GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN / GERMANY

International Max Planck Research School

Molecular Biology

MSc/PhD Program

YEARBOOK 2011 / 2012

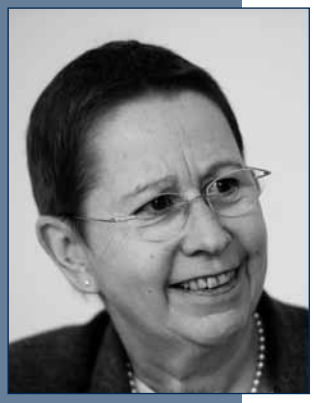
Yearbook 2011/2012

MSc/PhD Molecular Biology Program

at the University of Göttingen

International Max Planck Research School

Index



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 supported by the federal Excellence Initiative since 2007.

The Molecular Biology and Neuroscience programs remain unique within the Graduate School GGNB in offering integrated MSc/PhD curricula with a fast track option which allows excellent BSc graduates to directly enter the PhD phase after successfully absolving the initial first 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 development 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, the Max Planck Society, 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 PhD 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, 62 International Max Planck Research Schools have been established involving 73 Max Planck Institutes, 37 German universities with 82 participating faculties and 38 universities abroad. About 2720 PhD students from 108 countries are presently enrolled. More than 2600 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 Neurosciences 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 and Molecular Biosciences, thus being instrumental for the success of the University in the German Excellence Initiative. 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

Reinhard Jahn
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 2011/12 class, the faculty members, the program committee and the coordination team.

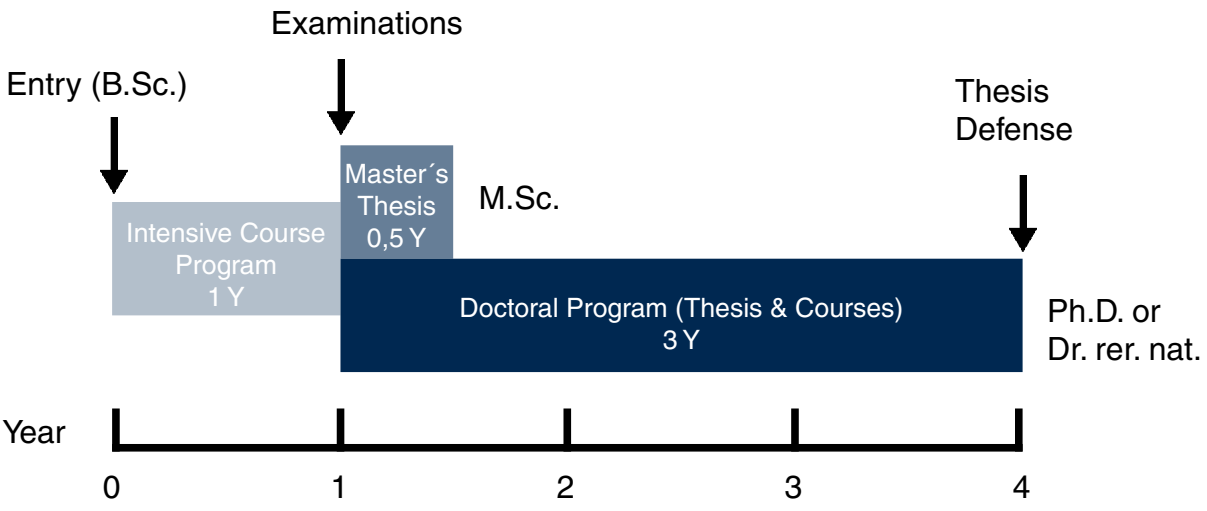
The program belongs to the Göttingen Graduate School for Neurosciences, Biophysics, and Molecular Biosciences (GGNB), which is funded by the Excellence Initiative of the German Federal and State Governments. It is offered by the Göttingen Center for Molecular Biosciences (GZMB), the Max Planck Institute 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:

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

International Degree Programs - Auslandsorientierte Studiengänge (AS)

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

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, Essen, Germany, http://www.stifterverband.org

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

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 structure
- DNA replication and repair
- transcription, RNA splicing, RNA quality control
- RNA-based regulation (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, nucleocytoplasmictransport
- protein sorting and processing, membrane traffic
- autophagocytosis
- cytoskeleton
- cell Adhesion
- immunology
- infectious diseases, principles of pathogenicity
- cell cycle, apoptosis, cancer
- nervous systems, sensory systems

D. Model Systems of Molecular Biology / Biotechnology

- fungi
- *Arabidopsis*
- *Drosophila, C. elegans*
- *Xenopus*, Zebrafish
- chicken, mouse
- 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. The methods comprise 14 two-day experiments and a selection of two (out of four) special courses in small groups.

A. Proteins

- protein preparation and characterization by gel electrophoresis and Western blot
- chromatographic protein separation
- gene expression analysis with microarrays or sequencing
- analysis of protein-protein and nucleic acid-protein interaction

B. Nucleic Acids

- purification and electrophoresis of nucleic acids
- polymerase chain reaction I
- cDNA-synthesis, cloning
- DNA sequence analysis and bioinformatics / Modeling biological networks
- chemical and enzymatic analysis of RNA structure
- spectroscopic characterization of nucleic acids

C. Cell Biology and Genetics

- light microscopy
- analysis of cellular compartments
- cell culture
- expression analysis

D. Special 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 two of the following disciplines:

- biochemistry
- structural biology
- genetics
- microbiology
- cell biology
- immunology
- developmental biology

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 doctoral thesis 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, outstanding speakers and approximately 200 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. will be 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 2011

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 2011, the Molecular Biology program received 522 applications from 62 countries.

Continent	Applications	Admissions
Europe (total)	**102**	**11**
Germany	31	6
other West Europe	23	1
East Europe	48	4
America (total)	**51**	**3**
North America	18	1
Central/South America	33	2
Africa (total)	**78**	**0**
North Africa	40	0
Central/South Africa	38	0
Asia (total)	**291**	**6**
Near East	32	1
Central Asia/ Far East	259	5
Australia	**0**	**0**

Students 2011 / 2012

Name		Home Country
Gurneet	Braich	Canada
Kolja	Eckermann	Germany
Muna Ayesha	Khan	India
Mahdokht	Kohansal Nodehi	Iran
Dragomir	Milovanovic	Serbia
Lena	Musiol	Germany
Sabin	Prajapati	Nepal
Emmanuel	Reyna González	Mexico
Katja	Rust	Germany
Evgeniia	Samoiliuk	Russian Federation
Katharina	Seitz	Germany
Heena	Sharma	India
Sumana	Sharma	Nepal
Anita Klarisa	Smarandache	Romania
Sven	Truckenbrodt	Germany
Kanika	Vanshylla	India
Arturo	Vera Rodríguez	Mexico
Laura	Winters	Germany
Agata	Witkowska	Poland
Olena	Zaitseva	Ukraine

Gurneet Braich

Canada

Gurneet Braich

EDUCATION

College / University

University of Calgary, Calgary, Alberta, Canada

Highest Degree

Bachelor of Science

Major Subjects

Biological Sciences, Biochemistry

Lab Experience

HPLC, LC-MS, GC-MS, qPCR, cloning, genomics, enzyme assays

Projects / Research

9/2010 – 7/2011 Comparative Genomics and Reverse Genetics of Proanthocyanidin Biosynthesis in Plant, University of Calgary, Calgary, Canada

5/2010 – 8/2010 Genetic Markers and Biogeographic Patterns in European *Populus tremula*. University College Dublin, Dublin, Ireland

5/2009 – 8/2009 Identification and Characterization of New Allelic Variation in Candidate Genes for Oil Content. Georg August Universität, Göttingen, Germany

Scholarships / Awards

2011 – 2012 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society

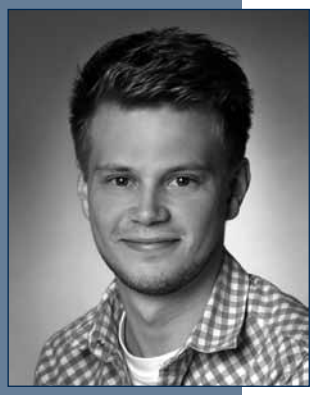
2010 – 2011 University of Calgary Research Award

2008 – 2011 Government of Alberta Jason Lang Scholarship

5/2010 – 8/2010 Undergraduate Research Experience and Knowledge Award - Collections Based Biology in Dublin

5/2009 – 8/2009 DAAD RISE Program

Kolja Eckermann



Germany

Kolja Eckermann

EDUCATION

College / University

Georg August University Göttingen, Germany

Highest Degree

Bachelor of Science

Major Subjects

Developmental Biology

Lab Experience

Various techniques in biochemistry, cell biology and molecular genetics. Such as SDS-PAGE/ Western Blot, Cell Fractionation Assays, PCR mutagenesis, Plasmid Cloning and Purification, Protein Extraction, *Drosophila* husbandry and genetics, Gal4/ UAS-System, RNAi, *Drosophila* cell culture (S2R-cells), Transfection, Immunostaining and Confocal Microscopy

Projects / Research

10/2010 – 9/2011 Research on the identification of nuclear localization signals in *Drosophila* PAR-6 and Lgl. Department of Stem Cell Biology (Prof. Dr. Andreas Wodarz), Göttingen Center of Molecular Biosciences (GZMB), Georg August University Göttingen, Germany

Scholarships / Awards

2011 – 2012 International Max Planck Research School support

India

Muna Ayesha Khan

EDUCATION

College / University

Sri Venkateswara College, University of Delhi, India

Highest Degree

B.Sc. (Honors) Biochemistry

Major Subjects

Biochemistry, Molecular Biology, Genetics, Cell Biology, Immunology, Membrane Biology, and Bioenergetics

Lab Experience

Techniques in molecular biology, immunology and microbiology, including PCR, chromatography, ELISA, sonication and recombinant DNA technology

Projects / Research

2010 Study on "The purification of *E. coli* enzyme RNA polymerase"

2010 Study on "The importance of C-terminal domain of bacteriophage N-protein in antitermination at single Rho dependent transcription terminator"

2009 – 2010 Clinical project: "The effect on nutrient levels in the diet of a vegetarian vs a nonvegetarian person"

2009 Identification and characterization of unknown strain of soil bacterium

2008 – 2009 Isolation and purification of enzyme acid phosphatase from *Vigna radiate*

Scholarships / Awards

2011 – 2012 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society

2010 Summer Research Fellowship at the Centre of DNA Fingerprinting and Diagnostics (CDFD), Hyderabad, awarded by the Indian Academy of Science

Iran

Mahdokht Kohansal Nodehi

EDUCATION

College / University

Alzahra University, Tehran, Iran

Tarbiat Modares University, Tehran, Iran

Highest Degree

M.Sc.

Major Subjects

Biochemistry

Lab Experience

Various techniques in molecular biology

Projects / Research

2/2010 – 4/2011 Site-directed mutagenesis of alpha-amylase and characterization of biochemical (kinetic and activation) parameters of mutants and wild type. Also investigating inhibition mechanism of acarbose (antidiabetic drug) on these enzymes

4/2009 – 2/2010 Investigating the role of a C-terminal sequence of alpha-amylase with and without signal peptide on secretion of enzyme in to culture medium in *Bacillus subtilis*

Scholarships / Awards

2011 – 2012 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society

2008 Ranked 6th in national graduate programs entrance exam in the field of biochemistry

Serbia

Dragomir Milovanovic

EDUCATION

College / University

University of Belgrade, Faculty of Chemistry, Department of Biochemistry

Indiana University of Pennsylvania, College of Mathematics and Natural Sciences

Highest Degree

B.Sc. (Honors) in Biochemistry

Major Subjects

Biochemistry, Molecular Biology, Cell Biology

Lab Experience

Expression/purification of proteins, enzymatic analysis, RT-PCR, cell culture

Projects / Research

7/2011 – 9/2011 Analysis of the Ebf1 Interaction Partners Using the Proximity Ligation Assay

10/2010 – 6/2011 Variability of mitochondrial DNA haplotypes in *Drosophila subobscura*

7/2010 – 9/2010 Racemization Studies of Recombinant N-acetyl Amino Acid Racemase from *Geobacillus kaustophilus* and *Geobacillus thermodenitrificans*

07/2009 – 09/2009: The Cross Correlated Relaxation Rate as a Tool to Investigate Protein Dynamics

09/2008 – 05/2009: Optimization of the Srs2 Protein Expression in *E. coli*

Scholarships / Awards

2011 – 2012 Stipend of the Excellence Foundation for the Promotion of the Max

4/2009 American Chemical Society and the Department of Chemistry at Indiana University of Pennsylvania Award for the Student Achievements

Germany

Lena Musiol

EDUCATION

College / University

Leibniz University Hannover, Germany

Highest Degree

B.Sc.

Major Subjects

Biochemistry, Molecular Biology

Lab Experience

Various techniques in biochemistry, cell biology and molecular biology

Projects / Research

4/2011 – 8/2011 Investigation of membrane association of Prostate-Specific Membrane Antigen using protein chimeras. Bachelor's Thesis. Department of Physiological Chemistry, University of Veterinary Medicine Hannover (Foundation), Germany

8/2010 Four-week internship on Lysosomal Storage Diseases in the Department of Physiological Chemistry, University of Veterinary Medicine Hannover (Foundation), Germany

Scholarships / Awards

2011 – 2012 International Max Planck Research School support

Nepal

Sabin Prajapati

EDUCATION

College / University

Universal Science College affiliated with Pokhara University, Nepal

Highest Degree

B.Sc.

Major Subjects

Biochemistry, Molecular Biology and Cellular Biology, Microbiology

Lab Experience

PCR, SDS-PAGE and agarose gel electrophoresis, proteins and nucleic acid extraction and purification, bacterial cell transformation, basic chromatography techniques and cell culture

Projects / Research

3/2010 – 8/2010 Screening and characterization of pesticide degrading bacteria. Research Laboratory for Agricultural Biotechnology and Biochemistry (RLABB), Nepal

5/2009 – 10/2009 Characterization of *Choreospondias axillaris* (Lapsi) fruit protease. Universal Science College, Department of Biochemistry, Nepal

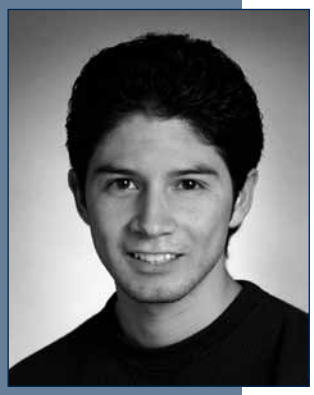
Publications

Prajapati S and Sharma S (2010) Characterization of *Choreospondias axillaris* (Lapsi) fruit protease. Online Journal "International Journal of Life Sciences"

Scholarships / Awards

2011 – 2012 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society

2005 – 2009 Scholarship for Academic Excellence. Biochemistry Department, Universal Science College, Nepal



Mexico

Emmanuel Reyna González

EDUCATION

College / University

2007 – 2011 Facultad de Química, Universidad Nacional Autónoma de México (UNAM), Mexico City, Mexico

Highest Degree

B.Sc.

Major Subjects

Biochemistry and Pharmacology

Lab Experience

Various techniques in molecular biology, including nucleic acids extraction, PCR, gel electrophoresis and sequencing reactions

Projects / Research

2/2010 – 12/2010 Impact of mutations in the gag gene in the replication capacity of HIV in the immunogenetic context of Mexican population. Centro de Investigación en Enfermedades Infecciosas (CIENI), INER, Mexico City, Mexico

Scholarships / Awards

2011 – 2012 Scholarship by the Mexican National Council for Science and Technology (CONACYT) and the German Academic Exchange Service (DAAD)

6/2009 – 8/2009 Stanford Summer Honors Program Scholarship. UNAM – Stanford University

Germany

Katja Rust

EDUCATION

College / University

Georg August University Göttingen, Germany

Highest Degree

B.Sc.

Major Subjects

Developmental Biology and Biochemistry

Lab Experience

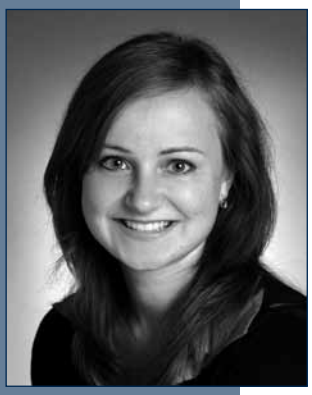
Various techniques in biochemistry and molecular genetics, furthermore nucleus-cytoplasm separation and microinjection into *Xenopus* oocytes

Projects / Research

10/2010 – 4/2011 Analysis of the contribution of SYNCRIP towards RNA localisation in *Xenopus laevis* oocytes (Bachelor's Thesis). Institute for Developmental Biochemistry (Prof. Dr. Thomas Pieler), Georg August University Göttingen, Germany

Scholarships / Awards

2011 – 2012 International Max Planck Research School support



Russian Federation

Evgeniia Samoiliuk

EDUCATION

College / University

St. Petersburg State Polytechnical University, Physical-Mechanical Faculty, Dept. of Biophysics

Highest Degree

B.Sc. in Physics

Major Subjects

Physics

Lab Experience

Electrophysiological method of suction pipette

Projects / Research

Localization of enzymes for hydrolysis and synthesis of cAMP in the rods of the retinas of amphibian. Bachelor's thesis. The work was done within the project on elucidating the cAMPdependent control loop of phototransduction cascade. (Sechenov Institute for Evolutionary Physiology and Biochemistry, Russian Academy of Sciences)

Scholarships / Awards

2011 – 2012 Scholarship by the German Academic Exchange Service (DAAD)

2010 – 2011 Orbeli scholarship (research scholarship of the Sechenov Institute for Evolutionary Physiology and Biochemistry, Russian Academy of Sciences)

Katharina Seitz

Germany

Katharina Seitz

EDUCATION

College / University

University of Würzburg, Germany

FernUniversität in Hagen, Germany

Highest Degree

B.Sc.

Major Subjects

Biomedicine, Mathematics

Lab Experience

Basic molecular biology and cell culture techniques, including PCR, Western blot, cultivation of several adherent cell lines. shRNA mediated gene silencing (design and cloning of shRNAs, lentivirus production, infection of target cells). Official requisite qualifications in radiation protection and handling/welfare of laboratory animals

Projects / Research

3/2011 – 6/2011 Validation of a high-throughput shRNA-screen to identify synthetic lethal interactions in MYCN-amplified tumour cells. Bachelor's Thesis. Physiological Chemistry II, University of Würzburg, Germany

7/2008 – 8/2008 Using recombinant enzymes for creatine phosphate synthesis. Internship. Roche Diagnostics, Penzberg, Germany

Scholarships / Awards

2011 – 2012 International Max Planck Research School support

2010 – present e-fellows.net scholarship

Heena Sharma

India

Heena Sharma

EDUCATION

College / University

2009 – 2011 Department of Biochemistry, University of Delhi, India

2006 – 2009 Sri Venkateswara College, University of Delhi, India

Highest Degree

M.Sc. in Biochemistry

Major Subjects

Proteins and enzymes, cell biology and signaling, membranes, immunology, molecular biology, recombinant DNA technology

Lab Experience

Basic molecular biology and immunology techniques, including expression of recombinant protein, protein expression, kinetics, basics of bioinformatics

Projects / Research

06/2010 – 04/2011 Studies on Lambda Phage Display system and expression studies of different vectors for *in vivo* complementation

06/2008 – 07/2008 Study of overexpression of Pao in *Arabidopsis thaliana*

Scholarships / Awards

2011 – 2012 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society

2009 – 2011 Gold Medal for 1st rank in MSc Biochemistry, University of Delhi, India

03/2011 Qualified Graduate Aptitude Test in Engineering

12/2010 Qualified the National Eligibility Test for CSIR – Junior Research Fellowship

Nepal

Sumana Sharma

EDUCATION

College / University

Jacobs University Bremen, Germany

Highest Degree

B.Sc.

Major Subjects

Biochemistry, Cell Biology, Microbiology, Molecular Genetics, Immunology

Lab Experience

Various techniques in molecular biology including PCR, RT-PCR, gel electrophoresis (agarose, PAGE, SDS-PAGE), Western blot, Northern blot, confocal laser scanning microscopy, indirect immunofluorescence, cell culture, transformation and transfection

Projects / Research

9/2010 – 04/2011 Construction of a *pilE* deficient mutant of *Marinobacter adhaerens* by site-directed mutagenesis, Jacobs University Bremen, Germany. Bachelor's thesis.

7/2010 – 8/2010 Study on the role of β-1 integrins in endocytosis of Anthrax toxin, École polytechnique fédérale de Lausanne (EPFL), Switzerland. Summer internship.

Scholarships / Awards

2011 – 2012 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society

2008 – 2011 President's list award for outstanding academic achievement, Jacobs UniversityBremen

2008 VOW ("Voice of Women") Top 10 Women of the Year award, Nepal

Romania

Anita Klarisa Smarandache

EDUCATION

College / University

Jacobs University Bremen, Germany

Highest Degree

B.Sc.

Major Subjects

Biochemistry and Cell Biology

Lab Experience

Cell culture, immunohistochemistry, mouse dissections, confocal microscopy

Projects / Research

2/2011 – 6/2011 Generation of mutants in the catalytic site of DNA methyltransferase 1. Biochemistry Department, Jacobs University Bremen, Germany

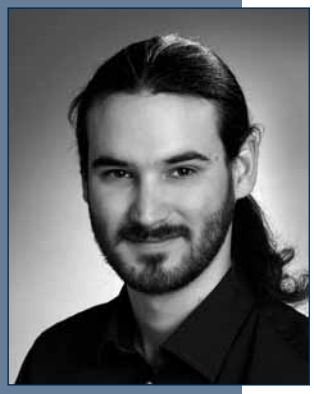
9/2010 – 11/2010 Effects of lunar and martian dust simulants and terrestrial dust on HaCaT keratinocyte migration in scratch assays. Cell Biology Department, Jacobs University Bremen, Germany

2/2010 – 6/2010 Fidelity determination of polymerases. SeSaM Biotech GmbH, Bremen, Germany

2/2009 – 6/2009 Site directed mutagenesis for improving thermostability of phosphatase. Biochemical Engineering Department, Jacobs University Bremen, Germany

Scholarships / Awards

2011 – 2012 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society



Germany

Sven Truckenbrodt

EDUCATION

College / University

Julius Maximilians University Würzburg, Germany (BSc in Biomedicine)

FernUniversität in Hagen, Germany (BSc in Psychology, study on-going)

Highest Degree

B.Sc. in Biomedicine

Major Subjects

Biomedicine

Lab Experience

Calcium imaging, *in vivo* dissection techniques on *Drosophila melanogaster*, behavioral paradigms, basic techniques in molecular biology, protein biochemistry and cell biology, official requisite qualifications in radiation protection and handling/welfare of laboratory animals

Projects / Research

5/2011 – 7/2011 Evaluation of novel optogenetic tools – GCaMP3 and Cameleon 2.1 in *in vivo* calcium imaging. University of Würzburg, Neurobiology and Genetics, group of Prof. Erich Buchner

3/2010 – 8/2010 Student research assistant, establishing a new approach to study the neural network of *Drosophila melanogaster* by direct manipulation in a behavioural setup using Channelrhodopsin. University of Würzburg, Neurobiology and Genetics, group of Prof. Erich Buchner

Scholarships / Awards

2011 – 2012 International Max Planck Research School support

10/2010 1st price at Scientific Writing Contest of the 5th International PhD Students' Symposium of the GSLS in Würzburg, Germany

India

Kanika Vanshylla

EDUCATION

College / University

Sri Venkateswara College, University of Delhi, India

Highest Degree

B.Sc. (Hons) Biochemistry

Major Subjects

Biochemistry, Molecular Biology, Genetics, Membrane Biochemistry, Bioenergetics, Cell Biology, Immunology

Lab Experience

Spectrophotometry, enzymology, chromatography, clinical biochemistry, protein purification, microbiology, cell fractionation, immune-precipitations, molecular biology and RDT techniques. Add-on course in bioinformatics

Projects / Research

1/2011 – 3/2011 Cloning of the gene RV1695 from *Mycobacterium tuberculosis* in *E. coli* using p-GEMT cloning vector. Biochemistry Department, Sri Venkateswara College.

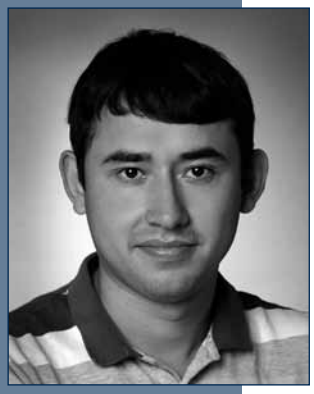
5/2010 – 7/2010 Study of Multiple Drug Resistance in *Candida albicans*. Yeast Molecular Genetics Lab (Dr. Snehlata Bhadoriya), JNU

10/2009 – 11/2009 Study on the Effect of Vegan Diet on Blood Micronutrients. Biochemistry Department, Sri Venkateswara College

Scholarships / Awards

2011 – 2012 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society

2011 Gold Medal for 1st rank in B.Sc. (Hons) Biochemistry, University of Delhi



Mexico

Arturo Vera Rodríguez

EDUCATION

College / University

Instituto Politécnico Nacional, Unidad Profesional Interdisciplinaria de Biotecnología, UPIBI-IPN. Mexico City, Mexico

Highest Degree

B.Sc.

Major Subjects

Biotechnological Engineering

Lab Experience

General techniques in biochemistry, microbiology and molecular biology

Projects / Research

2009 – 2011 Chloroplast transformation in *Chlamydomonas reinhardtii* for the expression of the Ag85b antigen of *Mycobacterium bovis*. Thesis project. UPIBI-IPN. Mexico City, Mexico

2007 – 2008 Study of the expression and refolding of the cellulose binding modules of the endoglucanase CP105 of *Cellulomonas flavigena*. Research project. CINVESTAV-IPN. Department of Biotechnology. Mexico City, Mexico

Scholarships / Awards

2011 – 2012 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society

2010 Scholarship. Institutional Program for the Training of Researchers, Instituto Politécnico Nacional, Mexico

2006 – 2010 Scholarship. National Program of Scholarships for Bachelor. National Ministry of Public Education, SEP, Mexico

Germany

Laura Winters

EDUCATION

College / University

Universität Bremen, Germany

Highest Degree

B.Sc.

Major Subjects

Biology (Molecular Biosciences)

Lab Experience

Various techniques in molecular biology and cell culture

Projects / Research

4/2011 – 8/2011 Construction of a control vector for yeast two-hybrid experiments with HMGA2 (thesis project). Center for Human Genetics, Universität Bremen, Germany

8/2010 – 10/2010 Taxonomic identification and genetic analysis of colormorphs among *Rhodactis*. Centre for Marine Environmental & Economic Research (CMEER), Victoria University of Wellington, New Zealand

Scholarships / Awards

2011 – 2012 International Max Planck Research School support

2010 Scholarship awarded by the German Academic Exchange Service (DAAD) in the RISE (Research Internships in Science and Engineering) worldwide program

Agata Witkowska

Poland

Agata Witkowska

EDUCATION

College / University

2007 – 2011 Warsaw University of Life Sciences, Poland

2010 – Gent University, Belgium (Erasmus exchange program)

Highest Degree

Bachelor of Science / Engineer

Major Subjects

Biotechnology, molecular biology

Lab Experience

Molecular biology and biochemistry techniques enabling nucleic acids and protein analysis, cell and tissue culture techniques

Projects / Research

10/2010 – 2/2011 “Construction of PRA carrier state diagnostic test for canine breeds of Polish Greyhound, Briard and Miniature Schnauzer”, Warsaw University of Life Sciences, Department of Genetics and Animal Breeding

2/2010 – 7/2010 “Study of the molecular basis of TNF-induced glucocorticoid resistance in MEF cells”, Flanders Institute for Biotechnology, Department for Molecular Biomedical Research

8/2009 “Thymosin ß4”, Polish Academy of Sciences, Institute of Medical Biology, Laboratory of Cellular Proteomics

Scholarships / Awards

2011 – 2012 Scholarship by the German Academic Exchange Service (DAAD)

2008 – 2011 Scholarship for the scientific achievements (Warsaw University of Life Sciences)

Olena Zaitseva

Ukraine

Olena Zaitseva

EDUCATION

College / University

“Kyiv-Mohyla academy” National University, Kiev, Ukraine

Highest Degree

B.Sc.

Major Subjects

Biology, Ecology

Lab Experience

Basic microbiology and cell biology techniques, molecular techniques (protein extraction and purification, gel electrophoresis, Western blot analysis, immunohistochemical analyses, PCR)

Projects / Research

Protein kinase D2, protein kinase Cβ and transcription factor IPO-38 as potential molecular markers of diffuse large B-cell lymphoma. Diploma research.

2011 Field research in the Ukrainian/Russian joint research project “Impact of invasion species in long-term changes of Black Sea bottom ecosystems“ as a volunteer-trainee (Crimean and Caucasian Black Sea coasts)

2009 – 2010 Field research of bottom vegetation and benthic invertebrates at the offshore area of the Karadag Nature Reserve of the National Academy of Sciences of Ukraine as a volunteer-trainee

Scholarships / Awards

2011 – 2012 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society

Faculty

Name		Institute	
Mathias	Bähr	Neurology	U Göttingen
Holger	Bastians	Molecular Oncology	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
Matthias	Dobbelstein	Molecular Oncology	U Göttingen
Roland	Dosch	Junior Group Leader at the Dept. of Developmental Biochemistry	U Göttingen
Stefan	Eimer	Molecular Neurogenetics	ENI
Wolfgang	Engel	Human Genetics	U Göttingen
Ivo	Feußner	Plant Biochemistry	U Göttingen
Ralf	Ficner	Molecular Structural Biology	UGöttingen
Wolfgang	Fischle	Chromatin Biochemistry	MPI bpc
Christiane	Gatz	General and Developmental Physiology of the Plant	U Göttingen
Boris	Görke	General Microbiology	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
Tim	Grüne	Structural Chemistry	U Göttingen
Heidi	Hahn	Human Genetics	U Göttingen
Claudia	Höbartner	Nucleic Acid Chemistry	MPI bpc
Herbert	Jäckle	Molecular Developmental Biology	MPI bpc
Reinhard	Jahn	Neurobiology	MPI bpc
Steven	Johnsen	Molecular Oncology	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	Professor for 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
Erwin	Neher	Membrane Biophysics	MPI bpc
Heinz	Neumann	Applied Synthetic Biology	U Göttingen
Tomas	Pieler	Developmental Biochemistry	U Göttingen
Stefanie	Pöggeler	Genetics of Eukaryotic Organisms	U Göttingen
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
Reinhard	Schuh	Molecular Organogenesis	MPI bpc
Blanche	Schwappach	Professor, Director of Biochemistry I	U Göttingen
Halyna	Shcherbata	Gene expression and signaling	MPI bpc
George Michael	Sheldrick	Structural Chemistry	U Göttingen
Mikael	Simons	Molecular and Cellular Neurobiology	MPI em
Holger	Stark	3D Electron Cryomicroscopy	MPI bpc
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	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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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 CMPB examines the role of α-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 α-synuclein in the nigrostriatal system of rodents. Using this technology we also developed a novel model of PD based on RNA-interference mediated depletion of anti-oxidant defense mechanisms, demonstrating several features of idiopathic PD such as selective degeneration of DA neurons, progressive aggregate formation and inflammation. A similar approach is also used to develop new gene therapy strategies using viral vectors for delivery of neuroprotective factors to specific neurons or glial cells in various species.
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

Krumova P, Meulmeester E, Garrido M, Tirard M, Hsiao HH, Bossis G, Urlaub H, Zweckstetter M, Kügler S, Melchior F, Bähr M, Weishaupt JH.J Cell Biol. 2011 Jul 11;194(1): 49-60

Rau CR, Hein K, Sättler MB, Kretzschmar B, Hillgruber C, McRae BL, Diem R, Bähr M. Am J Pathol. 2011 Apr;178(4): 1770-81

Gadjanski I, Boretius S, Williams SK, Lingor P, Knöferle J, Sättler MB, Fairless R, Hochmeister S, Sühs KW, Michaelis T, Frahm J, Storch MK, Bähr M, Diem R (2009) Role of N-Type voltage-dependent calcium channels in autoimmune optic neuritis. Ann Neurol 66(1): 81-93

Planchamp V, Bermel C, Tönges L, Ostendorf T, Kügler S, Reed JC, Kermer P, Bähr M, Lingor P (2008) BAG1 promotes axonal outgrowth and regeneration *in vivo* via Raf-1 and reduction of ROCK activity. Brain 131(Pt 10): 2606-19

Lingor P, Tönges L, Pieper N, Bermel C, Barski E, Planchamp V, Bähr M (2008) ROCK inhibition and CNTF interact on intrinsic signalling pathways and differentially regulate survival and regeneration in retinal ganglion cells. Brain 131 (Pt 1): 250-63

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Holger Bastians

Professor of Cellular Oncology

- Heisenberg-Professor of Cellular Oncology, University Medical Center Göttingen (UMG), since 2011
- 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, Bastians H (2011) The tumor suppressor CHK2: regulator of DNA damage response and mediator of chromosomal stability. Clinical Cancer Research 17: 401-405.

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, Bastians H (2010) Mitotic drug targets. J. Cell. Biochem., 111: 258 -265.

Kaestner P, Stolz A, Bastians H (2009) Determinants for the efficiency of anticancer 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.

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Further Information

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Gerhard H. Braus

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
- Porcine hernia inguinalis and scrotalis
- Early embryonal death in cattle

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

Charoensook R, Brenig B, Gatphayak K, Knorr C (2011) Further resolution of porcine phylogeny in Southeast Asia by Thai mtDNA haplotypes. Animal Genetics 42: 445-50

SenaL, Schneider MP, Brenig B, Honeycutt RL, Honeycutt DA, Womack JE, Skow LC (2011) Polymorphism and gene organization of water buffalo MHC-DQB genes show homology to the BoLA DQB region. Animal Genetics 42: 378-85

Wemheuer WM, Benestad SL, Wrede A, Wemheuer WE, Brenig B, Bratberg B, Schulz-Schaeffer WJ (2011) PrPSc spreading patterns in the brain of sheep linked to different prion types. Veterinary Research 42: 32

Brenig B, Beck J,. Schutz E (2010) Shotgun metagenomics of biological stains using ultra-deep DNA sequencing. Forensic Sci Int Genet 4: 228-31

Chen C, Sargent C, Quilter C, Yang Z, Ren J, Affara N, Brenig B, Huang L (2010) Cloning, mapping and molecular characterization of porcine progesterone receptor membrane component 2 (PGRMC2) gene. Genetics and Molecular Biology 33: 471-4

Kolodziejczak D, Da Costa Dias B, Zuber C, Jovanovic K, Omar A, Beck J, Vana K, Mbazima V, Richt J,Brenig B, Weiss SF (2010) Prion interaction with the 37-kDa/67-kDa laminin receptor on enterocytes as a cellular model for intestinal uptake of prions. J Mol Biol 402: 293-300

Morina , Knorr C, Haase B, Leeb T, Seuberlich T, Zurbriggen A, Brem G, Schutz E, Brenig B (2010) Molecular analysis of carbohydrate N-acetylgalactosamine 4-O sulfotransferase 8 (CHST8) as a candidate gene for bovine spongiform encephalopathy susceptibility. Animal Genetics 41: 85-8

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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 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

Kawabe H, Brose N (2011) The role of ubiquitylation in nerve cell development. Nat Rev Neurosci 12: 251-268

Kawabe H, Neeb A, Dimova K, Young SMJr, Takeda M, Katsurabayashi S, Mitkovski M, Malakhova OA, Zhang DE, Umikawa M, Kariya K, Goebbels S, Nave KA, Rosenmund C, Jahn O, Rhee JS, 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

Wojcik SM, Brose N (2007) Regulation of membrane fusion in synaptic excitation-secretion coupling: Speed and accuracy matter. Neuron 55: 11-24

Jockusch W, Speidel D, Sigler A, Sørensen, JB, Varoqueaux F, Rhee JS, 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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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, since 2004
- Head of the Department of Molecular Oncology, Georg-August-Universität Göttingen, since 2005

Major Research Interests

We are focussing our research on the tumor suppressor p53, trying to elucidate its mechanisms of action, its regulation and its suitability as a target for cancer therapy. p53 operates as a transcription factor and prevents uncontrolled cell proliferation. This activity is regulated through a sophisticated regulatory network that responds to DNA damage. Despite our knowledge concerning the molecular biology of p53, an integrated concept of its regulation, and its translation into rational diagnostics and therapy, are still in their infancy. The tumor suppressor gene TP53 is mutated or deleted in approximately 50% of malignant tumors. However, this does not mean that p53 is active in the remaining cases. It appears that in the vast majority of the remaining 50% of tumors, p53 is inactivated through malfunction of its modulators, such as Mdm2, p14ARF, deltaNp73, and others. We are therefore pursuing the unique opportunity to re-establish p53‘s “dormant” tumor-suppressive activity by targeting its modulators as a potential avenue to therapy.

Selected Recent Publications

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

Contente A, Dittmer A, Koch MC, Roth J, Dobbelstein M (2002) A polymorphic microsatellite that mediates induction of PIG3 by p53. Nature Genetics 30: 315-320

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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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Stefan Eimer

Group Leader Molecular Neurogenetics / Neurodegeneration

- Ph.D. 2003 at the Gene Center of the Ludwig-Maximilian University (LMU in Munich
- 2003 Postdoc at the Ecole Normale Superieure in Paris, France
- since Oct 2005 independent group leader of the Center for Molecular Physiology of the Brain (CMPB) at the European Neuroscience Institute (ENI) in Göttingen

Major Research Interests

Neuotransmitter gated ion channels are involved in a large subset of neuronal events ranging from fast synaptic transmission to the modulation of neuronal circuits that lead to memory formation and cognition. En route to the cell surface these multimeric receptors have to undergo multiple assembly, quality control, and sorting steps to eventually reach the synapse.

Our group aims to understand the mechanisms and rules that control the trafficking and sorting of ligand gated ion channels within the secretory apparatus. In particular, we are focusing on the nicotinic acetylcholine receptor family of ligand gated ion channels, which have been implicated in numerous neurological and neurodegenerative diseases.

To find new molecules involved in these processes, we take advantage of the nematode *Caenorhabditis elegans* as a main model system, and use a combination of genetic, cell biological, and biochemical approaches as well as electro-physiology and electron-microscopy. As our main model system were are studying cholinergic neurotransmission at the neuro-muscular junction (NMJ) of *C. elegans*. Through genetic screens we have identified novel evolutionary conserved integral membrane proteins that regulate nAChR sorting at the Golgi-Endosomal interface. Further studies have implicated these molecules in the regulation and activation of small GTPases at Golgi complex. Based on these findings we have also started to study systematically how these GTPases are required for structure and function of the Golgi apparatus and how their activity affects the trafficking and neurotransmission at the NMJ of *C. elegans*.

Selected Recent Publications

Sumakovic M, Hegermann J, Luo L, Husson SJ, Schwarze K, Olendrowitz C, Schoofs L, Richmond J, Eimer S (2009) UNC-108/RAB-2 and its effector RIC-19 are involved in dense core vesicle maturation in *Caenorhabditis elegans*. J Cell Biol 186(6): 897-914

Marza E, Long T, Saiardi A, Sumakovic M, Eimer S, Hall DH, Lesa GM (2007) Polyunsaturated fatty acids influence synaptojanin localization to regulate synaptic vesicle recycling. Mol Biol Cell, in press

Eimer S, Gottschalk A, Richmond JE, Hengartner M, Schafer W, Bessereau J-L (2007) Regulation of nicotinic receptor trafficking by the transmembrane Golgi protein UNC-50. EMBO J 26: 4313-23

Yamasaki A, Eimer S, Okochi M, Smialowska A, Kaether C, Baumeister R, Haass C, Steiner H (2006) The GxGD motif of presenilin contributes to catalytic function and substrate identification of gamma-secretase. J Neurosci 26: 3821-8

Gally C, Eimer S, Richmond JE, Bessereau J-L (2004) A transmembrane protein required for acetylcholine receptor clustering in *C. elegans*. Nature 431: 578-582

Eimer S, Lakowski B, Donhauser R, Baumeister R (2002) Loss of spr-5 bypasses the requirement for the presenilin sel-12 by stage-specific derepression of hop-1. EMBO J 21: 5787-5796

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Wolfgang Engel

Professor of Human Genetics

- Dr. med., Universität Freiburg, 1967
- Physician, Hospital Schorndorf, 1966 - 1968
- Postdoc, Institute of Human Genetics and Anthropology, Universität Freiburg,1968 - 1977
- Habilitation (Human Genetics), Universität Freiburg, 1974
- Professor of Human Genetics and Director of the Institute, Universität Göttingen, 1977

Major Research Interests

Our research is focussed on the molecular analysis of normal human variability and genetic disturbances of development and differentiation.

Isolated genes are being analysed in detail with respect to their functional properties by animal models (transgenic and knock-out-mice). For suitable genetic diseases therapeutic strategies (substitution; gene therapy) are being developed and initial evaluation of such strategies is done in the mouse. - We are working on the genotype – phenotype correlations in neurological and cardiovascular diseases (e. g. Spastic paraplegia, Rett syndrome, mental retardation by subtelomeric microdeletions, molybdenum cofactor deficiency; cardiomypathies, Noonan syndrome) and several genetically determined malformation syndromes (e.g. Townes-Brocks syndrome, Okihiro syndrome, Morbus Osler).We are also engaged in the molecular and cellular basis of initiation events of cancer, specifically in prostate cancer, medulloblastoma and rhabdomyosarcoma. - One main interest in our institute is the analysis of structure, expression and function of genes involved in differentiation of male gametes. The knowledge of the function of those genes can help us to clarify the genetic causes of male infertility.

We have isolated spermatogonial stem cells (SSCs) from adult mouse testis and demonstrated that these cells are as pluripotent as embryonic stem cells (ESCs). Our main interest is now to isolate and proliferate SSCs from adult human testis. These cells would be of great interest for regenerative medicine.

Selected Recent Publications

Xu X, Pantakani K, Lührig S, Tan X, Khromov T, Nolte J, Dressel R, Zechner U, Engel W (2011) Stage-specific germ-cell marker genes are expressed in all mouse pluripotent cell types and emerge early during induced pluripotency. PLoS ONE 6 (7): e22413. doi: 10.1371/journalpone.0022413

Glaser T, Opitz T, Kischlat T, Konang R, Sasse P, Fleischmann BK, Engel W, Nayernia K, Brüstle O (2008) Adult germ line stem cells as a source of functional neurons and glia. Stem Cells 26: 2434-2443

Zovoilis A, Nolte J, Drusenheimer N, Zechner U, Hada H, Guan K, Hasenfuß G, Nayernia K, Engel W (2008) Multipotent adult germline stem cells and embryonic stem cells have similar microRNA profiles. Molecular Human Reproduction 14: 521-529

Guan K, Wagner S, Unsöld B, Maier LS, Kaiser D, Hemmerlein B, Nayernia K, Engel W, Hasenfuss G (2007) Generation of functional cardiomyocytes from adult mouse spermatogonial stem cells. Circulation Research 100: 1615-1625

Nayernia K, Nolte J, Michelmann HW, Lee JH, Rathsack K, Drusenheimer N, Dev A, Wulf G, Ehrmann IE, Elliott DJ, Okpanyi V, Zechner, Haaf T, MeinhardtA, Engel W (2006) *In vitro*-differentiated embryonic stem cells give rise to male gametes that can generate offspring mice. Developmental Cell 11: 125-132

Guan K, Nayernia K, Maier LS, Wagner S, Dressel R, Lee JH, Nolte J, Wolf, F, Li M, Engel W, Hasenfuß G (2006) Pluripotency of spermatogonial stem cells from adult mouse testis. Nature 440: 1199-1203

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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 for Biochemistry, Georg-August-University, Göttingen (Germany)
- Award: Habilitation-Prize of the Ernst Schering Research Foundation (2001)
- Fellow of the Saxonian Academy of Sciences, Leipzig, Germany (2009)

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 metabolomics and molecular genetics, including the generation of transgenic organisms ("gain-of-function") or mutants ("loss-of-function").
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. Other studies deal with the role of oxylipins in plants, mosses and algae as well as in the interaction of *Aspergillus nidulans* with seeds and the infection of roots with *Verticillium longisporum*. In addition the catalytic mechanism of lipoxygenases and related dioxygenases is analysed.
We study the biochemical pathways or networks that led to an increase in the seed oil content of oilseed crop plants. 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

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

Pommerrenig B, Feussner K, Zierer W, Rabinovych V, Klebl F, Feussner I, Sauer N (2011) Phloem-specific expression of yang cycle genes and identification of novel yang cycle enzymes in *Plantago* and *Arabidopsis*. Plant Cell 23: 1904-1919

Stumpe M, Gobel C, Faltin B, Beike AK, Hause B, Himmelsbach K, Bode J, Kramell R, Wasternack C, Frank W, Reski R, Feussner I (2010) The moss *Physcomitrella patens* contains cyclopentenones but no jasmonates: mutations in allene oxide cyclase lead to reduced fertility and altered sporophyte morphology. New Phytol, doi: 10.1111/j.1469-8137.2010.03406.x

Andreou A, Göbel C, Hamberg M, Feussner I (2010) A bisallylic mini-lipoxygenase from cyanobacterium *Cyanothece* SP. that has an iron as cofactor. J Biol Chem 285: 14178-14186

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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, and enzymes of the polysialic acid metabolism.

Selected Recent Publications

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

Monecke T, Dickmanns A, Ficner R (2009) Structural basis for m7G-cap hypermethylation of small nuclear, small nucleolar and telomerase RNA by the dimethyltransferase TGS1. Nucleic Acids Res 37(12): 3865-77

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

Wohlwend D, Strasser A, Dickmanns A, Ficner R (2007) Structural basis for RanGTP independent entry of spliceosomal U snRNPs into the nucleus. J Mol Biol 374(4): 1129-38

Wohlwend D, Strasser A, Dickmanns A, Doenecke D, Ficner R (2007) Thermodynamic analysis of H1 nuclear import: receptor tuning of importinbeta/importin7. J Biol Chem 282(14): 10707-19

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

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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

Seeliger D, Soeroes S, Klingberg R, Schwarzer D, Grubmüller H, Fischle W (2011) Quantitative Assessment of Protein Interaction with Methyl-Lysine Analogues by Hybrid Computational and Experimental Approaches. ACS Chem Biol.

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

Koester-Eiserfunke N, Fischle W (2011) H3K9me2/3 Binding of the MBT Domain Protein LIN-61 Is Essential for Caenorhabditis elegans Vulva Development. PLoS Genet. 7: e1002017

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.

Franz H, Mosch K, Soeroes S, Urlaub H, Fischle W (2009) Multimerization and H3K9me3 binding is required for CDYL1b heterochromatin association. J. Biol. Chem. 284: 35049-35059

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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 signalling 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 for both responses. These proteins reside in the cell in an inactive state before pathogen infection. We are interested in the SA- and JA/ET-mediated mechanisms that activate the function of TGA factors by co-activators (Fode et al., 2008) or redox modulators (Ndamukong et al., 2007). Moreover, we are interested in the cross-talk between both pathways. 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.

Selected Recent Publications

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

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

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

Herde M, Gärtner K, Köllner TG, Fode B, Boland W, Gershenzon J, Gatz C*, Tholl D (2008) Identification and regulation of TPS04/GES an *Arabidopsis* geranyllinalool synthase catalyzing the first step in the formation of the insect-induced volatile C16-homoterpene TMTT. Plant Cell 20: 1152-1168 (*corresponding author)

Ndamukong I, Al Abdallat A, Thurow C, Fode B, Zander M, Weigel R, Gatz C (2007) SA-inducible *Arabidopsis* glutaredoxin interacts with TGA factors and suppresses JA-responsive PDF1.2 transcription. Plant J 50: 128-139

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Boris Görke

PD Microbiology and Genetics

- 1995 Diploma (Biology), Albert-Ludwigs University of Freiburg, Germany
- 2000 Dissertation (Dr. rer. nat.), Albert-Ludwigs University of Freiburg, Germany
- 2000 -2001 Postdoctoral fellow at the University of Freiburg, Germany
- 2002-2004 Postdoctoral fellow at the Laboratoire de Chimie Bacteriénne at the Centre National de la Recherche Scientifique (CNRS),
- Marseille, France
- Since 2004 Group leader in the department of General Microbiology, Georg-August University, Göttingen, Germany
- 2009 Habilitation in Microbiology and Genetics, University of Göttingen, Germany

Major Research Interests

Our aim is to understand the regulatory principles that control and adjust carbohydrate metabolism in bacteria. The control of uptake and metabolism of carbon sources in heterotrophic bacteria is an extensively studied topic not only in basic research but also relevant for applied fields as bioremediation or bioproduction. Since all macromolecules of the cell consist of carbon, uptake and fluxes of carbon compounds through central metabolic pathways must be tightly controlled and coordinated with virtually all other processes taking place in the cell. Therefore, extensive regulation occurs on all levels including post-transcriptional control and regulation on protein level. We focus on two regulatory principles: (I) post-transcriptional control of gene expression by small regulatory RNAs and (II) the role of reversible protein phosphorylation in controlling protein activities. We perform our studies in the bacteria *Escherichia coli* and *Bacillus subtilis*, which are the two model organisms, representative for the Gram-negative and Gram-positive world of bacteria, respectively. In *E. coli*, we currently investigate the role of two small RNAs, GlmY and GlmZ, that control synthesis of enzyme glucosamine-6-phosphate synthase GlmS. GlmS catalyzes a key reaction in the pathway leading to synthesis of the cell wall. GlmY and GlmZ compose a hierarchically acting cascade to regulate expression of the glmS gene, which is a novel principle in sRNA regulation. In addition we investigate the regulatory roles of proteins of the phosphotransferase system (PTS). We recently found that potassium transport is controlled by interaction of a sensor kinase with a PTS protein in *E. coli*. The interaction is in turn governed by the phosphorylation state of this protein. This control coordinates potassium transport with flux through central carbohydrate metabolic pathways. We use the whole repertoire of modern molecular biology methods to achieve our aims.

Selected Recent Publications

Pflüger-Grau K, Görke B (2010) Regulatory roles of the bacterial nitrogen-related phosphotransferase system. Trends Microbiol 18: 205-214

Reichenbach B, Göpel Y, Görke B (2009) Dual control by perfectly overlapping Sigma54- and Sigma70-promoters adjusts small RNA GlmY expression to different environmental signals. Mol Microbiol 74: 1054-1070

Lüttmann D, Heermann R, Zimmer B, Hillmann A, Rampp I, Jung K, Görke B (2009) Stimulation of the potassium sensor KdpD kinase activity by interaction with the phosphotransferase protein IIANtr in *Escherichia coli*. Mol. Microbiol. 72: 978-994

Görke B., Vogel J. (2008) Noncoding RNA control of the making and breaking of sugars. Genes Dev 22:2914-2925 Reichenbach B, Maes A, Kalamorz F, Hajnsdorf E and Görke B (2008) The small RNA GlmY acts upstream of the sRNA GlmZ in the activation of glmS expression and is subject to regulation by polyadenylation in *Escherichia coli*. Nucleic Acids Res. 36: 2570-2580

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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

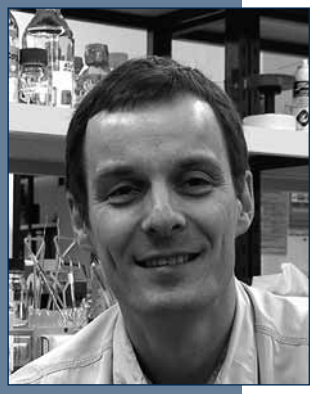
Frey S, Görlich D (2007) A saturated FG-repeat hydrogel can reproduce the permeability properties of nuclear pore complexes. Cell 130: 512-523

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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- 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. Structural biology projects are performed in the context of signal transduction, ion channels, G-protein coupled receptors, cytoskeletal proteins, catalytic RNA, enzymes and drug/target complexes using NMR as well as X-ray crystallography to characterize structure and dynamics. A rather big project is the investigation of proteins involved in neurodegenerative diseases that are studied in the context of the CMPB and involve almost all resources of the department. 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 and developing structural proteomics tools. 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

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, DOI:10.1002/anie.201105086

Kumar A, Heise H,. Blommers MJJJ, Krastel P, Schmitt E, Petersen F, Jeganathan S, Mandelkow EM, Carlomagno T, Griesinger C, Baldus M (2010) Interaction of Epothilone B (Patupilone) with Microtubules as Detected by Two-Dimensional Solid State NMRSpectroscopy. Angew Chem Int Ed 49: 7666-69

Karpinar P, Gajula Balija MB, Kuegler S, Opazo F, Rezaei-Ghaleh N, Wender N, Kim HJ, Taschenberger G, Falkenburger BH, Heise H, Kumar A, Riedel D, Fichtner L, Voigt A, Braus GH, Giller K, Becker S, Herzig A, Baldus M, Jaeckle H, Eimer S, Schulz JB, Griesinger C, Zweckstetter M (2009) Pre-fibrillar α-synuclein variants with impaired bold β-structure increase neurotoxicity in Parkinson's disease models. EMBO J 28(20): 3256-68

Lee D, Walter KFA, Brückner AK, Hilty C, Becker S, Griesinger C (2008) Bilayer in small bicelles revealed by lipid-protein interactions using NMR spectroscopy, J Am Chem Soc 130: 13822-3

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 inverstigating fungal factors and mechanisms that are involved in pathogenesis of mycoses; i.e. cell wall structure and differentiation processes.

Selected Recent Publications

Bereswill S, Fischer A, Plickert R, Haag LM, Otto B, Kühl AA, Dashti JL, 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: e20953. Epub 2011 Jun 15.

Lin SS, Blume M, von Ahsen N, Groß U, Bohne W (2011) Extracellular T. gondii tachyzoites do not require carbon source uptake for ATP maintenance, gliding motility and invasion in the first hour of their extracellular life. Int J Parasitol 41: 835-841.

Tareen, AM, Dasti JL, Zautner AE, Groß U, Lugert R (2011) Sulphite: cytochrome c oxidoreductase deficiency in Campylobacter jejuni reduces motility, host cell adherence and invasion. Microbiol 157: 1776-1785

Tareen AM, Dasti JI, Zautner A, Groß U, Lugert R (2010) *Campylobacter jejuni* proteins Cj0952c and Cj0951c affect the chemotactical behavior towards formic acid and are important for the invasion of host cells. Microbiology 156: 3123-3135

Zautner AE, Herrmann S, Corso J, Tareen AM, Alter T, Groß U (2011) Epidemiological association of different Campylobacter jejuni groups with metabolism-associated genetic markers. Appl Environ Microbiol 77: 2359-2365

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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 embryologicalexperiments 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

Kanesaki T, Edwards C, Schwarz U, Großhans J. Dynamic ordering of nuclei in syncytial embryos: a quantitative analysis of the role of cytoskeletal networks. Integ Biol 2011, in press

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 metabolism, in press

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

Wenzl C, Yan S, Laupsien P, Großhans J (2010) Localization of RhoGEF2during *Drosophila* cellularization is developmentally controlled by slam. Mech Dev 127 (2010): 371-384

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

Brandt A, Papagiannouli F, Wagner N, Wilsch-Bräuninger M, Braun M, Furlong EE, Loserth S, Wenzl C, Pilot F, Vogt N, Lecuit T, Krohne G, Großhans J (2006) Developmental control of nuclear size and shape by kugelkern and kurzkern. Curr Biol 16: 543-552

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Tim Grüne

Postdoctoral research fellow at the Institute of Inorganic Chemistry, University of Göttingen

- 2003 - present: Postdoctoral research fellow with Prof. G. M. Sheldrick, Georg-August-Universität Göttingen
- 2007: 3 months sabbatical at the Australian Synchrotron
- 2003 - 2006 EMBO long-term fellowship on “automated building of nucleic acid structures”
- 2003: Joint PhD EMBL/ Universite Josef-Fourier Grenoble “Structural studies on ISWI, an ATP-dependent nucleosome remodelling factor”
- 1999: Diplom Physics, TH Karlsruhe, Diploma thesis with Dr S. Curry, Imperial College London

Major Research Interests

- Methods in X-ray and neutron crystallography; in particular data reduction and scaling in order to reduce systematic errors and produce reliable data even from poorly diffracting crystals.
- Automation of model building for nucleic acids. We try to find properties of nucleic acid structures that are suitable for computers to facilitate the process of model building.
- Low resolution model building and refinement (3-4Å). At low resolution the diffraction data are far from sufficient to create a reliable model, and it becomes necessary to incorporate as much additional knowledge as possible into the process of model creation.

Selected Recent Publications

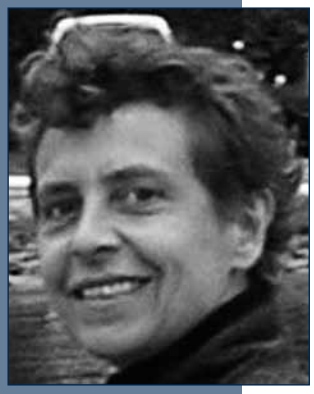
Gruene T et al. (2011) Integrated Analysis of the Conformation of a Protein-Linked Spin Label by Crystallography, EPR and NMR Spectroscopy. J Biomol NMR 49

Gruene T, Sheldrick GM (2010) Geometric properties of nucleic acids with potential for autobuilding. Acta Crystallogr A 67(1)

Beck T et al. (2010) The magic triangle goes MAD: experimental phasing with a bromine derivative. Acta Crystallogr D 66

Pal A et al. (2009) Structure of Tripeptidyl-peptidase I Provides Insight into the Molecular Basis of Late Infantile Neuronal Ceroid Lipofuscinosis. J Biol Chem 284

Gruene T (2008) mtz2sca and mtz2hkl: facilitated transition from CCP4 to the SHELX program suite. J App Cryst 41(1)



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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. Uncommitted precursor cells might contribute to increased incidence of embryonal rhabdomyosarcoma in heterozygous *Patched1* mutant mice. Oncogene, 2011 May 23. [Epub ahead of print]

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 Res 70(7): 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 Res 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; Wojnowski L; Zimmer AM; Hall J; Miller G; Zimmer A (1998) Rhabdomyosarcomas and radiation hypersensitivity in a mouse model for Gorlin syndrome. Nature Medicine; 4(5): 619-622

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(6): 841-51

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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.
The catalytic potential of artificial single-stranded DNA (deoxyribozymes) was first reported in 1994. Deoxyribozymes are identified by in vitro selection from random-sequence DNA pools. The most prominent and widely used deoxyribozymes catalyze the site-specific cleavage of phosphodiester bonds in RNA substrates. More recently, deoxyribozymes that catalyze the sequence-specific ligation of RNA have been gaining increasing importance. All catalytically active DNA molecules must fold into complex, three-dimensional structures that form the basis for their sophisticated functions. However, very little is currently 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 develop 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 in the laboratory for practical use. We explore the diversity of DNA-catalyzed reactions in as-yet unaddressed areas and develop nucleic acids as tools for post-synthesis modifications, such as site-specific attachment of biophysical probes onto nucleosides within DNA and RNA.
In the field of RNA chemistry, we study natural RNA modifications, such as nucleobase and ribose methylations and we use artificial nucleoside analogs, such as selenium-containing nucleosides, spin-labeled 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

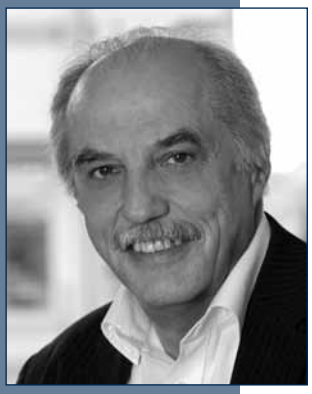
Selected Recent Publications

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, ASAP. doi: 10.1021/ja205894w

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

Wachowius F, Höbartner C (2010) Chemical RNA modifications for studies of RNA structure and dynamics, Chem Bio Chem 11: 469-480



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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. Since recent years it is known that 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. The neuronal SNAREs are among the best characterized. They are the targets of the toxins responsible for botulism and tetanus. To understand how these proteins make membranes fuse, we studied their properties in detail using biochemical and biophysical approaches. We found that they assemble into a tight complex which ties the membrane closely together and thus probably initiates bilayer mixing.
In our current approaches, we study membrane fusion at the level of isolated proteins as well as in semi-intact and intact cells. Thus, we are investigating conformational changes of the SNARE proteins before and during fusion. Furthermore, we use reconstitution of membrane fusion in cell-free assays and in proteoliposomes. Other projects of the group include the study of neurotransmitter uptake by synaptic vesicles and the function of Rab-GTPases in neuronal exocytosis

Selected Recent Publications

van den Bogaart G, Meyenberg K, Risselada JH, Amin H, Willig KI, Hubrich BE, Dier M, Hell SW, Grubmüller H, Diederichsen U, Jahn R. Membrane protein sequestering by ionic protein-lipid interactions. Nature, in press

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

Pavlos NJ, Grønborg M, Riedel D, Chua JJE, Boyken J, Kloepper TH, Urlaub H, Rizzoli SO, Jahn R (2010) Quantitative analysis of synaptic vesicle Rabs uncovers distinct yet overlapping roles for Rab3a and Rab27b in Ca^{2+} -triggered exocytosis. J Neurosci 30(40): 13441-13453

Chua JJ, Kindler S, Boyken J, Jahn R (2010) The architecture of an excitatory synapse. J Cell Sci 123: 819-823

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

Van den Bogaart G, Holt MG, Bunt G, Riedel D, Wouters FS, Jahn R (2009) One SNARE complex is sufficient for membrane fusion. Nat Struct Mol Biol 17: 358-364

Grønborg M, Pavlos NJ, Brunk I, Chua JJE, Münster-Wandowski A, Riedel D, Ahnert-Hilger G, Urlaub H, Jahn R (2009) Quantitative comparison of glutamatergic and GABAergic synaptic vesicles unveils selectivity for few proteins including MAL2, a novel synaptic vesicle protein. J Neurosci 30: 2-12

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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- 2003 - 2006 Doctoral Fellow, Center for Molecular Neurobiology (ZMNH), Hamburg, Germany
- 2006 - 2007 Post-Doctoral Fellow, European Molecular Biology Laboratory (EMBL), Heidelberg, Germany
- since 2007 Assistant Professor in Molecular Oncology, University of Göttingen Medical Faculty, Göttingen, Germany

Major Research Interests

The 3 x 10^9 bp of DNA in the human genome is organized in several higher order chromatin structures which allow for the correct packaging and “reading” of the genetic material. Importantly, the proper regulation of gene transcription, DNA replication and probably most DNA-associated nuclear functions is regulated by the post-translational modification of histone proteins. Our group is focused on the role and regulation of chromatin modifications in controlling transcription and transcription-coupled nuclear processes during tumorigenesis. The primary interest of our work is the monoubiquitination of histone H2B (H2Bub1) which appears to serve a tumor suppressor role in breast cancer and is tightly associated to active gene transcription. Although this modification has been studied extensively in yeast, relatively little is known about its function and regulation in higher eukaryotic organisms.
In our future work we will address:

1. The role of H2B modifying enzymes in tumorigenesis in transgenic mouse models.
2. The regulation of tumorigenic properties and metastasis by epigenetic modifiers.
3. How epigenetic modifications control cellular differentiation and dedifferentiation.
4. The function of dynamics changes in chromatin structure in various nuclear processes including transcription and DNA repair.
5. The importance and regulation of 3-dimensional nuclear organization in the control of nuclear hormone receptor-regulated gene transcription.

Selected Recent Publications

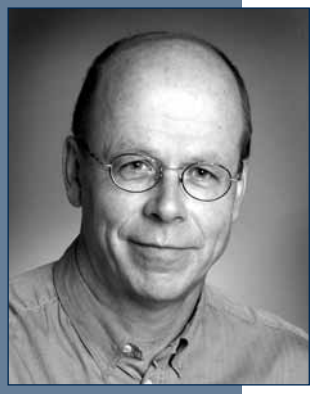
Kari V, Shchebet A, Neumann H, and Johnsen SA (2011) The H2B Ubiquitin Ligase RNF40 Cooperates with SUPT16H to Induce Dynamic Changes in Chromatin Structure During DNA Double Strand Break Repair. Cell Cycle 10(20): 3495 – 3504

Prenzel T, Begus-Nahrmann Y, Kramer F, Hennion M, Hsu C, Gorsler T, Hintermair C, Eick D, Kremmer E, Simons M, Beissbarth T, and Johnsen SA (2011) Estrogen-Dependent Gene Transcription in Human Breast Cancer Cells Relies upon Proteasome-Dependent Monoubiquitination of Histone H2B. Cancer Res 71: 5739-5753

Pirngruber J, Shchebet A, Schreiber L, Shema E, Minsky N, Chapman RD, Eick D, Aylon Y, Oren M, Johnsen SA (2009) CDK9 Directs Histone H2B Monoubiquitination to Control Replication-Dependent Histone mRNA 3’ End Processing. EMBO Rep 10: 894-900

Johnsen SA et al. (2009) Regulation of Estrogen-Dependent Transcription by the LIM Cofactors CLIM and RLIM in Breast Cancer. Cancer Res 69: 128-136

Shema E et al. (2008) The Histone H2B-specific Ubiquitin Ligase RNF20/hBRE1 Acts as a Putative Tumor Suppressor Through Selective Regulation of Gene Expression. Gene Dev 22(19): 2664-2676



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- 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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- 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

Wagner OI, Esposito A, Köhler B, Chen CW, Shen CP, Wu GH, Mandalapu S, Wenzel D, Wouters FS, Klopfenstein DR (2009) Synaptic scaffolding protein SYD-2 clusters and activatesKinesin-3 UNC-104 in C. elegans. Proc Natl Acad Sci USA (PNAS Early Edition Week 44)

Klopfenstein DR, Vale RD (2004) The Lipid Binding Pleckstrin Homology Domain in UNC-104 Kinesin is Necessary for Synaptic Vesicle Transport in *Caenorhabditis elegans*. Mol Biol Cell 15(8): 3729-39

Al-Bassam J, Cui Y, Klopfenstein D, Carragher BO, Vale RD, Milligan RA (2003) Distinct conformations of the kinesin Unc104 neck regulate a monomer to dimer motor transition. J Cell Biol 163(4): 743-53

Tomishige M, Klopfenstein DR, Vale RD (2002) Dimerization triggers fast, processive movement of single Unc104/KIF1A kinesin motor along microtubules. Science 297(5590): 2263-2267

Klopfenstein DR, Tomishige M, Stuurman N, Vale RD (2002) Role of phosphatidylinositol(4,5)bisphosphate organization in membrane transport by the Unc104 kinesin motor. Cell 109(3): 347-58

Klopfenstein DR, Vale RD, Rogers SL (2000) Motor protein receptors: Moonlighting on other jobs. Cell 103(4): 537-40

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- 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

Besides being fast and highly accurate, the most important demand on replication of DNA is that is has to be completed. While this may sound trivial on first glance, many obstacles like protein-DNA complexes and damaged nucleotides on the template strand can prevent replication fork progression. It is estimated that at least one fork arrest occurs per replication round in *E. coli.* Therefore, all organisms analysed so far in detail possess several pathways to reactivate stalled replication forks. We discovered that the baker´s yeast Mph1 protein defines a hitherto unknown pathway for replication restart, which is apparently also operating in higher eukaryotes including humans. One question we are interested in is the exact mechanism, by which this pathway works. We are also interested in positioning this pathway within the complex cellular network of replication reinitiation mechanisms, where two principle possibilities for fork reactivation can be found: one being quite safe, but acting on the expense of replicational fidelity, whereas the other is error-free, but bears the inherent danger of genomic rearrangements. Therefore, we are also interested in the regulatory mechanisms that guide the choice of the cell for one or the other possibility as well as the conditions that are sensed by the regulatory proteins.

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(1): 45-55

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(1): 67-79

Rudolph C, Schürer KA, Kramer W (2005) Facing stalled replication forks: The intricacies of doing the right thing. In: Genome Dynamics and Stability: Facets of Genome Integrity. Lankenau DH (Ed). Springer Verlag Heidelberg. in press (Review)

Prakash R, Krejci L, van Komen S, Schürer KA, Kramer W, Sung P (2005) Saccharomyces cerevisiae MPH1 gene, required for homologous recombination-mediated mutation avoidance, encodes a 3' to 5' DNA helicase. J Biol Chem 280: 7854-7860

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 postreplicative repair. Genetics 166: 1673-1686

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- 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

Hackmann A, Gross T, Baierlein C, Krebber H (2011) The mRNA export factor Npl3 mediates the nuclear export of large ribosomal subunits. EMBO Rep, doi: 10.1038/embor.2011.155

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

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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- 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

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. Current Biology, in press *co-corresponding authors

Lipka U, Fuchs R, Lipka V (2008) *Arabidopsis* non-host resistance to powdery mildews. Current Opinion in Plant Biology 11: 404-411

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

Stein M, Dittgen J, Sanchez-Rodriguez C, Hou B-H, Molina A, Schulze-Lefert P, Lipka V, Somerville S (2006) *Arabidopsis* PEN3/PDR8, an ATP binding cassette transporter, contributes to nonhost resistance to inappropriate pathogens that enter by direct penetration. Plant Cell 18: 731-746

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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- 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)
- since 2007: Honorary Professor at the Philipps University of Marburg (since 2000) and 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

Schneider M, Will CL, Anokhina A, Tazi J, Urlaub H, Lührmann R (2010) Exon definition complexes contain the tri-snRNP and can be directly converted into B-like pre-catalytic splicing complexes. Mol Cell 38: 223-235

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

Lührmann R, Stark H (2009) Structural mapping of spliceosomes by electron microscopy. Curr Opin Struct Biol 19: 96-102

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

Pena V, Mozaffari SJ, Fabrizio P, Orlowski J, Bujnicki JM, Lührmann R, Wahl MC (2009) Common design principles in the spliceosomal RNA helicase Brr2 and in the Hel308 DNA helicase. Mol Cell 35: 454-466

Bessonov S, Anokhina, M, Will CL, Urlaub H, Lührmann R (2008) Isolation of an active step 1 spliceosome and composition of its RNP core. Nature 452: 846-850

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- 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 α- and subsequently β-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

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

Gallarda B, Bonanomi D, Müller D, Brown A, Alaynick W A, Andrews S E, Lemke G, Pfaff S L, Marquardt T (2008) Segregation of axial motor and sensory pathways through heterotypic trans-axonal signaling. Science [accepted Feb 25, 2008]

Ghosh S, Marquardt T, Thaler J, Carter N, Pfaff S L, Hunter T (2008) Instructive role of aPKCζ subcellular localization in the assembly of adherens junctions in neural progenitors. Proc. Natl. Acad. Sci. USA 105(1): 335-40

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

Marquardt T, Pfaff SL (2001) Cracking the transcriptional code for cell specification in the neural tube. Cell 106: 651-654

Marquardt T, Ashery-Padan RA, Andrejewski N, Scardigli R, Guillemot F, Gruss P (2001) Pax6 is required for the multipotent state of retinal progenitor cells. Cell 105: 43-55

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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 central 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. Current projects include novel graph-theoretical approaches to integrate local homologies into a multiple alignment and alignment of structure-annotated RNA sequences.

Other areas of research in our department include: metabolomics and mass spectroscopy data analysis, phylogeny reconstruction, RNA structure analysis, 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

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, Gobel 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

Stanke M, Tzvetkova A, Morgenstern B (2006) AUGUSTUS+ at EGASP: using EST, protein and genomic alignments for improved gene prediction in the human genome. Genome Biol 7: S11

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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 pathology of sound encoding at the hair cell ribbon synapse. Molecular dissection and detailed physiological characterization of ribbon synapse function employ a spectrum of molecular, biophysical and physiological techniques such as mutagenesis (in collaboration with Brose), *in vivo* and *in vitro* viral gene transfer into hair cells and spiral ganglion neurons of mice, single cell RT-PCR, immunohistochemistry, confocal microscopy of hair cells, synaptic ultrastructure: STED & 4Pi microscopy; electron microscopy (in collaboration with Wichmann, Hell, Egner and Riedel), hair cell synaptic physiology: pre- or postsynaptic patch-clamp, on-cell and whole-cell membrane capacitance measurements, optical methods: Ca^{2+} and pHluorin imaging using confocal, epifluorescence and TIRF, mouse auditory systems physiology (recordings of otoacoustic emissions, endocochlear potential and electrocochleography and auditory brainstem responses), optogenetic stimulation of the cochlea for devising an optical cochlear implant, computational modeling (in collaboration with Wolf and Neef). 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 understanding hair cell ribbon synapse structure and function and initiated the concept of auditory synaptopathies

Selected Recent Publications

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(7): 869-76

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

Frank T, Khimich D, Neef A, Moser T (2009) Mechanisms contributing to synaptic Ca^{2+} signals and their heterogeneity in hair cells. Proc Natl Acad Sci USA 106: 4483-8

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: 444-53

Roux I, Safieddine S, Nouvian R, Grati M, Simmler MC, Perfettini I, Le Gall M, Rostaing P, Hamard G,Triller A, Avan P, Moser T, Petit C (2006) Otoferlin, defective in DFNB9 deafness, is essential for the Ca^{2+}-triggered synaptic exocytosis at the auditory hair cell ribbon synapse. Cell 127: 277-89

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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

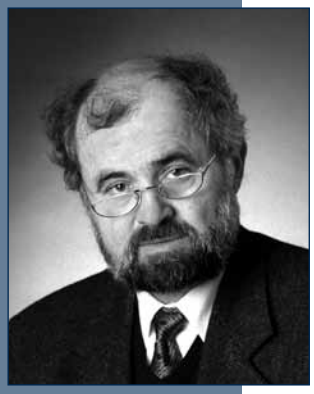
Nave KA (2010) Myelination and glial support of axonal integrity. Nature 468: 244-252

Brinkmann BG, Agarwal A, Sereda MW, Garratt AN, Müller T, Wende H, Stassart RM, Nawaz S, Humml C, Velanac V, Radyuschkin K, Goebbels S, Fischer TM, Franklin RJ, Lai C, Ehrenreich H, Birchmeier C, Schwab MH, Nave, KA (2008) Neuregulin-1/ErbB signaling serves distinct functions in myelination of the peripheral and central nervous system. Neuron 59: 581-595

Kassmann CM, Lappe-Siefke C, Baes M, Brügger B, Mildner A, Werner HB, Natt O, Michaelis Th, Prinz M, Frahm J, Nave KA (2007) Axonal loss and neuroinflammation caused by peroxisome-deficient oligodendrocytes. Nat Genet 39: 969-976

Saher G, Brugger B, Lappe-Siefke C, Mobius W, Tozawa R, Wehr MC, Wieland F, Ishibashi S, Nave KA (2005) High cholesterol level is essential for myelin membrane growth. Nat Neurosci 8: 468-475

Michailov G, Sereda V, MW, Brinkmann B, Fischer TM, Haug B, Birchmeier C, Role L, Lai C, Schwab MH, Nave KA (2004) Axonal neuregulin-1 regulates myelin sheath thickness. Science 304: 700-703



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Professor, Emeritus at the Max Planck Institute for Biophysical Chemistry

- M.Sc. (Physics), University of Wisconsin, (1967)
- Ph.D. (Physics), Institute of Technology, Munich (1970)
- Research associate at the Max Planck Institute for Biophysical Chemistry in Göttingen, Germany (1972 - 1975 and 1976 - 1982) and as a guest in the laboratory of Dr. Ch.F. Stevens at Yale University, Dept. of Physiology, New Haven, Conn. (1975 - 1976)
- Fairchild Scholar, California Institute of Technology; Pasadena, USA (1989)
- Director of the Membrane Biophysics Department at the Max Planck Institute for Biophysical Chemistry, Göttingen, Germany, since 1983

Major Research Interests

Molecular Mechanisms of Exocytosis, Neurotransmitter Release, and Short Term Synaptic Plasticity

In order to understand how the brain handles its information flow and adjusts synaptic connections on the second and subsecond timescale, one has to understand all aspects of synaptic transmission ranging from availability of vesicles for exocytosis, presynaptic electrophysiology, Ca^{++} signalling, the process of exocytosis, and postsynaptic neurotransmitter action. Our work concentrates on presynaptic aspects.. We use neuronal cell cultures and brain slices for studying mechanisms of short term plasticity, such as depression and paired pulse facilitation. The Calyx of Held, a specialized synapse in the auditory pathway, offers unique possibilities for simultaneous pre- and postsynaptic voltage clamping. This allows a quantitative analysis of the relationship between $[Ca^{++}]$ and transmitter release. We recently developed techniques to express mutated synaptic proteins in the Calyx terminal, such that the functional role of specific molecules can be studied on the single-cell level.

A second line of research concerns the analysis of fluorescence images, particularly the separation of multiple labels.

Selected Recent Publications

Haucke V Neher E, Sigrist SJ (2011) Protein scaffolds in the coupling of synaptic exocytosis and endocytosis. Nature Rev Neurosci 12: 127-138

Mohrmann R, de Wit H, Verhage,M, Neher E, Soerensen JB (2010) Fast vesicle fusion in living cells requires at least three SNARE complexes. Science 330: 502-505

Neher RA, Mitkovski M, Kirchhoff F, Neher E, Theis FJ, Zeug A (2009) Blind source separation techniques for the decomposition of multiply labeled fluorescence images. Biophys J 96:3791-3800

Young S. Jr, Neher E (2009) Synaptotagmin has an essential function in synaptic vesicle positioning for synchronous release in addition to its role as a calcium sensor. Neuron 63: 482-496

Neher E, Sakaba T (2008) Multiple roles of calcium ions in the regulation of neurotransmitter release. Neuron 59: 861-872

Sakaba T, Stein A, Jahn R, Neher E (2005) Distinct kinetic changes in neurotransmitter release after SNARE protein cleavage. Science 309: 491-494

Sakaba T, Neher E (2003) Direct modulation of synaptic vesicle priming by GABAB receptor activation at a glutamatergic synapse. Nature 424: 775-778

Soerensen J, Nagy G, Varoqueaux F, Nehring RB, Brose N, Wilson MC, Neher E (2003) Differential control of the releasable vesicle pools by SNAP-23. Cell 114: 75-86

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- 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 advanced online publication 14 Feb 2010 (DOI:10.1038/nature08817)

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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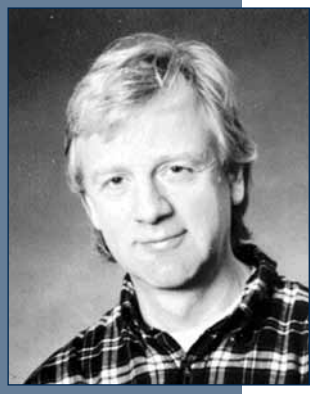

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Tomas Pieler

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

Koebernick K, Loeber J, Arthur PK, Tarbashevich K, Pieler T (2010) Elr-type proteins protect Xenopus Dead end mRNA from miR-18-mediated clearance in the soma. Proc Natl Acad Sci USA 107(37): 16148-53

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

Damianitsch K, Melchert J, Pieler T (2009) XsFRP5 modulates endodermal organogenesis in *Xenopus laevis*. Dev Biol. 329(2): 327-37

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

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 and Dev 20: 1441-1446

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Stefanie Pöggeler

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- 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 posttranslational 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

Nowrousian M, Staich J, Engh I, Kamerewerd J, Kempken F, Kunstamnn B, Kuo HC, Osiewacz HD, Pöggeler S, Read N, Seiler S, Smith S, Zickler D, Kück U, Freitag M (2010) Next-Generation Sequencing of the 40 Mb Genome of the Filamentous Fungus *Sordaria macrospora*. PloS Genetics 6:e1000891

Elleuche S, Pöggeler S (2009) Beta-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, Döring K, Pöggeler S (2008) Minimization of a eukaryotic mini-intein. Biochem Biophys Res Com 366: 239-243

Nolting N, Pöggeler S (2006) A STE12 homologue of the homothallic ascomycete *Sordaria macrospora* interacts with the MADS box protein MCM1 and is required for ascosporogenesis. Mol Microbiol 62: 853-868

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- 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

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(1): 141-154

Chacinska A, van der Laan M, Mehnert CS, Guiard B, Mick DU, Hutu DP, Truscott KN, Wiedemann N, Meisinger C, Pfanner N, Rehling P (2010) Distinct forms of mitochondrial TOM-TIM supercomplexes define signal-dependent states of preprotein sorting. Mol Cell Biol 30(1) 307-318

Odorizzi G, Rehling P (2009) Membranes and organelles. Curr Opin Cell Biol21: 481-3

Mick DU, Wagner K, Van der Laan M, Frazier AE, Perschil I, Pawlas M, Meyer HE, Warscheid B, Rehling P (2007) Shy1 couples Cox1 translational regulation to cytochrome c oxidase assembly. EMBO J 26: 4347-4358

Van der Laan M, Meinecke M, Dudek J, Hutu DP, Lind M, Perschil I, Guiard B, Wagner R, Pfanner N, Rehling P (2007) Motor-free mitochondrial presequence translocase drives membrane integration of preproteins. Nat Cell Biol 9: 1152-1159

Meinecke M, Wagner R, Kovermann P, Guiard B, Mick DU, Hutu DP, Voos W, Truscott KN, Chacinska A, Pfanner N, Rehling P (2006) Tim50 maintains thepermeability barrier of the mitochondrial inner membrane. Science 312: 1523-1526

Frazier AE, Taylor R, Mick DU, Warscheid B, Stoepel N, Meyer HE, Ryan MT, Guiard B, Rehling P (2006) Mdm38 interacts with ribosomes and is a component of the mitochondrial protein export machinery. J Cell Biol 172: 553-564

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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

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 U S A 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

Denker A, Krohnert K, Rizzoli SO (2009) Revisiting synaptic vesicle pool localization in the *Drosophila* neuromuscular junction. J Physiol 587: 2919-2926

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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

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

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

Wohlgemuth I, Pohl C, Rodnina MV (2010) Optimization of speed and accuracy of decoding in translation. EMBO J 29: 3707-3709

Konevega AL, Fischer N, Semenkov YP, Stark H, Wintermeyer W, Rodnina MV (2007) Spontaneous reverse movement of tRNA-mRNA through the ribosome. Nat Struct Mol Biol 14: 318-324

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- 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

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

Djannatjan MS, Galinski S, Fischer TM, Rossner M (2011) Studying G protein-coupled receptor activation using split-TEV assays. Analytical Biochmistry. Feb 2. doi 10.1016/j.ab.2011.01.042

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. July; 68(1): 33-40. Epub April 29

Botvinnik A, Wichert SP, Fischer TM, Rossner M (2010) Integrated analysis of receptor activation and downstream signaling with EXTassays. Nature Methods. Jan;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. Aug 14;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. Jul 23;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. Jul 13;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. Dec;3(12): 985-93

Rossner M, Hirrlinger J, Wichert SP, Boehm C, Newrzella D, Hiemisch H, Eisenhardt G, Stuenkel C, von Ahsen O, Nave KA (2006) Global Transcriptome Analysis of Genetically Identified Neurons in the Adult Cortex. J Neuroscience, Sep 27, 26(39): 9956-9966

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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

Harder B, Schomburg A, Pflanz R, Küstner K M, 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

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- 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

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

Independent Max Planck Research Group Leader

- MS, Biology and Chemistry, Lemberg (Lviv) National University, Ukraine, 1992
- Ph.D., Genetics, Kyiv Institute for Plant Physiology and Genetics, Ukraine, 1996
- Scientific Researcher, Lemberg (Lviv) National University, Ukraine, 1996 - 2000
- Assistant Professor, Genetics and Biotechnology Department, Lemberg (Lviv) National University, Ukraine, 2000 - 2003
- Postdoc, Biochemistry Department, Institute for Stem cell and Regenerative Medicine, University of Washington, Seattle, WA, USA, 2003 - 2007
- Max Planck Research Group Leader, MPI for Biophysical Chemistry, Goettingen, Germany, 2008 - present

Major Research Interests

Our group is currently working on studying the role of the miRNA pathway in stem cells. Previously we have demonstrated the necessity of the microRNA pathway for proper control of stem cell division and maintenance. Given implication of the microRNA pathway in a great variety of developmental processes, any advance in understanding its function in stem cell maintenance or cell cycle control might provide new insight into stem cell and cancer biology and aid development of new therapies. Now, by performing genetic screens, we are trying to find different components and pathways, which are required for stem cell division and maintenance.
The other project we are interested is understanding the origin of muscular dystrophy. Previously we have developed a *Drosophila* model for studying muscular dystrophies, now we decided to use the genetic tractability of *Drosophila* to search for novel components of the Dystroglycan glycoprotein complex, as well as components that may be involved in its signaling and regulation. This could provide new insights into the origin of muscular dystrophy and facilitate development of novel therapeutic strategies for treatment of these fatal neuromuscular diseases.

Selected Recent Publications

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

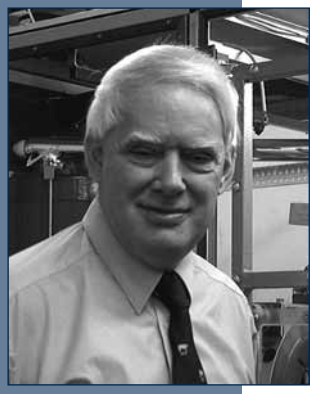
Marrone AK, Kucherenko MM, Wiek R, Göpfert MC, Shcherbata HR (2011) Hyperthermic seizures and aberrant cellular homeostasis in *Drosophila* dystrophic muscles. Sci Rep 1

Yatsenko AS, Kucherenko MM, Pantoja M, Fischer KA, Madeoy J, Deng WM, Schneider M, Baumgartner S, Akey J, Shcherbata HR, Ruohola-Baker H (2009) The conserved WW-domain binding sites in Dystroglycan C-terminus are essential but partially redundant for Dystroglycan function. BMC Dev Biol 9: 18

Shcherbata HR, Yatsenko AS, Patterson L, Sood VD, Nudel U, Yaffe D, Baker D, Ruohola-Baker H (2007) Dissecting muscle and neuronal disorders in a *Drosophila* model of muscular dystrophy. The EMBO journal 26: 481-493

Shcherbata HR, Ward EJ, Fischer KA, Yu JY, Reynolds SH, Chen CH, Xu P, Hay BA, Ruohola-Baker H (2007) Stage-specific differences in the requirements for germline stem cell maintenance in the *Drosophila* ovary. Cell Stem Cell 1: 698-709

Shcherbata HR, Hatfield S, Ward EJ, Reynolds S, Fischer KA, Ruohola-Baker H (2006) The MicroRNA pathway plays a regulatory role in stem cell division. Cell Cycle 5: 172-175



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George M. Sheldrick

Professor of Structural Chemistry and part-time programming technician at the University of Göttingen

- PhD (1966) University of Cambridge with E.A.V. Ebsworth; thesis entitled "NMR Studies of Inorganic Hydrides"
- 1966 - 1978: University Lecturer and Fellow of Jesus College, Cambridge
- Since 1978 Professor at the University of Göttingen
- Author of about 800 scientific papers and of a computer program called SHELX (http://shelx.uni-ac.gwdg.de/SHELX/)

Major Research Interests

Interested in methods of solving and refining crystal structures (both small molecules and proteins) and in structural chemistry.
Holy Grail: the Crystallographic Phase Problem. If only there was an easy way of measuring the phases of X-ray reflections as well as their intensities, crystal structures could be determined directly. At resolutions of better than about 2.5A, there are more measured intensities than atomic coordinates, so the problem is overdetermined and there should be a solution. Recently we were able to increse the size of structures that can be solved from the intensity data alone by 'ab initio direct methods' from about 200 to 1000 unique atoms, given data to 'atomic resolution', but most interesting macromolecular structures are still out of the reach of such methods. Indirctly however the same techniques are proving very useful for the solution of large macromolecular structures when a little starting phase information is available, e.g. by incorporating heavy atoms into the crystal.

Selected Recent Publications

Sheldrick, GM (2008) A short history of SHELX. Acta Crystallogr A64: 112-122 (open access) This paper is currently the most highly cited scientific paper of the last five years in all subjects; see http://www.info.scopus.com/topcited/

Beck T, Krasauskas A, Grüne T, Sheldrick GM (2008) A magic triangle for experimental phasing of macromolecules. Acta Crystallogr D64 1179-1182

Pfoh R, Laatsch H, Sheldrick GM (2008) Crystal structure of trioxacarcin A covalently bound to DNA. Nucleic Acids Research 36: 3508-3514 (open access)

Pal A, Debreczeni JE, Sevvana M, Grüne T, Kahle B, Zeeck A, Sheldrick GM (2008) Structures of viscotoxins A1 und B2 from European mistletoe solved using native data alone. Acta Crystallogr D64: 985-992

Bunkóczi G, Vértesy L, Sheldrick GM (2005) The antiviral antibiotic feglymycin: First direct-methods solution of a 1000+ equal-atom structure. Angew Chem 117: 1364-1366; Int Edn 44: 1340-1342

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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, 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, Aug 30

Aggarwal S, Yurlova L, Simons M (2011) Central nervous system myelin: structure, synthesis and assembly. Trends Cell Biol: Jul 18

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 TBC-1D10A-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

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): 5037-48

Trajkovic K, Dhaunchak AS, Goncalves J, Wenzel D, Bunt G, Nave KA, Simons M (2006) Neuron to glia signalling triggers myelin membrane exocytosis from endosomal storage sites. J Cell Biol 172: 937-48

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- 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

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

Schmeisser M, Heisen BC, Luettich M, Busche B, Hauer F, Koske T, Knauber KH, Stark H (2009) Parallel, distributed and GPU computing technologies in single-particle electron microscopy. Acta Crystallogr D Biol Crystallogr 65(Pt 7): 659-71

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

Lührmann R, Stark H (2009) Structural mapping of spliceosomes by electron microscopy. Curr Opin Struct Biol 19(1): 96-102

Chari A, Golas MM, Klingenhäger M, Neuenkirchen N, Sander B, Englbrecht C, Sickmann A, Stark H, Fischer U (2008) An assembly chaperone collaborates with the SMN complex to generate spliceosomal SnRNPs. Cell 135(3): 497-509

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- 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

Schmidl S , 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

Hübner S. Declerck N, Diethmaier C, Le Coq D, Aymerich S, Stülke J (2011) Prevention of cross-talk in conserved regulatory systems: Identification of specificity determinants in RNA-binding antiterminationproteins of the BglG family. Nucl Acids Res 39: 4360-4372.

Flórez L A, Gunka K, Polanía R, Tholen S, Stülke J (2011) Integration of metabolism and regulation: development of a unifying mathematical framework based on Boolean satisfiability (SAT). BMC Systems Biol 5: 5

Lehnik-Habrink M, Schaffer M, Mäder U, Diethmaier C, Herzberg C, Stülke J (2011) RNA processing in Bacillus subtilis: Identification of targets of the essential RNase Y. Mol. Microbiol 81: 1459-1473

Schmidl S R, Gronau K, Pietack N, Hecker M, Becher D, Stülke J (2010) The phosphoproteome of the minimal bacterium Mycoplasma pneumoniae: Analysis of the complete known Ser/Thr kinome suggests the existence of novel kinases. Mol Cell Proteomics 9: 1228-1242

Commichau FM, Roth FM, Herzberg C, Wagner E, Hellwig D, Lehnik-Habrink M, Hammer E, Volker U, Stülke J (2009) Novel activities of glycolytic enzymes in *Bacillus subtilis*: Interactions with essential proteins involved in mRNA processing. Mol Cell Proteomics 8: 1350-1360

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

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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

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

Farré JC, Krick R, Subramani S, Thumm M (2009) Turnover of organelles by autophagy in yeast. Curr Opinion Cell Biol 21: 522-530

Krick R, Muehe Y, Prick T, Bremer S, Schlotterhose P, Eskelinen EL, 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

Santt O, Pfirrmann T, Braun B, Juretschke J, Kimmig P, Scheel H, Hofmann K, Thumm M, Wolf DH (2008) The yeast GID complex, a novel ubiquitin ligase (E3) involved in the regulation of carbohydrate metabolism. Mol Biol Cell 19(8): 3323-33

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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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Group Leader - Bioanalytical Mass Spectrometry Group

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- 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 Goerlich, Reinhard Jahn, Reinhard Lührmann, Peter Rehling, Oliver Schlüter, Holger Stark, Jürgen Wienands Markus Zweckstätter, 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

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, in press. *co-corresponding author

Oellerich T et al (2011) The B cell antigen receptor signal through a preformed transducer module of SLP65 and CIN85, EMBO J, in press. *co-corresponding author

Kramer K, Hummel P, Hsiao HH, Luo X, Wahl M, Urlaub H (2011) Mass-spectrometric analysis of proteins cross-linked to 4-thio-uracil- and 5-bromo-uracil-substituted RNA. Int J Mass Spec 304: 184-194

Schmidt C, Lenz C, Grote M, Lührmann R, Urlaub H (2010) Determination of protein stoichiometry within protein complexes using absolute quantification and multiple reaction monitoring. Anal Chem 82: 2784-2796

Gronborg M et al (2010) Quantitative comparison of glutamatergic and GABAergic synaptic vesicles unveils selectivity for few proteins including MAL2, a novel synaptic vesicle protein. J Neurosci 30: 2-12 * co-corresponding author

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- 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 Ca^{2+} 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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- 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

A key question in developmental biology is how diverse animal body plans are specified. For insects, only in Drosophila the early developmental events are known in molecular detail. However, arthropods with varied life histories must compensate different reproductive strategies by adjusting the regulatory networks within the developmental program. Therefore, phylogenetic differences between diverse species must be manifested in the genetic circuitries regulating embryogenesis. By genomics approaches, transgenesis, and reverse genetics based on RNA interference, we analyze genetic interactions within the regulatory network of early embryogenesis in diverse arthropod species. This will help us to understand how animal evolution is based on changes in gene regulation governing early pattern formation.
Furthermore, we apply our knowledge on developmental processes to insect pest management. Genetic control based on the sterile-insect technique (SIT) uses the release of sterile males to cause infertile matings which reduce pest population levels. Due to the species specificity, SIT is considered an ecologically safe procedure. However, conventional sterilization by ionizing radiation also decreases the competitiveness of sterilized males. To overcome this problem, we design transgenic approaches to selectively produce vigorous and potent sterile males by generating conditional male sterility in combination with conditional female lethality.

Selected Recent Publications

Ntini E, Wimmer EA (2011) Second order regulator Collier directly controls intercalary-specific segment polarity gene expression. Dev Biol, doi:10.1016/j.ydbio.2011.09.035

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

Trauner J, Schinko J, Lorenzen MD, Shippy TD, Wimmer EA*, Beeman RW, Klingler M, Bucher G, Brown SJ (2009) Large-scale insertional mutagenesis of the coleopteran stored grain pest, the red flour beetle *Tribolium castaneum*, identifies embryonic lethal mutations and enhancer traps. BMC Biology 7: 73 (* corresponding author)

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

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

Zhang G, Breuer M, Förster A, Egger-Adam D, Wodarz A (2009) Mars, a *Drosophila* protein related to vertebrate HURP, is required for the attachment of centrosomes to the mitotic spindle during syncytial nuclear divisions. J Cell Sci 122: 535-545

Wodarz A, Näthke IS (2007) Cell polarity in development and cancer. Nat Cell Biol 9: 1016-1024

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Prof. Dr. Stefanie Pöggeler
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