MSc/PhD Molecular Biology Program
at the University of Göttingen

International Max Planck Research School
Letter from the President

The international Master's / PhD Programs Molecular Biology and Neurosciences were established by the Georg August University Göttingen, together with the Max Planck Society for the Advancement of Science, in the year 2000 to attract excellent students from all over the world and provide them with an outstanding, research-oriented graduate program. Both programs are taught in English by internationally renowned scientists and offer a high level of services and individual support.

Several hundred students from all over the world apply for the 20 study places available in each of the programs every year. Both programs have introduced and combined elements of international recruitment, competitive admission procedures, advanced curricula, research training, social integration programs, extracurricular support and evaluation procedures into successful working structures. They have achieved excellent recommendations in several external evaluations and have been awarded the 2004 prize for excellent support services for foreign students by the German Federal Foreign Office. For the newly established Georg August University School of Science (GAUSS) and other graduate schools in Göttingen, the Molecular Biology and Neuroscience Programs are considered exemplary and serve as best practice models.

In October 2006, the two programs were awarded the label „Top 10 International Master's Degree Courses made in Germany“ by the „Stifterverband für die Deutsche Wissenschaft“ and the German Academic Exchange Service (DAAD) in a national contest, in which 121 Master's programs of 77 universities participated. The Göttingen Molecular Biology and Neuroscience programs were the only Master's programs in the natural sciences and medicine which received this award. Both programs are members of the Göttingen Graduate School for Neurosciences and Molecular Biosciences (GGNB), which was successful in the recent Excellence Initiative by the German Federal and State Governments to promote science and research at German universities.

Five Göttingen University faculties, three Göttingen Max Planck Institutes as well as the German Primate Center participate in the programs. International guest lecturers are also involved. The Max Planck Society contributes through its newly established International Max Planck Research Schools. Both programs keep close contact with the relevant industries to further enhance the chances of the graduates for a successful professional career.

I would very much like to thank all scientific bodies and institutions for their committed support in establishing these international programs and, last but not least, the German Academic Exchange Service (DAAD), the Lower Saxony Ministry of Science and Culture and the various generous donors.

The Georg August University of Göttingen is proud of its long-standing international experience the two attractive and innovative programs have already become an integral part of. The university will continue to support these programs within the setting of Göttingen's lively urban, cultural and social life, in itself a prerequisite for creative teaching and research.

Prof. Dr. Kurt von Figura
(President of the Georg August University Göttingen)
Letter from the Max Planck Society

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

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

The goals of the International Max Planck Research Schools are

- to attract excellent students from all around the world to intensive Ph.D. training programs in Germany, preparing them for careers in science,
- to integrate Max Planck scientists in top-level scientific training of junior scientists,
- to intensify the ties to the universities owing to the participation of internationally renowned Max Planck scientists in joint teaching activities, and
- to strengthen international relationships by providing individual support to each student and by exposing foreign students to German culture and the German language.

By now, 51 International Max Planck Research Schools have been established involving 65 Max Planck Institutes, 48 German universities with 70 participating faculties and more than 15 universities abroad. More than 1900 (mostly PhD) students from 87 countries are presently enrolled. Approximately 850 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 reshaped 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. In addition to general information on the program, the yearbook introduces the current year’s students, the faculty members, the program committee and the coordination team.

The program is member of the recently founded Göttingen Graduate School for Neurosciences 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), a newly established scientific center of excellence at the University of Göttingen, the Max Planck Institute for Biophysical Chemistry, the Max Planck Institute for Experimental Medicine, and the 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. An example for cooperation with research institutes abroad are joint activities and student exchange with the Feinberg Graduate School at the Weizmann Institute of Science in Rehovot, Israel.

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 three week orientation program. Applications may be submitted until January 15 of the year of enrollment. To ensure a high standard of individual training, the number of participants is limited to 20 students per year.

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

Subsequently, two separate segments are offered:

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

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

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

*International Degree Programs - Auslandsorientierte Studiengänge (AS)*

**IPP**
International Postgraduate Programs – Internationale Promotionsprogramme (IPP)

**Max Planck Society for the Advancement of Science**, Munich, Germany, [http://www.mpg.de](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/](http://www.mwk.niedersachsen.de/home/)

*Innovationsoffensive*

*Doctoral Programs - Promotionsprogramme*

**Stifterverband für die Deutsche Wissenschaft**, Essen, Germany, [http://www.stifterverband.org](http://www.stifterverband.org)

**Exzellenzstiftung zur Förderung der Max-Planck-Gesellschaft**, Munich, Germany, [http://www.exzellenzstiftung.de](http://www.exzellenzstiftung.de)

**Gemeinnützige Hertie-Stiftung**, Frankfurt am Main, Germany, [http://www.ghst.de](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 8-11 week units. The following topics are taught at an advanced level throughout the first year (36 weeks, 4 hours per week):

A. Biochemistry and Structural Biology
   - The Prokaryotic and Eukaryotic Cell
   - Energy Metabolism, Lipid Metabolism, Metabolic Networks
   - NMR, Crystallography
   - Single Particle Electron Microscopy, EPR Spectroscopy
   - Protein Structures and Folding
   - Enzyme Mechanisms and Regulation

B. Molecular Genetics
   - DNA and Chromatin Structure
   - DNA Replication and Repair
   - Transcription
   - RNA-processing and Translation
   - Signal Transduction
   - Genomics, Bioinformatics

C. Functional Organization of the Cell / Neurobiology / Immunology
   - Nucleocytoplasmic Transport
   - Protein Sorting and Processing
   - Vesicular Transport, Organelle Biogenesis
   - Cytoskeleton
   - Cell Adhesion
   - Nervous Systems, Sensory Systems
   - Immunology
   - Infectious Diseases, Principles of Pathogenicity
   - Cell Cycle, Apoptosis, Cancer

D. Model Systems of Molecular Biology/Biotechnology
   - Prokaryotes
   - Biotechnology
   - Fungi
   - Arabidopsis
   - Drosophila, C. elegans
   - Xenopus, Zebrafish
   - Chicken, Mouse
   - Human Genetics

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 discussion of related topics.
Methods Courses

During the 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 18 two-day experiments in small groups.

A. Proteins
   - Protein preparation and characterization by gel electrophoresis and Western blot
   - Chromatographic protein separation
   - NMR spectroscopy
   - Structural analysis of proteins and protein structure validation
   - Proteomics
   - Microarrays
   - 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
   - Chemical and enzymatic analysis of RNA structure
   - Spectroscopic characterization of nucleic acids

C. Cell Biology and Genetics
   - Light microscopy
   - Electron microscopy
   - Biochemical cell fractionation
   - Cell culture
   - Expression analysis

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, by now, more than 300 participants from all over the world. The meeting was designed by the students to promote scientific exchange between young researchers from different disciplines. Since 2007, a “Career Fair for Scientists” precedes the annual Horizons meetings. The career fair offers a unique and exciting program of career presentations, CV-Check, workshops and interviews and is also organized by the Molecular Biology students.

At the end of the PhD training program, a doctoral thesis is submitted either in the traditional format, or as a collection of scientific publications in internationally recognized journals along with a general introduction and a discussion of the results. The degree PhD or, alternatively, Dr. rer. nat. 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 2009

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 2009, the Molecular Biology program received 418 applications from 57 countries.

<table>
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<tr>
<th>Continent</th>
<th>Applications</th>
<th>Admissions</th>
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<td>Europe (total)</td>
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<td>other West Europe</td>
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<tr>
<td>Ahmed AbdElSamad</td>
<td>Egypt</td>
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<td>Maximilian Fünfgeld</td>
<td>Germany</td>
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<td>Kevser Gencalp</td>
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<td>Akanksha Goyal</td>
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<td>Christian Hoffmann</td>
<td>Germany</td>
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<td>Lena Hyatt</td>
<td>USA</td>
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<td>Veena Jagannathan</td>
<td>India/USA</td>
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<td>Seol-hee Joo</td>
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<td>Simone Mayer</td>
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<td>Jonathan Melin</td>
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<td>Danesh Moradi Garavand</td>
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<td>Rafik Tarek Neme Garrido</td>
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<td>Jennifer Seefeldt</td>
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<td>Congwei Wang</td>
<td>P. R. China</td>
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<tr>
<td>Miriam Weiss</td>
<td>Germany</td>
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<td>Halenur Yavuz</td>
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</tbody>
</table>
Ahmed Abd El Samad

EDUCATION
College / University
Cairo University, Egypt

Highest Degree
B.Sc.

Major Subjects
Biotechnology

Lab Experience
Various techniques in molecular biology such as nucleic acid and protein isolation, electrophoresis and blotting, PCR techniques, cloning, transformation and others

Projects / Research
02/2007 – 07/2007 Production of recombinant human insulin in a microbial host. Cairo University, Egypt
08/2008 – 08/2009 Conversion of atmospheric carbon dioxide into a biofuel. Agricultural Genetic Engineering Research Institute, ARC, Giza, Egypt

Scholarships / Awards
2009 – 2010 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society

Maximilian Fünfgeld

EDUCATION
College / University
Swiss Federal Institute of Technology (ETH) Zürich, Switzerland

Highest Degree
B.Sc.

Major Subjects
Biology, Chemistry

Lab Experience
Various standard methods in molecular biology and chemistry

Projects / Research
2008 Investigating function and location of $\beta$-amylase 4, 5, 6 and 9 in Arabidopsis thaliana. Group of Plant Biochemistry, ETH Zürich
2008 Directed evolution of the AroQd subclass chorismate mutase from Mycobacterium tuberculosis: Probing an manipulating determinants for activation by the complex partner DHAP synthase. Laboratory of Organic Chemistry, ETH Zürich
2008 A novel approach to crystallize a subunit complex of RAP74 and RAP30. Institute of Molecular Biology und Biophysics, ETH Zürich
2008 Investigating the initial steps of cell polarization in MDCK cells by confocal microscopy. Institute of Biochemistry, ETH Zürich

Scholarships / Awards
2009 – 2010 International Max Planck Research School support
Kevser Gencalp

EDUCATION
College / University
Middle East Technical University (METU), Ankara, Turkey
Highest Degree
B.Sc.
Major Subjects
Molecular Biology and Genetics
Lab Experience
Various techniques in molecular biology and genetics
Projects / Research
06/2008 – 09/2008 Identification of three developmentally important gene orthologs in Parhyale hawaiensis, AG Gerberding, Max Planck Institute for Developmental Biology, Tübingen, Germany
10/2008 – 04/2009 miRNA research in various breast and colon cancer cell lines, to identify possible miRNA candidates in tumorigenesis process, Erson Lab, METU, Ankara, Turkey
02/2009 – 06/2009 Establishment and optimization of a miRNA in situ hybridization protocol for cultured MCF7 cells with LNA probes, Erson Lab, METU, Ankara, Turkey
Scholarships / Awards
2009 – 2010 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society
2004 – 2009 Middle East Technical University Graduates Aegean Association Scholarship

Akanksha Goyal

EDUCATION
College / University
Sri Venkateswara College, University of Delhi
Highest Degree
B.Sc.
Major Subjects
Biochemistry, Molecular Biology, Cell Biology, Immunology, Membrane Biology and Bioenergetics, Genetics
Lab Experience
Spectrophotometry, protein purification, recombinant DNA Technology (PCR, DNA purification, transformation, plasmid isolation, restriction mapping), ELISA, IE, thin layer, paper and gel chromatography, DNA/ protein gel electrophoresis, SDS-PAGE, enzyme assays, Western blotting, certificate programme in bioinformatics and computational biology.
Projects / Research
05/2008 – 07/2008 Cloning of signal transduction genes Rv2176, Rv0903c and Rv3220c in Mycobacterium tuberculosis H37Rv (ICGEB, Dept of Biotechnology, Government. of India)
Scholarships / Awards
2009 – 2010 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society
Christian Hoffmann

EDUCATION
College / University
Dresden University of Technology, Germany
Highest Degree
B.Sc.
Major Subjects
Molecular Biotechnology
Lab Experience
Various techniques in molecular biology and biochemistry
Projects / Research
08/2008 – 10/2008 Cloning of developmental genes and analysis of gene expression in Nemato-stella vectensis. Max Planck Institute of Molecular Genetics, Berlin, Germany
03/2009 – 08/2009 Towards molecular insight into transcriptional regulation of trophoblast glycoprotein-like by Wnt/b-catenin signaling in zebrafish (Bachelor’s thesis). BIOTEC Dresden, Germany

Scholarships / Awards
2009 – 2010 International Max Planck Research School support

Lena Hyatt

EDUCATION
College / University
University of North Carolina, USA
Highest Degree
B.Sc
Major Subjects
Chemistry, Biology
Lab Experience
Techniques in biochemistry, analytical chemistry, molecular biology
Projects / Research
08/2006 – 12/2008 Functional and physical relationships between two DNA repair proteins, BLM and SPN-A, in Drosophila melanogaster. Sekelsky Lab, University of North Carolina
05/2008 – 08/2008 Investigation of meiosis in the planarian Schmidtea mediterranea by a directed RNAi screen. Dernburg Lab, University of California at Berkeley, Amgen Scholar Program
05/2007 – 08/2007 Study of DNA mismatch repair system (MutHLS) using crosslinking and FRET techniques. Institute for Biochemistry, Justus-Liebig-University, Giessen, Germany, DAAD RISE Program

Scholarships / Awards
2009 – 2010 Scholarship by the German Academic Exchange Service (DAAD)
2008 Hypercube Scholar Award (excellence in Chemistry)
2007 Goldwater Scholar
Veena Anjana Jagannathan

EDUCATION
College / University
Sri Venkateswara College, University of Delhi, India

Highest Degree
B.Sc. (Honors) in Biochemistry

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

Lab Experience
Basic molecular biology techniques. Protein purification techniques such as gel filtration chromatography, ion exchange chromatography. Protein analysis techniques such as Western Blotting, SDS PAGE

Projects / Research
05/2008 – 06/2008 Growth kinetics and GPL profile of Mycobacterium smegmatis as a function of different media. In vivo characterization of dps2 promoter. (under Prof. Dipankar Chatterji, MBU, IISc, Bengaluru, India)

Scholarships / Awards
2009 – 2010 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society
2008 – 2009 Medal for securing third rank at University of Delhi, India
2008 Summer Research Fellowship sponsored by IAS (Bengaluru), INSA (New Delhi), and NAS (Allahabad)
2007–2008 Certificate of Merit for securing third position at UDSC (University of Delhi - South Campus, India)

Seol-hee Joo

EDUCATION
College / University
Sogang University, Seoul, South Korea

Highest Degree
M.Sc.

Major Subjects
Integrated Biotechnology

Lab Experience
Voltage clamping, DNA extraction from bacteria, RNA extraction from mammalian tissues, molecular cloning work including site-directed mutagenesis and chimera construction using PCR, RT-PCR, mammalian cell culture, purification of tagged proteins, yeast two-hybrid, western blotting

Projects / Research
02/2007 – 08/2008 G protein-mediated modulation of T-type calcium channels
08/2006 – 02/2009 Interaction of the β subunits with Cav3.1 T-type calcium channels

Scholarships / Awards
2009 – 2010 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society
2001 & 2003 Honors scholarships from Sogang University
2006 – 2008 Scholarships from the Korean Ministry of Education
Samir Karaca

EDUCATION
College / University
Middle East Technical University (METU), Ankara, Turkey

Highest Degree
B.Sc.

Major Subjects
Molecular Biology and Genetics

Lab Experience
Recombinant DNA techniques, various techniques in microbiology and molecular biology. Some immunological techniques such as ELISA, ELISPOT, Cytokine Flow Cytometry

Projects / Research
10/2008 – 06/2009 “Effect of Heat Stress on Gene Expression Levels in Melon (Cucumis melo L.) Seedlings”. Plant Biotechnology Laboratory, Middle East Technical University, Ankara, Turkey
07/2008 – 08/2008 Development of assays of T cell function. IAVI Core Laboratory (Dr. Peter Hayes), Imperial College London, United Kingdom

Scholarships / Awards
2009 – 2010 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society
2004 – 2009 Mehmet Zorlu Association Scholarship

Simone Mayer

EDUCATION
College / University
University of Cambridge, Sidney Sussex College, United Kingdom

Highest Degree
B.A. (Hons)

Major Subjects
Neuroscience

Lab Experience
Various techniques in cell biology and neuroscience

Projects / Research
10/2008 – 06/2009 The physiological role of Golgi cells during behaviour (Bachelor thesis). Department of Physiology, Development and Neuroscience, University of Cambridge, United Kingdom
07/2008 – 08/2008 The role of cLINGO-1 in the development of the spinal cord (Biology Undergraduate Summer School). Department of Zoology, University of Zurich, Switzerland
07/2007 – 08/2007 The connectivity of thalamocortical axons in rat brain slices. Department of Cell Physiology, Max Planck Institute for Medical Research, Heidelberg, Germany

Scholarships / Awards
2009 – 2010 International Max Planck Research School support
2009 Tripos Title of Scholar of Sidney Sussex, Samuel Taylor Scholarship
Jonathan Melin

EDUCATION
College / University
University of California, Irvine, USA

Highest Degree
B.Sc. (Magna Cum Laude and Honors in Biological Sciences)

Major Subjects
Biological Sciences (UC Irvine, USA)
Biomedical Sciences (King's College, London, UK)

Lab Experience
Cell culture, in situ hybridization, immunofluorescence, microinjection, spectro-photometry, HPLC, mass spectroscopy, general molecular biology techniques

Projects / Research
05/2007 – 08/2007 Development of an ELISA for the detection of a cardiovascular disease susceptibility biomarker in rheumatoid arthritis patients. Rheumatology Dept., UC, Los Angeles, CA, USA
09/2007 – 07/2008 Quantification of endogenous retinoic acid within the chick embryo. King's College, London, United Kingdom
09/2008 – 06/2009 Investigation of Wnt, Fgf and retinoic acid within the zebrafish hindbrain. UC, Irvine, CA, USA

Scholarships / Awards
2009 – 2010 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society
05/2006 John Hollowell Research Writing Award University of California, Irvine, Department of English. Title of Paper: The Uninsured States of America

Danesh Moradi Garavand

EDUCATION
College / University
University of Tehran, Iran

Highest Degree
M.Sc.

Major Subjects
Molecular Biology, Biotechnology and Bioinformatics

Lab Experience
Acquaintance with basic techniques in molecular biology, biochemistry and genetics

Projects / Research
2008 – 2009 Development of a novel high throughput automated evolutionary screening algorithm for in silico drug design. Pasteur Institute of Iran, Tehran

Scholarships / Awards
2009 – 2010 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society
2007 – 2009 National Foundation of Elites Stipend, Iran
2004 – 2009 Ministry of Science, Research and Technology Stipend for Exceptional Talents
Rafik Tarek Neme Garrido

EDUCATION

College / University
Universidad Nacional de Colombia, Bogotá, Colombia

Highest Degree
B.Sc.

Major Subjects
Molecular Biology, Bioinformatics, Biochemistry, Plant and Animal Immunology, Genomics

Lab Experience
Techniques in molecular biology, biochemistry and bioinformatics

Projects / Research
06/2008 – 09/2009 Resistance gene prediction from a new unigene set in cassava (*Manihot esculenta*). Universidad Nacional de Colombia, Bogotá, Colombia
06/2008 – 09/2009 General gene classification and annotation strategies for a new unigene set in cassava (*Manihot esculenta*). Universidad Nacional de Colombia, Bogotá, Colombia
06/2008 – 09/200 Bioinformatic approach to evaluate the role of microRNAs in viral immune response in eight model plant species. Universidad Nacional de Colombia, Bogotá, Colombia

Scholarships / Awards
2009 – 2010 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society

Momchil Ninov

EDUCATION

College / University
Sofia University “St. Kliment Ohridsky”, Sofia, Bulgaria

Highest Degree
B.Sc.

Major Subjects
Organic Chemistry, Biochemistry

Lab Experience
HPLC, FPLC, NMR spectroscopy, UV/VIS spectroscopy, SDS PAGE, column flash chromatography

Projects / Research
2007 – 2009 Synthesis and characterization of photozymes
04/2007 – 06/2007 IR spectroscopical analysis of the bioflavonoid silibinin
09/2006 – 03/2008 Bioflavonoids: Complexation properties and biological activity
09/2005 – Complexes of macrocyclic ligands with alkali metal cations
All project at Sofia University “St. Kliment Ohridsky”, Sofia, Bulgaria

Scholarships / Awards
2009 –2010 Scholarship by the German Academic Exchange Service (DAAD)
03/2009 – 02/2010 Scholarship holder of the Vernadsky Foundation, Russia
03/2008 – 09/2008 Erasmus Scholarship, University of Saarland, Germany
2007 “Alma Mater” Prize by the Sofia
2005 – 07/2009 Scholarship for Academic Excellence, Sofia
Reejuana Parveen

EDUCATION
College / University
2007 – 2009 University of Hyderabad, India
2004 – 2007 St. Anns’ College, Hyderabad, India

Highest Degree
M.Sc.

Major Subjects
Biotechnology

Lab Experience
Techniques in protein chemistry, molecular biology and tissue culture

Projects / Research

Scholarships / Awards
2009 – 2010 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society
2007 – 2008 Department of Biotechnology, Government of India Scholarship
2008 – 2009 University of Hyderabad Achievers’ Award

Paula Perin

EDUCATION
College / University
University of São Paulo, Brazil

Highest Degree
B.Sc.

Major Subjects
Biochemistry, cell biology and molecular biology

Lab Experience
Biochemistry (ELISA, Western-Blotting), cell biology (cell culture, fluorescence microscopy), and molecular biology techniques (Real-Time PCR, DNA-sequencing)

Projects / Research
08/2005 – 12/2007 Structural and biological characterization of GPI-mucin from intracellular-epimastigote (Trypanosoma cruzi). University of São Paulo, São Paulo, Brazil
07/2008 – 03/2009 Association study between SLCO1B1 and SLCO2B1 gene polymorphisms and atorvastatin response from hypercholesterolemic patients. University of São Paulo, São Paulo, Brazil

Scholarships / Awards
2009 – 2010 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society
08/2006 – 07/2007 Scholarship from Brazil National Council of Scientific and Technological Development
Jennifer Seefeldt

EDUCATION
College / University
Georg August University Göttingen, Germany

Highest Degree
B.Sc.

Major Subjects
Biochemistry

Lab Experience
Various techniques in cell biology, biochemistry and molecular genetics

Projects / Research
07/2009 – 08/2009 Optimizing the biosynthesis of wax esters by retargeting of biosynthetic enzymes (Bachelor thesis), Albrecht-von-Haller Institute for Plant Sciences, Department of Plant Biochemistry, Göttingen, Germany
11/2008 – 03/2009 Investigation of early endosomal budding and fusion, Max Planck Institute for Biophysical Chemistry, Department of Neurobiology, Göttingen, Germany
03/2008 Establishment of a HPLC-based method for the analysis of oxylipids derived from pinolenic and stearidonic acid, Albrecht-von-Haller Institute for Plant Sciences, Department of Plant Biochemistry, Göttingen, Germany
08/2008 - 10/2008 Internship at CombinatoRX, Inc., Singapore

Scholarships / Awards
2009 – 2010 International Max Planck Research School support

Upadhyayula Srinivas

EDUCATION
College / University
University of Hyderabad, India

Highest Degree
M.Sc.

Major Subjects
Biochemistry

Lab Experience
Techniques in Biochemistry

Projects / Research
07/2008 – 04/2009 Identification of phosphorylated sugars and related receptors in goat milk. University of Hyderabad, Hyderabad, India

Scholarships / Awards
2009 – 2010 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society
2009 Qualified CSIR-JRF
2009 GATE Score 99.86 Percentile (All India 18 rank)
2007 – 2009 Achievers’ Scholarship in M.Sc. for two years
2007 – 2009 Gold medalist, School of Life Sciences, University of Hyderabad, India
Congwei Wang

EDUCATION

College / University
Capital Normal University, Beijing, P. R. China

Highest Degree
B.Sc.

Major Subjects
Bioscience

Lab Experience
Basic techniques in molecular biology, biochemistry and microbiology

Projects / Research
04/2007 – 04/2008 Application of immobilized proteases in the paper splitting technology, University Tübingen, Germany

Scholarships / Awards
2009 – 2010 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society
04/2007 – 04/2008 DAAD International Study and Training Partnerships Stipend
2005 – 2008 Stipend of the Capital Normal University, 1st class

Miriam Weiss

EDUCATION

College / University
University of Rostock, Germany

Highest Degree
B.Sc.

Major Subjects
Medical Biotechnology

Lab Experience
08/2008 – 09/2008 Investigation of point mutations in autoimmune disorders. Institute for Clinical Immunology and Transfusion Medicine, University of Leipzig, Germany

Scholarships / Awards
2009 – 2010 International Max Planck Research School support
2006 – present e-fellows.net
Halenur Yavuz

EDUCATION
College / University
Middle East Technical University (METU), Ankara, Turkey

Highest Degree
B.Sc.

Major Subjects
Biology

Lab Experience
Techniques in cellular and molecular biology, functional genomics

Projects / Research
06/2008 – 09/2008 Analysis of undetermined expression of ion channels in the postnatal rat brain & control tissues via quantitative-PCR and robotic in situ hybridization. Department of Genes and Behavior, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany
09/2008 – 02/2009 Gene expression analysis on nerve and heart muscle cells differentiated from mesenchymal stem cells via real time PCR techniques. Biomaterials and Tissue Engineering Research Center, Middle East Technical University, Ankara, Turkey

Scholarships / Awards
2009 – 2010 Stipend of the Excellence Foundation for the Promotion of the Max Planck Society
06/2008 – 09/2008 Erasmus Program’s summer practice scholarship
## Faculty

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<td>Dirk Görlich</td>
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<td>Claudia Höbartner</td>
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<td>Andreas Wodarz</td>
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</table>

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
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

We are interested to understand 2 basic questions in cellular and molecular neurobiology:
1. Which factors support survival of adult CNS neurons?
2. What kills these cells under pathological conditions?
Up to now, only little is known about the mechanisms that support survival of a postmitotic cell like a human neuron for eventually more than 100 years under physiological conditions. However, by examining the molecular regulation of cell survival and cell death during development and in the lesioned adult CNS, one may get some clues to answer this question.

In our group, several in vitro and in vivo model systems are used which allow examination of neuronal de- and regeneration. Our basic model is the rodent retino-tectal projection. Here, we can study development, de- and regeneration of the respective projection neurons, the retinal ganglion cells (RGCs) in single cell cultures, explants or in vivo. Transection or crush-axotomy of the optic nerve induces retrograde death more than 80% of RGCs within two weeks. This secondary cell loss is mainly apoptotic and involves specific changes in gene expression pattern of transcription factors (e.g. c-jun or ATF-2), pro- and anti-apoptotic genes (e.g. bcl-2 or bax) and growth-associated genes (like GAP-43). Thus, long term survival and initiation of regeneration programmes of RGCs critically depends on inhibition of apoptotic cell death. To that end, we have used a variety of techniques to interfere with the cell death cascades that follow lesions of the optic nerve in adult rats. Inhibition of neuronal apoptosis can be afforded by pharmacological administration of trophic factors or by gene therapy approaches using adenovirus or adeno-associated virus vectors that can deliver neurotrophic or anti-apoptotic factors directly into neurons or into surrounding glial cells. These, and other new strategies like using peptide-transduction-domains to deliver anti-apoptotic proteins across the blood-brain-barrier are now used to develop new experimental therapy strategies in animal models of human neurological disorders like stroke, trauma, multiple sclerosis or neurodegenerative diseases (e.g. Alzheimer’s or Parkinson’s disease).

Selected Recent Publications

Botho Bowien

Professor of Microbiology
- Dr. rer. nat., Georg-August-Universität Göttingen, 1970
- Postdoc, Case Western Reserve University, Cleveland, Ohio, USA, 1973 - 1975
- Habilitation (Microbiology), Georg-August-Universität Göttingen, 1978
- Professor of Microbiology, Georg-August-Universität Göttingen, 1983

Major Research Interests

Carbon dioxide (CO₂) is an essential gas for all organisms. Assimilation of CO₂ by autotrophs such as the photosynthetic higher plants, algae and cyanobacteria constitutes the primary biosynthetic activity in the biosphere. In addition to these organisms there is a great diversity of photo- and/or chemolithoautotrophic bacteria and archaea. Such organisms are often facultative autotrophs, i.e. they are able to grow either autotrophically or heterotrophically. The mutual shift between autotrophy and heterotrophy requires a sophisticated regulation on the metabolic as well as genetic level.

*Ralstonia eutropha* H16 is an aerobic, facultatively chemolithoautotrophic bacterium that assimilates CO₂, like the majority of autotrophs, via the Calvin-Benson-Bassham (CBB) carbon reduction cycle. A main interest of our laboratory concerns the transcriptional control of the *cbb* operons encoding most of the CBB enzymes in *R. eutropha*. The regulatory components of the cbb system, their response to metabolic signals and the interlocking of the *cbb* control with larger regulatory networks are the prime research subjects. The recently elucidated genome sequence of the organism provides an excellent basis to study these questions.

Functional genomics of *R. eutropha* H16 with the goal of assessing and developing the metabolic potential of the organism for future biotechnological applications – particularly under autotrophic growth conditions- is another field of research. The genetics and control of sugar and sugar acid utilization in *R. eutropha* H16 are also being investigated.

Selected Recent Publications


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 (Switzerland), 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 COP9 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 immuno-compromised patients (A. fumigatus) and as plant pathogens (V. longisporum).

Selected Recent Publications


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 economically important genetic defects in livestock and other domesticated animals. So far our main focus was on porcine genes and their function, e.g. since several years we are analyzing the molecular origin of porcine hernia inguinalis and scrotalis. Using a whole genome scan we have identified several chromosomal regions that are linked to this disorder. Fine mapping, positional cloning and candidate gene analysis are used for further elucidation. However, we are also interested in other species, e.g. cattle, dog, horse, and sheep.

In recent years we have also focused on the analysis of circulating nucleic acids (CNA) which we have identified in BSE infected cattle. Currently, we are using next generation sequencing technology to determine the repertoire of CNAs in man, cattle, and dog and associate differences in CNA patterns to diseases, e.g. cancer.

Selected Recent Publications


Nils Brose

Professor, Director at the Max Planck Institute for Experimental Medicine

- Dr. rer. nat. (Ph.D.) 1990, Ludwig Maximilians University Munich
- Appointed as Director at the Max Planck Institute for Experimental Medicine 2001

Major Research Interests

Research in the Department of Molecular Neurobiology focuses on the molecular mechanisms of synapse formation and function in the vertebrate central nervous system. Typically, synapses are formed between cellular processes of a sending and a receiving nerve cell. They are the central information processing units in the vertebrate brain where some 1012 nerve cells are connected by 1015 synapses to form an elaborate and highly structured neuronal network that is the basis for all forms of behaviour. Signal transmission at synapses is mediated by the regulated release of signal molecules (neurotransmitters) which then diffuse to the receiving nerve cell and change its physiological state. In the Department of Molecular Neurobiology, we combine biochemical, morphological, mouse genetic, behavioural, and physiological methods to elucidate the molecular basis of synapse formation and transmitter release processes. Our synaptogenesis research concentrates on synaptic cell adhesion proteins and their role in synapse formation. Studies on the molecular mechanisms of neurotransgenesis research focuses on synaptic cell adhesion proteins and their role in synapse formation.

Selected Recent Publications


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


Detlef Doenecke

Professor of Biochemistry

- MD, 1967, University Saarland Medical School
- Postdoc at the Universities of San Francisco (UCSF) and Marburg
- Professor of Biochemistry, 1987, University of Göttingen
- Head of the Department of Molecular Biology at the Institute of Biochemistry and Molecular Cell Biology

Major Research Interests

The main interest of the laboratory is in the structure, function and regulation of synthesis of nuclear proteins including chromosomal proteins and other protein factors involved in the control of transcription. DNA replication during the S-phase of the cell cycle requires the coordinate synthesis of histones in stoichiometric amounts for the assembly of chromatin on replicated DNA. The major human histone gene cluster has been mapped to chromosome 6p21.1-6p22.2, and more than 50 histone genes were identified and sequenced within that gene cluster. Several S-phase independent histone genes map as solitary genes to other chromosomes. Current work in this project area deals with the function and of individual H1 histone subtype genes. A second major project deals with the factors mediating the transport of histone-related transcriptional regulators from the cytoplasm to the cell nucleus. This work concentrates on the differential role of nuclear import receptors and specific protein-protein interactions during the nuclear transport of these proteins. The third topic of research deals with the structural transitions of chromatin during programmed cell death and with the regulation of factors involved in apoptotic chromatin cleavage and histone modification.

Selected Recent Publications

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 (CMPI) at the European Neuroscience Institute (ENI) in Göttingen

Major Research Interests

Neurotransmitter 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 electrophysiology 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


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; cardiomyopathies, 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


Dirk Fasshauer

Independent Research Group Leader - Structural Biochemistry

- 1994 Doctoral degree (Dr. rer. nat.) University of Göttingen
- 1995-97 Postdoctoral fellow, Yale University
- since 1997 Postdoctoral fellow, Dept. for Neurobiology, Max Planck Institute for Biophysical Chemistry, Göttingen
- since 2002 Group leader within the Dept. for Neurobiology, Max Planck Institute for Biophysical Chemistry, Göttingen
- since 2006 Independent Research Group Leader, Structural Biochemistry, Max Planck Institute for Biophysical Chemistry, Göttingen

Major Research Interests

The mechanism by which eukaryotic cells transport material between intracellular organelles is of fundamental importance in cell biology. Transport is mediated by vesicles that bud from a donor organelle and afterwards fuse with a target organelle. Currently, it is becoming clear that the underlying molecular machineries involved in the principal aspects of vesicular trafficking are highly conserved among all eukaryotes. Key players during the final step in vesicle trafficking, the fusion of a vesicle with its acceptor membrane, are the so-called SNARE proteins. SNARE proteins are thought to assemble into a tight complex between the fusing membranes, pulling them together (the ‘zipper’ model). To come to a better understanding of the molecular events during vesicular fusion, we focus on a detailed structural, kinetic, thermodynamic, and phylogenetic characterization of the underlying protein-protein interactions. In particular, we want to investigate how SNARE assembly takes place, how this process is controlled and catalyzed by other factors. Next to standard biochemical techniques, we employ spectroscopic (Circular Dichroism and Fluorescence Spectroscopy) and calorimetric (Isothermal Titration Calorimetry) methods.

Selected Recent Publications


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

Plant Metabolic Pathways: Our laboratory is currently studying the primary metabolism of plants with main focus on the metabolism of lipids. For this purpose, different approaches ranging from analytical chemistry to biochemistry and molecular biology were used.

Plant Lipid Metabolism: We are interested in physiological functions of specific lipoxygenases, i.e. their involvement in the degradation of storage lipids during germination and in the destruction of organellar membranes during stress. Another research topic is the analysis of their catalytic mechanism. In addition, lipid peroxidation reactions were analysed in general by metabolomic approaches and by studying the biosynthesis of aldehydes (fruit aromas), hydroxy fatty acids and divinyl ether fatty acids (plant defence). Moreover, enzymes which introduce new functionalities (i.e. conjugated double bonds) in the fatty acid backbone were isolated and characterized in order to obtain new seed oils for biotechnological and medical purposes. In relation to that we are manipulating the primary metabolism and organelle development of seeds in order to increase the oil content of seeds.

Metabolic transport processes: Another research topic is the analysis of the mechanism and regulation of transport processes across the peroxisomal membrane. The biochemistry of phosphoinositides and the transfer of enzymes facilitates the metabolic pathways for lcPUFAs from donor organisms into plants.

Selected Recent Publications


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


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


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 2005

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


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.

Members of the TGA family of transcription factors that have been identified as essential regulators for both responses are proteins of the TGA family. 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-time 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


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 Postdoc (Laboratory of T.A. Rapoport, Berlin)
- 1996 - 2007 Research group leader at the ZMBH Heidelberg
- 2001 - 2007 Professor for Molecular Biology (Universität Heidelberg)
- 2001 - 2006 Deputy Director of the ZMBH
- 2005 - Director, Dept. Cellular Logistics, MPI for Biophysical Chemistry, Göttingen

Major Research Interests
- Nuclear transport
- Importins and Exportins
- RanGTPase-system
- Nuclear pore complexes (NPCs), NPC-assembly, Mechanism of NPC-passage
- Hydrogels
- Integral membrane proteins, Translation
- Systems biology
- Spermiogenesis

Selected Recent Publications


Christian Griesinger

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

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

Major Research Interests

In the department, we develop NMR spectroscopic methods and apply them to the investigation of water soluble and membrane proteins, nucleic acids and their complexes as well as drug/target complexes. 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 unfolded 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


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 how the pathogen is inducing host-cell apoptosis, thereby promoting disease of epithelial-layered tissues, such as the intestine. In addition, we are appointed the National Reference Center for Systemic Mycoses. In this respect, we are investigating fungal factors and mechanisms that are involved in pathogenesis of mycoses; i.e. cell wall structure and differentiation processes.

Selected Recent Publications


Holpert M, Groß U, Bohne W (2006) Disruption of the bradyzoite-specific P-type (H+)-ATPase /PMA1/ in *Toxoplasma gondii* leads to decreased bradyzoite differentiation after stress stimuli but does not interfere with mature tissue cyst formation. Mol Biochem Parasitol 146: 129-33


Jörg Großhans

Professor of Developmental Biochemistry

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

Major Research Interests

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

Selected Recent Publications


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-tumor 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


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 deoxyri-
bozymes 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 cata-
lysts 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 chemi-
cal 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 modifi-
cations, 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 syn-
thetic 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 prepara-
tion of complex RNA targets. The structural and biophysical properties of highly
functionalized RNAs and their interactions with proteins are studied in collabora-
tion with several other research groups at the Max Planck Institute for Biophysi-
cal Chemistry

Selected Recent Publications

Pradeepkumar PI, Höbartner C, Baum DA, Silverman SK (2008) DNA-catalyzed
formation of nucleopeptide linkages. Angew Chem Int Ed 47: 1753-1757

Höbartner C, Silverman SK (2007) Engineering a Selective Small-Molecule Sub-
strate Binding Site into a Deoxyribozyme. Angew Chem Int Ed 46: 7420-7424

Höbartner C, Silverman SK (2005) Modulation of RNA tertiary folding by incor-
poration of caged nucleotides. Angew Chem Int Ed 44: 7305-7309

Höbartner C, Rieder R, Kreutz C, Puffer B, Lang K, Polonskaia A, Serganov A,
Micura R (2005) Syntheses of RNAs with up to 100 nucleotides containing site-
127: 12035-12045
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 Developmental 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 phenomenon 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


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


Steven Johnsen

Assistant Professor in Molecular Oncology

- 1999-2002 Ph.D. Mayo Clinic College of Medicine, Rochester, Minnesota, USA
- 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. How p53 controls replication-dependent histone pre-mRNA processing and the role of this during tumorigenesis.
2. The role of RNF20 and RNF40 in controlling estrogen-regulated transcription and tumorigenic properties in mammary tumorigenesis.
3. The role of the ubiquitin-proteasome system and crosstalk with chromatin modifications and structure during estrogen-regulated transcription.
5. The regulation of H2Bub1 by CDK9 and the function of these during physiological stress responses.

Selected Recent Publications


Michael Kessel

Professor of Molecular Biology

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

Major Research Interests

The group studies patterning processes in chick and mouse embryos. We apply biochemical, genetic and embryological techniques, including expression analysis, transplantation in embryo culture, in vivo gene transfer by electroporation, and gene knock-out technology.

We 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. We are currently studying a conditional mouse knock-out model.

We further analyze the homeobox gene Hesx1 and its role during the development of the pituitary. Hesx1 protein interacts with Mad2l2, a regulator of the APC/C complex, and a subunit of translesion DNA polymerase zeta. We study the involvement of Mad2l2-Hesx1 in the progression of the cell cycle in conditional knock-out mice.

Our goal is an understanding of the coordination between proliferation and pattern formation.

Selected Recent Publications


Dieter Klopfenstein

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

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

Major Research Interests

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

Selected Recent Publications


Wilfried Kramer

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

Major Research Interests
Besides being fast and highly accurate, the most important demand on replication of DNA is that it 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
Volker Lipka

Professor of Plant Cell Biology

- Dr. rer.nat. at the Department for Plant Molecular Biology, Technical University Aachen, 1999
- Postdoctoral fellow at the Sainsbury Laboratory, 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


Reinhard Lührmann

Professor, Director at the Max Planck Institute for Biophysical Chemistry

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


Ahmed Mansouri

Molecular Developmental Genetics

- Diploma (Chemistry), Technical University, Braunschweig (Germany) 1975
- Dr. rer. nat. Chemical Technology Institute, Technical University, Braunschweig (Germany), 1978
- Postdoc at the Institute of Human Genetics in Göttingen (1982 - 1986)
- Postdoc at the Miescher Institute in Tübingen (MPI) and at the Max Planck Institute of Immunobiology 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 Lmx1a/b in order to promote the generation of functionally distinct dopaminergic neuron populations.

Selected Recent Publications


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, Universität Bielefeld
- Since 2002 Professor of Bioinformatics, Universität Göttingen

Major Research Interests

The focus of our work is on algorithm development for nucleic acid and protein sequence analysis. We are particularly interested in multiple sequence alignment and gene prediction; the software programs DIALIGN and AUGUSTUS have been developed and are maintained by our department. Current projects in these fields include novel graph-theoretical approaches to multiple alignment and application of conditional random fields for probabilistic sequence modeling.

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


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 environmental 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

Erwin Neher

Professor, Director 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


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


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)
- 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 signaling 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


Stefanie Pöggeler

Professor of Genetics of Eukaryotic Microorganisms

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

Major Research Interests

Fruiting-body development in filamentous ascomycetes

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

Fungal inteins

An intein is a self-catalytic protein-intervening sequence that catalyses its precise excision from a host protein and the ligation of its flanking sequences, termed N- and C-exteins, to produce the mature spliced product. Protein splicing is a 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


Peter Rehling

Professor, Director of the Dept. of Biochemistry II

- 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) at the Medical Faculty, 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

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 as to 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 the assembly process. 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. In our work we combine biochemical and genetic techniques on the model organism Saccharomyces cerevisae with experiments in human cell lines.

Selected Recent Publications


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


*equal contribution
Marina Rodnina

Professor of Biochemistry

- PhD, Institute of Molecular Biology and Genetics, Academy of Science, Ukraine, Kiev, 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


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 diameter 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


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

*Drosophila melanogaster* is an excellent model organism due to a combination of its easy-to-manipulate genetic system, relatively short life cycle, low cost, and biological complexity. As the complete genome of *Drosophila* has been sequenced, it provides critical information about human genes that have homologues in the fruit fly. Around 75% orthologs to human genes have been found within the fly genome.

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


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 2.5Å, there are more measured intensities than atomic coordinates, so the problem is overdetermined and there should be a solution. Recently we were able to increase 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. Indirectly 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/


Mikael Simons

Group Leader of Centre for Biochemistry and Molecular Cell Biology

- 1991 - 1997 Medical School, University of Heidelberg
- 1993 - 1996 MD thesis (Laboratory of K. Beyreuther, ZMBH, University of Heidelberg)
- 1997 - 1999 Residency in Neurology, Department of Neurology, University of Tübingen
- 1999 - 2000 Post-Doc (Laboratory of J. Trotter, Department of Neurobiology, University of Heidelberg)
- 2000 - 2004 Residency in Neurology, Department of Neurology, University of Tübingen
- 2004 Facharzt/ Specialty qualification in Neurology
- 2005 Habilitation in Neurology, University of Tübingen
- 2004 Junior group leader, Centre for Biochemistry and Molecular Cell Biology, University of Göttingen

Major Research Interests

Mechanisms of myelin biogenesis; neuron and glia interactions; membrane trafficking in oligodendrocytes; mechanisms of remyelination in multiple sclerosis; amyloid precursor protein processing in Alzheimer's disease

Selected Recent Publications


Holger Stark

Group Leader 3D-Cryo Electron Microscopy

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

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 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


Jörg Stülke

Professor of Microbiology

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

Major Research Interests

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

Selected Recent Publications


Michael Thumm

Professor of 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 eukaryots 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. The intracellular lysis of a membrane is a very interesting feature of eukaryotic cells and implies a high risk for cellular integrity. In a genetic screen, we identified Aut5 as an essential component of this lysis process. We found that Aut5 is an integral membrane protein and that its lipase active site motive is essential for lysis of autophagic bodies.

Selected Recent Publications

Kai Tittmann

Professor of Bioanalytics

- 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 research of the division of bioanalytics is concerned with the mechanistic and structural analysis of various enzymes of carbon metabolism. A particular emphasis is laid on the time-resolved detection and structural characterization of enzymic on-pathway intermediates by means of rapid reaction kinetics, NMR spectroscopy, X-ray crystallography and theoretical studies. In a current project we aim to elucidate the mechanism of regulation by phosphorylation of the human pyruvate dehydrogenase multienzyme complex taking into account both kinetic and structural studies. We are also investigating the catalytic mechanism of bacterial and plant acetohydroxyacid synthases, which catalyze the first committed step of branched-chain amino acid biosynthesis. In another project, underlying principles of intramolecular electron transfer reactions and reversible membrane binding of pyruvate oxidases are being studied. A second research line is devoted to the analysis of the selective bond fission in the enzymes transketolase and transaldolase which act on sugar substrates. Here, we study the reaction trajectory of both enzyme superfamilies by means of detailed transient kinetics, X-ray crystallography and DFT studies. Another related aspect of this work is the mechanistic analysis of ring-opening reactions of cyclic sugar substrates at the active site of these enzymes.

Selected Recent Publications

Henning Urlaub

Group Leader - Bioanalytical Mass Spectrometry Group

- since 2005: Independent research group “Bioanalytical Mass Spectrometry Group” at the Max Planck Institute for Biophysical Chemistry, Göttingen
- since 2001: Establishment and management of the mass spectrometry in the Department of Cellular Biochemistry at the Max Planck Institute for Biophysical Chemistry, Göttingen
- 2000-2001: Guest researcher at the EMBL, Heidelberg, Protein Analytical Group of Dr. Matthias Wilm
- 2000: Senior scientist in the Department of Cellular Biochemistry at the Max Planck Institute for Biophysical Chemistry, Göttingen
- 1997 - 2000: Post-Doc in the group of Prof. Dr. Reinhard Lührmann at the Institut für Molekularbiologie und Tumorforschung (IMT) of the Philipps-Universität Marburg
- 1996: Dr. rer. nat. at Faculty of Chemistry, Frei Universität Berlin
- 1993 - 1996: Doctoral thesis project in the group of Prof. Dr. Brigitte Wittmann-Liebold at the Max-Delbrück-Centre of Molecular Medicine, Berlin

Major Research Interests

Modern mass-spectrometric methods are key technologies in the life sciences to elucidate changes at the protein level. Nonetheless, the detection of post-translational modification, reliable MS-quantification procedures, MS-based detection of protein–protein and protein–nucleic acid interactions and, importantly, the identification of proteins that escape detection under standard conditions (e.g., protein isoforms and membrane proteins) are still far from being routine matters.

Our own projects are centered around the establishing of methods for the mass-spectrometric analysis of post-translational modifications and protein–nucleic acid contact sites in ribonucleoprotein (RNPs) particles, such as the spliceosome (collaboration with Reinhard Lührmann at the Max Planck Institute for Biophysical Chemistry (http://www.mpibpc.gwdg.de/english/research/dep/lueherrmann/index.html). For that purpose we are developing novel analytical techniques including mass-spectrometric methods (MALDI- and ESI-MS) and chromatographic enrichment strategies.

In collaboration with the Neurobiology Department of Reinhard Jahn at the Max Planck Institute for Biophysical Chemistry (http://www.mpibpc.mpg.de/groups/jahn/), we are developing methods suitable for the reliable MS-based identification of membrane proteins. We use different gel-based purification strategies and liquid-chromatographic approaches to identify novel membrane proteins, for example from synaptic vesicles.

Selected Recent Publications


Lutz Walter

Head of Department of Primate Genetics at the German Primate Center

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

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 either kill other cells or 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.

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) and Epstein-Barr virus (EBV).

Selected Recent Publications


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. project 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 Ca²⁺. 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


for review see:

Ernst Wimmer

Professor of Developmental Biology

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

Major Research Interests

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


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

Major Research Interests

At the center of my research interests is the question of how neural stem cells divide asymmetrically to produce another stem cell and a progenitor cell that will differentiate and give rise to neurons and glia cells. One important aspect of asymmetric cell division is the establishment of an intrinsic polarity which is the prerequisite for the asymmetric localization of proteins and mRNAs that serve as cell fate determinants. Our model system for the asymmetric division of stem cells is the embryonic neuroblast of Drosophila. Here we study the function of genes that control cell polarity, asymmetric localization of cell fate determinants and orientation of the mitotic spindle. The knowledge obtained in the Drosophila system has stimulated intense research on the participation of the orthologous genes and proteins in the asymmetric division of vertebrate stem cells.

Selected Recent Publications


**Graduate Program Committee**

**Faculty**
Prof. Dr. Ivo Feußner (Chair)
Prof. Dr. Dieter Heineke
Prof. Dr. Reinhard Jahn
Prof. Dr. Tomas Pieler (Vice Chair)
Prof. Dr. Jörg Stülke
PD Dr. Wilfried Kramer

**Students**
Lena Hyatt
Dirk Jessen
Lope Flórez Weidinger

**Program Coordination**

**Molecular Biology Program**

Dr. Steffen Burkhardt  
(Program Coordinator)

Kerstin Grüniger  
(Program Assistant)

**Neuroscience Program**

Prof. Dr. Michael Hörner  
(Program Coordinator)

Sandra Drube  
(Program Assistant)

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**GZMB Board Members**

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(executive director)
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Prof. Dr. Tomas Pieler
Prof. Dr. Andrea Polle
Dr. Steffen Burkhardt
Andreas Nolte

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**Further Information**

Georg-August-Universität
Göttingen
Coordination Office
Molecular Biology
Justus-von-Liebig-Weg 11
37077 Göttingen
Germany

phone:
+49 – 551 – 39 12110 / 12111
fax:
+49 – 551 – 39 3811
e-mail:
gpmolbio@gwdg.de

http://www.gpmolbio.uni-goettingen.de
Molecular Biology
MSc/PhD Program

www.gpmolbio.uni-goettingen.de