rizzoli SO (2010) A fluorescence-based *in vitro* assay for investigating early endosome dynamics. Nat Protoc 5: 1127-1137

Opazo F, Punge A, Bückers J, Hoopmann P, Kastrup L, Hell SW, Rizzoli SO (2010) Limited intermixing of synaptic vesicle components upon vesicle recycling. Traffic 11: 800-812

Barysch SV, Aggarwal S, Jahn R, Rizzoli SO (2009) Sorting in early endosomes reveals connections to docking- and fusion-associated factors. Proc Natl Acad Sci USA 106: 9697-9702

Bethani I, Werner A, Kadian C, Geumann U, Jahn R, Rizzoli SO (2009) Endosomal fusion upon SNARE knockdown is maintained by residual SNARE activity and enhanced docking. Traffic 10: 1543-1559

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Professor of Biochemistry

- PhD, Institute of Molecular Biology and Genetics, Academy of Science Ukraine, Kiew, Ukraine, 1989
- Research Fellow of the Alexander von Humboldt Foundation, University of Witten, Germany, 1990 – 1992
- Research Fellow at the Institute of Molecular Biology, University of Witten/Herdecke, 1992 – 1998
- Associate Professor for Physical Biochemistry at the Institute of Molecular Biology, University of Witten/Herdecke, 1998 – 2000
- Full Professor, Head of the Institute of Physical Biochemistry, University of Witten/Herdecke, 2000 – 2008
- Director of Department of Physical Biochemistry, Max Planck Institute for Biophysical Chemistry, Göttingen, since 2008

Major Research Interests

1. Ribosome function and dynamics
2. Regulation and fidelity of translation
3. Ribosome-catalyzed reactions

Protein synthesis from amino acids in the cell is performed on ribosomes, large ribonucleoprotein particles that consist of several RNA molecules and over 50 proteins. The ribosome is a molecular machine that selects its substrates, aminoacyl-tRNAs, very rapidly and accurately and catalyses the synthesis of peptides from amino acids. Among the most important unresolved questions is the role of structural dynamics in ribosome function. The communication between the functional centers of the ribosome is known to be crucial, but there are only vague ideas as to how this may take place. The activation of the GTPase of elongation factor (EF)-Tu is a key step in selection of aminoacyl tRNAs by the ribosome. It is triggered by events on the small subunit, but the GTP-binding site of EF-Tu associates with the large subunit, and the way the signal is transmitted within the ribosome remains unknown. The mechanism of the translocation step, i.e. the movement of tRNAs and mRNA through the ribosome, remains a major challenge. EF-G accelerates translocation by using the energy of GTP hydrolysis to drive translocation which resembles the way motor proteins work; however, the structural basis for the movement and its biophysical characteristics are not known. Finally, incorporation of unusual amino acids, such as selenocysteine, requires highly specialized machinery for delivery; very little is known about the molecular mechanism of this process. None of these problems can be solved without using a combination of techniques from Biochemistry, Structural Biology and Physical Biochemistry and developing new approaches to structure, function, and dynamics of the translational apparatus. In a broader context, the ribosome can serve as a well-characterized model of large macromolecular assemblies. Using the biophysical approaches devised for the ribosome, it should be possible to obtain information for even larger and more complex macromolecular assemblies. Developing of highly efficient and controlled ribosome translation systems on a highly sophisticated technological level is important for production of proteins with desired properties for purposes of proteomics and high-throughput structural studies emerging in the post-genomic era. The translational apparatus is a major target for antibiotics. Better understanding of the mechanisms of antibiotic action, resistance mechanisms and the interplay between resistance and bacterial fitness using systems biology will be increasingly important for developing new antimicrobials and combating the major infectious diseases.

Selected Recent Publications

Doerfel LK, Wohlgemuth I, Kothe C, Peske F, Urlaub H, Rodnina MV (2013) EF-P is essential for rapid synthesis of proteins containing consecutive proline residues. Science 339: 85-88

Davydov II, Wohlgemuth I, Artamonova II, Urlaub H, Tonevitsky AG, Rodnina MV (2013) Evolution of the protein stoichiometry in the L12 stalk of bacterial and organellar ribosomes. Nat Commun 4: 1387

Milón P, Maracci C, Filonava L, Gualerzi CO, Rodnina MV (2012) Real-time assembly landscape of bacterial 30S translation initiation complex. Nat Struct Mol Biol 19: 609-615

Kuhlenkoetter S, Wintermeyer W, and Rodnina, MV (2011) Different substrate-dependent transition states in the active site of the ribosome. Nature 476: 351-354

Fischer N, Konevega AL, Wintermeyer W, Rodnina MV, Stark H (2010) Ribosome dynamics and tRNA movement by time-resolved electron cryomicroscopy. Nature 466: 329-333

Moritz Rossner

- 1998 PhD, Center of Molecular Biology Heidelberg (ZMBH), University of Heidelberg
- 2000 Project Leader, Axaron Bioscience AG, Heidelberg
- 2003 Group Leader, Max-Planck-Institute of Experimental Medicine, Göttingen
- 2013 Professor Molecular and Behavioral Neurobiology, Dep. of Psychiatry, LMU Munich

Major Research Interests

Our research interest is directed towards the generation and analysis of transgenic mouse mutants in order to understand individual gene functions in the adult brain. Towards this goal, we employ mouse genetics, molecular/biochemical and behavioral techniques. Our current interest focuses on basic-helix-loop-helix (bHLH) transcription factors. Several loss- and gain-of-function mouse mutants of the bHLH family that we and others have analyzed display behavioral alterations frequently also observed in psychiatric diseases. Among these are alterations of the sleep-wake or circadian behavior, altered cognitive performances and disturbed environmental adaptations to time shifts (jet-lag) or social stress. At the molecular level, we find several signaling pathways to be deregulated that likely provide a mechanistic link between disturbed environmental adaptations and deregulated gene expression seen in bHLH mouse mutants. To study cellular signaling upstream of gene expression, we have developed a series of genetically encoded biosensors that can be analyzed with standard fluorescent or luminescent reporter proteins but also with libraries of molecular barcodes to perform systems-level analyses. Currently, we aim at combining mouse models and genetic sensors to better understand the molecular adaptations of gene-environment interactions relevant for psychiatric and neurological diseases.

Selected Recent Publications

Brzózka MM, Rossner MJ (2013) Deficits in trace fear memory in a mouse model of the schizophrenia risk gene TCF4. Beh Brain Res 237: 348-356

Wehr MC, Holder M, Maile T, Saunders R, Jiang M, Instrell R, Howell M, Rossner MJ, Tapon N (2013) Salt-inducible kinases regulate growth through the Hippo signalling pathway. Nat Cell Biol 15: 61–71

Djannatjan MS, Galinski S, Fischer TM, Rossner M (2011) Studying G protein-coupled receptor activation using split-TEV assays. Analytical Biochmistry 412(2): 141-52

Brzózka MM, Radyushkin R, Wichert SP, Ehrenreich H, Rossner M (2010) Cognitive and sensorimotor gating impairments in transgenic mice overexpressing the schizophrenia susceptibility gene Tcf4 in the forebrain. Biological Psychiatry 68(1): 33-40

Botvinnik A, Wichert SP, Fischer TM, Rossner M (2010) Integrated analysis of receptor activation and downstream signaling with EXTassays. Nature Methods 7(1): 74-80

He Y, Jones CR, Fujiki N, Xu Y, Guo B, Holder JL Jr, Rossner M, Nishino S, Fu YH (2009) The transcriptional repressor DEC2 regulates sleep length in mammals. Science 325(5942): 866-70

Rossner M, Oster H, Wichert SP, Reinecke L, Wehr MC, Reinecke J, Eichele G, Taneja R, Nave KA (2008) Disturbed clockwork resetting in Sharp-1 and Sharp-2 single and double mutant mice. PLoS ONE 3(7): e2762

Wehr MC, Reinecke L, Botvinnik A, Rossner M (2008) Analysis of transient phosphorylation-dependent protein-protein interactions in living mammalian cells using split TEV. BMC Biotechnol 8: 55

Wehr MC, Laage R, Bolz U, Fischer TM, Grunewald S, Scheek S, Bach A, Nave KA, Rossner M (2006) Monitoring regulated proteinprotein interactions using split TEV. Nature Methods 3(12): 985-93

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Oliver Schlüter

Group Leader Molecular Neurobiology

- 1995 - 2001M.D. Ph.D. with Thomas C. Südhof at the Max-Planck-Institute for Experimental Medicine in Göttingen (Germany)
- Dr. rer. nat. (PhD) 2000, University of Hannover
- Dr. med. (Medical thesis), University of Göttingen
- 2002 – 2006 Postdoc with Robert C. Malenka at Stanford University Medical Center (USA)
- Independent group leader (Emmy-Noether/DFG) at the European Neuroscience Institute Göttingen (ENI-G), since 2006

Major Research Interests

Activity-dependent modulations of synaptic transmission are important mechanisms of information processing and storage in neuronal circuits. A variety of related but mechanistically distinct forms of synaptic plasticity have been described in in vitro preparations of brain slices.
A major goal of my laboratory is to elucidate the underlying molecular events, leading to and regulating changes in synaptic efficacy. Newly developed techniques of molecular replacement, using mouse genetics and/or viral-mediated gene transfer allow us to manipulate the molecular composition of single neurons in a spatial and temporal controlled manner.
In particular, we are able to investigate the effects of heterologously expressed proteins on the background of wild-type neurons, or neurons, in which the endogenous protein expression is diminished. We combine this technique with simultaneous dual whole cell patch clamp recordings from rodent brain slices to monitor changes in synaptic efficacy in the manipulated cell in comparison to the neighboring control cell.
Knowledge gained from the understanding of molecular mechanisms of synaptic transmission and plasticity will ultimately provide important clues for the function of neuronal circuits and potentially the functioning of the brain.

Selected Recent Publications

Bonnet SA*, Akad DS*, Samaddar T, Liu Y, Huang X, Dong Y, Schlüter OM# (2013) Synaptic state-dependent functional interplay between Postsynaptic Density-95 and Synapse-associated Protein 102. J Neurosci 33(33): 13398-409

Suska A*, Lee BR, Huang YH, Dong Y#, Schlüter OM# (2013). Selective presynaptic enhancement of the prefrontal cortex to nucleus accumbens pathway by cocaine. Proc Natl Acad Sci USA 110(2): 713-8

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Xu* W, Schlüter OM, Steiner P, Czervionke BL, Sabatini B, Malenka RC (2008) Molecular dissociation of the role of PSD-95 in regulating synaptic strength and LTD. Neuron 57: 248-62

Schlüter OM, Xu* W, Malenka RC (2006) Alternative N-terminal domains of PSD-95 and SAP97 govern activity-dependent regulation of synaptic AMPA receptor function. Neuron 51: 99-111

Schlüter OM, Basu J, Südhof TC, Rosenmund C (2006) Rab3 superprimes synaptic vesicles for release: implications for short-term synaptic plasticity. J Neurosci 26, 1239-46

Chandra S, Gallardo G, Fernandez-Chacon R, Schlüter OM, Südhof TC (2005) Alpha-synuclein cooperates with CSP in preventing neurodegeneration. Cell 123: 383-96

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Reinhard Schuh

Research Group Leader at the MPI for Biophysical Chemistry

- Dr. rer. nat., University of Tübingen, Germany, 1986
- Postdoctoral Fellow at the Max Planck Institute for Developmental Biology, Tübingen, Germany, 1986 – 1988
- Postdoctoral Fellow at the University of Munich, Germany, 1989 – 1991
- Group leader in the Department of Molecular Developmental Biology at the Max Planck Institute for Biophysical Chemistry, Göttingen, Germany, 1992 – 2004
- Habilitation in Cellular and Molecular Biology, Technical University of Braunschweig, Germany, 2001
- Leader of the Research Group Molecular Organogenesis at the Max Planck Institute for Biophysical Chemistry, since 2005
- since 2008: Teaching as an adjunct professor on the Faculty of Biology at the University of Göttingen

Major Research Interests

Branched tubular networks are a fundamental structural design of many organs including lung, vascular system and kidney. Critical for organ function, i.e. the transport of fluids or gases, is the proper size and diameter of the tubular branches as well as an elaborated network formation. How do these networks develop? How do the branches grow out, detect their fusion partners and interconnect? How are tube size and dia-meter controlled? How can the system respond to different physiological needs? How do epidermal sheets control the paracellular passage of solutes?

We investigate the development of the *Drosophila* tracheal (respiratory) system since it provides an ideal model to address such questions, because of its simple stereotypic architecture, accessible genetics and molecular tools.

Selected Recent Publications

Weiss A, Charbonnier E, Ellertsdottir E, Tsirigos A, Wolf C, Schuh R, Pyrowolakis G, Affolter M (2010) A conserved activation element in BMP signaling during *Drosophila* development. Nature Struct Mol Biol 17: 69-76

Harder B, Schomburg A, Pflanz R, Küstner KM, Gerlach N, Schuh R (2008) TEV protease-mediated cleavage in *Drosophila* as a tool to analyze protein functions in living organisms. BioTechniques 44: 765-772

Krause C, Wolf C, Hemphälä J, Samakovlis C, Schuh R (2006) Distinct functions of the leucine-rich repeat transmembrane proteins Capricious and Tartan in the *Drosophila* tracheal morphogenesis. Dev Biol 296: 253-264

Adryan B, Schuh R (2004) Gene Ontology-based clustering of gene expression data. Bioinformatics 20: 2851-2852

Behr M, Riedel D, Schuh R (2003) The claudin-like Megatrachea is essential in septate junctions for the epithelial barrier function in *Drosophila*. Dev Cell 5: 611-620

Wolf C, Gerlach N, Schuh R (2002) *Drosophila* tracheal system formation involves FGF-dependent cell extensions contacting bridge-cells. EMBO Reports 3: 563-568

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Blanche Schwappach

Professor, Director of Biochemistry I

- 1996 Dr rer nat (Biology), Centre for Molecular Neurobiology (ZMNH), University of Hamburg
- 1997 – 2000 Postdoctoral fellow (Laboratory of Lily Jan, University of California, San Francisco, USA)
- 2000 – 2007 Research group leader at the Centre for Molecular Biology (ZMBH), University of Heidelberg
- 2004 Habilitation (Molecular Biology and Cell Biology) at the ZMBH
- 2007 – 2010 Wellcome Trust Senior Research Fellow, Faculty of Life Sciences, University of Manchester, UK
- since 2010 Professor of Biochemistry and Director of Biochemistry I
- since 2010 the group is associated with the Max Planck Institute of Biophysical Chemistry

Major Research Interests

The group works on different aspects of membrane protein biogenesis and its integration into the physiology of organs such as the brain or the heart. We study the early life of tail-anchored proteins that are post-translationally targeted to the endoplasmic reticulum for membrane integration. Other projects address the role of sorting motifs during the passage of ion channels and neurotransmitter receptors through the secretory pathway. One channel under investigation (the KATP channel) couples cellular metabolism to insulin secretion in pancreatic beta cells. In the brain and the heart KATP channels play less defined roles that we currently address employing biochemical methods. We study biogenesis and trafficking under (patho)physiological conditions in genetically tractable model organisms such as yeast or mouse. Besides membrane protein biochemistry we use GFP-based physiological sensors for small molecules and ions in cellular compartments. This allows us to tackle how ion channels and transporters contribute to different physicochemical milieus inside cells.

Selected Recent Publications

Powis K, Schrul B, Tienson H, Gostimskaya I, Breker M, High S, Schuldiner S, Jakob U, Schwappach B (2013) Get3 is a holdase chaperone and moves to deposition sites for aggregated proteins when membrane targeting is blocked. J Cell Sci 126: 473-483

Braun NA, Morgan B, Dick TP, Schwappach B (2010) The yeast CLC protein counteracts vesicular acidification during iron starvation J Cell Sci 123: 2342-2350

Leznicki P, Clancy A, Schwappach B, High S (2010) Bat3 promotes the membrane integration of tail-anchored proteins. J Cell Sci 123: 2170-2178

Rabu C, Schmid V, Schwappach B, High S (2009) Biogenesis of tail-anchored proteins: the beginning for the end? J Cell Sci 122: 3605-3

Schuldiner M, Metz J, Schmid V, Denic V, Rakwalska M, Schmitt HD, Schwappach B, Weissman JS (2008) The GET Complex Mediates Insertion of Tail-Anchored Proteins into the ER. Cell 134: 635-645

Michelsen K, Schmid V, Metz J, Heusser K, Liebel U, Schwede T, Spang A, Schwappach B (2007) Novel cargo-binding site in the beta and delta subunits of coatomer. J Cell Biol 179: 209-217

Heusser K, Yuan H, Neagoe I, Tarasov A, Ashcroft F, Schwappach B (2006) Scavenging of 14-3-3 proteins reveals their involvement in the cell-surface expression of ATP-sensitive potassium channels. J Cell Sci 119: 4353-4363

Michelsen K, Mrowiec T, Duderstadt KE, Frey S, Minor DL, Mayer MP, Schwappach B (2006) A multimeric membrane protein reveals 14-3-3 isoform specificity in forward transport in yeast. Traffic 7: 903-916

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Halyna Shcherbata

Max Planck Research Group Leader

- 1996 Ph.D., Genetics, Kyiv Institute for Plant Physiology and Genetics, Ukraine
- 1996 – 2003 Scientific Researcher, then Assistant Professor, Lemberg (Lviv) National University, Ukraine
- 2003 – 2008 Postdoc, then Research Professor, Biochemistry Department, Institute for Stem cell and Regenerative Medicine, University of Washington, Seattle, WA, USA
- 2008 – present Max Planck Research Group Leader, MPI for Biophysical Chemistry, Göttingen, Germany
- 2012 Habilitation in Developmental Biology, Georg-August University, Göttingen, Germany

Major Research Interests

My lab is focused on understanding of biological roles of miRNAs in cell differentiation and maintenance under normal, stress, and disease conditions in *Drosophila*. We show that the miRNAs-based regulatory network is accomplished via feedback-feedforward signaling, which allows to reduce transcriptional noise and fine-tune gene expression to regulate the entire gene expression profile. In addition, tissue-specific miRNAs direct differentiation toward corresponding lineages by suppressing alternative cell fates and ensuring the robustness of cell identity. Under stress and in chronic pathological states, miRNA levels are misregulated which disrupts tissue regeneration and homeostasis due to miRNA influence on cell proliferation and differentiation programs. We found that miRNAs act as spatio-temporal cell fate determinants, differentiation guardians and canalization factors, and stress response elements. We use *Drosophila* as a model organism that can serve as a valuable model system for conserved mechanisms underlying human disorders. One of our scientific interests is the analysis of the Dystrophin Glycoprotein Complex (DGC), perturbation in which results in muscular dystrophies and brain abnormalities in humans. We found that stress induces muscle degeneration even in wild type animals and accelerates age-dependent muscular dystrophy. In view of the facts that miRNAs have been implicated in stress response and the DGC has an effect on miRNA expression in vertebrates, we have conducted a miRNA microarray screen in stressed and not stressed wild type and dystrophic animals. The second line of the research that is actively conducted in my lab is focused on studying the role of the microRNA pathway in stem cells, where the *Drosophila* germline and neuronal stem cells are used as model systems. Our findings show that hormonal signaling and miRNAs direct neuronal and germline stem cell differentiation. Not only do steroid hormones control the miRNA expression, miRNAs also act in feedback loops to regulate the strength of the hormonal signaling. This provides the means to fine-tune the signals managing stem cell division, maintenance, and differentiation in response to ever-changing extracellular conditions.

Selected Recent Publications

Kucherenko MM, Shcherbata HR (2013) Steroids as external temporal codes act via miRNAs and cooperate with cytokines in differential neurogenesis. Fly (Austin) 7: 3

Marrone AK, Edeleva EV, Kucherenko MM, Hsiao NH, Shcherbata HR (2012) Dg-Dys-Syn1 signaling in *Drosophila* regulates the microRNA profile. BMC Cell Biol 13: 26

Kucherenko MM, Barth J, Fiala A, Shcherbata HR (2012) Steroid-induced microRNA let-7 acts as a spatio-temporal code for neuronal cell fate in the developing *Drosophila* brain. EMBO J 31(24), 4511-23

König A, Yatsenko AS, Weiss M, Shcherbata HR (2011) Ecdysteroids affect *Drosophila* ovarian stem cell niche formation and early germline differentiation. The EMBO J 30: 1549-1562

Kucherenko MM, Marrone AK, Rishko VM, Magliarelli Hde F, Shcherbata HR (2011) Stress and muscular dystrophy: a genetic screen for dystroglycan and dystrophin interactors in *Drosophila* identifies cellular stress response components. Developmental Biology 352: 228-242

Marrone AK, Kucherenko MM, Rishko VM, Shcherbata HR (2011) New dystrophin/dystroglycan interactors control neuron behavior in *Drosophila* eye. BMC Neurosci 12: 93

Marrone AK, Kucherenko MM, Wiek R, Göpfert MC, Shcherbata HR (2011) Hyperthermic seizures and aberrant cellular homeostasis in *Drosophila* dystrophic muscles. Sci Rep 1

Marrone AK, Shcherbata HR (2011) Dystrophin orchestrates the epigenetic profile of muscle cells via miRNAs. Front Genet 2: 64

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Mikael Simons

Group Leader of Centre for Biochemistry and Molecular Cell Biology

- 2004 Facharzt/Specialty qualification in Neurology
- 2005 Habilitation in Neurology, University of Tübingen
- 2004 – 2008 Junior group leader, Centre for Biochemistry and Molecular Cell Biology, University of Göttingen
- 2007 Attendant at the Department of Neurology; Head of the Multiple Sclerosis out-patient clinic, Department of Neurology, University of Göttingen
- 2008 Group leader with an ERC Starting Grant at the Max-Planck Institute for Experimental Medicine
- Feb 2009 W3- Heisenberg Professorship, Department of Neurology, University of Göttingen

Major Research Interests

Mechanisms of myelin biogenesis and repair
The myelin sheath is one of the most abundant membrane structures in the vertebrate nervous system. It is formed by the spiral wrapping of glial plasma membrane extensions around the axons, followed by the extrusion of cytoplasm and the compaction of the stacked membrane bilayers. These tightly packed membrane stacks provide electrical insulation around the axons and maximize their conduction velocity. Axonal insulation by myelin not only facilitates rapid nerve conduction but also regulates axonal transport and protects against axonal degeneration. Damage to the myelin sheath, as it for example occurs in multiple sclerosis (MS) results therefore in severe neurological disability also as a result of neurodegeneration.
Our main goal is to come up with new approaches of how to promote remyelination in demyelinating diseases such as MS. To realize this goal we need to understand how myelin is formed during normal development.

Selected Recent Publications

Aggarwal S, Snaidero N, Pähler G, Frey S, Sánchez P, Zweckstetter M, Janshoff A, Schneider A, Weil MT, Schaap IA, Görlich D, Simons M (2013) Myelin membrane assembly is driven by a phase transition of myelin basic proteins into a cohesive protein meshwork. PLoS Biol 11(6): e1001577

Aggarwal S, Yurlova L, Snaidero N, Reetz C, Frey S, Zimmermann J, Pähler G, Janshoff A, Friedrichs J, Müller DJ, Goebel C, Simons M (2011) A Size Barrier Limits Protein Diffusion at the Cell Surface to Generate Lipid-Rich Myelin-Membrane Sheets. Dev Cell 21(3): 445-56

Aggarwal S, Yurlova L, Simons M (2011) Central nervous system myelin: structure, synthesis and assembly. Trends Cell Biol 21(10): 585-93

Budde H, Schmitt S, Fitzner D, Opitz L, Salinas-Riester G, Simons M (2010) Control of oligodendroglial cell number by the miR-17-92 cluster. Development 137(13): 2127-32

Hsu C, Morohashi Y, Yoshimura SI, Manrique-Hoyos N, Jung SY, Lauterbach M, Bakhti M, Grønborg G, Möbius W, Rhee JS, Barr FA, Simons M (2010) Regulation of exosome secretion by Rab35 and its GTPase-activating proteins TBC1D10A-C. J Cell Biol 189(2): 223-32

Simons M, Raposo G (2009) Exosomes-vesicular carriers for intercellular communication. Curr Opin Cell Biol 21(4):575-81

Trajkovic K, Hsu C, Chiantia S, Rajendran L, Wenzel D, Wieland F, Schwille P, Brugger B, Simons M (2008) Ceramide triggers budding of exosome vesicles into multivesicular endosomes. Science 319(5867): 1244-7

Simons M, Trotter J (2007) Wrapping it up: the cell biology of myelination. Curr Opin Neurobiol. 17(5): 533-40

Fitzner D, Schneider A, Kippert A, Möbius W, Willig KI, Hell SW, Bunt G, Gaus K, Simons M (2006) Myelin basic protein-dependent plasma membrane reorganization in the formation of myelin. EMBO J 25(21): 5037-4

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Holger Stark

Group Leader 3D-Cryo Electron Microscopy

- 1996 Dr. rer. nat. (Biochemistry) Free University of Berlin
- 1997 – 1998 Postdoc (Laboratory of Marin van Heel, Imperial College, London)
- 1998 – 1999 Junior group leader, University of Marburg
- 2000 – 2004 Junior group leader, Max-Planck-Institute for Biophysical Chemistry
- 2005 – BioFuture group leader, Max-Planck-Institute for Biophysical Chemistry
- 2005 – 2007 BioFuture group leader
- since 2007 Professor for Molecular Electron Cryomicroscopy, University Göttingen and group leader, Max-Planck-Institute for Biophysical Chemistry

Major Research Interests

The work in our group is focused on 3D structure determination of large macromolecular complexes by single particle electron cryomicroscopy (cryo-EM). In cryo-EM, thousands of electron microscopical images of a macromolecular complex are taken at low temperature in the electron microscope and are used to calculate a 3D reconstruction of the object by computational image processing. Electron microscopical images can be considered as almost ideal two-dimensional projection images, similar to images obtained by computer tomography in medical applications. However, in cryo-EM the relative orientation of the molecules is a priori unknown and must be determined by computational means prior to calculating the 3D structure.

Cryo-EM is the method of choice for 3D structure determination of macromolecular complexes that are difficult to purify in the amounts and quality that is required for crystallization (X-ray crystallography). Due to the low copy number of many functionally important macromolecular complexes in the cell, cryo-EM is very often the only available method to study the 3D structure of these large macromolecules. Work in our group concentrates on macromolecular complexes related to pre-mRNA splicing, translation and cell cycle regulation and on the development of new methods to improve sample preparation, imaging and computational image processing techniques

Selected Recent Publications

Grimm C, Chari A, Pelz JP, Kuper J, Kisker C, Diederichs K, Stark H, Schindelin H, Fischer U (2013) Structural Basis of Assembly Chaperone- Mediated snRNP Formation. Mol Cell 49(4): 692-703

Sander B, Golas MM, Lührmann R, Stark H (2010) An approach for de novo structure determination of dynamic molecular assemblies by electron cryomicroscopy. Structure 18: 667-676

Fischer N, Konevega AL, Wintermeyer W, Rodnina MV, Stark H (2010) Ribosome dynamics and tRNA movement as visualized by time-resolved electron cryomicroscopy. Nature 466: 329-333

Herzog F, Primorac I, Dube P, Lenart P, Sander B, Mechtler K, Stark H, Peters JM (2009) Structure of the anaphase-promoting complex/cyclosome interacting with a mitotic checkpoint complex. Science 323: 1477-1481

Wolf E, Kastner B, Deckert J, Merz C, Stark H, Lührmann R (2009) Exon, intron and splice site locations in the spliceosomal B complex. EMBO J 28(15): 2283-2292

Kastner B, Fischer N, Golas MM, Sander B, Dube P, Boehringer D, Hartmuth K, Deckert J, Hauer F, Wolf E, Uchtenhagen H, Urlaub H, Herzog F, Peters JM, Poerschke D, Lührmann R, Stark H (2008) GraFix: sample preparation for single-particle electron cryomicroscopy. Nat Methods 5: 53-55

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Claudia Steinem

- 1987 – 1989 Studies of Biology at the University of Münster
- 1989 – 1994 Studies of Chemistry at the University of Münster
- 1994 – 1997 PhD thesis under supervision of Prof. Dr. H.-J. Galla
- 1997 – 1998 Postdoctoral Researcher at the Scripps Research Institute (La Jolla, California, USA)
- 1999 – 2001 Habilitation in Biochemistry at the University of Münster
- 2001 – 2006 Associate professor (C3) for Bioanalytics and Biosensors at the University of Regensburg
- 2006 Full professor (W3) for Biomolecular Chemistry at the University of Göttingen

Major Research Interests

Development and application of artificial lipid membranes on planar and porous supports, with particular emphasis on the function of ion channel proteins and transporters. Biophysical characterization of membrane-protein interactions.

Selected Recent Publications

Song C, Weichbrodt C, Salnikovc ES, Dynowskid M, Forsberg BO, Bechinger B, Steinem C, de Groot BL, Zachariae U, Zeth K (2013) Crystal structure and functional mechanism of a human antimicrobial membrane channel. Proc Natl Acad Sci USA 110: 4586-4591

Orth A, Johannes L, Römer W, Steinem C (2012) Creating and modulating microdomains in pore-spanning membranes. ChemPhysChem 13: 108-114

Lazzara T D, Carnarius C, Kokun M, Janshoff A, Steinem C (2011) Separating attoliter-sized compartments using fluid pore-spanning lipid bilayers. ACS Nano 5: 6935–6944

Bosk S, Braunger J, Gerke V, Steinem C (2011) Activation of F-actin binding capacity of ezrin: synergism of PIP2 interaction and phosphorylation. Biophys J 100: 1708-1717

Höfer I, Steinem C (2011) A membrane fusion assay based on pore-spanning membranes. Soft Matter 7: 1644-1647

Bernecker A, Wieneke R, Riedel R, Seibt M, Geyer A, Steinem C (2010) Tailored synthetic polyamines for controlled biomimetic silica formation. J Am Chem Soc 132: 1023-1031

Windschiegl B, Orth A, Römer W, Berland L, Stechmann B, Bassereau P, Johannes L, Steinem C (2009) Lipid reorganization induced by Shiga toxin clustering on planar membranes. PLoS ONE 4: e6238

Gaßmann O, Kreir M, Ambrosi C, Pranskevich J, Oshima A, Röling C, Sosinsky G, Fertig N, Steinem C (2009) The mutant of connexin26 reveals conductance states in pore-suspending membranes. J Struct Biol 168: 168-176

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Jörg Stülke

Professor of Microbiology

- 1990 Diploma (Biology), Ernst-Moritz-Arndt-Universität Greifswald
- 1994 Dissertation (Dr. rer. nat.), Ernst-Moritz-Arndt-Universität Greifswald
- 1994 – 1996 Postdoctoral Fellow at the Institut Pasteur, Paris
- 1996 – 2003 Group leader at the Chair of Microbiology, University Erlangen-Nürnberg
- 2000 Habilitation (Microbiology), University Erlangen-Nürnberg
- Since 2003 Professor of General Microbiology, Head of the Department of General Microbiology at the Institute of Microbiology and Genetics, University of Göttingen

Major Research Interests

Our group studies the regulation of metabolism in the pathogenic bacterium *Mycoplasma pneumoniae* and the model organism *Bacillus subtilis*. We are following global ("post-genomic") and gene-specific approaches. In *Mycoplasma pneumoniae*, we study the regulation of gene expression in this pathogenic bacterium and its relation to pathogenicity. This is highly interesting because this bacterium is an important cause of pneumonia. Moreover, *M. pneumoniae* is one of the organisms with the smallest genetic equipment that is capable of independent life. Understanding *M. pneumoniae* means understanding life! Specifically, we are analysing protein phosphorylation and mechanisms of transcription regulation in *M. pneumoniae*. We have shown, that protein phosphorylation of is of key importance for pathogenicity of *M. pneumoniae*. Metabolism in *Bacillus subtilis* is studied by transcriptomics, metabolome and fluxome analyses. Our specific interests are focussed on two key pathways: glycolysis and glutamate biosynthesis, the decisive link between carbon and nitrogen metabolism. The regulation of glycolysis is studied at the level of a controlled protein-RNA interaction. Regulation through RNA has become widely recognized in the past few years. Our studies revealed that glycolytic enzymes themselves are part of a protein complex that is required for mRNA processing and degradation. Finally, we are interested in systems biology approaches to the analysis of *B. subtilis* and develop web interfaces for the functional annotation.

Selected Recent Publications

Mehne FMP, Gunka K, Eilers H, Herzberg C, Kaever V, Stülke J (2013) Cyclic-di-AMP homeostasis in *Bacillus subtilis*: both lack and high-level accumulation of the nucleotide are detrimental for cell growth. J Biol Chem 288: 2004-2017

Rothe FM, Bahr T, Stülke J, Rak B, Görke B (2012) Activation of *Escherichia coli* antiterminator BglG requires its phosphorylation. Proc Natl Acad Sci USA 109: 15906-15911

Mäder U, Schmeisky AG, Flórez LA, Stülke J (2012) SubtiWiki – a comprehensive resource for the model organism *Bacillus subtilis*. Nucleic Acids Res 40: D1278-D1287

Nicolas P, Mäder U, Dervyn E, …, Stülke J …, Völker U, Bessières P, Noirot P (2012) The condition-dependent whole-transcriptome reveals high-level regulatory architecture in bacteria. Science 335: 1103-1106

Lehnik-Habrink M, Lewis RJ, Mäder U, Stülke J (2012) RNA degradation in *Bacillus subtilis*: an interplay of essential endo- and exoribonucleases. Mol Microbiol 84: 1005-1017

Schmidl SR, Otto A, Lluch-Senar M, Pinol J, Busse J, Becher D, Stülke J (2011) A trigger enzyme in *Mycoplasma pneumoniae*: Impact of the glycerophosphodiesterase GlpQ on virulence and gene expression. PLOS Pathogens 7: e1002263

Görke B, Stülke J (2008) Carbon catabolite repression in bacteria: many ways to make most out of nutrients. Nature Rev Microbiol 6: 613-624

Michael Thumm

Professor of Biochemistry and Molecular Cell Biology

- Center of Biochemistry and Molecular Cell Biology, University of Göttingen
- 1987 Dr. rer. nat., University of Stuttgart
- 1997 Habilitation (Biochemistry), University of Stuttgart

Major Research Interests

We are studying the molecular mechanism of autophagy in the yeast *Saccharomyces cerevisiae*. Autophagy is a starvation induced transport pathway, which delivers cytosolic material for degradation to the lysosome (vacuole). It is highly conserved in all eukaryotes from yeast to human and helps the cells to survive periods of nutrient limitation.

Autophagy further plays an important role in ageing, the development of breast cancer and cardiomyopathy and it was linked to neurodegenerative diseases like Alzheimer´s, Huntington´s and Parkinson´s disease. Autophagy is mechanistically unique, since its transport intermediates, the autophagosomes, are surrounded by two individual membranes. It starts at the newly-discovered preautophagosomal structure, where autophagosomes are formed. Autophagosomes unspecifically enclose parts of the cytoplasm including organelles like mitochondria, peroxisomes and parts of the ER.

When the autophagosomes reach the vacuole, their outer membrane-layer fuses with the vacuolar membrane and a still membrane-enclosed autophagic body is released into the vacuolar lumen. In the vacuole autophagic bodies are lysed and broken down together with their cytosolic content. The intravacuolar breakdown of autophagic bodies requires the selective lysis of their limiting membrane. Due to the use of two limiting membranes the biogenesis of autophagosomes is a very unique process. Molecular dissection of this process is one of our main areas of research.

Selected Recent Publications

Nair U, Thumm M*, Klionsky DJ*, Krick R (2011) GFP-Atg8 protease protection as a tool to monitor autophagosome biogenesis. Autophagy 7(12): 1546-1550, Toolbox, *corresponding authors

Krick R, Bremer S, Welter E, Schlotterhose P, Muehe Y, Eskelinen E-L, Thumm M (2010) Cdc48/p97 and Shp1/p47 regulate autophagosome biogenesis in concert with ubiquitin-like Atg8. J Cell Biol 190(6): 965-973

Welter E, Thumm M*, Krick R (2010) Quantification of nonselective bulk autophagy in S. cerevisiae using Pgk1-GFP. Autophagy (6): 794-7, Toolbox, *corresponding author

Krick R, Muehe Y, Prick T, Bremer S, Schlotterhose P, Eskelinen E-L, Millen J, Goldfarb DS, Thumm M (2008) Piecemeal microautophagy of the nucleus requires the core macroautophagy genes. Mol Biol Cell (19): 4492-4505

Krick R, Henke S, Tolstrup J, Thumm M (2008) Dissecting the localization and function of Atg18, Atg21 and Ygr223c. Autophagy 4(7): 896-905

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Kai Tittmann

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- Diploma (Biochemistry), Martin-Luther-University, Halle/Saale (Germany), 1996
- Dr. rer. nat., Martin-Luther-University, Halle/Saale (Germany), 2000
- Postdoc, Institute for Biochemistry, MLU Halle-Wittenberg, Halle/Saale (Germany), 2001 – 2002
- Jun.-Prof. of Molecular Enzymology, Institute for Biochemistry, MLU Halle-Wittenberg, Halle/Saale, (Germany), 2003 – 2008
- Invited Research Scientist at Rutgers University, Newark, NJ, USA, 2003
- Associate Guest Professor, Ben-Gurion-University of the Negev, Beer-Sheva, IL, 2006
- Since 2008 Professor of Bioanalytics, Georg-August-University, Göttingen (Germany)
- Awards: Dorothea-Erxleben-Prize (best doctoral thesis), 2001
- Prize for excellent basic research at Saxony-Anhalt, 2005

Major Research Interests

The central research topic of our department is the analysis of molecular reaction mechanisms of enzymes as nature's chemical catalysts. In this context, we study enzymes with vitamin-derived cofactors, with metal ions, and Schiff base-forming enzymes. A particular focus is laid on the structural and kinetic characterization of enzymatic reaction intermediates by high-resolution X-ray crystallography, steady-state and transient kinetic methods, NMR spectroscopy and theoretical studies. Knowledge about the reaction mechanism is exploited to redesign enzymes for biocatalytic applications and for drug design.

Selected Recent Publications

Lehwess-Litzmann A, Neumann P, Parthier C, Lüdtke S, Golbik R, Ficner R, Tittmann K (2011) Twisted Schiff-base Intermediates and Substrate Locale Revise Transaldolase Mechanism. Nature Chem Biol 7: 678-684

Meyer D, Walter L, Kolter G, Pohl M, Müller M, Tittmann K (2011) Conversion of pyruvate decarboxylase into an enantioselective carboligase with biosynthetic potential. J Am Chem Soc 133: 3609-3616

Kaplun A, Binstein E, Vyazmensky M, Steinmetz A, Barak Z., Chipman DM, Tittmann K, Shaanan B (2008) Glyoxylate carboligase challenges the paradigm for activation of thiamin-dependent enzymes. Nature Chem Biol 4: 113-118

Neumann P., Weidner A., Pech A., Stubbs M T, Tittmann K. (2008) Structural basis for membrane binding and catalytic activation of the peripheral membrane enzyme pyruvate oxidase from *E. coli*. Proc Natl Acad Sci USA 105: 17390-17395.

Wille G, Meyer D, Steinmetz A, Hinze E, Golbik R, Tittmann K (2006) The catalytic cycle of a thiamin diphosphate enzyme examined by cryocrystallography. Nature Chem Biol 2: 324-328

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Henning Urlaub

Group Leader - Bioanalytical Mass Spectrometry Group

- from 2010: Group leader “Bioanalytical Mass Spectrometry” group at the Max Planck Institute for Biophysical Chemistry, Göttingen and “Bioanalytics” group at University Medical Center Göttingen (UMG) within Dept. of Clinical Chemistry
- 2010: Professor at the Faculty of Medicine at Georg August University Göttingen
- 2005: Research group “Bioanalytical Mass Spectrometry Group” at the Max Planck Institute for Biophysical Chemistry
- 2001: Responsibility for running the mass spectrometry unit in the Dept. of Cellular Biochemistry at the Max Planck Institute for Biophysical Chemistry in Göttingen
- 2000 – 2001: Guest researcher at the EMBL in Heidelberg, Germany, in the group of Dr. Matthias Wilm
- 1997 – 2001: Post-Doc at the “Institut für Molekularbiologie und Tumorforschung” (IMT) of the Philipps University of Marburg, Germany (Group of Reinhard Lührmann) and at the Max Planck Institute for Biophysical Chemistry in Göttingen (Group of Reinhard Lührmann)
- 1993 – 1996 Ph.D. and Post-Doc in the research group of Prof. Brigitte Wittmann-Liebold at the Max Delbrück Center for Molecular Medicine (MDC) in Berlin
- 1992 – 1993 Diploma thesis in the research group of Prof. Volker A.
- Erdmann at the Institute of Biochemistry of the Free University of Berlin
- 1987 – 1993 Studied biochemistry at the Free University of Berlin, Germany

Major Research Interests

Modern mass-spectrometric methods have become key technologies in the life sciences. We apply “state-of-the-art” mass spectrometry to elucidate quantitative changes of proteins and their post-translational modifications derived from different samples, including tissue, cells, organelles, and cell compartments. In addition we apply mass spectrometric methods to monitor dynamic changes of protein and protein-ligand complexes through use of crosslinking and chemical probing. In this respect, we collaborate with several groups within the GGNB, like the groups of Wolfgang Fischle, Dirk Görlich, Reinhard Jahn, Reinhard Lühr-mann, Peter Rehling, Oliver Schlüter, Holger Stark, Jürgen Wienands, Markus Zweckstetter, and many others. We provide solutions and analytical workflows for solving cell biological issues; we further develop novel analytical workflows for in-depth analyses of entire proteomes and for structural analyses of proteins.

Selected Recent Publications

Schmitzová J, Rasche N, Dybkov O, Kramer K, Fabrizio P, Urlaub H, Lührmann R, Pena V (2012) Crystal structure of Cwc2 reveals a novel architecture of a multipartite RNA-binding protein. EMBO J 31(9): 2222-34

Nikolov M, Stuetzer A, Mosch K, Krasauskas A, Soeroes S, Stark H, Urlaub H, Fischle W (2011) Chromatin affinity purification and quantitative mass spectrometry defining the interactome of histone modification patterns. Mol Cell Proteomics 10(11): M110.005371 *co-corresponding author

Oellerich T, Bremes V, Neumann K, Bohnenberger H, Dittmann K, Hsiao H-H, Engelke M, Schnyder T, Batista F, Urlaub H*, Wienands J (2011) The B cell antigen receptor signal through a preformed transducer module of SLP65 and CIN85. EMBO J 30(17): 3620-34 *co-corresponding author

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Lutz Walter

Head of Department of Primate Genetics at the German Primate Center

- Dr. rer. nat. (PhD), University of Göttingen, 1994
- Postdoctoral fellow and group leader at the Division of Immunogenetics, University of Göttingen, 1994 – 2004
- Head of Department of Primate Genetics, German Primate Center, Göttingen, since 2004
- Habilitation (Immunology and Immunogenetics), Medical Faculty of the University of Göttingen, 2005
- apl Professor, Medical Faculty of the University of Göttingen, 2009

Major Research Interests

Natural killer (NK) cells belong to the lymphocyte lineage and represent an essential part of the innate immune system. Upon interaction with target cells and stimulation via various receptors, NK cells can kill other cells and secrete substantial amounts of cytokines. Signals from activating and inhibitory NK cell receptors are integrated and regulate the activity of NK cells. Typical targets for NK cell killing are virus-infected or malignant cells, which both frequently reveal changed patterns of ligand expression on their cell surface. Such changes are recognised by NK cells, leading to killing of virally infected or transformed cells. NK cells can also be activated by different stimuli during interaction with dendritic cells, leading to release of pro-inflammatory cytokines and anti-viral substances. Due to these properties, NK cells play also important roles in autoimmune diseases, transplantation, and reproduction. Recently, NK cells were shown to possess immunological

Our interests lie in biology and genetics of natural killer (NK) cells. In particular, we are interested in NK cell receptors and their interaction with MHC class I ligands and the regulation of NK cell activation. Furthermore, we analyse the role of micro-RNA molecules in the regulation of NK cell activity (see also below).

A further research area includes small non-coding RNA genes and molecules (micro-RNA, siRNA, snoRNA) and their role and contribution in various virus infection models including human immunodeficiency virus (HIV).

Selected Recent Publications

Rosner C, Kruse PK, Hermes M, Otto N, Walter L (2011) Rhesus macaque inhibitory and activating KIR3D interact with Mamu-A-encoded ligands. J Immunol 186: 2156-2163

Brameier M, Herwig A, Reinhardt R, Walter L, Gruber J (2011) Human box C/D snoRNAs with miRNA like functions: expanding the range of regulatory RNAs. Nucleic Acids Res 39: 675-686

Walter L (2011) MHC class I-interacting NK cell receptors of nonhuman primates. J Innate Immun 3: 236-241

Abi-Rached L, Kuhl H, Roos C, ten Hallers B, Zhu B, Carbone L, de Jong PJ, Mootnick AR, Knaust F, Reinhardt R, Parham P, Walter L (2010) A Small, Variable and Irregular Killer cell Immunoglobulin-like Receptor (KIR) Locus Accompanies the Absence of MHC-C and MHC-G in Gibbons. J Immunol 184: 1379-1391

Averdam A, Petersen B, Rosner C, Neff J, Roos C, Eberle M, Aujard F, Münch C, Schempp W, Carrington M, Shiina T, Inoko H, Knaust F, Coggill P, Sehra H, Beck S, Abi-Rached L, Reinhardt R, Walter L (2009) A novel system of polymorphic and diverse NK cell receptors in primates. PLoS Genetics Oct;5(10): e1000688 (open access)

Herr A, Dressel R, Walter L (2009) Different subcellular localisation of TRIM22 suggests species-specific function. Immunogenetics 61: 271-280

Averdam A, Kuhl H, Sontag M, Becker T, Hughes AL, Reinhardt R, Walter L (2007) Genomics and diversity of the common marmoset monkey natural killer complex (NKC). J Immunol 178: 7151-7161

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Jürgen Wienands

Professor of Cellular and Molecular Immunology

- 1982 – 89 Study of Biology at the University of Cologne; graduated at the Institute of Genetics, Dept. of Immunology
- 1989 – 92 Ph.D. poject at the Max Planck Institute for Immunobiology, Freiburg, Germany
- 1992 – 94 Postdoctoral fellow at the Dept. of Preclinical Research at Sandoz Pharma Ltd., Basel, Switzerland
- 1994 – 96 Postdoctoral fellow at the Max Planck Institute for Immunobiology, Freiburg, Germany
- 1996 – 2001 Group leader at the University of Freiburg, Institute of Biology III
- 2001 “Habilitation” and Venia Legendi in “Molecular Immunology and Biochemistry”
- 2001 – 2004 Full Professor for “Biochemistry and Molecular Immunology” at the University of Bielefeld
- since August 2004 Full Professor for “Molecular and Cellular Immunology” at the University of Göttingen

Major Research Interests

The signature structure of B lymphocytes is their clonotypic antigen receptor (BCR). Our major research focuses on the elucidation of intracellular BCR signaling pathways that regulate the development and activation of B cells in health and disease. We have identified enzymatically inert adaptor proteins such as SLP-65 (for: SH2 domain-containing leukocyte adaptor of 65 kDa), which nucleate the formation of multi-molecular protein complexes to integrate and amplify BCR signals. A key function of these signaling modules is to orchestrate the mobilization of the second messenger Ca^{2+}. Interference with expression and/or function of one the signaling components can cause severe immunodeficiencies in mouse and man. Moreover, viruses such as the Epstein-Barr virus (EBV) abuse BCR effector proteins to reorganize signaling cascades for their own benefit. Biochemical and genetic methods, which are applied to study these events *in vitro* and *in vivo*, include protein purification by affinity chromatography and immunoprecipitation, analysis of protein interactions, flow cytometry, targeted gene disruption in cell culture and embryonic stem cells followed by reconstitution experiments using electroporation techniques or retroviral gene transfer.

Selected Recent Publications

Oellerich T, Bremes V, Neumann K, Dittmann K, Bohnenberger H, Engelke M, Hsiao HH, Schneyder T, Batista FD, Urlaub H, Wienands J (2011) The B cell antigen receptor signals through a preformed transducer module of SLP65 and CIN85. EMBO J 30: 3620-363

Engels N, König L, Heemann C, Lutz J, Tsubata T, Griep S, Schrader V, Wienands J (2009) Recruitment of the cytoplasmic adapter Grb2 to surface IgG and IgE provides antigen receptor-intrinsic costimulation to class-switched B cells. Nature Immunol 10: 1018-1025

Oellerich T, Grønborg M, Neumann K, Hsiao HH, Urlaub H, Wienands J (2009) SLP-65 phosphorylation dynamics reveals a functional basis for signal integration by receptor-proximal adaptor proteins. Mol Cell Proteom 8: 1738-1750

Stork B, Neumann K, Goldbeck I, Alers S, Kähne T, Naumann M, Engelke M, Wienands J (2007) Subcellular localization of Grb2 by the adaptor protein Dok-3 restricts the intensity of Ca2+ signaling in B cells. EMBO J 26: 1140-1149

Grabbe A, Wienands J (2006) Human SLP-65 isoforms contribute differently to activation and apoptosis of B lymphocytes. Blood 108: 3761-3768

for review see:

Engels N and Wienands J (2011) The signaling tool box for tyrosine-based costimulation of lymphocytes. Curr Opin Immunol 23: 324-329

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Ernst Wimmer

Professor of Developmental Biology

- 1991 Diplom (Biology), Ludwig Maximilians University, Munich (Germany)
- 1995 Dr. rer. nat., Max-Planck-Institute for Biophysical Chemistry, Göttingen (Germany) and Howard Hughes Medical Institute, Baylor College of Medicine, Houston (USA)
- 1995 – 1998 Postdoctoral Fellow and Associate, Howard Hughes Medical Institute, The Rockefeller University, New York (USA)
- 1998 – 2003 Assistant Professor and Robert Bosch Foundation 'Junior Professor' Department of Genetics, University of Bayreuth, Bayreuth (Germany)
- Since 2003 Professor of Developmental Biology at the Johann Friedrich Blumenbach Institute of Zoology and Anthropology, Georg August University, Göttingen (Germany)

Major Research Interests

Phylogenetic Variance and Plasticity of Developmental Processes. A key question in evolutionary developmental biology is how diverse animal body plans are specified. To identify the plasticity in developmental processes, we study their conservation and divergence in different arthropod species by transgenesis and functional genomics approaches. This will help us to understand how animal evolution is based on changes in gene regulation governing pattern formation processes.

Smelling Beetles: Stink Glands and Odour Detection the Red Flour Beetle *Tribolium castaneum*. Beetles are prolific producers of repellent and/or toxic compounds. Defensive substances are usually multifunctional: as repellents, toxicants, insecticides, or antimicrobics, they are directed against a large array of potential target organisms or may function for boiling bombardment or as surfactants. We are interested both in the development of these glands as well as their biochemical composition and biological function. The red flour beetle also offers a great system to address olfaction from the odour recognition and discrimination at the periphery to the analysis of the plasticity of the central olfactory pathway. Our focus lays on the biological function of odorant binding proteins (OBPs) and sensory neuron membrane proteins (SNMPs) which is still largely unknown, despite their necessity for olfaction.

Applied Developmental Biology. Biotechnological improvements on the Sterile Insect Technique (SIT). SIT is a successful genetic pest management strategy to prevent, control, suppress, or even eradicate invasive insect pest species from islands, large agricultural production areas, or even complete continents. SIT is a species-specific and eco-friendly insect birth control measure involving mass production, sterilization, and sustained area-wide release of large quantities of sterilized insects. This leads to unproductive matings, which shrinks the population. Our current biotechnological efforts improve on transgenic female-specific lethality systems to enable more efficient male-only releases, on reproductive sterility systems to overcome the problem of radiation-reduced fitness, and on transgenic markers to better monitor the efficacy of SIT applications.

Selected Recent Publications

Li J, Lehmann S, Weißbecker B, Ojeda-Naharros I, Schütz S, Joop G, Wimmer EA (2013) Odoriferous defensive stink gland transcriptome to identify novel genes for quinone synthesis in the red flour beetle, *Tribolium castaneum*. PLoS Genet 9, e1003596

Ogaugwu CE, Schetelig MF, Wimmer EA (2013) Transgenic sexing system for *Ceratitis capitata* (Diptera: Tephritidae) based on female-specific embryonic lethality. Insect Biochem Mol Biol 43, 1-8

Ntini E, Wimmer EA (2011) Second order regulator Collier directly controls intercalary-specific segment polarity gene expression. Dev Biol 360: 403-414

Schaeper ND, Prpic NM, Wimmer EA (2010) Evolutionary plasticity of *collier* function in head development of diverse arthropods Dev Biol 344: 363-76

Schetelig MF, Caceres C, Zacharopoulou A, Franz G, Wimmer EA (2009) Conditional embryonic lethality to improve the sterile insect technique in *Ceratitis capitata* (Wiedemann; Diptera: Tephritidae). BMC Biology 7: 4

Schetelig MF, Scolari F, Kittelmann S, Malacrida AR, Gasperi G, Wimmer, EA (2009) Site-specific integration to modify successfully tested transgenic *Ceratitis capitata* (Diptera: Tephritidae) lines. Proc Natl Acad Sci USA 106: 18171-6

The *Tribolium* Genome Consortium (2008). The genome of the model beetle and pest *Tribolium castaneum*. Nature 452: 949-955

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Andreas Wodarz

Professor of Stem Cell Biology

- Diploma Biology, University of Cologne, 1990
- Dr. rer. nat. Developmental Biology, University of Cologne, 1993
- Postdoc, Howard Hughes Medical Institute, Stanford University, 1994 – 1997
- Junior Group Leader, Heinrich Heine University Düsseldorf, 1997 – 2004
- Habilitation in Genetics, Heinrich Heine University Düsseldorf, 2001
- Appointed as Head of the Department of Stem Cell Biology at the University of Göttingen, 2004
- Appointed as Head of the Department of Anatomy and Cell Biology at the University of Göttingen, 2010

Major Research Interests

The research activities in the Wodarz laboratory focus mainly on different aspects of the asymmetric division of neural stem cells. Asymmetric cell division is a fundamental mechanism for the generation of cell diversity in complex organisms. At the same time, asymmetric cell division is essential for the balance between stem cells and differentiating cells in an organism. Disturbances of this balance can cause severe diseases, including cancer and neurodevelopmental disorders. Asymmetric cell division is intricately linked to the control of apical-basal cell polarity, which is investigated in a second research focus. The establishment and maintenance of apical-basal cell polarity is connected to the regulation of planar cell polarity (PCP) and cell adhesion, especially in epithelial tissues. In this context, we investigate the function of the evolutionarily conserved Wnt signal transduction pathway in the regulation of PCP and cell adhesion.
The model organism of our research is mainly the fruit fly *Drosophila melanogaster*, as it is easily accessible to genetic manipulation and is very well suited for cell biological analyses using high-resolution light microscopy.

Selected Recent Publications

Gailite I, Egger-Adam D, Wodarz A (2012) The phosphoinositide-associated protein Rush hour regulates endosomal trafficking in *Drosophila*. Mol Biol Cell 23: 433-447

Morawe T, Honemann-Capito M, von Stein W, Wodarz A (2011) Loss of the extraproteasomal ubiquitin receptor Rings lost impairs ring canal growth in *Drosophila* oogenesis. J Cell Biol 193: 71-80

Krahn MP, Bückers J, Kastrup L, Wodarz A (2010) Formation of a Bazooka-Stardust complex is essential for plasma membrane polarity in epithelia. J Cell Biol 190: 751-760

Krahn MP, Klopfenstein D, Fischer N, Wodarz A (2010) Membrane targeting of Bazooka/PAR-3 is mediated by direct binding to phosphoinositide lipids. Curr Biol 20: 636-642

Koch CM, Honemann-Capito M, Egger-Adam D, Wodarz A (2009) Windei, the Drosophila homolog of mAM/MCAF1, is an essential cofactor of the H3K9 methyl transferase dSETDB1/Eggless in germ line development. PLoS Genetics 5: e1000644

Kim S, Gailite I, Moussian B, Luschnig S, Goette M, Fricke K, Honemann-Capito M, Grubmüller H, Wodarz A (2009) Kinase activity independent functions of atypical protein kinase C in *Drosophila*. J Cell Sci 122: 3759-3771

Krahn MP, Egger-Adam D, Wodarz A (2009) PP2A antagonizes phosphorylation of Bazooka by PAR-1 to control apical-basal polarity in dividing embryonic neuroblasts. Dev Cell 16: 901-908

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