Yearbook 2005/06

MSc/PhD/MD-PhD Neuroscience Program
at the University of Göttingen

International Max Planck Research School

Imprint

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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.

The two programs met with immediate success. By now, some 800 students from more than 70 countries apply for the 20 study places available in each of the programs every year. Over the past five years, 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 both achieved excellent recommendations in several external evaluations and have recently 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 two other graduate schools in Göttingen, the Molecular Biology and Neuroscience Programs are considered exemplary and serve as best practice models.

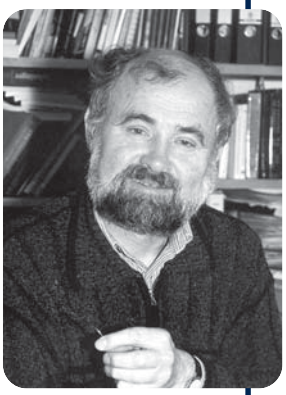
Five Göttingen University faculties, three Göttingen Max Planck Institutes in Göttingen as well as the German Primate Center participate in the programs. International guest lecturers are also involved. The Max Planck Society contributes through its newly established International Max Planck Research Schools. Both programs keep close contacts 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 sponsors.

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 1998 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, 29 International Max Planck Research Schools have been established involving 34 Max Planck Institutes and 26 German universities. More than 1200 (mostly PhD-) students from 85 countries are presently enrolled. Eight more schools have been initiated and will be established next year.

The success of the Göttingen International Max Planck Research Schools in Molecular Biology and Neurosciences is evident from the high quality of the students and from the hundreds of applications the programs receive each year. The Schools have also re-shaped the local scientific community, strengthened the ties between the participating institutions, and initiated new scientific collaborations that augment the international reputation of Göttingen as a center for scientific excellence. 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
for the Advancement
of Science

Erwin Neher
Dean of the IMPRS
Neurosciences

Overview

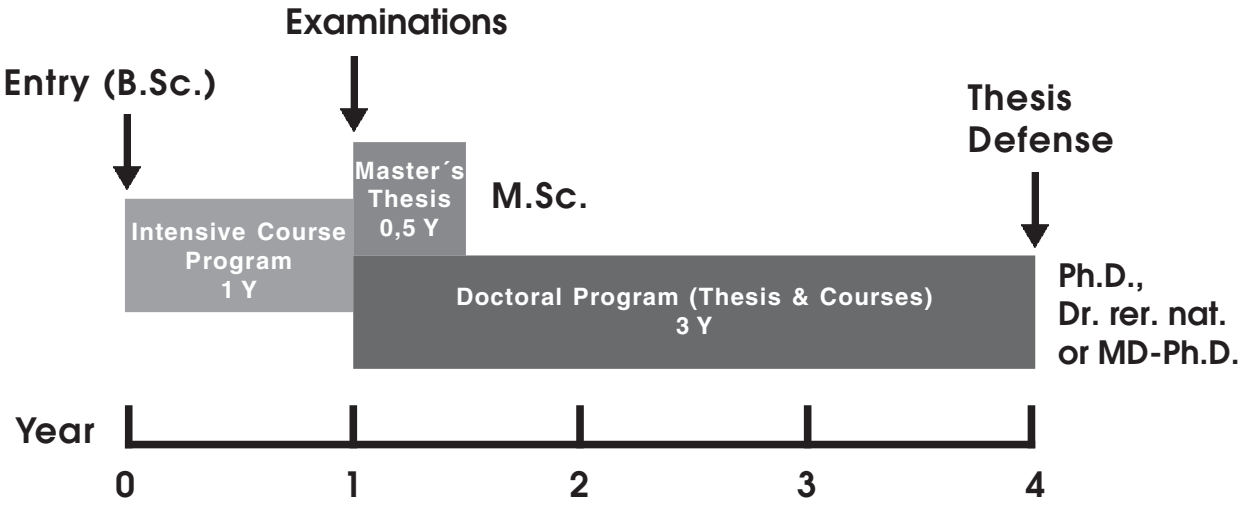
This yearbook is intended to provide information on the International MSc/PhD/MD-PhD Neuroscience Program in Göttingen, Germany, which was established in 2000. In addition to general information on the program, the yearbook introduces the current year's students, the faculty members, the program committee and the coordination team.

The program is jointly conducted by the University of Göttingen, the Max Planck Institute for Biophysical Chemistry (MPIbpc), the Max Planck Institute for Experimental Medicine (MPIem), the Max Planck Institute for Dynamics and Selforganization (MPIds), the German Primate Center (DPZ) and the European Neuroscience Institute (ENI). Further to their active participation in the Neuroscience Program, the above-mentioned partners closely cooperate in the DFG Research Center for Molecular Physiology of the Brain (CMPB), the Göttingen Center for Molecular Biosciences (GZMB), the Center for Systems Neuroscience (ZNV), in three collaborative research centers (Sonderforschungsbereiche, SFB), and in five interdisciplinary doctoral programs (Graduiertenkollegs, GK).

The International MSc/PhD/MD-PhD Neuroscience Program qualifies students for professional work in the neurosciences. The program is open to students from Germany and from abroad, who hold a Bachelor's degree (or equivalent) in the biosciences, medicine, psychology, physics, or related fields. All courses are held in English. Tuition fees are waived and scholarships are available. The academic year starts in October and is preceded by a three week orientation program. Applications may be submitted until January 31 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 independent, 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 3 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. Students that finished medical school can apply for an MD-PhD title.
- **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 following institutions and funding initiatives contributed to the success of the Molecular Biology Program:

DAAD

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

International Degree Programs - Auslandsorientierte Studiengänge (AS)

IPP made in Germany

International Postgraduate Programs – Internationale Promotionsprogramme (IPP)

Max Planck Institut for Dynamics and Self-Organization, Munich, Germany, http://www.mpg.de

International Max Planck Research Schools

Niedersächsisches Ministerium für Wissenschaft und Kultur

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

Innovationsoffensive

Doctoral Programs - Promotionsprogramme

Stifterverband für die Deutsche Wissenschaft

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

The following companies contributed stipends:

Bayer AG, Leverkusen, Germany
http://www.bayer.com/en/index.php

Carl Zeiss Lichtmikroskopie, Göttingen, Germany
http://www.zeiss.de

Degussa AG, Düsseldorf, Germany
http://www.degussa.com

DeveloGen AG, Göttingen, Germany
http://www.develogen.com

Heka Elektronik GmbH, Lambrecht / Pfalz, Germany
http://www.keka.com

Hellma GmbH & Co. KG, Müllheim / Baden, Germany
http://www.hellma-worldwide.com

KWS Saat AG, Einbeck, Germany
http://www.kws.com

Leica Microsystems GmbH, Bensheim, Germany
http://www.leica-microsystems.com

Luigs & Neumann, Ratingen, Germany
http://www.luigs-neumann.com

Roche Diagnostics GmbH, Penzberg, Germany
http://www.roche.de

Sartorius AG, Göttingen, Germany
http://www.sartorius.com

Solvay Pharmaceuticals, Hannover, Germany
http://www.solvay.com

Springer Verlag, Heidelberg, Germany
http://www.springer.de

Vossius & Partner, München, Germany
http://www.vossiusandpartner.com

Intensive Course Program (First Year)

Throughout the first year, current topics in the neurosciences are covered by

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

Lectures and Tutorials

A comprehensive lecture series is organized into a sequence of 4-6 week units. The following topics are taught on an advanced level throughout the first year (36 weeks, 4 hours per week):

A. Neuroanatomy

B. Physiology and Basic Statistics

C. Methods in the Neurosciences

D. Molecular Biology, Development and Neurogenetics

E. Sensory and Motor Systems

F. Clinical Neurosciences and Higher Brain Functions

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

Methods Courses

During the first months of the Neuroscience 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 courses comprise the following topics:

I Neuroanatomy

- histology and development of the brain
- cytology of the cortex (EM)
- sensory systems
- neuronal stem cells
- hippocampus
- monamine systems
- human brain
- spinal cord/cerebellum
- anatomy of leech nervous system, behaviour of leeches

II Membrane Physiology and Neurophysiology

- membrane physiology
- sensory physiology
- ca-imaging
- FCS
- motor reflexes
- FLIM
- communication of weakly electric fish
- ERG of the fly
- neuronal basis of acoustic communication
- pharmacological brain stimulation

III Methods in the Neurosciences

- neuronal modelling
- tissue slicing and cell culture
- optical imaging
- patch clamp data analysis
- behavioral analysis

Laboratory Rotations

Starting in January, every student carries out four independent research projects (laboratory rotations) in participating laboratories. Each project is individually supervised and involves five to six 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 at least three different subjects.

Seminars

Seminars start in February. 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. Furthermore, topics covered by the laboratory rotations will be examined.

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 of the students. Doctoral students select three faculty members as their doctoral committee which closely monitors work progress and advises students in their research project. Laboratory work is accompanied by seminars, training in scientific writing and oral presentation skills, elective courses, and participation in international conferences or workshops.

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. Having fullfilled all the PhD degree requirements, medical students may apply for the degree of an MD-PhD at the Medical Faculty.

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 members of the Neuroscience Program.

Orientation, Language Courses, Social Activities

A three-week orientation prior to the program provides assistance and advice for managing day-to-day life, including arrangements for bank account, health insurance, residence permit, housing, and enrollment. 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.

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

Application, Selection and Admission 2005

Applicants must hold a Bachelor's degree or equivalent in biology, medicine, psychology, physics, or related fields. They are required to document their proficiency in English and should not be older than 27 years.

In the year 2004, the coordination office received 227 applications from 52 countries.

Continent	Applications	Admissions
Europe (total)	**53**	**13**
Germany	24	9
other West Europe	16	0
East Europe	13	4
America (total)	**2**	**1**
North America	1	1
Central/South America	1	0
Africa (total)	**22**	**0**
North Africa	3	0
Central/South Africa	19	0
Asia (total)	**135**	**5**
Near East	25	0
Central Asia/ Far East	109	5
Astralia	**1**	**0**

Students 2005/2006

Name		Home Country
Jin	Bao	P.R. China
Esther	Breunig	Germany
Agnieszka	Burzynska	Poland
Ye	Chen	P.R. China
Minou Susan	Djannatian	Germany
Kalina	Draganova	Bulgaria
Thomas	Frank	Germany
Sebastian	Gliem	Germany
Christian	Henrich	Germany
Mrinalini	Hoon	India
Burcu	Kasapoglu	Turkey
Manuel	Koch	Germany
Ling	Luo	P.R. China
David	Owald	Germany
Ewa Katarzyna	Ratajczak	Poland
Florian	Rüßmann	Germany
Marija	Sumakovic	Serbia and Montenegro
Andrea	Wirmer	Germany
Andrew	Woehler	United States of America

Jin Bao

First Name
Jin

Last Name
Bao

Date of Birth
30 October 1979

Country
P.R. China

EDUCATION

College / University
Sep 2002 - Jul 2005: Tsinghua University, P.R. China
Sep 1997 - Jul 2002: Zhejiang University, P.R. China

Highest Degree
B.Eng. in Biomedical Engineering

Major Subjects
Electrical circuits, engineering physiology, biochemistry, cell biology, digital signal processing, quantitative physiology, nonlinear optics, quantum mechanics

Lab Experience
Combining Two-Photon Fluorescence Microscopy and Second Harmonic Generation Imaging, apoptosis of embryo cells and the rotation of the spindle during cell division.

Projects / Research
Jun 04 - May 05: investigate apoptosis of embryo cells using Two-Photon Fluorescence Laser Scanning Microscopy and Second Harmonic Generation Imaging
Mar 04 - Nov 04: collaborate with Traditional Chinese Medical Hospital to research the skin wound healing using optical imaging methods
Sep 03 - Jan 04: work with Chinese-Japanese Friendship Hospital to research the physics origin of optical second harmonic generation in biological tissues
Jul 01 - Aug 01: training on the experiment methods of biochemistry and molecular biology

Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany
2003 - 2004: An Excellent Graduate Student of Tsinghua University, Third Prize
1999 - 2000: All-Round Excellent student
1999 - 2000: Zhejiang University Scholarship, Second Prize

SCIENTIFIC INTERESTS AND GOALS

The nervous system is a delicate digital network of nature, and to know how it works is my great interest. Signal processing of this system is smarter and more efficient than any electrical system. I hope I can find out the signal processing algorithm of the brain.

Esther Breunig

First Name
Esther

Last Name
Breunig

Date of Birth
24 March 1983

Country
Germany

EDUCATION

College / University
2002 - 2005: Ruprecht Karls University of Heidelberg, Germany

Highest Degree
B.Sc. (Molecular Biotechnology)

Major Subjects
Drug research / drug development, bioinformatics / functional genomics, structural biology / biophysics

Lab Experience
Basic techniques in bioanalytics, biochemistry, biophysics, microbiology, molecular biology, and biotechnology

Projects / Research
2004: Internship at the Deutsches Krebsforschungszentrum in Heidelberg; I worked in a research group investigating the causes of autism

Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany

SCIENTIFIC INTERESTS AND GOALS

I am very interested in the complexity of the processes in cells, and in the mechanisms regulating these processes. It is also very exciting to see how different genes and processes in cells influence various diseases, especially neural diseases, and then attempt to determine a possible therapy for these diseases. I would be glad to contribute to the research concerning the background of neural diseases.

Agnieszka Burzynska

First Name
Agnieszka

Last Name
Burzynska

Date of Birth
24 February 1983

Country
Poland

EDUCATION

College / University
University of Perugia, Italy
University of Gdansk, Poland

Highest Degree
B.Sc.

Major Subjects
Biotechnology

Lab Experience
Cell culture and primary cell culture, DNA and protein molecular techniques, immunohistochemistry, behavioral tests, electron microscopy, chromatography

Projects / Research
Bachelor's Thesis “Proteolipids M6A and M6B in neuronal outgrowth and connectivity: an *in vivo* study” at the Max Planck Institute for Exp. Med., Göttingen, Germany (2005)
3-month project “Subcellular Localization of Dok1 adapter protein” at the International Agency for Research on Cancer, WHO, Lyon, France (2004)
GRATE Chromatography Course at the University of Bremen (UFT), Germany (2003)

Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany
2004: Socrates-Erasmus scholarship, Perugia, Italy
2003 - 2005: scholarship of the University of Gdansk, Poland
2002: Special Award of the President of Gdansk, Poland

SCIENTIFIC INTERESTS AND GOALS

One of my ideas is to investigate the relationship between the structure, physiology, and molecular biology of the human nervous system, and the functioning of individuals in a society.

Ye Chen

First Name
Ye

Last Name
Chen

Date of Birth
04 October 1982

Country
P.R. China

EDUCATION

College / University
2000 - 2004: Tsinghua University, P.R. China

Highest Degree
B.S.

Major Subjects
Biology

Lab experience
Genetics of *drosophila*, molecular cloning

Projects / Research
Sep 04 - Jul 05: generate transgenetic flies by microinjection to study the role of Hopscotch in JAK/STAT pathway
Jul 2003 - Jul 2004: study the impact of metal deficiency on the tasting behavior of *drosophila*; use p-element excision to generate a SOD2 mutant

Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany
2003: 3rd class scholarship of Tsinghua University (Sponsor: City University of Hong Kong)

SCIENTIFIC INTERESTS AND GOALS

- the mechanisms of cognition or behavior in the molecular lever
- neurodevelopment

Minou Susan Djannatian

First Name
Minou Susan

Last Name
Djannatian

Date of birth
07 October 1984

Country
Germany

EDUCATION

College / University
Georg August University Göttingen, Germany
Highest Degree
Physikum
Major Subjects
Medicine
Lab Experience
Embryonic stem cell culture, PCR, immunocytochemistry, basic experiences in molecular biology, fMRI data acquisition and analysis
Projects / Research
2005: fMRI study on the vasoreactivity of the central nervous system in response to hypercapnia (University of Göttingen, Dept. for Medical Psychology)
2003 - 2005: studies on the differentiation of embryonic stem cells towards dopaminergic neurons (University of Göttingen, Dept. for Neuroanatomy)
2002: practical training on the generation of knockout flies to study the function of synapse proteins (Leibniz Institute for Neurobiology (IfN), Magdeburg)
Studies on the effect of drugs on electrophysiological parameters during the development of heart muscle cells (University of Cologne, Dept. for Neurophysiology)
Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany

SCIENTIFIC INTERESTS AND GOALS

I would like to combine my medical education with the background of neurosciences in order to get a deeper insight in brain function. Knowledge of the basic mechanisms should be necessary for a better understanding of how and why the brain misfunctions in disease. By working at an interface between basic research and medical profession, I could contribute e.g. to the development of new therapies in neurological diseases.

Kalina Draganova

First Name
Kalina

Last Name
Draganova

Date of birth
04 October 1983

Country
Bulgaria

EDUCATION

College / University
International University Bremen, Germany
Highest Degree
B.Sc.
Major Subjects
Biochemistry and Cell Biology
Lab Experience
ELISA assay, FACS analysis, biomass estimates of microbial organisms, FISH, in vitro protein expression, Western blot, SDS-PAGE with radioactively labeled proteins, epifluorescence and laser scanning microscopy, immunohistochemistry, cryosectioning, RT-PCR
Projects / Research
June 2005: Int. Univ. Bremen: cellular distribution and expression of the cysteine proteases B, K, and L after surgical trauma in the epithelial cells of small intestine in rat and mouse models
Feb 2005 - May 2005: International University Bremen: cloning of a-factor gene, *in vitro* transcription and translation of a-factor
Jun 2004 - Jul 2004: internship at Veterinary School, Cambridge, UK: identification of antibody-binding profiles associated with polymorphisms in ovine prion protein, cloning of ovine truncated PrP-ARQ
Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany
June 2005: Sponsored participation in the Annual Nobel Laureate Meeting, Lindau
Sep 2003 - Jun 2005: President's List, scholarship from the International University Bremen
Sep 2002 - Dec 2002: German Academic Exchange Service (DAAD) stipend

SCIENTIFIC INTERESTS AND GOALS

My interests are mainly centered on neurodegenerative disorders, prion diseases in particular. In the future, I would like to study the implications of the immune system on the disease and its involvement in the spread of prions to the nervous system.

Thomas Frank

First Name
Thomas

Last Name
Frank

Date of Birth
04 February 1982

Country
Germany

EDUCATION

College / University
2004 - 2005: University of Magdeburg, Germany
2002 - 2004: University of Giessen, Germany

Highest Degree
Vordiplom

Major Subjects
Biology, Neurobiology

Lab Experience
Basic techniques in the fields of electrophysiology, molecular biology, biochemistry, histochemistry, and behavioural experiments.

Projects / Research
Contribution of the two different olfactory systems to the individual recognition in rats and mice

Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany

SCIENTIFIC INTERESTS AND GOALS

Besides the interest in gaining an interdisciplinary overview of the several subdisciplines of the exceedingly exciting field of neuroscience, I am especially interested in affective and other psychiatric disorders. My main goal therefore is to acquire the knowledge and the techniques, necessary to later perhaps contribute to a better understanding of the underlying mechanisms, and the development of new therapies of these pathological states of the human brain.

Sebastian Gliem

First Name
Sebastian

Last Name
Gliem

Date of Birth
31 March 1982

Country
Germany

EDUCATION

College / University
2002 - 2005: Philipps University Marburg, Germany

Highest Degree
Vordiplom

Major Subjects
Human Biology

Lab Experience
Practical studies in the institutes of molecular biology and tumor research, biochemistry, physiology, anatomy and cell biology

Projects / Research
Basic research in the function of Rab-Proteins (cell biology)

Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany

SCIENTIFIC INTERESTS AND GOALS

My main interest is how a synapse is created and modified, especially during the process of learning. I would like to compare different kinds of synaptic modifications, e.g. brain stem and cerebellum, to find out if there are any exciting alignments between the mechanisms or not (I hope, that I will find several of them).I wish that my research will be a meaningful contribution to the community of neuroscientists on earth.

Christian Henrich

First Name
Christian

Last Name
Henrich

Date of Birth
04 December 1981

Country
Germany

EDUCATION

College / University
2001 - 2005: University of Karlsruhe (TH), Germany
Highest Degree
Vordiplom Informatik
Major Subjects
Number Theory
Lab Experience
2003: lab at the Chair of Biochemistry, Department of Organic Chemistry, University of Karlsruhe (TH)
Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany
2001 - 2005: Karrierenetzwerk e-fellows.net Scholarship

SCIENTIFIC INTERESTS AND GOALS

I am very interested in the phenomenon of intelligence. Coming from Computer Science I want to gain understanding why the brain outperformances computers in almost all areas. My main goal is to understand the difference between brain and computer and to improve my comprehension of human intelligence as well as to apply this knowledge to artificial intelligence.
Another point of interest is the possibility of communication between neurons and artificial interfaces that will allow better control of not only computers but also other technical devices.

Mrinalini Hoon

First Name
Mrinalini

Last Name
Hoon

Date of Birth
12 September 1984

Country
India

EDUCATION

College / University
2002 - 2005: Presidency College / University of Calcutta, India
Highest Degree
B.Sc. (Honours)
Major Subjects
Physiology
Lab Experience
Biochemistry, histology, experimental physiology, microbiology, work physiology, human genetic studies (PCR, genotyping, primer designing, linkage analysis)
Projects / Research
Jun - Aug 2005: Dr. Anuranjan Anand, Human Genetic Lab, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore: molecular genetic study of Non-Syndromic Hearing Loss (NSHL) related to CDH23
Nov 2004: BSc final year project: survey and analysis of the social and physiological conditions - cardiovascular, haematological, and anthropometric parameters of isolated tribal inhabitants
Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany
2005: Jawaharlal Nehru Centre for Advanced Scientific Research, summer research fellowship

SCIENTIFIC INTERESTS AND GOALS

My key area of interest lies in the field of neuronal or synaptic plasticity leading to permanent conditioning and behavioral changes. I would like to find out how human beings classify significance and importance of experiences via altering the strength of neuronally processed memory traces. I would also like to explore into the inheritance of behavior and emotions in order to assess the neurophysiological and genetic contributions to the varied behavioral patterns.

Burcu Kasapoglu

First Name
Burcu

Last Name
Kasapoglu

Date of Birth
08 February 1983

Country
Turkey

EDUCATION

College / University
2000 - 2005: Middle East Technical University, Turkey

Highest Degree
B.Sc. in Molecular Biology and Genetics
Minor Program in Psychology

Major Subjects
Molecular and cellular biology, genetics, microbiology, neurochemistry, sensory physiology, experimental psychology, cognitive processes, physiological psychology

Lab Experience
Protein isolation, purification, characterisation techniques, Mendelian, molecular genetics, cell biology, stereotaxic surgery procedures, mammalian and bacterial cell culture, spectrophotometric analysis, fluorescence microscopy-based visualization, preparation of polymer films

Projects / Research
Project on responsive tissue engineering carriers, poly(NIPAM) as a thermoresponsive cell carrier, Middle East Technical University, Turkey
Summer practice on molecular analysis in neurodegenerative diseases, like SCA and ALS, Bogazici University, Turkey
Summer research on cloning of the thermostable DNA polymerase gene from a thermophilic bacterium found in a hot spring water in Turkey, Bilkent University, Turkey

Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany

SCIENTIFIC INTERESTS AND GOALS

I am curious about ways to find a treatment for both psychiatric and neurodegenerative diseases. The question how a chemical abnormality or an impairment in a common mechanism can affect someone's emotional life or selectively damage one type of cells waits its answer. I wish to study the de/regeneration and regrowth processes of the nerve cells and the action of the signal transduction mechanisms in these processes. Additionally, I wish to deal with the stem cells in order to construct models to be able to implant nerve tissues to replace the damaged tissue.

Manuel Koch

First Name
Manuel

Last Name
Koch

Date of Birth
04 November 1981

Country
Germany

EDUCATION

College / University
University of Kiel, Germany

Highest Degree
Vordiplom

Major Subjects
Biochemistry / Molecular Biology

Lab Experience
Inorganic, organic, physical, pharmaceutical chemistry, microbiology, physics, botany, zoology, biochemistry, molecular biology

Projects / Research
MPI for Molecular Physiology (Dortmund): structure of proteins; Inst. Zoology (CAU Kiel): evolution of the immune system in Urochordata, pattern formation in Cnidaria; Molecular Oncology (Uniklinik Kiel): interaction between Topoisomerase IIα and 14-3-3ε after treatment with etoposide in tumor cells; Inst. Organic Chemistry (CAU Kiel): synthesis of a Mannose-derivative for the treatment of fimbrial *E. coli*; Institute of Biochemistry (CAU Kiel): expression of Endotoxin-tagged antibody against viral IL-6; Research Centre Borstel: pathogen and host interaction focusing on *Mycobacterium tuberculosis*

Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany
Apr 2005 - now: Scholarship of the Studienstiftung des deutschen Volkes
Oct 2002 - Sep 2004: Scholarship of the VCI (Verband der Chemischen Industrie)

SCIENTIFIC INTERESTS AND GOALS

My special interest belongs to the molecular understanding of developmental biology. How are two cells from the same origin different from each other and how is it possible build up the brain with this complexity? What does our environment contribute to change this tissue? How is it possible to develop consciousness? After finding some principles, the therapeutical application for the treatment of related diseases is subject of my interest.

Ling Luo

First Name
Ling

Last Name
Luo

Date of Birth
02 November 1983

Country
P.R. China

EDUCATION

College / University
2001 - 2005: Peking University, P.R. China
Highest Degree
B.Sc.
Major Subjects
Biological Science
Lab Experience
Sep 2004 - May 2005: expression, refolding, purification, and crystallization of MHC-I molecules and associated protein complexes, at the Institute of Microbiology, Chinese Academy of Science, under the direction of George F. Gao
Oct 2003 - Apr 2004: research on clone and function of RIP5 - a RIP-homologous inducer of cell apoptosis, at Peking University, under the direction of Shu Hongbin
Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany

SCIENTIFIC INTERESTS AND GOALS

My interest is primarily on the cellular and molecular mechanism of signal processing and transduction in neural system. I am also interested in the relationship between neural cell activities and complex neural processes such as memory, judgement, and learning.

David Owald

First Name
David

Last Name
Owald

Date of Birth
29 March 1983

Country
Germany

EDUCATION

College / University
University of Heidelberg, Germany
Highest Degree
B.Sc.
Major Subjects
Molecular Biotechnology
Lab Experience
Molecular biology, biochemistry, proteomics; basics in: structural biology, cellular biology, microbiology, biophysics, bioinformatics
Projects / Research
Apr - Jul 2005: development of a 2D-electrophorese device
Feb - Apr 2005: yeast two-hybrid screen with a neuronal protein as bait
Aug - Sep 2004: isolation, purification, and crystallization of proteins
Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany

SCIENTIFIC INTERESTS AND GOALS

I wish to apply my fascination for molecular and cellular mechanisms towards contributing to the investigation of neuronal signal processing, synchrony and plasticity. I would like to link neuroelectric and neurochemical processes to perceptive and cognitive capabilities, thus working towards the understanding of learning and memory.

Ewa Katarzyna Ratajczak

First Name
Ewa Katarzyna

Last Name
Ratajczak

Date of Birth
31 January 1983

Country
Poland

EDUCATION

College / University
2002 - 2005: International First Level Degree "Job Creation Oriented Biotechnology", Univ. Perugia, Italy; Intercollegiate Faculty of Biotechnology, Univ. Gdansk, Poland

Highest Degree
B.Sc. in Biotechnology

Major Subjects
Biotechnology, molecular biology

Lab Experience
Bacteria, yeast and mammalian cell culture, yeast ascospore microdissection, murine embryonic stem cell culture (transgenic ES cell lines), hybridization and analysis of BAC libraries, RNA interference

Projects / Research
Jan - Jun 2005: B.Sc. "Phenotype rescue in Nfib deficient mice via transgenesis and RNA interference", Max Planck Inst., Dept. Developmental Genetics, Berlin, Germany
Jun - Aug 2004: "Substitution of EXOI in *Saccharomyces cerevisiae* with a human copy of the gene using delitto perfetto technique", Dept. Genetics, Univ. Leicester, UK
Jun - Aug 2003: "Research for imprinted genes in livestock animals", Biopsytec Analytik GmbH, Rheinbach, Germany

Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany
2004 - 2005: (winter semester): Erasmus Scholarship
2003 - 2005: Scholarship of the Polish Ministry of Education

Honors / Awards
2002: Finalist on the national level in the Biology Contest for high school students

SCIENTIFIC INTERESTS AND GOALS

My scientific interests are dual. Namely the medical implication of research and the cognitive processes in humans and primates. I would like both to help patients suffering from neurological diseases, and to involve myself in solving mysteries of conscience, dreams, thoughts, imagination. I am also interested in the phenomenon of intelligence, communicative abilities and culture separating primates from humans.

Florian Rüßmann

First Name
Florian

Last Name
Rüßmann

Date of Birth
30 March 1982

Country
Germany

EDUCATION

College / University
2002 - 2005: Philipps University Marburg, Germany
2002: RWTH Aachen, Germany

Highest Degree
Vordiplom

Major Subjects
Human biology

Lab Experience
Basic techniques in molecular biology, biochemistry, immunology, and physiology

Projects / Research
“Expression of dihydroorotate: ubiquinone oxidoreductase from *Ustilago maydis* and *Candida albicans* in *E. coli*, protein purification and identification of enzyme kinetics with and without possible inhibitors”: Philipps University Marburg, Dept. of Physiological Chemistry, AG Prof. M. Löffler
Judging the direction of visual motion' and “Self-Motion Perception / Heading”: Applied Physics / Neuro Physics Group, AG Prof. F. Bremmer

Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany

SCIENTIFIC INTERESTS AND GOALS

I hope I will have a share in exploring molecular and electrophysiological properties of neuronal cells. Perhaps this could lead to a deeper understanding of pathogenic processes and in the end to the development of drugs, helping people with brain disorders.

Marija Sumakovic

First Name
Marija

Last Name
Sumakovic

Date of Birth
02 April 1981

Country
Serbia and Montenegro

EDUCATION

College / University
Faculty of Biology, University of Belgrade, Serbia and Montenegro
Highest Degree
Diploma
Major Subjects
Molecular Biology and Physiology
Lab Experience
Genetic engineering, EMSA (gel shift mobility assay), cell culture
Projects / Research
2005: diploma work "Cloning of Thiopurine S-metilase gene promoter into the reporter vector pCAT basic", Laboratory for Molecular Hematology, Institute for Molecular Genetics and Genetic Engineering, Belgrade, Serbia and Montenegro
2002: group school project "The effect of the psychosocial stress of aggregation on the antioxidative enzymes activity and ascorbic acid concentration in the rat heart", Institute for Physiology and Biochemistry, Belgrade, Serbia and Montenegro
Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany
2003 - 2005: Stipend Foundation for young scientists and artists, Ministry of Education, Government of Republic of Serbia
2000 - 2003: Stipend University of Belgrade
2001 - 2003: Stipend Smederevo City Government

SCIENTIFIC INTERESTS AND GOALS

My main interests are cellular and molecular bases of psychiatric and neurodegenerative diseases and high cognitive functions, learning, memory, and behavior.

Andrea Wirmer

First Name
Andrea

Last Name
Wirmer

Date of Birth
05 July 1981

Country
Germany

EDUCATION

College / University
Georg August University Göttingen, Germany
Highest Degree
Vordiplom
Major Subjects
Zoology, Genetics, Psychology
Lab Experience
Practical training in the department of neurobiology
Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany

SCIENTIFIC INTERESTS AND GOALS

I am interested in the functions of neurotransmitters and their influence on the behavior of an animal. Later I would like to do research that helps understanding the human brain and the development of consciousness.

Andrew Woehler

First Name
Andrew

Last Name
Woehler

Date of Birth
21 February 1981

Country
United States of America

EDUCATION

College / University
1999 - 2004: Arizona State University, USA

Highest Degree
B.Sc.E. in Bioengineering

Major Subjects
Biology, Physics, Signals and Systems/Control Systems, Neuroscience

Lab Experience
Basic techniques in biology, chemistry and physics, microcomputer application to biological systems, and biomedical instrumentation

Projects / Research
2003 - 2004: Capstone Design and Development Project: System for the Controlled Electrical Neural Stimulation of Epileptic Rats. ASU Brain Dynamics Lab, Barrow Neurological Institute EEG Animal Research Lab
2003 - 2004 Undergraduate Thesis: Nonlinear Dynamical Systems in Physiology and NLDS Application to Epilepsy Prediction and Prevention

Scholarships
2005 - 2006: Stipend International Max Planck Research School, Germany
1999 - 2004: Arizona State Regents Scholarship
1999 - 2004: ASU Presidential Scholarship

SCIENTIFIC INTERESTS AND GOALS

I would like to gain a greater understanding of the molecular level mechanisms and activities of the brain and their relationship to the larger system level function. I am interested in gaining an in-depth understanding of the current modeling methods for normal neuronal behavior, as well as the anomalous behavior that lead to neurological disease. Ultimately, my goal is to be able to apply these techniques to help develop new therapies for prevention and treatment of neurological disorders.

Faculty

(Senior Faculty, Group Leaders, Lecturers)

Mathias	Bähr	Neurology	U Göttingen
Nils	Brose	Molecular Neurobiology	MPI em
Edgar	Brunner	Medical Statistics	U Göttingen
Norbert	Elsner	Neurobiology	U Göttingen
Gabriele	Flügge	Neurobiology	DPZ
Jens	Frahm	Biomedical NMR Research / Physical Chemistry	MPI bpc
Eberhard	Fuchs	Animal Physiology / Neurobiology	DPZ
Theo	Geisel	Nonlinear Dynamics, Complex Matter	MPI ds
Ralf	Heinrich	Neurobiology	U Göttingen
Michael	Hörner	Cell Biology	U Göttingen
Sven	Hülsmann	Neuro- and Sensory Physiology	U Göttingen
Reinhard	Jahn	Neurobiology	MPI bpc
Hubertus	Jarry	Clinical and Experimantal Endocrinology	U Göttingen
Jürgen	Klingauf	Membrane Biophysics	MPI bpc
Willhart	Knepel	Molecular Pharmacology	U Göttingen
Kerstin	Krieglstein	Neuroanatomy	U Göttingen
Markus	Missler	Neuro and Sensory Physiology	U Göttingen
Tobias	Moser	Otolaryngology	U Göttingen
Klaus-Armin	Nave	Neurogenetics	MPI em
Erwin	Neher	Membrane Biophysics	MPI bpc
Walter	Paulus	Clinical Neurophysiology	U Göttingen
Evgeni	Ponimaskin	Neuro- and Sensory Physiology	U Göttingen
Thomas	Rammsayer	Psychology	U Göttingen
Diethelm W.	Richter	Neuro and Sensory Physiology	U Göttingen
Michael	Rickmann	Neuroanatomy	U Göttingen
Eleni	Roussa	Neuroanatomy	U Göttingen
Detlev	Schild	Molecular Neurophysiology	U Göttingen
Stephan	Sigrist	Neuroplasticity	ENI
Anastassia	Stoykova	Molecular Cell Biology	MPI bpc
Walter	Stühmer	Molecular Biology of Neuronal Signals	MPI em
Andreas	Stumpner	Neurobiology	U Göttingen
Stefan	Treue	Cognitive Neuroscience and Biological Psychology	DPZ
Michael	Waldmann	Psychology	U Göttingen
Fred	Wolf	Nonlinear Dynamics	MPI ds
Fred	Wouters	Cellular Biophysics	ENI
Weiqi	Zhang	Neuro- and Sensory Physiology	U Göttingen

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

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

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Further Information

http://www.baehr-lab.med.uni-goettingen.de/

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 adeno- 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

Meyer R, Weissert R, de Graaf K, Diem R, Bähr M (2001) Acute neuronal apoptosis in a rat model of multiple sclerosis. J Neurosci 21: 6214-6220

Kilic E, Dietz GPH, Herrmann DM, Bähr M (2002) Intravenous TAT-Bcl-XL is protective when delivered before and after middle cerebral artery occlusion in mice. Ann Neurol 52(5) 617-22

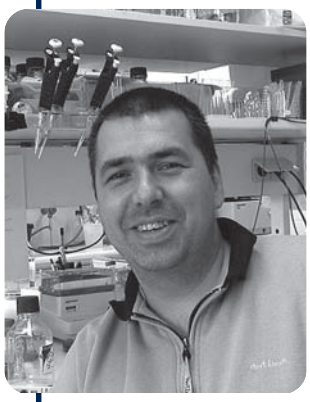
Diem R, Hobom M, Maier K, Weissert R, Storch MK, Meyer R, Bähr M (2003) Methyprednisolone increases neuronal apoptosis during autoimmune CNS inflammation by inhibition of an endogenous neuroprotective pathway. J Neurosci 23(18): 6993-7000

Dietz GPH and Bähr M (2004) Delivery of Bioactive Molecules into the Cell: The Trojan Horse Approach. Mol Cell Neurosci 27(2): 85-131

Diem R, Sättler MB, Merkler D, Demmer I, Maier K, Stadelmann C, Ehrenreich H and Bähr M (2005) Combined therapy with methylprednisolone and erythropoietin in a model of multiple sclerosis. Brain 128: 375-85

Lingor P, Koeberle P, Kügler S and Bähr M (2005) Downregulation of apoptosis mediators by RNA interference inhibits axotomy-induced retinal ganglion cell death *in vivo*. Brain 128: 550-558

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 10^{12} nerve cells are connected by 10^{15} 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 neurotransmitter release focus on components of the presynaptic active zone and their regulatory function in synaptic vesicle fusion.

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fax: +49-551-3899 715
e-mail: brose@em.mpg.de

Further Information

http://www.em.mpg.de/User/Brose/index.html

Selected Recent Publications

Rhee J-S, Betz A, Pyott S, Reim K, Varoqueaux F, Augustin I, Hesse D, Südhof TC, Takahashi M, Rosenmund C and Brose N (2002) β Phorbol ester- and diacylglycerol-induced augmentation of transmitter release is mediated by Munc13s and not by PKCs. Cell 108: 121-133

Roßner S, Fuchsbrunner K, Lange-Dohna C, Hartlage-Rübsamen M, Bigl V, Betz A, Reim K and Brose N (2004) Munc13-1-mediated vesicle priming contributes to secretory APP processing. J Biol Chem 279: 27841-27844

Junge H, Rhee J-S, Jahn O, Varoqueaux F, Spiess J, Waxham MN, Rosenmund C and Brose N (2004) Calmodulin and Munc13 form a Ca^{2+}-sensor/effector complex that controls short-term synaptic plasticity. Cell 118: 389-401

Dresbach T, Neeb A, Meyer G, Gundelfinger ED and Brose N (2004) Synaptic targeting of Neuroligin is independent of Neurexin and SAP90/PSD95 binding. Mol Cell Neurosci 27: 227-235

Reim K, Wegmeyer H, Brandstätter, JH, Xue M, Rosenmund C, Dresbach T, Hofmann K and Brose N (2005) Structurally and functionally unique Complexins at retinal ribbon synapses. J Cell Biol 169: 669-680

Edgar Brunner

Address

Dept. Medical Statistics
University of Göttingen
Humboldtallee 32

37073 Göttingen
Germany

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fax: +49-551-39 4995
e-mail: edgar.brunner@ams.med.uni-goettingen.de

Further Information

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

Professor of Medical Statistics

- Student: WS 64/65 - SS 69, Technical University of Aachen
- Diploma: April 1969, Mathematics
- Promotion: 12. May 1971, (Dr. rer. nat.), Technical University of Aachen
  Title: Eine Beziehung zwischen dem Holm-Test und dem Kolmogorov-Smirnov-Test (A Relation between Holm's Test and the Kolmogorov-Smirnov-Test)
- Habilitation: 11.11.1973, Medical Statistics
- Professor: 01.01.1976 University of Göttingen, Dept. of Medical Statistics,
- 01.03.1976 Head of the Department

Major Research Interests

Nonparametric Statistics

- Asymptotic distribution of rank statistics
- Multi-factor designs
- Adjustment for covariates

Longitudinal data

Ordered categorical data

Design and analysis of diagnostic trials

Statistical methods for the analysis of microarray data

Selected Recent Publications

Akritas MG, Arnold SF, Brunner E (1997) Nonparametric hypotheses and rank statistics for unbalanced designs. Journal of the American Statistical Association 92: 258-265

Brunner E, Munzel U, Puri ML (1999) Rank-Score Tests in Factorial Designs with Repeated Measures. Journal of Multivariate Analysis 70: 286-317

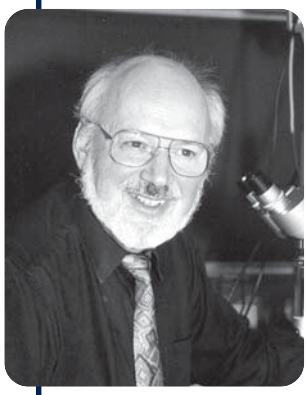
Brunner E, Munzel U, Puri ML (2001) The multivariate nonparametric Behrens-Fisher-Problem. J Statist Plann and Inf 108: 37-53

Brunner E, Domhof S, Langer F (2002) Nonparametric Analysis of Longitudinal Data in Factorial Designs. Wiley: New York

Brunner E, Munzel U (2002) Nichtparametrische Datenanalyse. Springer. Heidelberg

Kaufmann J, Werner C, Brunner E (2005) Nonparametric Methods for Analyzing the Accuracy of Diagnostic Tests with Multiple Readers. Statistical Methods in Medical Research 14: 1-18

Bretz F, Landgrebe J, Latif M, Brunner E (2005) Efficient Design and Analysis of Two Color Factorial Microarray Experiments. Computational Statistics and Data Analysis (to appear)



Professor of Zoology

- Dr. rer. nat. University of Cologne 1967
- PostDoc: Makerere University College, Kampala (Uganda) 1968
- Department of Zoology, University of Copenhagen (Denmark) 1971
- Department of Biology, University of Oregon (USA) 1972
- Habilitation (Zoology) University of Cologne 1974
- Professor of Zoology, University of Göttingen 1978
- Head of the Department of Neurobiology

Major Research Interests

The common research topic of the department is Neuroethology of acoustic communication in singing insects. This involves as main fields of interest neuronal basis of song production and song recognition, neuropharmacology of motor actions, interdependence of singing and hearing, evolution of acoustic communication, bioacoustic and sensory ecology in the lab and in the field, and development and regeneration of components of the auditory system.
The songs of insects are produced as fixed action patterns. Single cell recordings, behaviour following lesions and electric or pharmacologic stimulation of the brain help to identify single elements and networks in the CNS producing the innate song patterns. Application of neuroactive substances to the brain aim to identify mechanisms like second messenger cascades involved in production of these motor programs (Heinrich).
A song only makes sense when it is heard by a potential partner. Song parameters and song recognition behaviour are studied with a focus on bushcrickets (Stumpner). The function of sensory cells and auditory interneurones in various insects is investigated by means of extra- and intracellular recordings, neuroanatomy and immunohistochemistry. The relevant questions are: to what degree are hearing systems specialized to species-specific needs, how is song recognition realized on the level of single interneurones, or: what are the potential predecessor structures or systems in the evolution of audition? For the latter, various sensory organs are in the focus of research - neuroanatomically, functionally and their ontogenesis (Lakes-Harlan, Stumpner).
Singing and hearing, of course, are highly interdependent, on the one hand by interference of movements with the ability to hear (studied e.g. by laser-vibrometry), on the other hand by biophysical constraints limitating the detection of parameters in the field (studied e.g. by sound analysis and behavioural tests) (Elsner).
Very helpful and sometimes surprising data are gained from developmental studies. This involves regeneration of behaviour and neuronal structures, molecular mechanisms in early development and regeneration as well as cell cultures with neurones identified as parts of the auditory system (Lakes-Harlan).

Address

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Anthropology and
Develop. Biology
Dept. Neurobiology
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fax: +49-551-39 2262
e-mail: nelsner@gwdg.de

Further Information

http://www.znv.de/
mem_elsner.shtml

Selected Recent Publications

Heinrich R, Elsner N (1997) Central nervous control of hindleg coordination in stridulating grasshoppers. J Comp Physiol A 180: 257-269

Heinrich R, Jacobs K, Lakes-Harlan R (1998) Tracing of a neuronal network in the locust by pressure injection of markers into a synaptic neuropile. J Neurosci Meth 80: 81-89

Heinrich R, Rozwod K, Elsner N (1998) Neuropharmacological evidence for inhibitory cephalic control mechanisms of stridulatory behaviour in grasshoppers. J Comp Pysiol A 183: 389-399

Lakes-Harlan R & Pfahlert C (1995) Regeneration of axotomized tympanal nerve fibres in the adult grasshopper *Chorthippus biguttulus* (L.)(Orthoptera: Acrididae) correlates with regaining the localization ability. J Comp Physiol A 176: 797-807

Jacobs K & Lakes-Harlan R (1997) Lectin histochemistry of the metathoracic ganglion of the locust, *Schistocerca gregaria*, before and after deafferentation. J Comp Neurol 387: 255-265

Lakes-Harlan R, Stölting H & Stumpner A (1999) Convergent evolution of an insect ear from a preadaptive structure. Proc R Soc Lond B 266: 1161-1167

Stölting H, Stumpner A (1998) Tonotopic organization of auditory receptorcells in the bushcricket *Pholidoptera griseoaptera* (Tettigoniidae, Decticini). Cell Tissue Res 294: 377-386

Stumpner A (1998) Picrotoxin eliminates frequency selectivity of an auditory interneuron in a bushcricket. J Neurophysiol 79: 2408-2415

Stumpner A (1999) An interneurone of unusual morphology is tuned to the female song in the bushcricket *Ancistrura nigrovittata* (Orthoptera: Phaneropteridae). J Exp Biol 202: 2071-2081

Gabriele Flügge

Privatdozent, Experimental Neuroscience

- Dr. rer. nat., University of Munich, 1979
- Senior Scientist, Clinical Neurobiology Laboratory at the German Primate Center

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German Primate Center
Dept. Neurobiology
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Further Information

http://www.dpz.gwdg.de/clineu/people/fluegge/start.htm

Major Research Interests

In humans, stressful or traumatic life events such as death of a close relative often represent a chronic psychological load that can lead to psychopathologies such as depression. Because the central nervous mechanisms that lead to such diseases are still not elucidated we are investigating processes that occur in the course of chronic psychosocial stress in the brains of animals that show similar symptoms as depressed patients. Using molecular techniques, we identify genes in the brain that are regulated by stress. *In situ* hybridization and immunocytochemistry serve to localize changes in neurotransmitter systems, receptors, transporters and other molecules in distinct neurons of the brain. Similar tools are used to clarify the mechanisms that underlie the beneficial effects of antidepressant drugs. In conjunction with behavioral studies we are able to find neuromolecular factors that contribute to emotionality.

Selected Recent Publications

Flügge G (2000) Regulation of monoamine receptors in the brain: dynamic changes during stress. Int Rev Cytology 195: 145-213

Fuchs E, Flügge G (2001) Psychosoziale Belastung hinterläßt Spuren im Gehirn. Z Med Psychol 10: 99-105

Fuchs E, Flügge G (2002) Social stress in tree shrews: Effects on physiology, brain function, and behavior of subordinate individuals. Pharmacol Biochem & Behav 73: 247-258

Flügge G, van Kampen M, Meyer H, Fuchs E (2003) Alpha2A and alpha2C-adrenoceptor regulation in the brain: alpha2A changes persist after chronic stress. Eur J Neurosci 17: 917-28

Flügge G, van Kampen M, Mijnster MJ (2004) Perturbations in brain monoamine systems during stress. Cell & Tiss Res 315: 1-14

Alfonso J, Pollevick GD, van der Hart MG, Flügge G, Fuchs E, Frasch AC (2004) Identification of genes regulated by chronic psychosocial stress and antidepressant treatment in the hippocampus. Eur J Neurosci 19: 659-666

Palchaudhuri M, Flügge G (2005) 5-HT_{1A} receptor expression in pyramidal neurons of cortical and limbic brain regions. Cell Tissue Res Jun 10: published online (Epub ahead of print)

Jens Frahm

Professor of Physical Chemistry

- Director of 'Biomedizinische NMR Forschungs GmbH'
  - Biomedical Nuclear Magnetic Resonance -

Major Research Interests

General

- development and application of magnetic resonance imaging (MRI) techniques for noninvasive studies of the central nervous system of humans and animals

Methodology

- functional neuroimaging
- localized neurospectroscopy
- diffusion tensor imaging

Brain Research

- non-invasive neurobiology, human neuroscience
- structural, metabolic, and functional studies of the central nervous system
- functional mapping of neuronal activation, cognitive information processing in humans
- brain disorders in childhood
- MRI of animal models (nonhuman primates, rats, transgenic mice, insects)

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Further Information

http://www.mpibpc.gwdg.de/abteilungen/NMR/index.html

Selected Recent Publications

Merboldt KD, Baudewig J, Treue S, Frahm J (2002) Functional MRI of Self-Controlled Stereoscopic Depth Perception. Neuroreport 13: 1721-1725

Dechent P, Frahm J (2003) Functional Somatotopy of Finger Representations in Human Primary Motor Cortex. Hum Brain Mapp 18: 272-283

Frahm J, Baudewig J, Dechent P, Merboldt KD (2004) Advances in Functional MRI of the Human Brain. Progr NMR Spectr 44: 1-32

Watanabe T, Frahm J, Michaelis T (2004) Functional Mapping of Neural Pathways in Rodent Brain *In Vivo* Using Manganese-Enhanced Three-Dimensional Magnetic Resonance Imaging. NMR Biomed 17: 554-568

Michaelis T, Watanabe T, Natt O, Boretius S, Frahm J, Utz S, Schachtner J (2005) *In Vivo* 3D MRI of Insect Brain: Cerebral Development During Metamorphosis of Manduca Sexta. NeuroImage 24: 596-602

Eberhard Fuchs

Professor of Animal Physiology

- 1977: Dr. rer. nat., University of Munich
- 1996 - 2000: Professor (Animal Physiology), University of Karlsruhe
- 2000 - 2003: Professor for Animal Physiology, University of Göttingen
- since 2003: Professor for Neurobiology, Department of Neurology, Medical School, University of Göttingen

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Further Information

http://www.dpz.gwdg.de/clineu/people/fuchs/start.htm

Major Research Interests

The Clinical Neurobiology Laboratory (CNL) at the German Primate Center is an interdisciplinary research laboratory using neuroanatomical, neuropharmacological, behavioral and molecular techniques to investigate functioning of the brain in animal models of psychiatric and neurodegenerative diseases. The aim of our work is to elucidate brain structures, circuits, pathways and mechanisms that underlie normal and pathological behavior. This work integrates inputs from other research fields with the ultimate aim of developing new therapeutic strategies for psychiatric and neurodegenerative diseases.
The laboratory specializes in the development, validation and investigation of animal models to detect abnormal cognitive, motor and emotional expressions of brain pathology. Currently, we are engaged in the investigation of central nervous and behavioral phenomena associated with stress and depression. In addition, we provide service platforms to study Parkinson's disease and multiple sclerosis..

Selected Recent Publications

Czéh B, Michaelis T, Watanabe T, Frahm J, de Biurrun G, van Kampen M, Bartolomucci A, Fuchs E (2001) Stress-induced changes in cerebral metabolites, hippocampal volume and cell proliferation are prevented by antidepressant treatment with tianeptine. Proc Natl Acad Sci USA 98: 12796-12801

Kuhn HG, Palmer TD, Fuchs E (2001) Adult neurogenesis: a compensatory mechanism for neuonal damage. Europ Arch Psychiat Clin Neurosci 251: 152-158

Kole MHP, Swan L, Fuchs E (2002) The antidepressant tianeptine persistently modulates glutamate receptor currents of the hippocampal CA3 commissural-associational synapse in chronically stressed rats. Europ J Neurosci 16: 807-816

Coe CL, Kramer M, Czéh B, Gould E, Reeves AJ, Kirschbaum C, Fuchs E (2003) Prenatal stress diminishes neurogenesis in the dentate gyrus of juvenile rhesus monkeys. Biol Psychiat 54: 1025-1034

Keuker JIH, de Biurrun G, Luiten PGM, Fuchs E (2004) Preservation of hippocampal neuron numbers and hippocampal subfield volume in behaviorally characterized aged tree shrews. J Comp Neurol 468: 509-517

Fuchs E, Flügge G (2004) Cellular consequences of stress and depression. Dialogues Clin Neurosci 6: 171-183

Thinyane K, Baier PC, Schindehütte J, Mansouri A, Paulus W, Trenkwalder C, Flügge G, Fuchs E (2005) Fate of pre-differentiated mouse embryonic stem cells transplanted in unilaterally 6-hydroxydopamine lesioned rats: Histological characterization of the grafted cells. Brain Res 1045: 80-87

Fuchs E (2005) Social stress in tree shrews as an animal model of depression: An example of a behavioral model of a CNS disorder. CNS Spectr 10: 182-189

Theo Geisel

Professor of Theoretical Physics

- Director, Max Planck Institute for Dynamics and Self-Organization
- Coordinator, Bernstein Center for Computational Neuroscience

Major Research Interests

Complex dynamics is everywhere. In the electrical activity of hearts, the firing patterns of neuronal networks, the motion of electrons in semiconductor nanostructures, the spreading of epidemics, turbulent motion of fluids, and even in simple economic models to name a few. The complexity is caused by nonlinearities in the equations of motion as well as (in many cases) interactions among many individual units, cells, oscillators, or degrees of freedom. The science of nonlinear dynamics has made considerable progress in recent years in providing concepts and methods, which now can be applied to gain a mathematical understanding of complex dynamical phenomena occurring in nature. In our group we focus on the study of dynamical problems in neuroscience, electron transport in semiconductor nanostructures, and quantum chaos.

Coordinated activity, and in particular synchronization of cortical neurons are believed to play functional roles, e.g. for the so-called binding problem. We address questions such as the stability and the speed of synchronization and study the effect of delayed interactions, network topology, and network heterogeneity on the resulting firing patterns. We have found e.g. that the delayed interactions between neurons typically lead to unstable attractors, which allow rapid switching and provide the network with a high degree of flexibility in fulfilling successive tasks.

On a much slower time scale nonlinear mechanisms also govern the activity dependent formation of cortical representations and neuronal maps. Nonlinear models of pattern formation allow us to understand details of ocular dominance, orientation preference, and other neuronal maps.

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Selected Recent Publications

Wolf F, Geisel T (1998) Spontaneous pinwheel annihilation during visual development. Nature 395: 73-78

Timme M, Wolf F, Geisel T (2002) Prevalence of unstable attractors in networks of pulse-coupled oscillators. Phys Rev Lett 89(15): 154105

Wolf F, Geisel T (2003) Universality in visual cortical pattern formation. Journal of Physiology - Paris 97: 253-264

Denker M, Timme M, Diesmann M, Wolf F, Geisel T (2004) Breaking Synchrony by Heterogeneity in Complex Networks. Phys Rev Lett 92: 974193

Wolf F, Timme M,Geisel T (2004) Topological speed limits to network synchronization. Phys Rev Lett 92: 074101

Hufnagel L, Brockmann D, Geisel T (2004) Forecast and Control of Epidemics in a Globalized World. PNAS 101: 15124

Ralf Heinrich

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Juniorprofessor of Molecular Neuropharmacology of Behavior

- Dr. rer. nat., University of Göttingen, 1995
- Postdoctoral fellow, Harvard Medical School, Boston, USA, 1997 - 1999

Major Research Interests

Invertebrate preparations can offer unique advantages over more complex nervous systems of vertebrates and especially mammals, such as a smaller total number of neurons in the CNS, the concept of individually identifiable neurons and rather limited repertoires of behaviors composed of genetically determined and stereotype components.

Behavior is the product of complex interactions between various types of neurons. We are especially interested in the central nervous mechanisms underlying the selection and adaptation of actions that are most appropriate for a particular behavioral situation an animal encounters. Our neuroethological studies focus on two systems:

1) *The acoustic communication behavior of insects*: Pharmacological interference with transmitter- and second messenger-systems in identified brain areas aims to characterize the signaling pathways that contribute to general motivation, initiation of communication behaviors and the selection/composition of behaviorally meaningful song patterns. Our studies on intact and behaving preparations allow to link natural sensory stimuli to physiological changes in the brain (on transmitters, modulators, second messengers) and to analize their modulatory effects on the subsequent behavior of the animal.
2) *Aggressive behavior of arthropods*: In essentially all species of animals, including man, 5HT is important in aggression, which is a quantifiable behavior in various arthropods. In lobsters and crayfish, enhanced serotonergic function is linked to increased aggression and dominance, while octopamine (the invertebrate analogue of norepinephrine) antagonizes these effects. Pharmacological and physiological studies aim to find out where and how these amine-releasing neurosecretory systems change during a fight to establish stable hierarchies and allow experience to alter the subsequent fighting behavior. Agonistic behavior of *Drosophila melanogaster* is displayed, when access to food or mates is limited. Males and females fight with different genetically programmed strategies, but only males seem to establish stable hierarchies. Whith genetic tools and various already available mutants at hand, *D. melanogaster* offers new methodological approaches to understand the central nervous mechanisms that drive aggressive behaviors.

Selected Recent Publications

Heinrich R, Cromarty SI, Hörner M, Edwards DH, Kravitz EA (1999) Autoinhibition of serotonin cells: an intrinsic regulatory mechanism sensitive to the pattern of usage of the cellls. Proc Nat Acad Sci USA 96: 2473-2478

Heinrich R, Bräunig P, Walter I, Schneider H, Kravitz EA (2000) Aminergic neuron systems of lobsters: Morphology and electrophysiology of octopamine-containing neurosecretory cells. J Comp Physiol A 186: 617-629

Heinrich R, Wenzel B, Elsner N (2001) A role for muscarinic excitation: Control of specific singing behavior by activation of the adenylate cyclase pathway in the brain of grasshoppers. Proc Nat Acad Sci USA 98: 9919-9923

Wenzel B, Elsner N, Heinrich R (2002) mAChRs in the grasshopper brain mediate excitation by activation of the AC/PKA and the PLC second-messenger pathways. J Neurophysiol 87: 876-888

Heinrich R (2002) Impact of descending brain neurons on the control of stridulation, walking and flight in orthoptera. Microscopy Research and Technique 56: 292-301

Wenzel B, Kunst M, Günther C, Ganter GK, Lakes-Harlan R, Elsner N, Heinrich R (2005) Nitric oxide/cyclic GMP-signaling in the central complex of the grasshopper brain inhibits singing behavior. J Comp Neurol 488: 129-139

Michael Hörner

Apl. Professor of Cellular Neurobiology

- Dr. rer. nat., University of Göttingen, 1989
- Postdoctoral Fellow, Medical University of Kiel, Dept. Physiology, 1989 - 1990
- Assistant Professor, Institute for Zoology and Anthropology, Göttingen, 1990 - 1997
- Habilitation (Zoology), 1997
- Associate Professor, Institute for Zoology and Anthropology, Göttingen, 1997 - 2002
- Guest Professor, University of Science & Technology, Hongkong, 2002 - 2004
- apl. Professor, Inst. for Zoology, Anthropol. and Develop. Biol., Göttingen, since 2004

- Research Assistant, MPI for Ethology, Seewiesen, 1985/1986
- Research Fellow, Arizona Research Labs, Tucson, USA, 1993/1996
- Feodor-Lynen/Humboldt Fellow, Harvard Medical School, Boston, USA, 1994 - 1995
- Research Fellow Marine Biological Labs, Woods Hole, USA, 1992/1997

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Major Research Interests:

Molecular Mechanisms Of Synaptic And Non-Synaptic Modulation

Biogenic amines such as serotonin, dopamine, histamine or octopamine (OA), the pendant of norepinephrine in invertebrates, are widely distributed within the animal kingdom. These evolutionary conserved neuroactive substances are involved in the control of vital functions in both vertebrates and invertebrates. Biogenic amines often initiate long-lasting neuro-modulatory effects following non-synaptic release, diffusion and binding to G-protein coupled receptors in their target cells. My work is focussed on the investigation of cellular and molecular mechanisms underlying aminergic modulation of neuronal signaling in identified networks and synapses in invertebrate model systems.

Using electrophysiological, pharmacological and immunocytochemical techniques in combination with behavioral measurements, I am investigating aminergic modulation in defined networks in insects, crustacean and annelids. To address both mechanistic and functional questions, a parallel approach has been developed, which allows investigating single identified neurons both *in-vivo* with intact synaptic connections and *in-vitro* in primary "identified" cell culture. Parallel quantitative behavioral measurements allow insights into the functional meaning of aminergic modulation in behaviorally-relevant circuits.

Electrophysiological experiments show that OA enhances the responsiveness of an identified cholinergic pathway in insects ("giant fiber pathway"), which triggers a fast behavioral escape reaction. The reaction to sensory stimuli in the postsynaptic giant interneurons, which are monosynaptically coupled to sensory neurons via excitatory cholinergic synapses, is significantly enhanced by OA application. Characteristic changes of the action potentials *in-vivo* ("spike broadening") and patch-clamp recordings in-vitro suggest that OA selectively affects slow K^+-conductances in postsynaptic giant interneurons.

Selected Recent Publications:

Kloppenburg P, Hörner M (1998) Voltage-activated currents in identified giant interneurons isolated from adult crickets, *Gryllus bimaculatus*. J Exp Biol 201(17): 2529-2541

Heinrich R, Cromarty S I, Hörner M, Edwards D H, Kravitz E A (1999) Autoinhibition of serotonin cells: An intrinsic regulatory mechanism sensitive to the pattern of usage of the cells. Proc Natl Acad Sci USA 96: 2473-2478

Ferber M, Hörner M, Cepok S, Gnatzy W (2001) Digger wasp versus cricket: Mechanisms underlying the total paralysis caused by the predators venom. J Neurobiol 47: 207-2222

Hörner, M, Heinrich, R, Cromarty, S I, Kravitz, E A (2002) Synaptic connectivity of amine-containing neurosecretory cells of lobsters: inputs to 5HT- and OCT- containing neurons. in: The Crustacean Nervous System. (ed. K. Wiese) Springer Verlag, Berlin, Heidelberg, New York, pp156-172

Rose, T, Gras, H, Hörner, M (2005) Activity-dependent suppression of spontaneous spike generation in the Retzius neurons of the leech, *Hirudo medicinalis*. submitted for publication

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Privatdozent, Department of Neurophysiology

- Dr. med., University of Münster, 1995
- Postdoctoral fellow, University of Münster Dept. of Neurosurgery, 1995 - 1996
- Postdoctoral fellow, University of Göttingen, Dept. of Neurophysiology, 1996 - 2001
- Group leader (Wissenschaftlicher Assistent) Neurophysiology, since 2001
- Principle Investigator at the DFG Research Center for Molecular Physiology of the Brain (CMPB) since 2002
- Habilitation, University of Göttingen, 2005

Major Research Interests

The majority of cells in the human brain are glial cells, outranging the number of neurons by a factor of 10. However, most behavioral aspects of life are attributed to neurons, leaving a rather white spot of knowledge about the function of the different types of glial cells.
Our group aims to identify and clarify the mechanisms that allow glial cells, e.g. astrocytes to modulate and stabilize the most vital behavior of breathing.

Selected Recent Publications

Hülsmann S, Oku Y, Zhang W, Richter DW (2000) Metabotropic glutamate receptors and blockade of glial Krebs cycle depress glycinergic synaptic currents of mouse hypoglossal motoneurons. Eur J Neurosci 12(1): 239-46

Hülsmann S, Oku Y, Zhang W, Richter DW (2000) Metabolic coupling between glia and neurons is necessary for maintaining respiratory activity in transverse medullary slices of neonatal mouse. Eur J Neurosci 12(3): 856-62

Gomeza J, Hülsmann S, Ohno K, Eulenburg V, Szöke K, Richter D, Betz H (2003) Inactivation of the glycine transporter 1 gene discloses vital role of glial glycine uptake in glycinergic inhibition. Neuron 40(4): 785-96

Gomeza J, Ohno K, Hülsmann S, Armsen W, Eulenburg V, Richter DW, Laube B, Betz H (2003) Deletion of the mouse glycine transporter 2 results in a hyperekplexia phenotype and postnatal lethality. Neuron 40(4): 797-806

Grass D, Pawlowski PG, Hirrlinger J, Papadopoulos N, Richter DW, Kirchhoff F, Hülsmann S (2004) Diversity of functional astroglial properties in the respiratory network. J Neurosci 24(6): 1358-65

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

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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

Takamori S, Rhee JS, Rosenmund C, Jahn R (2000) Identification of a vesicular glutamate transporter that defines a glutamatergic phenotype in neurons. Nature 407: 189-194

Fasshauer D, Antonin W, Subramaniam V, Jahn R (2002) SNARE assembly and disassembly exhibit a pronounced hysteresis. Nature Struct Biol 9: 144-151

Holroyd P, Lang T, Wenzel D, De Camilli P, Jahn R (2002) Imaging direct, dynamin-dependent recapture of fusing secretory granules on plasma membrane lawns from PC12 cells. Proc Natl Acad Sci USA 99: 16806-16811

Jahn R, Lang T, Südhof TC (2003) Membrane fusion. Cell 112: 519-533

Schuette CG, Hatsuzawa K, Margittai M, Stein A, Riedel D, Küster P, König, M., Seidel, C.A.M., Jahn, R. (2004) Determinants of liposome fusion mediated by synaptic SNARE proteins. Proc Natl Acad Sci 101: 2858-2863

Graf C, Riedel D, Schmitt HD, Jahn R (2005) Identification of functionally interacting SNAREs using complementary substitutions in the conserved '0' layer. Mol Biol Cell 16: 2263-2274

Sakaba T, Stein A, Jahn R, Neher E (2005) Cleavage of the three SNARE-proteins synaptobrevin, syntaxin, and SNAP-25 leads to distinct kinetic changes in neurotransmitter release. Science, in press

Hubertus Jarry

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Professor of Clinical and Experimental Endocrinology

- 1976 - 1980 University of Göttingen, study of biology, diploma degree in bio chemistry, microbiology, organic chemistry
- 1980 - 1983 PhD thesis, Department of Biochemistry, University of Göttingen, PhD degree in biochemistry, microbiology, organic chemistry (summa cum laude)
- Until February 1985 German Primate Center Göttingen, Dept. Reproductive Biology
- March 1985 until March 1986 Michigan State University, Dept. Pharmacology and Toxicology
- Since April 1986 Research Associate Dept. Clinical and Experimental Endocrinology University of Göttingen
- Januar 1991 Habilitation
- Dezember 1995 Promotion to Professor

Major Research Interests

The proper function of the GnRH pulse generator ist essential for reproduction of all mammals studied so far. GnRH pulses are a prerequisite for proper pituitary gonadotropin release. The neurochemical mechanisms leading to pulsatile GnRH release involve norepinephrine and gamma amino butyric acid (GABA) as most important neurotransmitters. In addition, other catecholamines, amino acid neurotransmitters and neuropeptides play a modulatory role in the function of the GnRH pulse generator. Many of the GABAergic neurons in the hypothalamus are estrogen-receptive. The mechanisms by which the estrogen receptors of the alpha and beta subtype regulate gene and protein expression of neurotransmitter-producing enzymes are at present a prime focus of interest. Induction of puberty is not a gonadal but a hypothalamic maturational process. The initiation of proper GnRH pulse generator function is the ultimate trigger signal for puberty which is currently investigated. Ageing involves also neuroendocrine mechanisms. The GnRH pulse generator function deteriorates in aged rats, mechanisms which involve a variety of catecholamines and amino acid neurotransmitters which are currently investigated. Steroidal feedback signals (of estradiol, progesterone, and glucocorticoids) are crucial for the development and proper function of the adult hypothalamus of which the molecular and neurochemical mechanisms are studied with cell biological and animal experimental tools. Proper function of the GnRH pulse generator is also of crucial importance for initiation of puberty and maintenance of normal menstrual cycles in women. Many of hitherto unexplained infertilities can be explained of malfunctioning GnRH pulse generators which are studied in a series of clinical experiments.

Selected Recent Publications

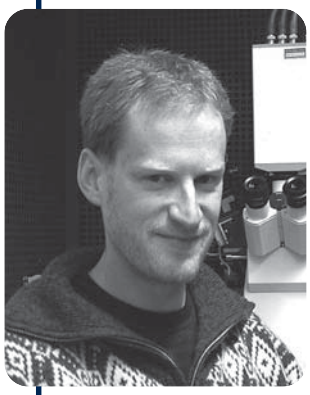
Kretz O, Fester L, Wehrenberg U, Zhou L, Brauckmann S, Zhao S, Prange-Kiel J, Naumann T, Jarry H, Frotscher M, Rune GM (2004) Hippocampal synapses depend on hippocampal estrogen synthesis. J Neurosci. 24: 5913-5921.

Roth C, Hegemann F, Hildebrandt J, Balzer I, Witt A, Wuttke W, Jarry H (2004) Pituitary and gonadal effects of GnRH (gonadotropin releasing hormone) analogues in two peripubertal female rat models. Pediatr Res. 55: 126-133

Prange-Kiel J, Wehrenberg U, Jarry H, Rune GM (2003) Para/autocrine regulation of estrogen receptors in hippocampal neurons. Hippocampus 13: 226-234.

Seong JY, Han J, Park S, Wuttke W, Jarry H, Kim K (2002) Exonic splicing enhancer-dependent splicing of the gonadotropin-releasing hormone premessenger ribonucleic acid is mediated by tra2alpha, a 40-kilodalton serine/arginine-rich protein. Mol Endocrinol. 16: 2426-2438.

Jürgen Klingauf



Research Group Leader at the Max Planck Institute for Biophysical Chemistry

- Research fellow, Dept. of Molecular & Cellular Physiology, Stanford University, Ca, 1996 - 1998
- Dr. rer. nat. (Ph.D.) 1999, University of Göttingen
- Since 2000 junior group leader at the Max Planck Institute for Biophysical Chemistry

Major Research Interests

The focus of our research is the study of synaptic transmission, with the emphasis on presynaptic mechanisms. At the synapse, neurotransmitter is rapidly released from small vesicles which are triggered to fuse with the plasma membrane by the entry of Ca^{2+} ions. The maintenance of synaptic transmission requires that these vesicles be retrieved by a reverse process, i.e. endocytosis. How is this endocytic activity and subsequent formation of fusion-competent vesicles coupled to exocytosis? To delineate the mechanisms by which synaptic vesicles can be retrieved we employ high-resolution imaging techniques, like two-photon laser scanning and total internal reflection microscopy, electrophysiology, as well as biochemical approaches. By transfection of neurons in primary cell culture or the usage of knock-out models we can target or modulate specific proteins thought to be pivotal in synaptic vesicle endocytosis. Currently, we are mainly studying synapses of rodent hippocampus, down to the level of single fluorescently labeled vesicles in cultured or freshly isolated synaptic boutons. By making use of fluorescent styryl dyes with different kinetic properties we found that in central nervous synapses at least two kinetically distinct modes of endocytosis co-exist. We are now trying to characterize the respective molecular events underlying those different mechanisms using genetically encoded fluorescent probes.

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Selected Recent Publications

Klingauf J, Kavalali ET, Tsien RW (1998) Kinetics and regulation of fast endocytosis at hippocampal synapses. Nature 394: 581-585

Kavalali ET, Klingauf J, Tsien RW (1999) Properties of fast endocytosis at hippocampal synapses. Phil Trans R Soc Lond B 354: 337-346

Kavalali ET, Klingauf J, Tsien RW (1999) Activity-dependent regulation of synaptic clustering in a hippocampal culture system. Proc Natl Acad Sci USA 96: 12893-12900

Choi S, Klingauf J, Tsien RW (2000). Postfusional regulation of cleft glutamate concentration during LTP at 'silent synapses'. Nature Neurosci 3: 330-336

Bruns D, Riedel D, Klingauf J, Jahn R (2000) Quantal release of serotonin. Neuron 28(1): 205-220

Willhart Knepel

Professor of Molecular Pharmacology

- Dr. rer. nat., University of Freiburg i. Br., Germany, 1980
- Habilitation, University of Freiburg i. Br., Germany, 1985
- Research Fellow, Laboratory of Molecular Endocrinology, Harvard Medical School, Boston, MA, USA, 1987 - 1990
- Joined Medical Faculty of the University of Göttingen 1991

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Major Research Interests

The main interest of the laboratory is in the molecular mechanisms of gene transcription. Transient transfections of reporter fusion genes, transgenic mice, and other molecular biology techniques are used to study the mechanisms of cell-specific and signal-induced gene transcription, and how drugs interfere with these mechanisms to produce pharmacological effects. 1. The pancreatic islet hormone glucagon is a biological antagonist of insulin and regulates blood glucose levels. Enhanced synthesis and secretion of glucagon contributes to increased hepatic glucose output and hyperglycemia in diabetes mellitus. We study the mechanisms which activate the glucagon gene in pancreatic islet a cells as well as signaling pathways to the glucagon gene induced by cAMP, membrane depolarization, and insulin. 2. We study the regulation of glucagon gene transcription by the new group of oral antidiabetic drugs, the thiazolidinediones. These so-called 'insulin sensitizers' may improve insulin action in part through an effect on glucagon. 3. The ubiquitously expressed, cAMP- and calcium-regulated transcription factor CREB is affected by several classes of drugs. We study how the immunosuppressive drugs cyclosporin A and FK506 (tacrolimus) inhibit CREB-mediated transcription. This effect may underlie their pharmacological effects, both desired and undesired. Using transgenic mice and an animal model of depression, we also study whether treatment with antidepressants alters CREB-mediated transcription in order to better understand the molecular mechansims of action of antidepressant drugs.

Selected Recent Publications

Beimesche S, Neubauer A, Herzig S, Grzeskowiak R, Diedrich T, Cierny I, Scholz D, Alejel T, Knepel W (1999) Tissue-specific transcriptional activity of a pancreatic islet cell-specific enhancer sequence/Pax6-binding site determined in normal adult tissues *in vivo* using transgenic mice. Mol Endocrinol 13: 718-728

Siemann G, Blume R, Grapentin D, Oetjen E, Schwaninger M, Knepel W (1999) Inhibition of cyclic AMP response element-binding protein/cyclic AMP response element-mediated transcription by the immunosuppressive drugs cyclosporin A and FK506 depends on the promoter context. Mol Pharmacol 55: 1094-1100

Herzig S, Füzesi L, Knepel W (2000) Heterodimeric Pbx-Prep1 homeodomain protein binding to the glucagon gene restricting transcription in a cell type-dependent manner. J Biol Chem 275: 27989-27999

Grzeskowiak R, Amin J, Oetjen E, Knepel W (2000) Insulin responsiveness of the glucagon gene conferred by interactions between proximal promoter and more distal enhancer-like elements involving the paired-domain transcription factor Pax6. J Biol Chem 275: 30037-30045

Schinner S, Dellas C, Schröder M, Heinlein C, Chang C, Fischer J, Knepel W (2002) Repression of glucagon gene transcription by peroxisome proliferator-activated receptor γ through inhibition of Pax6 transcriptional activity. J Biol Chem 277: 1941-1948

Kerstin Krieglstein

Professor of Anatomy/Neuroanatomy

- Dr. rer. nat., University of Gießen, Germany, 1990
- Postdoctoral fellow, University of California, Irvine, 1990 - 1992
- Professor of Anatomy, University of Saarland, 1999 - 2001
- Appointed 2001 as head of the Department of Anatomy/Neuroanatomy, University of Göttingen

Major Research Interests

The nervous system is a complex network of billions of neurons building appropriate connections and transmitting the information required. Although the nervous system has a lifelong synaptic plasticity, it is essentially built just once with very little regenerative capacity, meaning that neurons have to survive and function for lifetime. Loss of neurons will eventually lead to functional impairments such as those found in Alzheimer's, Parkinson's or ALS patients.

We are interested in the understanding of the regulation of neuronal survival and death. Recent advancements in the field have provided clear evidence that neuronal survival is caused by synergistic actions of neurotrophic factors along with other cytokines most prominently from the TGF-ß superfamily. Synergisms of TGF-ß in combination with neurotrophic factors, like GDNF or NGF, will be studied to establish their role in nervous system development and their therapeutic potential in brain repair. Specifically, we shall investigate such synergisms by utilising mouse mutants to understand the developmental role and by emplying genomic screens to identify new target genes for the establishment of new therapeutic strategies for human neurodegenerative disorders. Furthermore, as growth factors function not only in the decision of neuron survival or death, we shall explore their morphogenetic and differentiation capacities employing the powerful potential of embryonic (ES) and CNS stem cells.

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Selected Recent Publications

Krieglstein K, Henheik P, Farkas L, Jaszai J, Galter D, Krohn K, Unsicker K (1998) GDNF requires TGF-ß for establishing its neurotrophic activity. J Neurosci 18: 9822-9834

Schober A, Hertel R, Arumäe U, Farkas L, Jaszai J, Krieglstein K, Saarma M, Unsicker K (1999) GDNF rescues target-deprived spinal cord neurons but requires TGF-ß as co-factor *in vivo*. J Neurosci 19: 2008-2015

Krieglstein K, Richter S, Farkas L, Schuster N, Dünker N, Oppenheim R W, Unsicker K (2000) Reduction of endogenous transforming growth factor beta prevents ontogenetic neuron death. Nature Neuroscience 3: 1085-1091

Peterziel H, Unsicker K, Krieglstein K (2002) TGFbeta induces GDNF responsiveness in neurons by recruitment of GFRalpha1 to the plasma membrane, J Cell Biol 159: 157-167

Farkas L, Dünker N, Roussa E, Unsicker K, Krieglstein K (2003) Transforming growth factor-beta(s) are essential for the development of midbrain dopaminergic neurons *in vitro* and *in vivo*. J Neurosci 23: 5178-5186

v Bohlen und Halbach O, Schober A, Krieglstein K (2004) Genes, proteins, and neurotoxins involved in Parkinson's disease. Prog Neurobiol 73: 151-177

Markus Missler

Research Group Leader at the Center for Physiology

- Dr.med. (M.D.), University of Göttingen, 1992
- Graduate College (DFG), Göttingen, 1992 - 1994
- Postdoctoral fellow, UTSW & HHMI, Dallas, 1994 - 1999
- Research Group Leader (SFB 406), 1999 - 2004
- Univ. Professor for Genetics and Molecular Neurobiology (Otto-von-Guericke-University Magdeburg), 2004

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Major Research Interests

Synapses of the nervous system combine two different aspects: From a structural point of view, they represent a specialized form of cell-cell adhesion/recognition sites, and functionally they maintain neurotransmission, thereby sustaining the flow of information from one neuron to the next. Our group is particularly interested in studying the question of whether these two aspects of synapses are related to each other. To address this question we have studied the role of candidate molecules. In a recent major finding, we demonstrated that a family of cell adhesion molecules (neurexins) is indeed essential for efficient regulated exocytosis and is therefore required for a successful communication between neurons. We were able to show that (i) neurexins are presynaptically localized, and (ii) they regulate the activity of presynaptic as well as postsynaptic high-voltage activated calcium channels - the latter via a hitherto unknown transsynaptic signalling pathway.

Further activities in the laboratory include functional analysis of neurexophilins, a secreted ligand of α-neurexins. Expression patterns of neurexophilins show an extremely localised distribution pattern in specific subpopulations of neurons, which may utilize neurexophilins to modulate the α-neurexin function. In addtion, we have started a screening test to identify novel genes involved in synaptogenesis using a so-called differential display approach to examine differentially expressed mRNAs at chracteristic stages of development. Our investigations rely on molecular biological, neurogenetic, morphological and (in our collaborations) electrophysiological methods.

Selected Recent Publications

Verhage M, Maia AS, Plomp JJ, Brussard AB, Heeroma JH, Vermeer H, Toonen RF, Hammer RE, van den Berg TK, Missler M, Geuze HJ, Südhof TC (2000) Synaptic assembly of the brain in the absence of neurotransmitter secretion. Science 287: 864-869

Safavi-Abbasi S, Wolff JR, Missler M (2001) Rapid morphological changes in astrocytes are accompanied by re-distribution but not quantitative changes of cytoskeletal proteins. Glia 36: 102-115

Missler M (2003) Synaptic cell adhesion goes functional. Trends Neurosci 26: 176-178

Missler M, Zhang W, Rohlmann A, Kattenstroth G, Hammer RE, Gottmann K, Südhof TC (2003) a-Neurexins couple Ca^{2+}-channels to synaptic vesicle exocytosis. Nature 423: 939-948

Kattenstroth G, Tantalaki E, Südhof TC, Gottmann K, Missler M (2004) Postsynaptic N-methyl-D-aspartate receptor function requires a-neurexins. PNAS 101: 2607-2612

Tobias Moser

Professor of Experimental and Clinical Audiology

- Dr. med. (M.D.) 1995, University of Jena
- Postdoctoral fellow with E. Neher at the MPI for Biophysical Chemistry, 1994 - 1997
- Group leader at the Department of Otolaryngology, University of Göttingen since 1997

Major Research Interests

Our group focuses on the physiology and pathology of the hair cell ribbon synapse. Molecular dissection and detailed physiological characterization of ribbon synapse function have only recently become possible using novel molecular and biophysical techniques. We combine single cell RT-PCR, immunohistochemistry of hair cells with auditory physiology (recordings of otoacoustic emissions, compound action potentials and auditory brainstem responses) and in-depth biophysical analysis of the hair cell ribbon synapse in normal and mutant mice (Moser and Beutner, 2000; Beutner et al., 2001; Khimich et al., 2005). The biophysical approach includes patch-clamp, optical methods (epifluorescence and evanescent wave imaging as well as flash photolysis of caged compounds) to investigate membrane currents, synaptic membrane turnover (membrane capacitance and membrane dyes) and stimulus-secretion coupling in hair cells from the mouse.

The group has scontributed to understanding normal hair cell ribbon synapse function (review in Fuchs et al., 2003). In our previous work we have physiologically and in part morphologically characterized mutant mice with defects in hair cell synaptic coding (Brandt et al., 2003; Khimich et al., 2005) and auditory nerve function (Lacas-Gervais et al., 2004). The results demonstrated that defects of hair cell synaptic sound coding cause sensorineural hearing loss in animal models – auditory synaptopathy and confirmed impaired hearing in case of nerve disorders - auditory neuropathy.

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Selected Recent Publications

Moser T, Beutner D (2000) Kinetics of exocytosis and endocytosis at the cochlear inner hair cell afferent synapse of the mouse. Proc Natl Acad Sci USA, 97: 883-888

Beutner D, Voets T, Neher E, Moser T (2001) Calcium dependence of exocytosis and endocytosis at the cochlear inner hair cell afferent synapse. Neuron 29: 681-90

Brandt A, Striessnig J, Moser T (2003) CaV1.3 Channels are essential for Development and Presynaptic Activity of Cochlear Inner Hair Cells J Neurosci 23: 10832-40

Fuchs P, Glowatzki E, Moser T (2003) The afferent synapse of cochlear hair cells. Curr Opin Neurobiol 13: 453-58

Khimich D, Nouvian R, Pujol R, tom Dieck S, Egner A, Gundelfinger ED, Moser T (2005) Hair Cell Synaptic Ribbons are Essential for Synchronous Auditory Signaling. Nature 434: 889-94

Klaus-Armin Nave

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

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

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Major Research Interests

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

Future Projects and Goals
Mechanisms of neuron-glia signalling; function of myelin proteins and lipids; transcriptional profiling of single cells *in vivo*; novel mouse models of neuropsychiatric disorders.

Selected Recent Publications

Schwab M H, Bartholomä A, Heimrich B, Feldmeyer D, Druffel-Augustin S, Goebbels S, Naya F J, Frotscher M, Tsai M-J, Nave K-A (2000) Neuronal bHLH proteins (NEX and BETA2/NeuroD) regulate terminal granule cell differentiation in the hippocampus. J Neurosci 20: 3714-3724

Niemann S, Sereda MW, Suter U, Griffiths IR, Nave K-A (2000) Uncoupling of myelin assembly and Schwann cell differentiation by transgenic overexpression of PMP22. J Neurosci 20: 4120-4128

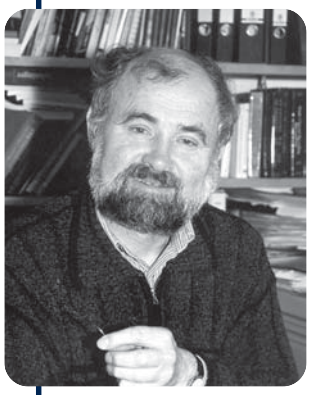
Lappe-Siefke C, Göbbels S, Gravel M, Nicksch E, Lee J, Braun P E, Griffiths I, Nave K-A (2003) Disruption of Cnp1 uncouples oligodendroglial functions in axonal support and myelination. Nature Genetics 33: 366-374

Sereda MW, Meyer zur Hörste G, Suter U, Uzma N, Nave K-A (2003) Therapeutic administration of anti-progesterone in a PMP22-transgenic model of Charcot-Marie-Tooth disease (CMT1A). Nature Medicine 9: 1533-1537

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

Saher G, Brügger B, Lappe-Siefke C, Möbius W, Tozawa R, Wehr M, Wieland F, Ishibashi S, and Nave K-A (2005) Cholesterol is essential and rate-limiting for myelin membrane growth. Nature Neurosci 8: 468-475

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)
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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 study the basic mechanisms of exocytosis, using adrenal chromaffin cells as a model system and the patch-clamp method. This work, in which intracellular Ca^{++} is manipulated (caged Ca^{++}) and measured on the single cell level aims at understanding the role of specific synaptic proteins in the maturation and exocytosis of secretory vesicles. 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.

Selected Recent Publications

Klingauf J, Neher E (1997) Modeling buffered Ca^{2+} diffusion near the membrane: Implications for secretion in neuroendocrine cells. Biophys J 72: 674-690

Neher E (1998) Vesicle pools and Ca^{2+} microdomains: new tools for understanding their roles in neurotransmitter release. Neuron 20: 389-399

Schneggenburger R, Neher E (2000) Intracellular calcium dependence of transmitter release rates at a fast central synapse. Nature 406: 889-893

Rettig J, Neher E (2002) Emerging roles of presynaptic proteins in Ca^{++}-triggered exocytosis. Science 298: 781-785

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

Soerensen J, Nagy G, Varoqueaux F, Nehring RB, Brose N, Wilson MC, Neher E (2003). Differential control of the releasable vesicle pools by SNAP-25 splice variants and SNAP-23. Cell 114, 75-86

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

Walter Paulus

Professor of Clinical Neurophysiology

- Dr. med., University of Düsseldorf, 1978
- Training in Neurology at the Universities of Düsseldorf, UCL London and Munich
- Habilitation (Neurology and Clinical Neurophysiology) in Munich
- Prof. and Head of the Department of Clinical Neurophysiology 1992

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Major Research Interests

Our main research goal is to development new neurophysiologically based therapies for neurological diseases incorporating excitability changes of the brain. For this we use repetitive transcranial magnetic stimulation (rTMS) and transcranial direct current stimulation (TDCS). TMS induces a short electric current in the human brain. Both rTMS and TDCS offer the prospect of inducing LTD and LTP like effects in the human brain. Diseases in our focus are Parkinson's disease, epilepsy, migraine, stroke and dystonia.

Both methods may also be used to measure excitability changes in the motor cortex or alterations in visual perception thresholds. We also evaluate rTMS and TDCS induced changes in motor cortex excitability by functional MR imaging.

Selected Recent Publications

Paulus W (2005) Toward Establishing a Therapeutic Window for rTMS by Theta Burst Stimulation. Neuron 45: 181-183

Thinyane K, Baier PC, Schindehutte J, Mansouri A, Paulus W, Trenkwalder C, Flugge G and Fuchs E (2005) Fate of pre-differentiated mouse embryonic stem cells transplanted in unilaterally 6-hydroxydopamine lesioned rats: Histological characterization of the grafted cells. Brain Res 1045: 80-87

von Spiczak S, Whone A L, Hammers A, Asselin MC, Turkheimer F, Tings T, Happe S, Paulus W, Trenkwalder C and Brooks DJ (2005) The role of opioids in restless legs syndrome: an [11C]diprenorphine PET study. Brain 128: 906-917

Evgeni Ponimaskin

Group Leader at the Centre for Molecular Physiology of the Brain

- 1994 Dr. rer. nat., Free University of Berlin, Germany
- 1994 - 2000 Postdoctoral training within the special research unit (Sonderforschungsbereich) "Cellular signal recognition and signal transduction"
- 2000 - 2002 Faculty member and group leader at the Departments of Neuro and Sensory Physiology, Medical School at the University of Göttingen
- Since October 2002 Tenure Track position within the Centre for Molecular
- Physiology of the Brain (ZMPG)

Major Research Interests

Our scientific activities are centered on the understanding of the time- and space-dependent interactions between different signalling proteins (in particular G-Protein Coupled Receptors and their downstream effectors), leading to the specific actions within the cell. As model system we use the serotonergic signaling, which is critically involved in regulation of different neuronal processes. This project addresses following aspects:

- Dynamic distribution and clustering of defined serotonin receptors (5-HTR) in different cell types. To study the activation-dependent changes in receptor distribution, individual receptor are coupled with fluorescence proteins (GFP, CFP, YFP) and analysed by confocal as well as 2-photon microscopy. We also analyse oligomerization state of different receptors by biochemical methods as well as by molecular imaging (i.e. FRET, single-cell FRET)
- Determination of G-proteins as well as downstream effectors specifically interacting with individual serotonin receptors. Cross-talk between GPCRs and specific effectors. To identify specific downstream effectors we apply biochemical, biophysical and electrophysiological methods. To get dynamic biochemical information we are establishing molecular imaging of high spatial and temporal resolution (single-cell FRET, fluorescence lifetime imaging microscopy (FLIM)). Combination of this nanotomographic fluorescence imaging with various forms of "patch clamping" will also be used for the parallel on-line measurement of physiological parameters in whole cell function. Using "patch-clamp" method will also allow the quantitative analysis of the transcription level for individual signalling molecules by using single-cell RT-PCR and TaqMan techniques, which are presently established in our lab.
- Functional role of post-translational protein modifications on G protein-coupled 5-HTR. Differential expression of receptors during development und after chronic application of drugs.

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Selected Recent Publications

Ponimaskin E, Heine M, Joubert L, Sebben M, Bickmeyer U, Richter DW, Dumuis A (2002) The 5-hydroxytryptamine(4a) receptor is palmitoylated at two different sites and acylation is critically involved in regulation of receptor constitutive activity. Journal of Biological Chemistry 277: 2534-2546

Ponimaskin E, Profirovic J, Vaiskunaite R, Richter DW, Voyno-Yasenetskaya T (2002) 5-hydroxytryptamine(4a) receptor is coupled to Galpha subunit of heterotrimeric G13 protein. Journal of Biological Chemistry 277: 20812-20819

Manzke T, Guenther U, Ponimaskin E, Haller M, Dutschmann M, Schwarzachwer S, Richter DW (2003) 5-HT4(a) receptors avert opioid-induced breathing depression without loss of analgesia. Science 301: 226-229

Richter DW, Manzke T, Wilken B, Ponimaskin EG (2003) Serotonin Receptors: Guardians for a Stable Breathing. Trends in Molecular Medicine 9: 542-548

Papoucheva K, Dumuis A, Sebben M, Richter D, Ponimaskin EG (2004) The 5-HT1A receptor is stably palmitoylated and acylation is critical for the receptor communication with Gi-protein. Journal of Biological Chemistry 279: 3280-3291

Thomas H. Rammsayer

Professor of Psychology

- 1988 - 1989 Postdoctoral Fellow, Department of Pharmacology, Thomas Jefferson University, Philadelphia, Pa.
- 1989 - 1995 Assistant Professor, Department of Psychology, University of Giessen
- 1995 - 1997 Associate Professor, Institute for Psychology, University of Jena
- since 1997 Professor of Psychology, Georg Elias Müller Institute for Psychology, University of Göttingen

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Major Research Interests

Biological and experimental personality research:
Biological basis of extraversion
Neuropharmacology of individual differences
Pharmacopsychological approaches to personality
Elementary cognitive tasks and mental ability
Behavioral sex differences

Temporal information processing in humans:
Neurobiological approaches to timing systems in humans
Perceptual and cognitive mechanisms in human timing and time perception
Time psychophysics

Cognitive neuroscience:
Neurochemistry of declarative and procedural memory functions
Cognitive inhibition in humans

Selected Recent Publications

Rammsayer TH (2004) Extraversion and the dopamine hypothesis. In RM Stelmack (Ed), On the psychobiology of personality (pp. 411-429). Amsterdam: Elsevier.

Rammsayer TH, Brandler S (2004) Aspects of temporal information processing: A dimensional analysis. Psychological Research 69: 115-123

Rammsayer TH, Stahl J (2004) Extraversion-related differences in response organization: Evidence from lateralized readiness potentials. Biological Psychology 66: 35-49

Rammsayer T (2003) Sensory and cognitive mechanisms in temporal processing elucidated by a model systems approach. In H. Helfrich (Ed.), Time and mind II: Information processing perspectives (pp. 97-113). Göttingen, Germany: Hogrefe & Huber Publishers.

Rammsayer TH (2003) NMDA receptor activity and the transmission of sensory input into motor output in introverts and extraverts. Quarterly Journal of Experimental Psychology, Section B: Comparative and Physiological Psychology 56B: 207-221

Diethelm Richter

Professor of Physiology
Chairman of the II. Department of Physiology, University of Göttingen
Deputy Speaker of the European Neuroscience Institute Göttingen

- Wiss. Angestellter, I. Physiol. Inst., University of Saarland, 1969 - 1970
- Wiss. Assistent, I. Physiol. Inst., University of Saarland, 1970 - 1972
- Wiss. Assistent, I. Physiol. Inst., University of Munich, 1972 - 1974
- Universitätsdozent, I. Physiol. Inst., University of Munich, 1974
- Universitätsdozent, I. Physiol. Inst., University of Heidelberg, 1975 - 1976
- C-3 Professor, I. Physiol. Inst., University of Heidelberg, 1976 - 1988
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Major Research Interests

Neurotransmitters, neuromodulators, and peptide hormones are known to activate metabotropic receptor proteins that control ion channels or second messenger cascades. These receptors regulate an intracellular network of interacting signal transduction pathways by means of G-proteins. Thus, receptors transmit extracellular signals to intracellular proteins and other chemical factors. These signals are normally not transduced in a stereotype manner, but they are integrated in a space- and time-dependent manner, resulting in highly dynamic and variable cellular responses. The specific nature of the cellular response depends on individual cell types that may differ in the expression pattern of receptor subtypes or of intracellular signaling factors.
Our research group concentrates on the spatial organization of various subtypes of serotonin receptors and targets an understanding of the highly localized regulation of molecular interactions occurring simultaneously at many sites of a neuron. The goal is to achieve a refined understanding of the parallel signal processing within networks of chemical signal pathways and to clarify their effects on the properties of the neuron as a whole.

Selected Recent Publications

Manzke T, Günther U, Ponimaskin EG, Haller M, Dütschmann M, Schwarzacher S, Richter DW (2003) 5-HT_{4ca1} Receptors avert opioid-induced breathing depression without loss of analgesia. Science 301: 226-229

Gomeza J, Hülsmann S, Ohno K, Eulenburg V, Szöke K, Richter D and Betz H (2003) Inactivation of the Glycine Transporter 1 Gene Discloses Vital Role of Glial Glycine Uptake in Glycinergic Inhibition. Neuron Vol 40: 785-796

Gomeza J, Ohno K, Hülsmann S, Armsen W, Eulenburg V, Richter DW, Laube B and Betz H (2003) Deletion of the Mouse Glycine Transporter 2 Results in a Hyperekplexia Phenotype and Postnatal Lethality. Neuron Vol 40: 797-806

Papoucheva E, Dumuis A, Sebben M, Richter DW and Ponimaskin EG (2004) The 5-Hydroxytryptamine(1A) Receptor is Stably Palmitoylated, and Acylation is Critical for Communication of Receptor with Gi-Protein. J Biol Chem 279: 3280-3291

Ponimaskin E G, Heine M, Dumuis A, Richter DW, Glebov K, Oppermann M (2005) Palmitoylation of the 5-Hydroxytryptamine(4a) Receptor Regulates Receptor Phosphorylation, Desensitization and ß-Arrestin mediated Endocytosis. Mol Pharmacol 67(5): 1434-1443

Eleni Roussa

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Privatdozentin, Neuroanatomy

- 1988 Dr. med. dent. University of Saarland, Germany
- Training in Periodontology, Dental School, University of Saarland
- Postdoctoral fellow, Department of Anatomy, Medical School, University of Saarland
- Temporary Lecturer for Anatomy, School of Biological Sciences, University of Manchester, UK
- since 2001 Senior scientist, Center for Anatomy, Department of Neuroanatomy, University of Göttingen, Germany
- 2002 Habilitation, University of Göttingen

Major Research Interests

Dopaminergic and serotonergic neurons play important roles in the regulation of motor performances, behavior and cognition. Neuron loss or functional impairment of dopaminergic or serotonergic neurons are associated with a wide range of human disease states, including Parkinson's disease, depression and anxiety.
We are interested in the understanding of the early determination and differentiation of mesencephalic dopaminergic neurons and hindbrain serotonergic neurons. We specifically focus on the identification of intrinsic and extrinsic regional determinants that dictate differentiation of progenitor cells towards particular types of neurons, as well as on new genes representing the intracellular mediators of development towards dopaminergic and serotonergic neurons.

Selected Recent Publications

Farkas LM, Dünker N, Roussa E, Unsicker K, Krieglstein K (2003) TGF-βs are essential for the development of midbrain dopaminergic neurons *in vitro* and *in vivo*. The Journal of Neuroscience 23: 5178-5186

Roussa E, Nastainczyk W, Thévenod F (2004) Differential expression of electrogenic NBC1 (SLC4A4) variants in rat kidney and pancreas. Biochemical Biophysical Research Communications 314: 382-389

Roussa E, Krieglstein K (2004) GDNF promotes neuronal differentiation and dopaminergic development of mouse mesencephalic neurospheres. Neuroscience Letters 361: 52-55

Roussa E, Farkas L, Krieglstein K (2004) TGF-beta promotes survival on mesencephalic dopaminergic neurons in cooperation with Shh and FGF-8. Neurobiology of Disease 16: 300-310

Roussa E, Krieglstein K, (2004) Induction and specification of dopaminergic cells development: focus on TGF-β, Shh and FGF8. Cell and Tissue Research (in press)

Detlev Schild

Professor of Physiology

- 1979 Diplom in Physics, University of Göttingen
- 1982 M.D., University of Göttingen
- 1985 Dr. rer.nat., University of Göttingen
- 1987 Dr. med., University of Göttingen
- 1997 Appointed head of the Department of Molecular Neurophysiology in the Center of Physiology and Pathophysiology, Medical School, University of Göttingen

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Major Research Interests

The olfactory system is able to detect and distinguish thousands of molecules in our environment. Receptor neurons are endowed with hundreds of different receptors to bind odorants and transduce the chemical signal into an electrical one. The receptor neurons convey their information onto the olfactory bulb where a neuronal image of odorants is generated. Using a combination of electrophysiological and high resolution imaging techiques, we are studying

- the biophysical details of the primary transduction processes,
- the synaptic transmission in the olfactory bulb,
- the generation of the neuronal chemotopic map and
- the mechanism of odor learning

Selected Recent Publications

Nezlin LP, Schild D (2005) Individual olfactory sensory neurons project into more than one glomerulus in *Xenopus laevis* tadpole olfactory bulb. J Comp Neurol 481: 233-239

Gennerich A, Schild D (2005) Sizing-up finite fluorescent particles with nanometer-scale precision by convolution and correlation image analysis. Eur Biophys J 34: 181-199

Schild D, Manzini I (2004) Cascades of response vectors of olfactory receptor neurons in *Xenopus laevis* tadpoles. Eur J Neurosci 20: 2111-2123

Manzini I, Schild D (2004) Classes and narrowing selectivity of olfactory receptor neurons of *Xenopus laevis* tadpoles. J Gen Physiol 123: 99 - 107

Manzini I, Schild D (2003) cAMP-independent olfactory transduction of amino acids in *Xenopus laevis* tadpoles. J Physiol 551: 115-123

Czesnik D, Rössler W, Kirchner F, Gennerich A, Schild D (2003) Neuronal representation of odorants in the olfactory bulb of *Xenopus laevis* tadpoles. Eur J Neurosci 17: 113-118

Gennerich A, Schild D (2002) Anisotropic diffusion in mitral cell dendrites of *Xenopus laevis* tadpoles Biophys J 83: 510-522

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Research Group Leader at the European Neuroscience Institute Göttingen

- Dr. rer. nat (PhD) 1997, University of Tübingen
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- 1997 - 2001 Postdoc with Christoph Schuster at Friedrich Miescher Laboratory in Tübingen (Germany), Max Planck Society
- 1993 - 1997 Ph.D. with Christian F. Lehner at Friedrich Miescher Laboratory in Tübingen (Germany), Max Planck Society

Major Research Interests

Synaptic strengths change as neuronal circuits develop and are modified by experience, providing a cellular basis for the correct development of neuronal systems as for higher brain functions (e.g. learning and memory). Model system for our studies is the developing larval neuromuscular junction (NMJ) of Drosophila, offering access for physiological, ultrastructural and biochemical methods as well as for the powerful molecular-genetic and genetic approaches typical for Drosophila. Moreover, the optical transparence of the larva opens the way for the *in vivo* imaging of plasticity relevant processes using genetically encoded GFP-sensors.

At the NMJ, we have recently demonstrated the existence of large aggregates of translation factors very close to the synaptic sites. Increasing this subsynaptic translation stimulated synaptogenesis, neurotransmission as well as morphological outgrowth of the developing NMJ. Postsynaptic translation we found to provoke this substantial long-term strengthening by increasing the synaptic levels of a particular glutamate receptor subunit, DGluR-IIA.

In our ongoing work, mechanisms underlying synapse formation and growth at the Drosophila NMJ are characterized further. On one hand, newly designed genetic screens and a molecular analysis of the translational control mechanisms throughout plasticity will be the basis to identify molecules that regulate synaptic growth and function. Moreover, synaptic protein synthesis, glutamate receptor dynamics and synaptic growth are visualized live in developing larvae, using lines transgenic for GFP-tagged marker proteins in combination with confocal and 2-photon microscopy. Moreover, the fact that learning and memory paradigms are well established for adult Drosophila flies offers the possibility to assess the relevance of junctional plasticity-mechanisms for central synapses and brain functions in general.

Selected Recent Publications

Sigrist SJ, Ried G, Lehner CF (1995a) *Dmcdc2* kinase is required for both meiotic divisions during *Drosophila* spermatogenesis and is activated by the twine/cdc25 phosphatase. Mech of Dev 53: 247-260

Sigrist SJ, Jacobs H, Stratmann R, Lehner CF (1995b) Exit from mitosis is regulated by *Drosophila* fizzy and the sequential destruction of cyclins A, B and B3. EMBO J 14(19): 4827-38

Sauer K, Weigmann K, Sigrist SJ, Lehner CF (1996) Novel members of the *cdc2*-related kinase family in *Drosophila*: cdk4/6, cdk5, PFTAIRE, and PITSLRE kinase. Mol Biol Cell: 1759-69

Sigrist SJ, Lehner CF (1997) *Drosophila* fizzy-related down-regulates mitotic cyclins and is required for cell proliferation arrest and entry into endocycles. Cell 1997 (4): 671-81

Sigrist SJ, Thiel PR, Reiff D, Lachance PE, Lasko P, Schuster CM (2000) Postsynaptic translation affects the morphology and efficacy of neuromuscular junctions. Nature 405 (6790): 1062-1065

Anastassia Stoykova

Privatdozent, Developmental Biology

- 1972 M.D. degree, Bulgarian Medical Academy
- 1973 - 1988 Research Associate in Neurochemistry; Regeneration Research Laboratory, Bulgarian Academy of Sciences, Sofia
- 1985 PhD; Bulgarian Academy of Sciences, Sofia
- 1989 Habilitation (Neurobiology) and Assistant Research Professor at the Institute of Molecular Biology, Bulgarian Academy of Sciences
- 1980 - 1981 and Guest investigator as Alexander von Humboldt grant holder at the
- 1988 - 1989 Max Planck Institute for Experimental Medicine and Max-Planck Institute for Biophysical Chemistry, Göttingen
- 1991 - 2002 Staff Research Scientist at the Max Planck Institute for Biophysical Chemistry; Department Molecular Cell Biology, Göttingen
- 2002 Habilitation (Developmental Biology); Faculty of Human Medicine, University of Göttingen
- since 2002 Research Group Leader at the Max Planck Institute for Biophysical Chemistry; Department Molecular Cell Biology, Göttingen Lecturer at the Interna tional Max Planck Research School, Program Neurosciences

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Major Research Interests

In the mammalian cortex billions of neurons are organized in six layers and numerous functional domains that process different kinds of sensory information. Our recent efforts are focused on the identification and functional analysis of genes involved in the arealization and layer formation of the developing cortex, using the mouse as a model system. As a result of microarray assays performed through the Affymetrix chip technology, we obtained a collection of genes and ESTs that are differentially expressed in distinct domains of the embryonic cortex. Currently we are in a process of creating and analyzing knockout mouse mutants for selected genes. The morphological, expression and behavioural phenotypic analysis of the generated loss-of-function mutants will be supplemented by gain-of-function assays through somatic electroporation in vitro (whole embryo cultures or isolated brains) and and *in vivo* (*in utero*) in the brain of developing embryos. Some of these mutants may represent models for human neurological diseases thus providing in the long term some basis to understand the relationship between the genetic regulation of cortical development and cortical dysfunctions in man.
Furthermore, we are analyzing the role of the transcription factor Pax6 in mammalian corticogenesis, which function is abolished in the human disease Aniridia. Evidences from our and other laboratories show that Pax6 is intrinsic determinant of the cortical pluripotent progenitors (the radial glial cells) and is also involved in the cortical arealization and layer formation. By using the Cre-LoxP recombination system for *in vivo* conditional inactivation and overexpression, we are studying the function of Pax6 on progenitor proliferation, regionalization, cell fate specification, functional arealization and layer formation. We will also attempt to identify downstream gene targets for the two Pax6 isoforms that are active in vertebrates and possibly involved in a specific cell fate pathway.

Selected Recent Publications

Götz M, Stoykova A, Gruss P (1998) *Pax6* controls radial glia differentiation in the cerebral cortex. Neuron 21: 1031-1044

Stoykova A, Treichel D, Hallonet M, Gruss P (2000) *Pax6* modulates the patterning of the mammalian telencephalon. J Neuroscience 20 (21): 8042-8050

Tarabykin V, Stoykova A, Usman N, Gruss P (2001) Cortical upper layer neurons derive from the subventricular zone as indicated by *Svet1* gene expression. Development 128(1): 1983-1993

Jones L, Lopez-Bendito G, Gruss P, Stoykova A and Molnar Z (2002) Pax6 is required for the normal development of the forebrain axonal connections. Development 129: 5041-5052

Muzio L, DiBenedetto B, Stoykova A, Boncinelli E, Gruss P, Mallamaci A (2002) Conversion of cerebral cortex into basal ganglia in *Emx2-/- Pax6*$^{sey/sey}$ double-mutant mice. Nature Neuroscience 5: 737-745

Haubst N, Berger J, Radjendirane V, Graw J, Favor J, Saunders G, Stoykova A and Götz M (2004) Molecular dissection of Pax6 function: the specific roles of the paired domain and homeodomain in brain development Development 131: 6131-6140

Muhlfriedel S, Kirsch F, Gruss P, Stoykova A and Chowdhury K (2005) A roof plate-dependent enhancer controls the expression of Homeodomain only protein in the developing cerebral cortex. Dev Biol 283(2): 522-534

Tole S, Remedios R, B Saha and Stoykova A (2005) Selective requirement of Pax6, but not Emx2, in the specification and development of several nuclei of the amygdaloid complex. J Neurosci 25: 2753-2760

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Professor of Neurophysiology, Director at the Max Planck Institute for Experimental Medicine

- 1978 - 1980 PhD with Dr. F. Conti in Camogli, Italy
- 1980 - 1983 Post Doc in the Department of Physiology and Biophysics in Seattle, USA, with Dr. W. Almers
- 1983 - 1992 group leader at the Max Planck Institute for Biophysical Chemistry in Göttingen with Dr. E. Neher
- 1992 - present Director of the Department Molecular Biology of Neuronal Signals at the Max Planck Institute for Experimental Medicine in Göttingen

Major Research Interests

The principal aim of the department "Molecular Biology of Neuronal Signals" is the study of signaling within cells and between cells. To this end, molecular biology, genetics and electrophysiology are used to elucidate structure-function relationships of membrane-bound proteins, expecially ion channels and receptors. Specific tools such as antibodies and toxins are developed and used to interfere with signaling pathways relevant for cell cycle control, ion selectivity and the secretion of cells in culture and in primary cells.

Selected Recent Publications

Pardo LA, del Camino D, Sánchez A, Alves F, Brüggemann A, Beckh S, Stühmer W(1999) Oncogenic potential of EAG K^+ channels. EMBO J 18: 5540-5547

Niemeyer BA, Mery L, Zawar C, Suckow A, Monje F, Pardo LA, Stühmer W, Flockerzi V, Hoth M (2001) Ion channels in health and disease. EMBO Rep 2: 568-573

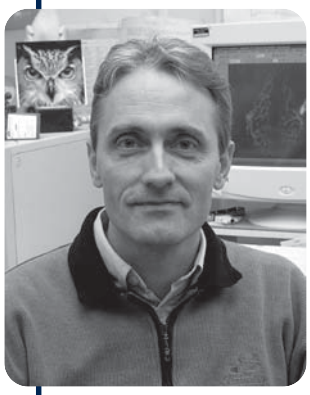
Loerke D, Stühmer W, Oheim M (2002) Quantifying axial secretory-granule motion with variable-angle evanescent-field excitation. J Neurosci Methods 119: 65-73

Jenke M, Sánchez A, Monje F, Stühmer W, Weseloh RM, Pardo LA (2003) C-terminal domains implicated in the functional surface expression of potassium channels. EMBO J 22: 395-403

Becherer U, Moser T, Stühmer W, Oheim M (2003) Calcium regulates exocytosis at the level of single vesicles. Nature Neurosci 6: 846-853

García-Ferreiro RE, Kerschensteiner D, Major F, Monje F, Stühmer W, Pardo LA (2004) Mechanism of block of hEag1 K^+ channels by imipramine and astemizole. J Gen Physiol 124: 301-317

Andreas Stumpner



Professor of Neuroethology

- Dr. rer. nat., University of Erlangen, Germany, 1988
- Postdoctoral fellow, Andrews University, Berrien Springs, USA, 1990 - 1991
- Habilitation, University of Göttingen, 1997
- Guestprofessor, University of Zürich, Switzerland, 2002 - 2003

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Major Research Interests

My research focuses on how a small nervous system recognises specific frequencies and temporal patterns (in the context of acoustic communication in insects, mainly in Orthoptera). Understanding these processes bears implications also for understanding function and evolution of the same performances of the vertebrate brain. I see the strength of the acoustic and invertebrate system *a)* in the precise temporal and spectral stimuli one can deliver and the clear (innate) responses on the behavioural and neuronal level, *b)* in the comparative potential (song recognition in groups of related species and differences in neuronal layout to related non-singing or non-hearing groups) allowing to understand what mechanisms might have played a role in evolution and how evolution of songs and recognition systems depend on each other, *c)* in the identified neurone-approach allowing to find homologous neurones in related species and indicating evolutionary changes on the cellular level and *d)* the potential to directly test hypotheses in behavioural experiments.
Recent findings from intracellular studies in bushcrickets are: Central neurons receive lateral frequency-dependent inhibitions. After blocking such inhibitions the frequency tuning broadens considerably. Species-specificity of a neuron in related species depends on specific inhibitions, not on specific excitations. And homologous neurons in more distantly related species may differ considerably in their properties.

Selected Recent Publications

Stumpner A (1998) Picrotoxin eliminates frequency selectivity of an auditory interneuron in a bushcricket. J Neurophysiol 79: 2408-2415

Rust J, Stumpner A, Gottwald J (1999) Singing and hearing in an ancient bushcricket. Nature 399: 650

Stumpner A (1999) Comparison of morphology and physiology of two plurisegmental sound-activated interneurones in a bushcricket. J Comp Physiol A 185: 199-205

Stumpner A, von Helversen D (2001) Evolution and function of auditory systems in insects. Naturwiss 88: 159-170

Stumpner A (2002) A species-specific frequency filter through specific inhibition, not specific excitation. J Comp Physiol A 188: 239-248

M. Hennig, A. Franz, A. Stumpner (2004) Processing of auditory information in insect. Microsc Res Tech, 63:351-374

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Professor, Director of the German Primate Center

- Head of the Cognitive Neuroscience Laboratory
- Ph.D. 1992, Massachusetts Institute of Technology
- Postdoctoral Fellow, MIT, 1992 - 1993
- Postdoctoral Fellow, Baylor College of Medicine, Houston, Texas, 1993 - 1995
- Work Group Leader, Laboratory of Cognitive Neuroscience, University of Tübingen, 1995 - 2001
- Professor of Animal Physiology, University of Tübingen, 2000 - 2001
- Professor of Cognitive Neuroscience and Biological Psychology, University of Göttingen, 2001

Major Research Interests

Research at the Cognitive Neuroscience Laboratory is aimed at understanding the neural basis of visual perception. Vision is an active process that is far more than a passive registration of our environment. Rather, on its way from the eyes to and through the cortex, visual information is modulated by numerous processes that enhance some aspects while diminishing others. One of these processes is attention, i.e. the ability to filter out unwanted information and concentrate the brain's processing abilities on relevant information.

The accurate representation of visual motion in the environment is one of the most important tasks of the visual system. Correspondingly research in the laboratory concentrates on this ability as a model for sensory information processing in general.

We use various techniques. While our emphasize is on electrophysiology, i.e. the recording of the activity of neurons in the visual cortex of macaque monkeys and measuring human perceptual abilities with psychophysical methods we also use theoretical approaches and functional brain imaging.
Using these techniques, we have been able to elucidate how motion information is represented in primate cortical area MT and how attention changes that representation and correspondingly the percept of the visual environment.

Selected Recent Publications

Treue S, Maunsell JHR (1996) Attentional modulation of visual motion processing in cortical areas MT and MST. Nature 382 (6591): 539-541

Treue S, Martinez Trujillo JC (1999) Feature-based attention influences motion processing gain in macaque visual cortex. Nature 399 (6736): 575-579

Treue S, Hol K, Rauber HJ (2000) Seeing multiple directions of motion - Physiology and psychophysics. Nature Neuroscience 3 (3): 270-276

Martinez-Trujillo JC, Treue S (2002) Attentional modulation strength in cortical area MT depends on stimulus contrast. Neuron 35: 365-370

Hol K, Treue S (2001) Different populations of neurons contribute to the detection and discrimination of visual motion. Vision Research 41(6): 685-689

Treue S (2001) Neural correlates of attention in primate visual cortex. Trends in Neurosciences 24(5): 295-300

Martinez-Trujillo JC, Treue S (2004) Feature-based attention increases the selectivity of population responses in primate visual cortex. Current Biology 14: 744-751

Michael R. Waldmann

Professor of Psychology

- 1988 Ph.D. at the University of Munich
- 1987 - 94 Teaching and research positions at the Universities of Frankfurt and Tübingen
- 1988 - 90 Postdoctoral research at the University of California, Los Angeles (UCLA); collaboration with Keith Holyoak
- 1995 Habilitation at the University of Tübingen
- 1994 - 98 Senior research scientist at the Max Planck Institute for Psychological Research
- since 1998 Professor of Psychology (C3) at the University of Göttingen

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Major Research Interests

Causal learning

Our general approach is to study the interaction of top-down knowledge about abstract characteristics of causality and bottom-up contingency learning. The majority of current learning theories view learning as a purely data-driven, associative process ("bottom up"). In contrast, our theory ("causal-model theory") assumes that the processing of the learning input is partly determined by domain knowledge. We are particularly interested in the role of abstract knowledge about causality, such as knowledge about causal directionality, causal relevance, causal structures, and causal interventions. In a number of studies we have shown that this kind of knowledge may dramatically affect learning despite the fact that the learning input was kept constant. Currently we are planning to explore the neural basis of associative as opposed to causal learning processes.

Categorization and Induction

In this project we are interested in the interplay between alternative categorial frameworks and induction. The traditional approach to categorization claims that categories mirror the correlational structure of the environment. By contrast, we argue that in many domains there are alternative ways of categorizing the world. For example, human behavior may either be explained by functional, cognitive or by neuropsychological theories. We are interested in factors determining the way domains are categorized, and in the influence of alternative categorial schemes on subsequent induction processes.

Selected Recent Publications

Waldmann MR, Holyoak KJ (1992) Predictive and diagnostic learning within causal models: Asymmetries in cue competition. Journal of Experimental Psychology: General 121: 222-236

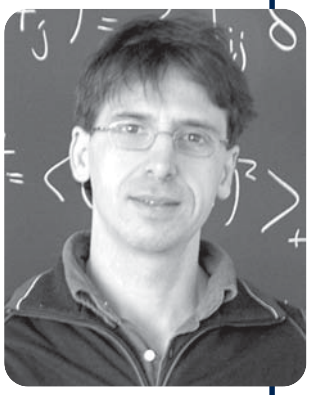
Waldmann MR, Holyoak KJ, Fratianne A (1995) Causal models and the acquisition of category structure. Journal of Experimental Psychology: General 124: 181-206

Waldmann MR (1996) Knowledge-based causal induction. In DR Shanks, KJ Holyoak, DL Medin (Eds), The psychology of learning and motivation, Vol. 34: Causal learning (pp. 47-88). San Diego: Academic Press

Waldmann MR, Hagmayer Y (1999) How categories shape causality. In M Hahn, SC Stoness (Eds), Proceedings of the Twenty-first Annual Conference of the Cognitive Science Society (pp. 761-766). Mahwah, NJ: Erlbaum

Waldmann MR (2000) Competition among causes but not effects in predictive and diagnostic learning. Journal of Experimental Psychology: Learning, Memory, and Cognition 26: 53-76

Fred Wolf



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Research Group Leader at the Max Planck Institute for Dynamics and Self-Organization

- Head of the Research Group „Theoretical Neurophysics“, Department of Nonlinear Dynamics, Max-Planck-Institut für Strömungsforschung, Göttingen, since 2004.
- Visiting Scholar, Kavli Institute for Theoretical Physics, UC Santa Barbara (USA), Fall 2001, 2003, 2004
- Research Associate, Max-Planck-Institut für Strömungsforschung, Göttingen, 2001 - 2004
- Amos de Shalit Fellow, Racah Institute of Physics and Interdisciplinary Center for Neural Computation, Hebrew Univ., Jerusalem (Israel), 2000
- Dr. phil. nat., J.W. Goethe Universität, Frankfurt , 1999

Major Research Interests

Theoretical Neuroscience and Nonlinear Dynamics, Sensory Processing in the Auditory System, Dynamics and Synchronization in Neuronal Networks, Function and Development of the Visual Cortex.

Selected Recent Publications

Symmetry, Multistability, and Long-Rang Interactions in Brain Development. F. Wolf Phys. Rev. Lett., in press, 2005.

Action potential onset dynamics and the response speed of neuronal populations. B. Naundorf, T. Geisel, and F. Wolf. Journal of Computational Neuroscience, 18(3): 297-309, 2005.

Wolf F (2005) Symmetry Breaking and Pattern Selection in Visual Cortical Development. in Methods and Models in Neurophysics, Les Houches, Session LXXX, 2003, p. 575-639, C.C. Chow, B. Gutkin, D. Hansel, C. Meunier, and J. Dalibard, eds. Elsevier.

Long chaotic transients in complex networks. A. Zumdieck, M. Timme, T. Geisel, and F. Wolf. Phys. Rev. Lett., 93: 244103, 2004.

Topological speed limits to network synchronization. M. Timme, F. Wolf, and T. Geisel. Phys. Rev. Lett., 92:074101, 2004.

Breaking synchrony by heterogeneity in complex networks. M. Denker, M. Timme, M. Diesmann, F. Wolf, and T. Geisel. Phys. Rev. Lett., 92: 074103, 2004.

Group Leader Cell Biophysics Group at the European Neuroscience Institute

- Dr. (Ph. D.) 1997, Faculty of Chemistry, University of Utrecht, The Netherlands
- Postdoctoral fellow, Imperial Cancer Research Fund (ICRF), London UK, 1997 - 2000
- Postdoctoral fellow, European Molecular Biology laboratory (EMBL), Heidelberg, 2000 - 2001
- Appointed as group leader at the European Neuroscience Institute, Göttingen 2001

Major Research Interests

The focus of our research is the regulation and role of the neuronal cytoskeleton in the modulation of neuronal shape and motility during chemotactic processes. The growing neuronal growth cone probes its environment for the chemical composition of its substrate and the presence of neighbouring cells. The former information is sampled by cell adhesion receptors in focal adhesion structures that, next to their sensing function also perform a structural function in that they provide the cell with a means to exert force on its substrate. We are primarily interested in the signal transduction processes that regulate these effects and the cross-talk between the different motility systems.
The main interest areas in this question are; 1. The role and molecular mechanism of lipid raft-resident cell adhesion molecules in the remodelling of the membrane cytoskeleton, 2. Dynamic control of growth cone protein content by local proteolysis and chaperone function during chemotactic responses, 3. Role and mechanism of the neuronal exocyst complex as critical landmarks for dendritic/axonal neuritogenesis.
Our group has a related interest in the pathophysiological mechanism of neurodegeneration by intracellular aggregation of the tau protein, as occurs in Alzheimer's disease. As tau is an intrinsically unstructured protein that can undergo remarkable conformational changes upon binding to microtubules and in the Alzheimer-related aggregation condition, it presents an ideal model system for the biophysical analysis of protein conformational change and protein interactions.
Our research depends on the development and application of advanced microscopy techniques, primarily; fluorescence lifetime imaging microscopy (FLIM), and Förster resonance energy transfer (FRET) microscopy, in combination with a range of GFP-based optical biosensors and novel bioconjugation approaches for organic dyes, and protein biochemical/molecular biological techniques to resolve and quantify biochemical reactions and conditions in living cells.

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Selected Recent Publications

Wouters FS, Bastiaens PIH, Wirtz KWA, Jovin TM (1998) FRET microscopy demonstrates molecular association of non-specific lipid transfer protein (nsL-TP) with fatty acid oxidation enzymes in peroxisomes. EMBO J 17: 7179-7189

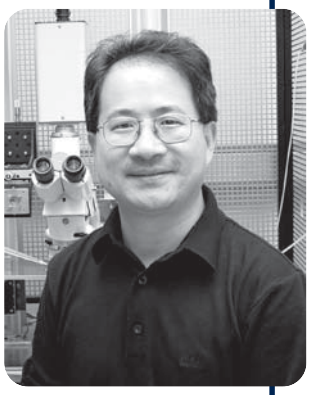
Wouters FS, Bastiaens PIH (1999) Fluorescence lifetime imaging of receptor tyrosine kinase activity in cells. Curr Biol 9: 1127-1130

Wouters FS, Verveer PJ, Reynolds AR, Bastiaens PIH (2000) Quantitative imaging of lateral ErbB1 receptor signal propagation in the plasma membrane. Science 290: 1567-70

Harpur A, Wouters FS, Bastiaens PIH (2001) Imaging FRET between spectrally similar GFP molecules in single cells. Nat Biotechnol 19: 167-9

Wouters FS, Verveer PJ, Bastiaens PIH (2001) Imaging biochemistry inside cells. Trends Cell Biol 11: 203-11

Weiqi Zhang



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Privatdozent, Neurophysiology

- Dr. med. (M. D.) University of Bonn, 1987
- Internship, Department of Neurology, University of Bern, Switzerland, 1988
- Postdoctoral fellow, Department of Physiology, University of Bern, Switzerland, 1989 - 1994
- Postdoctoral fellow, Department of Physiology, University of Oxford, UK, 1993
- Postdoctoral fellow, The Nobel Institute of Neurophysiology, Karolinska Institute, Stockholm, Sweden, 1994 - 1996
- Research Group Leader, Center of Physiology and Pathophysiology, University of Göttingen, since 1997
- Habilitation, University of Göttingen, 2003

Major Research Interests

The modulation of synaptic activity represents one of the essential features of neuronal network, which empowers the networks to keep their plasticity. The modulatory processes change the dynamic range of synaptic activity from milliseconds to hours and days depending on the requirements and the developmental stage of the network. Such modulatory processes involve ligand- and G-protein-mediated regulation of ion channel activity, regulation of neurotransmitter release machinery, regulation of receptor targeting, internalisation and intracellular RNA- and protein-synthesis. Currently, we use a combination of electrophysiological, immunocytochemical, biochemical and molecular biological methods to investigate the molecular mechanisms responsible for GABAB-, dopaminergic-, serotoninergic and opioid receptor-mediated modulation of ion channels and neurotransmitter release as well as for intracellular regulation of receptor targeting and internalisation in developing respiratory network of mice.
Furthermore, collaboration with other research groups allows us to analyze change of properties of network, receptor, channels and synapses in mutant mice, such as in MECP2, neuroligin, neurexin and 5-HT KO mice as well as in stress animal models, which are thought to be relevant for various development-related disorders causing failures in respiratory network.

Selected Recent Publications

Zhang W, Elsen F, Barnbrock A, Richter DW (1998) Postnatal development of $GABA_B$ receptor-mediated modulation of voltage-activated Ca^{2+} currents in mouse brain stem neurones. European Neurosci 11(7): 2332-2342

Ritter B, Zhang W (2000) The $GABA_A$-mediated inhibition matures during first postnatal week in brain stem of mouse. European Neurosci 12: 2975-2984

Zhang W, Barnbrock A, Gajic S, Pfeiffer A, Ritter B (2002) Differential ontogeny of $GABA_B$ receptor-mediated pre- and postsynaptic modulation of GABA and Glycine transmission in respiratory rhythm-generating network of mouse. The Physiology 540(2): 435-446

Missler M, Zhang W, Rohlmann A, Kattenstroth G, Hammer R, Gottmann K, Südhof TC (2003) α-Neurexins are Required for Coupling Ca^{2+}-Channels to Synaptic Vesicle Exocytosis. Nature 423: 939-948

Ritter B, Zschüntzsch J, Zhang W, Ponimaskin E (2004) The $GABA_B$ receptor subunits R1 and R2 interact differentially with the activation transcription factor ATF4 in mouse brain during the postnatal development. Developmental Brain Res 149/1: 73-77

Zhang W, Rohlmann A, Sargsyan V, Aramuni G, Hammer R, Südhof TC, Missler M (2005) Extracellular domains of α-neurexin are important for regulating synaptic transmission by selectively affecting N- and P/Q-type Ca^{2+}-channels. Neurosci 25 (17): 4330-4342

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PD Dr. E. Ponimaskin
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Prof. Dr. Dr. Detlev Schild
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