Letter from the President

In 2000, the Georg August University of Göttingen, together with the Max Planck Society for the Advancement of Science established two international MSc/PhD programs, namely *Neurosciences* and *Molecular Biology*.

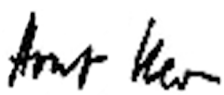
Both programs met with immediate success: Some 500 students from more than 70 countries applied for the 40 study places available.

These intensive research oriented programs are taught by internationally renowned scientists from five Göttingen University faculties, from the Max Planck Institutes for Biophysical Chemistry and for Experimental Medicine as well as from the German Primate Centre. International guest lecturers also participate in the programs. The Max Planck Society contributes through its newly established International Max Planck Research School.

Both programs keep close contacts with the relevant industries in order to also meet market requirements thus enhancing the chances for successful graduates to find attractive professional careers.

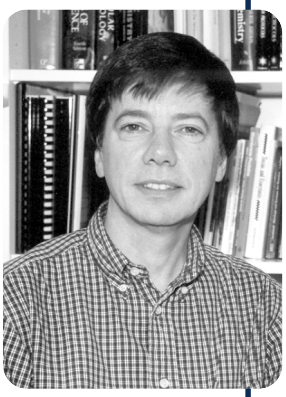
I would very much like to thank all scientific bodies and institutions for their keen support in establishing our new international programs and, last but not least, the German Academic Exchange Service (DAAD) as well as the Lower Saxony Ministry of Science and Culture.

The Georg August University of Göttingen is proud of its long international experience and very much looks forward to offering two attractive and innovative programs within the setting of a lively urban cultural and social background, a prerequisite for creative teaching and research.



Prof. Dr. Horst Kern
(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 intense 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 German language.

By now, 27 International Max Planck Research Schools have been established involving 32 Max Planck Institutes and 24 German universities. More than 400 (mostly PhD-) students from 58 countries are presently enrolled.

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 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 of their lives.

Peter Gruss
President
Max Planck Society
for the Advancement
of Science

Reinhard Jahn
Coordinator, IMPRS Göttingen
Director, MPI for Biophysical
Chemistry

Introduction

The Yearbook 2002/2003 is intended to inform about the international MSc/PhD/MD-PhD Program *Neurosciences* in Göttingen, Germany which started in October 2000 for the first time. Students, faculty, program committee and coordination staff are introduced on the following pages together with general information regarding the program.

The *Neuroscience* Program is carried out by the Georg August University of Göttingen, the Max Planck Institute for Biophysical Chemistry, the Max Planck Institute for Experimental Medicine, the German Primate Center (DPZ), and the European Neuroscience Institute (ENI). The Max Planck Institutes contribute as a newly established International Max Planck Research School to the program. The ENI is a union of research groups of the Medical Faculty, the Biological Faculty, and the Physics Faculty of the Georg August University as well as of the above-mentioned Max Planck Institutes and the DPZ. The aim of ENI is a European-wide promotion of the training of students and scientists in the area of the neurosciences. ENI cooperates with other European universities and research institutions to create a European-wide research and training network.

The entire program is based on close cooperation between all participating institutions.

Funding of the Program

DAAD

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

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

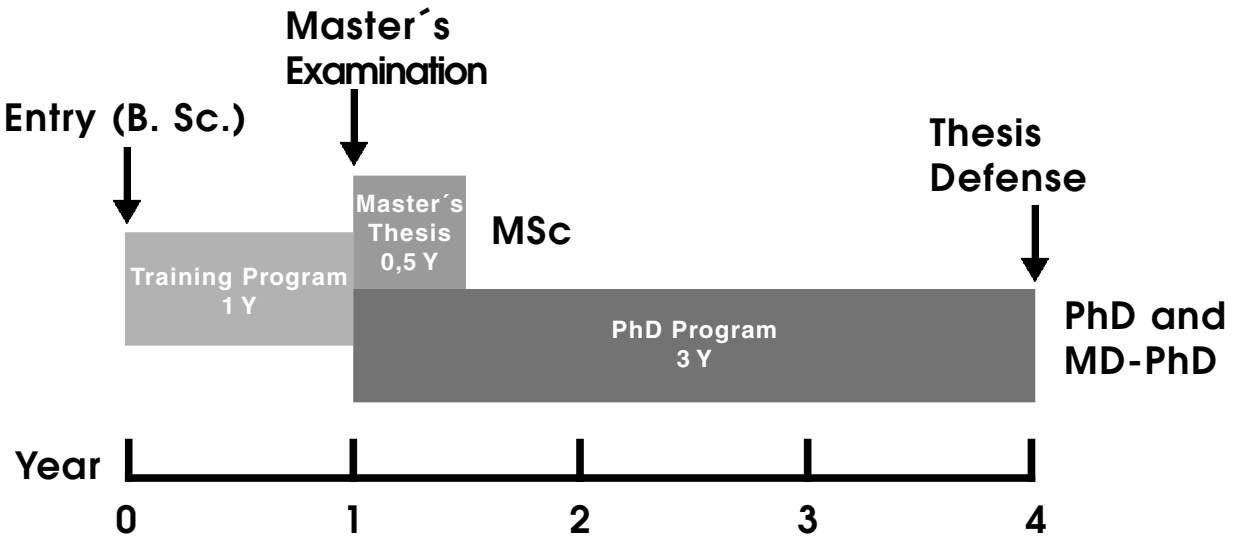
Niedersächsisches Ministerium
für Wissenschaft und Kultur

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

Overview

The Georg August University of Göttingen, the Max Planck Institute for Biophysical Chemistry, the Max Planck Institute for Experimental Medicine, the German Primate Center, and the European Neuroscience Institute offer an international graduate and postgraduate program in the neurosciences leading to a Master of Science (MSc) degree and a PhD / Dr. rer. nat. degree, respectively. Medical students can obtain an MD-PhD degree. The intensive, multidisciplinary and research-oriented program is taught in English by internationally renowned scientists. To assure individual training on a high standard, the number of participants is limited to twenty students per year. Selection and admission of highly qualified students involves several steps, including a written subject test and personal interviews with each candidate.

All successful applicants holding a Bachelor's degree (or equivalent) are guided through one year of intensive course work. The typical semester structure at German universities has been replaced by a modular training program during the first year, covering course work equivalent to three semesters. Good or excellent results after one year 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. Alternatively, students may conclude the program with a six-month Master's thesis project, leading to a Master of Science (MSc) degree.



The intensive, research oriented MSc/PhD program is taught by internationally renowned scientists. To assure individual training on a high standard, the number of participants in the program is limited to 20 students per year. A special emphasis is put on individual training in small groups. All courses are taught in English.

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

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

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

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

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

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

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

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

Intensive Training 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 (35 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.

During the first months of the training 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 are organized in the following teaching units:

I Neuroanatomy

- histology and development of the brain
- cytology of the cerebral cortex
- sensory systems
- hippocampus, brain stem, spinal cord, cerebellum
- monoamine systems
- cytology and histology of the invertebrate nervous system
- leech nervous system
- single neurons in invertebrates
- human brain

II Membrane Physiology and Neurophysiology

- recording of neuronal and muscular activity, electrical stimulation, electromyography
- nerve conduction
- perception, psychophysics
- optical and auditory system
- neuroethology of weakly electric fish
- fast and slow innervation of an insect muscle
- electroretinography (ERG)
- stretch receptor recording
- action potential propagation
- sensory physiology
- vestibular system EEG, evoked potentials, nystagmus
- motor system, EMG, reflexes

III Methods in Neurosciences

- neuron and synapse modelling
- tissue isolation, slicing, cell culture
- fluorescence microscopy, optical imaging
- embryo preparations, embryonic stem cells, gene transfer

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 four to five weeks of experimental work, followed by one week for data analysis and presentation. For each project, a report must be completed which has the format of a scientific research 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 training program emphasizes independent research of the students. PhD students select three faculty members as their advisory committee which closely monitor progress and advise students in their doctoral project. Laboratory work is accompanied by seminars, training of 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 received the PhD degree, 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 member of the Neuroscience Program.

Application, Selection and Admission 2002

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 2002, the coordination office received 172 applications from 40 countries

Continent	Applications	Admissions	(% of Applications)
Europe (total)	**44**	**7**	**(15.9)**
Germany	16	1	(6.25)
other West Europe	5	2	(40)
East Europe	23	4	(17.4)
America (total)	**19**	**2**	**(10.5)**
North America	7	0	(-)
Latin America	12	2	(16.6)
Africa(total)	**19**	**0**	**(-)**
North Africa	2	0	(-)
Central/South Africa	17	0	(-)
Asia (total)	**90**	**5**	**(5.5)**
Near East	4	0	(-)
Central Asia/ Far East	86	5	(5.8)

Orientation, Language Courses, Social Activities

A four-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 *Lektorat Deutsch als Fremdsprache* to facilitate the start in Göttingen. Additional language courses and social activities accompany the program.

Advertisement

Students 2002/2003

Name		Highest Degree	Home Country
Katharina	Anton-Erxleben	Vordiplom Psychology	Germany / USA
Jayeeta	Basu	B.Sc. Psychology	India
Benjamin	Cooper	B.Sc. Neuroscience	New Zealand / U.K.
Ignacio	Delgado Martinez	B.Sc. (hons) Medicine	Spain
Irina	Dudanova	Medical Doctor	Russian Federation
Emilio	Erazo Fischer	B.Sc. Biotechnology Engineering	Chile
Konstantin	Glebov	M.Sc. Biology	Russian Federation
Bao-Guo	Hsieh	B.Sc. Biology	Taiwan
Dragana	Jancic	Medical Doctor	Yugoslavia
Zaved	Khan	M.Sc. Biosciences	India
Segundo	Martinez Guzman	B.Sc. Pharmacology	Spain
Bibhash	Mukhopadhyay	B.Sc. (hons) Biochemistry	India
Primoz	Pirih	University Graduated Biologist	Slovenia
Gaston	Sendin	Licentiature in Biological Sciences	Argentina

Katharina Anton-Erxleben

First Name:
Katharina

Last Name:
Anton-Erxleben

Date of birth:
25 March 1980

Country:
Germany / USA

EDUCATION

College / University:
1999 - 2001: Universität Konstanz
2001 - 2002: Freie Universität Berlin

Highest Degree:
Vordiplom

Major Subjects:
Psychology

Lab Experience:
Assistance in planning and conducting psychological experiments, statistical analysis with SPSS

Projects / Research:
Research assistant in the DFG (Deutsche Forschungsgemeinschaft) project "Nicht-sprachliche Kognition und Textverstehen" (non-linguistic cognition and text comprehension), 2002, Technische Universität Berlin, project coordinator: Prof. Dr. Stephanie Kelter

Scholarships:
2002 - 2003: Stipend International Max Planck Research School
2002 - 2003: Carl Zeiss Stipend

SCIENTIFIC INTERESTS AND GOALS:

- understanding how neural mechanisms underlie human mind and behaviour
- learning more about information processing in the nervous system on the molecular level
- neural plasticity in development and due to experience, as well as its limits in adulthood

Jayeeta Basu

First Name:
Jayeeta

Last Name:
Basu

Date of birth:
6 March 1981

Country:
India

EDUCATION

College / University:
1999 - 2002: Presidency College, University of Calcutta

Highest Degree:
B.Sc.(first class honours)

Major Subjects:
Physiology

Lab Experience:
Histology ; biochemistry ; experimental physiology (nerve muscle studies, perfusion experiments on cardiac and smooth muscle); work physiology (physical fitness indices); microbiology; recombinant DNA technology (plasmid isolation, PCR, subcloning,transformation, site directed mutagenesis)

Projects / Research:
2001 (Nov): BSc final year project: Survey and analysis of the social and physiological conditions - cardiovascular, haematological and anthropometric parameters of coal miners & isolated tribal inhabitants
2002 (June - Aug): Rohit Mittal Lab, Dept. of Biological Sciences,Tata Institute of Fundamental Research, India: Modulation of G-protein mediated signal transduction: Cloning of GED domain & tyrosine residue mutagenesis of Dynamin

Scholarships:
2002 - 2003: Stipend International Max Planck Research School

Awards:
Best Human Quality Medal 2000, Presidency College, Calcutta

SCIENTIFIC INTERESTS AND GOALS:

I would like to gain an indepth knowledge and understanding of all aspects of neurosciences especially neurophysiology and molecular neurobiology. My current scientific interests include mechanisms of cell signalling -synaptic transmission & signal transduction. I want to investigate how the brain "creates" the mind - physiological, psychological and molecular basis of cognition, perception, learning and memory. I would like to pursue research on the mechanisms underlying various neurological disorders like stroke & neurodegenerative diseases so as to device novel therapeutic cures.

Ben Cooper

First Name:
Ben

Last Name:
Cooper

Date of birth:
26 May 1977

Country:
New Zealand

EDUCATION

College / University:
1995 - 1998: University of Otago, New Zealand
Highest Degree:
B.Sc (first class honours)
Major Subjects:
Neuroscience
Lab Experience:
Immunocytochemistry
Transmission electron microscopy(TEM): operation and specimen preparation
Projects / Research:
Honours degree project: "Evidence that distinct isoforms of nitric oxide synthase (NOS) are involved in the neurotoxicity of 3,4-methylenedioxymethamphetamine (MDMA).", Dept. Pharmacology, University of Otago, New Zealand
Scholarships:
2002 - 2003: Stipend International Max Planck Research School

SCIENTIFIC INTERESTS AND GOALS:

I am interested in neurodegenerative disorders and imaging techniques capable of visualising and assessing their impact on the structure and function of the central nervous system.

Ignacio Delgado Martínez

First Name:
Ignacio

Last Name:
Delgado Martínez

Date of birth:
1 December 1977

Country:
Spain

EDUCATION

College / University:
1996 - 2002: Faculty of Medicine, University of Cantabria, Santander, Spain
Highest Degree:
B.Sc.
Major Subjects:
Medicine
Projects / Research:
1999 (Aug): "Principles of the flow citometer", Department of Molecular Biology and Immunology, University of Cantabria.
2000 (Jul): "Cardiovascular research", Department of Surgical Sciences, University of Cantabria.
2000 (Aug): "Frontal lobe dysfunction in closed head injuries", Clinical Center of Belgrade.
2001 (Jul): "Promotor genes in neurofibromatosis type I", Institute of Neuropathology, Virchow Klinikum, Humboldt Universität, Berlin.
2001 - 2002: "Analysis of the blood cell production in murine´s alanthoides", Department of Anatomy and Cell Biology, University of Cantabria.
Scholarships:
2000: IFMSA Ellective project in Clinical Center of Belgrade.
2001: IFMSA Ellective project in Humboldt Universität (Berlin).
2002: Ministry of Education and Science: Collaboration grant at University of Cantabria.
2002 - 2003: Stipend International Max Planck Research School

SCIENTIFIC INTERESTS AND GOALS:

Interested in understanding life through the studying of the human mind.

Irina Dudanova

First Name:
Irina

Last Name:
Dudanova

Date of birth:
27 February 1981

Country:
Russian Federation

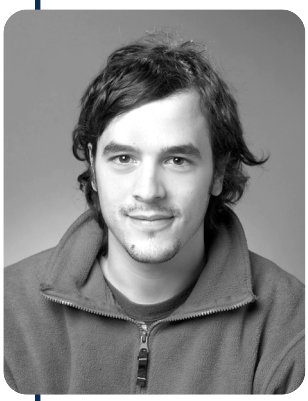
EDUCATION

College / University:
1998 - 2002: Petrozavodsk State University, Medical Faculty
Highest Degree:
MD in 2004
Major Subjects:
General Medicine
Projects / Research:
2001 - 2002: Porto-hepatic blood flow in patients with chronic hepatitis
Scholarships:
2001 - 2002: Scholarship of the President of Russia
2002 - 2003: Stipend International Max Planck Research School
2002 - 2003: Luigs & Neumann Stipend
Honors & Awards:
1998 : Successful participant of the Soros Olympiad in the field of Chemistry
1998: "Teletesting" Olympiad - 1st place in Karelia in Chemistry, Mathematics and English
1999, 2002: Awards at annual students' medical scientific conferences
(foreign language section)

SCIENTIFIC INTERESTS AND GOALS:

I would like to study the mechanisms causing disorders in the nervous system on the molecular and cellular level, for that is where we can find an explanation of the etiology and pathogenesis of nervous diseases. This would enable us to find a more effective treatment so that people suffering from these diseases could be socially adapted and live a productive life.

Emilio Erazo Fischer



First Name:
Emilio

Last Name:
Erazo Fischer

Date of birth:
19 July 1976

Country:
Chile / Germany

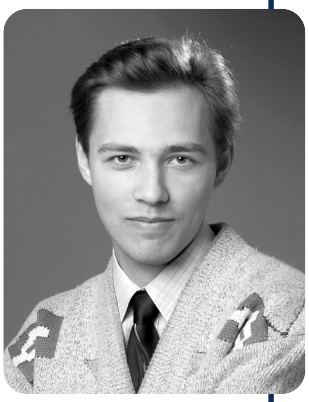
EDUCATION

College / University:
1996 - 2001: Universidad de Chile, Santiago
Highest Degree:
B.Sc. Molecular Biotechnology Engineering
Major Subjects:
Cell Biology, Microbiology, Biochemistry, Molecular Biology, Genetics, Immunology, Biotechnology
Lab Experience:
Protocols in Molecular Biology, cell culture, Flux cytometry, Immunology, bioinformatics, analysis and purification of proteins, etc.
Projects / Research:
1999: Cloning Chemotaxis genes of Helicobacter pylori, Dr. Hector Toledo, Department of Biochemistry, Faculty of Medicine, University of Chile, Santiago
2000: Transfection of Mouse Fibroblasts to express CIITa (class II trans-activator) Production of Monoclonal Antibodies against Cathepsin A, Dr. Maria Rosa Bono, Laboratory of Immunology, Faculty of Science, University of Chile, Santiago
2001 - 2002: Isolation, Sequence and Expression of genes coding for membrane proteins of *Piscirickettsia salmonis* to be used as a vaccine in salmonids, Thesis work, Dr. Vivian Wilhelm, Fundación Ciencia para la Vida and BiosChile IGSA, Santiago
Scholarships:
2002 - 2003: Stipend International Max Planck Research School

SCIENTIFIC INTERESTS AND GOALS:

Cognitive neuroscience, neurodegenerative diseases, neuroimmunology, regeneration of neural tissue. We´ll see.

Konstantin Glebov



First Name:
Konstantin

Last Name:
Glebov

Date of birth:
5 February 1980

Country:
Russian Federation

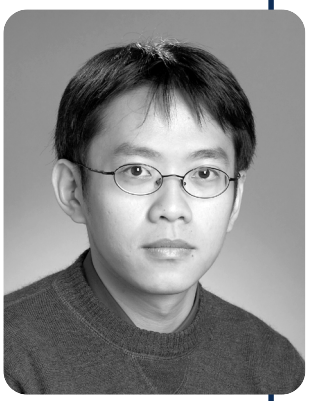
EDUCATION

College / University:
2001: University of Texas, Southwestern Medical Center at Dallas, USA
2000: Moscow State University, International Biotechnology Center, Cellular Engineering and Nuclear Transfer Program, Russia.
1997 - 2002: Tyumen State University, Department of Ecology and Genetics, Russia
Highest Degree:
M.Sc. with honour
Major Subjects:
Genetics, Molecular Biology, Ecology
Lab Experience:
Behavioral tests, DNA/protein gel-electrophoresis, cytogenic analyses, cell culture, plasmids creation, stable and transient cell transfection, PCR, RT-PCR, patch-clamp, chromatography, microbiological and biotechnological techniques
Projects / Research:
2002: Tyumen State University, Dept. of Ecology and Genetics: Analysis of influencing of nitrosomethylurea on variability of physiological and behavioral parameters in rats
2001: University of Texas, Southwestern Medical Center at Dallas: Characterize regions of the RGS16 gene that control mRNA expression
1999 - 2000: Tyumen State University, Dept. of Ecology and Genetics: Studies of features of a karyotype of a brown frog (*Rana temporaria*) in Tyumen region
Scholarships:
2002 - 2003: Stipend International Max Planck Research School

SCIENTIFIC INTERESTS AND GOALS:

I'm interesting in molecular biology, especially how to combine neuroscience and molecular biology for understanding fundamental processes in the brain. And try to find how we can improve memory skill with molecular biology. Also I'm interesting in any new techniques that can be useful in my research.

Bao-Guo Hsieh



First Name:
Bao-Guo

Last Name:
Hsieh

Date of birth:
6 August 1978

Country:
Taiwan

EDUCATION

College / University:
1999 - 2002 National University of Singapore
Highest Degree:
B.Sc (Honours)
Major Subjects:
Biology
Lab Experience:
Mammalian Cell Culture, In-Situ Hybridization, Immunochemical Techniques, Radio-Immunoassay, HPLC, Molecular Biology
Projects / Research:
1999 (Dec): National University of Singapore Hospital (NUH): project on Gene Therapy
2001 (Jan - May): Undergraduate Research Project (UROPS): study on protein aggregation in Parkinson's Disease
2002 (Jun - Dec): Honour´s Thesis Project on Dopamine induced toxicitz on dopaminergic neurons
Scholarships:
2001: Erasmus scholarship to go to Sweden in SS 2001
2002 - 2003: Stipend International Max Planck Research School

SCIENTIFIC INTERESTS AND GOALS:

I am interested in various aspects of Neuroscience such as the visual system and circadian rhythm. Furthermore, I wish to achieve an profound understanding how neurons at the circuit and systemic levels enable complex behaviours to be produced.

Dragana Jancic

First Name:
Dragana

Last Name:
Jancic

Date of birth:
29 January 1977

Country:
Yugoslavia

EDUCATION

College / University:
1995 - 2001: University of Belgrade, School of Medicine
Highest Degree:
M.D.
Major Subjects:
General Medicine
Projects / Research:
08/2000 - 01/2001: "Asherman's Syndrome - Case of Well Outcome Pregnancy followed by Hysteroscopic-Laparascopic Adhaesiolysis" at GAK, Belgrade
09/1997 - 03/1998: "Euthanasia - To Legalize It Or Not (comparative questionnaire)" at the Institute of Social Medicine, Belgrade
11/2000 - 06/2001: "Adenocarcinoma of Gall Bladder - Model for Predicting of Risks" in General Hospital, Kikinda
08/1999: professional exchange student at Hospital General in Guadalajara, Spain
06/2002: Group leader of topic "Genetic Engineering & Global Health", Gristuf Festival, Greifswald, Germany
Scholarships:
since 1999: Scholarship of Republic Foundation for Development of Scientific and Artistic Youth of Serbia
2000: Norwegian scholarship
2002 - 2003: Stipend International max Planck Research School
Awards:
2nd place at AIN SHAMS Congress, Cairo, Egypt, 2001

SCIENTIFIC INTERESTS AND GOALS:

The most interesting areas of scientific researches for me are: neuropharmacology, psychiatry, cognitive and behavioural science and neurogenetics. My personal wish is to enquire etiopathology of neurodisorders manifested in a way of psychiatric symptoms, to explore neural basis of emotions and to become more familiar with mechanisms of psychopharmacological treatment.

Zaved Ahmed Khan

First Name:
Zaved Ahmed

Last Name:
Khan

Date of birth:
2 March 1977

Country:
India

EDUCATION

College / University:
1997 - 2002: Jamia Millia Islamia, New Delhi, India
Highest Degree:
M.Sc. (Biosciences)
Major Subjects:
Physiology, molecualar biology, genetics
Lab Experience:
Molecular biology and immunological techniques
Projects / Research:
MSc project: Experimental studies on Nitric Oxide and some neurobehavioral patterns in VP chest institute,University of Delhi, India
Scholarships:
2002 - 2003: Stipend International Max Planck Research School
Awards:
2002: Cleared CSIR-UGC (council for scientific and industrial research-University Grant Commission) National eligibilty test for lecturership
2002: Cleared GATE (Graduate Apptitude Test for Engineering) in field of Life sciences

SCIENTIFIC INTERESTS AND GOALS:

I want to explore human nervous system at molecular level with special consideration at its power of regeneration. And the relation of behavioral aspects with molecular biology of neurons. My knowledge of all basic sciences like physics, chemistry, mathematics, computer programming and good background in molecular biology will certainly enable me to find out therapeutics cure for diseases directly or indirectly related to brain (especially Alzheimer and Parkinson disease).

Segundo José Martínez Guzmán

First Name:
Segundo José

Last Name:
Martínez Guzmán

Date of birth:
18 April 1976

Country:
Spain

EDUCATION

College / University:
1996 - 2002: University of Valencia
2000 - 2001: Westfälische Wilhelms Universität Münster
1995 - 2002: Faculty of Psychology, Open University Spain

Highest Degree:
B.Sc. in Pharmacy

Major Subjects:
Biochemistry, Pharmacodynamics and Pharmacokinetics, Physiology and Analytics

Lab Experience:
Quantitative and Qualitative analytical techniques, both chromatographical (HPCL, GC, CE and TLC) and spectophotometrical (UV, IR, fluorescence) applied to drug and toxicologycal analysis

Projects/Research:
2001: Drug Analysis and Toxicological Analysis: Institut für Pharmazeutische und Medizinische Chemie, Westfälische Wilhelms Universität Münster

Scholarships:
1996: Biology first class with distinction and remission of registration fee
2001: Socrates-Erasmus, Institut für Pharmazeutische und Medizinische Chemie
2002 - 2003: Stipend International Max Planck Research School

Honor / Awards:
1999: Lecturer in "II Spanish Symposium of Psychology and Internet", Neuroscience and the Mind-Brain problem (Toledo-Spain).

SCIENTIFIC INTERESTS AND GOALS:

Learning of the scientific technologies for the study of the cerebral physiology, as base for the understanding of the mental illness and the behavior of the human being like biological entity.

Bibhash Mukhopadhyay

First Name:
Bibhash

Last Name:
Mukhopadhyay

Date of birth:
16 January 1981

Country:
India

EDUCATION

College / University:
1999 - 2002 : All India Institute of Medical Sciences

Highest Degree:
B.Sc (Hons.) Human Biology

Major Subjects:
Biochemistry, Molecular Biology

Lab Experience:
General biochemical, molecular biology, cell biology and immunological techniques

Scholarships:
05 - 07 2002: Summer Fellowship awarded by Jawaharlal Nehru Centre for Advanced Scientific Research and Department of Science and Technology, Government of India
06 - 08 2002: Summer Fellowship at the Weizmann Institute of Science, Israel
2002 - 2003: Stipend International Max Planck Research School
2002 - 2003: Springer Verlag Stipend

SCIENTIFIC INTERESTS AND GOALS:

Synapse and molecular neurobiology. Mechanisms of neurotransmitter release and neuronal communication. I intend to be in academics and research and continue with post doctoral studies after my Ph.D.

Primo• Pirih

First Name:
Primo•

Last Name:
Pirih

Date of birth:
18 September 1975

Country:
Slovenia

EDUCATION

College / University:
1994 - 2002: Department of Biology, Biotechnical Faculty, University of Ljubljana, Slovenia

Highest Degree:
University Graduated Biologist

Major Subjects:
Animal & Human Physiology, Neurobiology, Membrane Biology, Comparative Anatomy, Ethology, Ecology

Lab Experience:
Insect physiology, computer analysis of ERG data, electrotechnics and programming

Projects / Research / Publications:
1999-2002: National Institute of Biology, Marine Biological Station Piran: scuba-diver in a biodiversity project and in a mariculture/ecology project
2001: "Ecophysiology Through Electroretinography: Ascalaphus macaronius, a Case Study". Poster. Conference on Rhabdomeric photoreceptors, Bad Herrenalb, 13 -15.10. 2001 (see http://007.biologija.org/ascalaphus)
2002: "The Effect of Temperature on Adaptation and Spectral Sensitivity of the Ascalaphus Owlfly Eye". Graduation Thesis. Supervisor Peter Stušek

Scholarships:
1990 - 2000: National scholarship of "•iga [Sigismund] Zois"
2002 - 2003: Stipend International Max Planck Research School

SCIENTIFIC INTERESTS AND GOALS:

Given the chance to take part in the program, I shall try to learn a variety of biophysical, molecular and optical techniques used in the laboratories here. I am also looking forward to learn more on the vertebrate nervous systems; nevertheless, I remain convinced that we shall still learn important concepts from the invertebrates. My main research interests are cell physiology and imaging of living tissue, neural network modelling and behaviour. A good side-effects would also be to learn german language and, last but not least, to have a good time with colleagues from both programs.

Gaston Sendin

First Name:
Gaston

Last Name:
Sendin

Date of birth:
13 April 1976

Country:
Argentina

EDUCATION

College / University:
1995 - 2002: School of Sciences, University of Buenos Aires, Argentina

Highest Degree:
Licentiature in Biological Sciences

Major Subjects:
Neurobiology and molecular physiology

Lab Experience:
Expression of foreign RNA in *Xenopus laevis* oocytes,two electrode voltage clamp recording, pharmacology, molecular biology, statistical analysis

Projects / Research:
1999 - 2002: "Study on the modulation by divalent cations of the GABA rho1 receptor expressed in *Xenopus laevis* oocytes". Research Thesis Project at INGEBI-UBA, Buenos Aires, Argentina

Scholarships:
2002 - 2003: Stipend International Max Planck Research School

Publications:
2001: Sendin GC, Goutman JD & Calvo DJ (2001) Study on the modulation by divalent cations of the GABA rho1 receptor expressed in *Xenopus laevis* oocytes. GABA Receptors ISN-ASN Joint Satellite Meeting, Mar del Plata, Argentina, August 2001

SCIENTIFIC INTERESTS AND GOALS:

The nervous system poses a challenge to every scientist because it pushes us to deal with complex systems where emerging properties are more than the sum of the parts. The knowledge derived from the study of the brain permeates disciplines as diverse as biology, philosophy, computation and mathematics. I think it´s worth visiting this inner frontier, as someone called it.

Graduate Program Committee

Prof. Dr. Eberhard Fuchs
Prof. Dr. Ralf Heinrich
Prof. Dr. Willhart Knepel
Dr. Christian Rosenmund
Prof. Dr. Dr. Detlev Schild
Prof. Dr. Walter Stühmer
PD Dr. Heinrich Terlau
Dr. Swen Hülsmann
Dr. Jürgen Klingauf
Dr. E. Ponimaskin
Katharina Anton-Erxleben
Manuela Schmidt

Program Coordination

Dr. Steffen Burkhardt
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(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
Wolfgang	Engel	Human Genetics	U Göttingen
Jens	Frahm	Biomedical NMR Research / Physical Chemistry	MPI bpc
Gabriele	Flügge	Neurobiology	DPZ
Eberhard	Fuchs	Animal Physiology / Neurobiology	DPZ
Folker	Hanefeld	Pediatrics and Child Neurology	U Göttingen
Ralf	Heinrich	Neurobiolgy	U Göttingen
Michael	Hörner	Cellular Neurobiology	U Göttingen
Sven	Hülsmann	Neuro- and Sensory Physiology	U Göttingen
Hubertus	Jarry	Clinical and Experimantal Endocrinology	U Göttingen
Herbert	Jäckle	Molecular Developmental Biology	MPI bpc
Reinhard	Jahn	Neurobiology	MPI bpc
Uwe	Jürgens	Zoology / Neurobiology	DPZ
Bernhard	Keller	Neuro- and Sensory Physiology	U Göttingen
Jürgen	Klingauf	Membrane Biophysics	MPI bpc
Willhart	Knepel	Molecular Pharmacology	U Göttingen
Reiner	Kree	Theoretical Physics	U Göttingen
Kerstin	Krieglstein	Neuroanatomy	U Göttingen
Reinhard	Lakes-Harlan	Neurobiology	U Göttingen
Gerd	Lüer	Psychology	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
Harald	Neumann	Neuroimmunology	ENI
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
Christian	Rosenmund	Membrane Biophysics	MPI bpc
Marjan	Rupnik	Neuroendocrinology	ENI
Eckart	Rüther	Psychiatry	U Göttingen
Detlev	Schild	Molecular Neurophysiology	U Göttingen
Ralf	Schneggenburger	Membrane Biophysics	MPI bpc
Friedrich-Wilhelm	Schürmann	Cell Biology	U Göttingen
Stefan	Schwarzacher	Neuroanatomy	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
Heinrich	Terlau	Molecular and Cellular Neuropharmacology	MPI em
Stefan	Treue	Cognitive Neuroscience and Biological Psychology	DPZ
Michael	Waldmann	Psychology	U Göttingen
Fred	Wouters	Cellular Biophysics	ENI
Wolfgang	Wuttke	Clinical and Experimental Endocrinology	U Göttingen
Weiqi	Zhang	Neuro- and Sensory Physiology	U Göttingen
Annette	Zippelius	Theoretical Physics	U Göttingen

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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Major Research Interests:

We are interested to understand 2 basic questions in cellular and molecular neurobiology:
1. Which factors support survival of adult CNS neurons?
2. What kills these cells under pathological conditions?

Up to now, only little is known about the mechanisms that support survival of a postmitotic cell like a human neuron for eventually more than 100 years under physiological conditions. However, by examining the molecular regulation of cell survival and cell death during development and in the lesioned adult CNS, one may get some clues to answer this question.
In our group, several *in vitro* and *in vivo* model systems are used which allow examination of neuronal de- and regeneration. Our basic model is the rodent retino-tectal projection. Here, we can study development, de- and regeneration of the respective projection neurons, the retinal ganglion cells (RGCs) in single cell cultures, explants or *in vivo*. Transection or crush-axotomy of the optic nerve induces retrograde death more than 80% of RGCs within two weeks. This secondary cell loss is mainly apoptotic and involves specific changes in gene expression pattern of transcription factors (e.g. c-jun or ATF-2), pro- and anti-apoptotic genes (e.g. bcl-2 or bax) and growth-associated genes (like GAP-43). Thus, long term survival and initiation of regeneration programmes of RGCs critically depends on inhibition of apoptotic cell death. To that end, we have used a variety of techniques to interfere with the cell death cascades that follow lesions of the optic nerve in adult rats. Inhibition of neuronal apoptosis can be afforded by pharmacological administration of trophic factors or by gene therapy approaches using adenovirus vectors that can deliver neurotrophic factors directly into neurons or into surrounding glial cells. These, an other new strategies like using 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 od neurodegenerative diseases (e.g. Alzheimer ‘s or Parkinson’s disease).

Selected Recent Publications:

Klöcker N, Kermer P, Weishaupt J H, Labes M, Ankerhold R, Bähr M (2000) BDNF mediated neuroprotection of adult rat retinal ganglion cells *in vivo* does not exclusively depend on PI-3-K/PKB signalling. J Neurosci 20: 6962-6967

Bähr M (2000) Live and let die - Survival and cell death in the developing and lesioned adult CNS. TINS 23(10): 483-490

Diem R, Meyer R, Weisshaupt J, Bähr M (2001) Reduction of potassium currents and PI3-K-dependent Akt phosphorylation by tumor necrosis factor a rescues axotomized retinal ganglion cells from secondary cell death *in vivo*. J Neurosci 21(6): 2058-2066

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

Kilic E, Dietz G P H, Herrmann D M, Bähr M (2002) Intravenous TAT-Bcl-XL is protective when delivered before and after middle cerebral artery occlusion in mice. Ann Neurol: in press

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

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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 of the Neuroligin family and their role in synapse formation. Studies on the molecular mechanisms of neurotransmitter release focus on components of the presynaptic active zone (Munc13s, RIM, Complexins) and their regulatory function in synaptic vesicle fusion.

Selected Recent Publications:

Augustin I, Korte S, Rickmann M, Kretzschmar H A, Südhof T C, Herms J W, Brose N (2001) The cerebellum-specific Munc13 isoform Munc13-3 regulates cerebellar synaptic transmission and motor lerning in mice. J Neurosci 21: 10-17

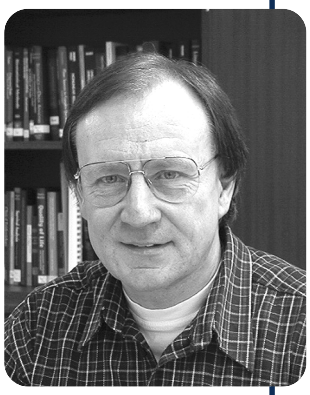
Reim K, Mansour M, Varoqueaux F, McMahon HT, Südhof TC, Brose N, Rosenmund C (2001) Complexins regulate a late step in Ca^{2+}-dependent neurotransmitter release. Cell 104: 71-81

Betz A, Thakur P, Junge H J, Ashery U, Rhee J S, Scheuss V, Rosenmund C, Rettig, J Brose N (2001) Functional interaction of the active zone proteins Munc13-1 and RIM1 in synaptic vesicle priming. Neuron 30: 183-196

Rhee J S, Betz A, Pyott S, Reim K, Varoqueaux F, Augustin I,
Hesse D, Südhof TC, Takahashi M, Rosenmund C, 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

Varoqueaux F, Sigler A, Rhee JS, Brose N, Enk C, Reim K, Rosenmund C (2002) Total arrest of spontaneous and evoked synaptic transmission but normal synaptogenesis in the absence of Munc13-mediated vesicle priming. Proc Natl Acad Sci USA 99: 9037-9042

Edgar Brunner



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 Kolmo-gorov-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

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Major Research Interests:

Nonparametric Statistics

- asymptotic distribution of rank
- statistics
- multi-factor designs
- adjustment for covariates

longitudinal data

ordered categorial data

multi center clinical trials

statistical methods for the analysis of microarray data

Selected Recent Publications:

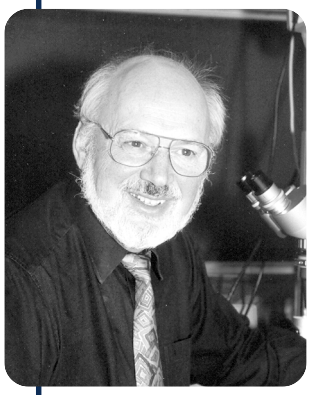
Akritas M G, Arnold S F and Brunner E (1997) Nonparametric hypotheses and rank statistics for unbalanced factorial designs. J Amer Statist Assoc 92: 258-265

Akritas M G und Brunner E (1997) A unified approach to ranks tests in mixed models. J Statist Plann and Inf 61: 249-277

Brunner E, Dette H und Munk A (1997) Box-Type Approximations in Nonparametric Factorial Designs. J Amer Statist Assoc 92: 1494-1502

Brunner E, Munzel U and Puri M L (1999) Rank-Score Tests in Factorial Designs with Repeated Measures. J Mult Analysis 70: 286-317

Brunner E, Domhof S and Langer F (2001) Nonparametric Analysis of Longitudinal Data in Factorial Designs. Wiley: New York



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).

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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

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

A Stumpner (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

Wolfgang Engel

Professor of Human Genetics

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

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Major Research Interests:

7% of men are infertile and in about 37% of them, infertility is suggested to be due to genetic defects. We are interested in the isolation, characterization and functional analysis of genes which are involved in the differentiation of male germ cells. Functional analysis is studied in transgenic and knock-out mice. The characterized genes could be candidate genes for male infertility.

Cryptorchidism (abdominal or inguinal position of the testes) occurs in 0.5 to 1% of men and results in male infertility. Furthermore, cryptorchid men have an increased risk for testicular tumors. We have isolated the Insl3 gene which is only expressed in testicular Leydig cells. Mice deficient for the Insl3 gene show bilateral, abdominal cryptorchidism. Therefore these mice can be used as a model system for the study of cryptorchidism in human and for the evaluation of downstream and upstream target genes in the gene cascade.

Testicular seminomas are the most frequently occuring tumors in young men. To date it is unknown from which type of germ cells seminomas derive from. Using transgenic mice, in which an oncogene is under the control of germ cell specific promoters, this question can be answered. Furthermore, these mouse models are suitable for the isolation and characterization of genes which are involved in malignant germ cell transformation and seminoma development.

Selected Recent Publications:

Nayernia K, Adham I M, Burkhardt-Göttges E, Neesen J, Rieche M, Wold S, Sancken U, Kleene K, Engel W (2002) Asthenozoospermia in mice with targeted deletion of the sperm mitochondrion-associated cysteine-rich protein (Smcp) gene. Molecular and Cellular Biology 9: 3046-3052

Trappe R, Ahmed M, Gläser B, Vogel C, Tascou S, Burfeind P, Engel W (2002) Identification and characterization of a novel murine multigene family containing a PHD-finger-like motif. Biochemical and Biophysical Research Communications 296: 319-327

Zimmermann S, Steding G, Emmen J M A, Brinkmann A O, Nayernia K, Holstein A F, Engel W, Adham IM (1999) Targeted disruption of the Insl3 gene causes bilateral cryptorchidism. Molecular Endocrinology 13: 681-691

Shamsadin R, Adham I M, Nayernia K, Heinlein U A O, Oberwinkler H, Engel W (1999) Male mice deficient for germ-cell Cyritestin are infertile. Biology of Reproduction 61: 1445-1451

Neesen J, Kirschner R, Ochs M, Schmiedl A, Habermann B, Mueller C, Holstein A F, Nuesslein T, Adhman I, Engel W (2001) Disruption of an inner arm dynein heavy chain gene results in asthenozoospermia and reduced ciliary beat frequency. Human Molecular Genetics 109 (11): 1117-1128

Jens Frahm

Professor of Physical Chemistry

Director of 'Biomedizinische NMR Forschungs GmbH'
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jfrahm@gwdg.de

Further Information:

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

Major Research Interests:

Methodology

- development and application of spatially resolved NMR
- magnetic resonance functional neuroimaging
- localized magnetic resonance neurospectroscopy

Brain Research

- noninvasive 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
- animal models, transgenic mice

Selected Recent Publications:

Fransson P, Merboldt K D, Ingvar M, Petersson K M, Frahm J (2001) Functional MRI with Reduced Susceptibility Artifact: High-Resolution Mapping of Episodic Memory Encoding. NeuroReport 12: 1415-1420

Baudewig J, Nitsche M A, Paulus W, Frahm J (2001) Regional Modulation of BOLD MRI Responses to Human Sensorimotor Activation by Transcranial Direct Current Stimulation. Magn Reson Med 45: 196-201

Baudewig J, Bittermann H J, Paulus W, Frahm J (2001) Simultaneous EEG and Functional MRI of Epileptic Activity: A Case Report. Clin Neurophysiol 112: 1196-1200

Watanabe T, Michaelis T, Frahm J (2001) Mapping of Retinal Projections in the Living Rat Using High-Resolution 3D MRI with Mn^{2+}-Induced Contrast. Magn Reson Med 46: 424-429

Czeh 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 98: 12796-12801

Gabriele Flügge

Privatdozent, Experimental Neuroscience

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

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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 central nervous diseases such as depression. We are investigating central nervous processes that occur in the course of chronic psychosocial stress in animals that show similar symptoms as depressed patients.
Changes in neurotransmitter systems, receptors, transporters and other molecules are investigated using molecular biology methods to quantify expression of genes in combination with *in situ* hybridization and immunocytochemistry to localize the changes in distinct neurons of the brain. The effects of antidepressants are investigated with the same tools to elucidate mechanisms that underlie the beneficial effects of these drugs. In conjunction with behavioral studies we are able to find neuromolecular factors that contribute to emotional behavior in the animals.

Selected Recent Publications:

Fuchs E, Flügge G (2002) Social stress in tree shrews. Effects on physiology, brain function, and behavior of subordinate individuals. Pharmacol Biochem Behav 73: 247-58

Flügge G, Kramer M, Fuchs E (2001) Chronic subordination stress in male tree shrews: replacement of testosterone affects behavior and central alpha$_2$-adrenoceptors. Physiol. Behav 73: 293-300

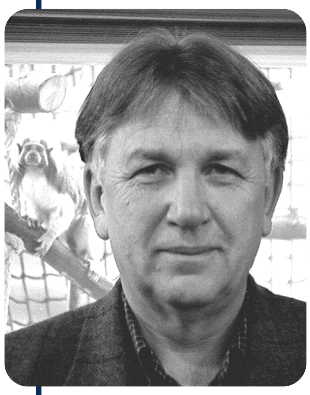
Meyer H, Palchaudhuri M, Scheinin M, Flügge G (2000) Regulation of alpha$_{2A}$-adrenoceptor expression by chronic stress in neurons of the brain stem. Brain Research 880: 147-158

Isovich I, Mijnster MJ, Flügge G, Fuchs E (2000) Chronic psychosocial stress reduces the density of dopamine transporters. Eur J Neurosci 12: 1071-1078

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

Flügge G (1999) Effects of cortisol on brain alpha$_2$-adrenoceptors: potential role in stress. Neuroscience Biobehav Rev 23: 949-956

Eberhard Fuchs



Professor of Animal Physiology

1977: Dr. rer. nat, University of München
1996 - 2000: Professor (Animal Physiology), University of Karlsruhe
2000: Professor (Animal Physiology), University of Göttingen
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Major Research Interests:

We are an interdisciplinary research laboratory using functional 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 disorders.
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, depression and aging. In addition, there are initial studies in the areas of Parkinson's disease and Multiple Sclerosis.

Selected Recent Publications:

Kole M H P, Swan L, Fuchs E (2002) The antidepressant tianeptine persistently modulates glutamate receptor currents of the hippocamapl CA3 commissural-associational synapse in chronically stressed rats. Europ J Neurosci in press

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

Bartolomucci A, de Biurrun G, Czeh B, van Kampen M, Fuchs E (2002) Selective enhancement of spatial learning under chronic psychosocial stress. Europ J Neurosci 15: 1863-1866

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

Czeh 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

Michaelis T, de Biurrun G, Watanabe T, Frahm J, Ohl F, Fuchs E (2001) Gender-specific alterations of cerebral metabolites with aging and cortisol treatment. J Psychiat Res 35: 231-237

Lucassen P, Vollmann-Honsdorf G K, Gleisberg M, de Kloet E R, Fuchs E (2001) Chronic psychosocial stress differentially affects apoptosis in hippocampal subregions and cortex of the adult tree shrew. Europ J Neurosci 14: 161-166

Folker Hanefeld

Professor of Pediatrics and Child Neurology

Georg-August-Universität Göttingen since 1985
Dr. med. Dr. med. h.c.
Training in Pediatrics at the Free University Berlin, 1965 - 69
Pediatric Neurology at Hospital for
Sick Children, London, 1970 - 72
Habilitation (Pediatrics) FU Berlin 1974
Professor of Pediatrics, FU Berlin 1975

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Major Research Interests:

Neurological disorders - acquired or inborn - form the bulk of daily problems in a pediatric hospital.
The Department of Pediatrics and Child Neurology has special interest in neurometabolic and neuromuscular disorders, mental retardation (including Rett syndrome) and inflammatory demyelination of the CNS (including childhood Multiple Sklerosis). Following the discovery of an inborn error of creatine synthesis (GAMT deficiency) the neuroprotective potential of creatine is studied by different means clinically and in an animal model (cooperation with Prof. Richter, Dept. of Neurophysiology).
MR spectroscopy is used to evaluate unclassified neurological diseases of gray and white matter (cooperation with Prof. Frahm, MPI). Childhood MS is studied in a prospective epidemiological and clinical study. Mental retardation, in particular MeCP2 mutations, is analysed with respect to genotype-phenotype correlation (cooperation with Prof. Engel, Institute Human Genetics).
Amongst the muscular diseases, congenital myopathies and mitochondrial disorders are studied using immunofluoreszens and molecular genetic techniques.

Selected Recent Publications:

Hanefeld F, Oligoyric Microcephaly. Letter to the editor: Neuropediatrics 30: 102-103,1999

Wilken B, Ramirez JM, Probst I, Richter DW, Hanefeld F. Anoxic ATP depletion in neonatal mice brainstem is prevented by creatine supplementation. Arch Dis Child FETAL & NEONATAL 82/3: F224-F227, 2000-12-07

Hanefeld F, Körner C, Holzbach-Eberle U, von Figura K (2000) Congenital disorders of glycosylation-Ic: Case report and genetic defect. Neuropediatrics 31: 60-62

Huppke P, Laccone F, Krämer N, Engel W, Hanefeld F. Rett syndrome: analysis of *MECP*2 and clinical characterization of 31 patients. Human Molecular Genetics 9/9: 1369-75, 2000-12-07

Wilken B, Dechent P, Herms P, Maxton C, Markakis E, Hanefeld F, Frahm J (2000) Quantitative Proton Magnetic Resonance spectroscopy of focal brain lesions. Pediatric Neurology 23/1: 22-31

Herms J, Neidt I, Lüscher B, Sommer A, Schürmann P, Schröder T, Bergmann M, Wilken B, Probst-Cousin S, Hernaiz-Driever P, Behnke J, Hanefeld F, Pietsch T, Kretschmar H A (2000) C-M *YC* Expression in medulloblastoma and its prognostic value. Int. J. Cancer (Pred. Oncol.) 89: 395-402

Brück W, Herms J, Brockmann K, Schulz-Schaeffer W, Hanefeld F. Myelinopathia Centralis Diffusa (Vanishing White Matter Disease): Evidence of Apoptotic Oligodendrocyte Degeneration in Early Lesion Development. Ann Neurol 2001; 50: 532-536

Ralf Heinrich

Juniorprofessor, 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 and to analize their modulatory effects on the subsequent behavior of the animal.
2) *Aggressive behavior of crustaceans:* In essentially all species of animals, including man, 5HT is important in aggression, which is a quantifiable behavior in crustaceans. 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.

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Selected Recent Publications:

Heinrich R, Cromarty S I, Hörner M, Edwards D H and Kravitz E A (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 and Kravitz E A (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 and 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 and 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

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Postdoc Fellow Physiology Medical University of Kiel, 1989 - 1990
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Associate Prof. (Oberassistent C2, Univ. of Göttingen), 1997 - dato
Research Assistant MPI for Ethology (Seewiesen), 1985/1986
Research Fellow Arizona Research Labs (Tucson, USA), 1993/1996
Feodor-Lynen-Stipend from the A. von Humboldt-Foundat. (Harvard Medical School Boston, USA), 1994 - 1995
Research Fellow Marine Biological Labs (Woods Hole, USA), 1992/1997
2002 Apl. Professor Cellular Neurobiology, University of Göttingen
Guestprofessor, University of Hongkong, 2002 - 2003

Major Research Interests:

Molecular Mechanisms Of Synaptic And Non-Synaptic Modulation

Biogenic amines such as serotonin, dopamine, histamine or octopamine, 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. Compared to other transmitter substances, biogenic amines often initiate long-lasting neuro-modulatory effects in their targets, which is due to diffusion processes following non-synaptic release activating G-protein coupled to intracellular pathways. My work is focussed on the investigation of cellular and molecular mechanisms underlying the modulation of neuronal signaling in identified networks in invertebrate model systems.
Using electrophysiological, pharma-cological and immunocytochemical techniques in combination with behavioral measurements, I am investigating mechanisms of aminergic modulation in identified neurons of defined networks in insects and crustacea. To address both mechanistic and functional questions, a parallel approach has been developed, which allows to investigate single identified neurons both *in-vivo* with intact synaptic connections and *in-vitro* in primary 'identified' cell culture, where neurons are separated from connections to other neurons. The functional meaning of aminergic modulation on the cellular level in behaviorally-relevant circuits is assessed by quantitative behavioral measurements.
The investigations show that OA enhances the responsiveness of a neuronal network in insects ('giant fiber pathway') which triggers a fast escape reaction. The electrical 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:

Hörner M, Weiger W A, Edwards H D, Kravitz E A (1997) Excitation of identified serotonergic neurons by escape command neurons in lobsters. J Exp Biol 200(14): 2017-2033

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

Hörner M (1999) The cytoarchitecture of histamine-, dopamine- and serotonin-containing neurons in the cricket ventral nerve cord. in: The cellular distribution of histamine and other biogenic amines in the nervous system of arthropods. (eds J.E. Johnson, M. Hörner) Special issue of the journal Microscopy Research and Technique, Wiley and Sons, New York, Chichester, Vol 44 (2/3), pp 137-166

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: 207-222

Swen Hülsmann

Group leader at the Department of Neurophysiology

Dr. med., University of Münster
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

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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 aspect 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. In a neuronal network of the caudal medulla the small population of neurons in the pre-Bötzinger Complex generates the neuronal rhythm of breathing. Recent observations suggest that this neuronal activity indeed strongly depends on the function of astrocytes.

Selected Recent Publications:

Hülsmann S, Oku Y, Zhang W, Richter D W (2000) Metabolic coupling between glia and neurons is necessary for maintaining respiratory activity in transverse medullary slice of neonatal mouse. Eur J Neurosci 12: 856-862

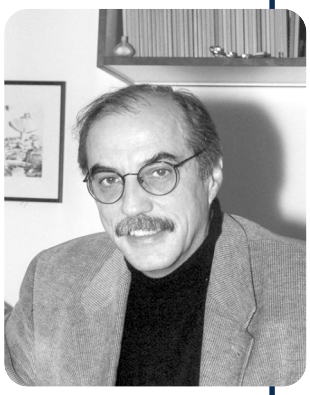
Hülsmann S, Oku Y, Zhang W, Richter D W (2000) Metabotropic glutamate receptors and blockade of glial Krebs cycle depress glycinergic synaptic currents of mouse hypoglossal motoneurons. Eur J Neurosci 12: 239-246

Hülsmann S, Greiner C, Köhling R, Wölfer J, Moskopp D, Riemann B, Lücke A, Wassmann H, Speckmann E-J (1999) Dimethyl sulfoxide increases latency of anoxic terminal negativity in hippocampal slices of guinea pig *in vitro*. Neurosci Lett 261: 1-4

Hülsmann S, Köhling R, Greiner C, Moskopp D, Lücke A, Wassmann H, Speckmann E-J (1999) Neuroprotection by 21-aminosteroids: insights from latencies of anoxic terminal negativity in hippocampus slices of guinea pig. Neurol Res 21: 305-308

Hülsmann S, Mußhoff U, Madeja M, Fischer B, Speckmann E-J (1998) Characterization of transmembraneous ion currents elicited by a stream of fluid during spontaneous and ligand-induced chloride-current oscillation in *Xenopus laevis* oocytes. Pflügers Arch 436: 49-55

Herbert Jäckle



Professor, Director at the Max Planck Institute for Biophysical Chemistry

Faculty member at the EMBL, Heidelberg (1980 - 1982)
Head of the group (associate professor), Max Planck Institute for Developmental Biology, Tübingen (1982 - 1988)
Professor and Chairman, Dept. of Genetics and Microbiology, Univ. of Munich (1988 - 1991)

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Major Research Interests:

How is the embryo generated from a single cell, the egg? We address this question by using the *Drosophila* embryo as an experimental system, applying the combined tools of classical embryology, genetics, molecular biology and biochemistry. We have focussed our efforts to isolate and characterize the factors underlying early pattern formation along the anterior-posterior axis of the embryo. We sought to unravel their mode of action und the molecular mechanism in which they function.
Many of the factors required to establish the basic body plan are also necesssary for organ formation, a process which involves local inductive interactions between groups of cells and/or epithelial cell layers. We have started to identify the genetic components and regulatory circuitries involved in organogenesis as well as in neural conductivity and function. We also use the fly to identify the components of novel biochemical pathways and cellular key components that control and maintain homeostasis and energy balance, and we initiated a gene discovery program to systematically characterize the function of genes on the *Drosophila* X-chromosome.

Selected Recent Publications:

Schöck F, Reischl J, Wimmer E, Taubert H, Purnell B A and Jäckle H (2000) Phenotypic supression of *empty spiracles* is prevented by buttonhead. Nature 405: 351-354

Piepenburg O, Vorbrüggen G, and Jäckle H (2000) *Drosophila* segment borders result from unilateral repression of hedgehog activity by Wingless signaling. Molecular Cell 6: 203-209

Niessing D, Sprenger F, Driever W, Taubert H, Jäckle H and Rivera-Pomar R (2000) Homeodomain position 54 specifies transcriptional versus translational control by Bicoid. Mol Cell 5: 595-401

Linder B, Gerlach N and Jäckle H (2001) The *Drosophila* homolog of the human AF10 is a HP1-interacting suppressor of position effect variegation. EMBO reports 2: 211-216

Benos P V *et al*. (2001) From first base: The sequence of the tip of the *X*-chromosome of *Drosophila melanogaster*, a comparison of two sequencing strategies. Genome Research 11: 710-730

Reinhard Jahn

Professor, Director at the Max Planck Institute for Biophysical Chemistry

Dr. rer. nat. (Ph.D.) 1981, University of Göttingen
Professor (since 1997 Adjunct Professor) of Pharmacology, Yale University School of Medicine
Appointed as Director at the Max Planck Institute for Biophysical Chemistry 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

Lang T, Bruns D, Wenzel D, Riedel D, Holroyd P, Thiele C, Jahn R (2001) SNAREs are concentrated in cholesterol-dependent clusters that define docking and fusion sites for exocytosis. EMBO J 20: 2202-2213

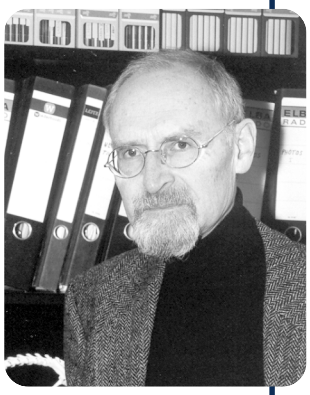
Antonin W, Fasshauer D, Becker S, Jahn R, Schneider TR (2002) Crystal structure of the endosomal SNARE complex reveals common structural principles of all SNAREs. Nature Struct Biol 9: 107-111

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

Jahn R, Grubmüller H (2002) Membrane fusion. Curr Opinion in Cell Biology 14: 488-495

Lang T, Margittai M, Hölzler, H, Jahn R (2002) SNAREs in native plasma membranes are active and readily form core complexes with endogenous and exogenous SNAREs. J Cell Biol 158: 751-760

Uwe Jürgens



Professor of Zoology

1961 - 66 Studies of biology at the University of Munich, Germany
1966 - 91 Research associate at the Max-Planck-Institute of Psychiatry, Munich
1969 Degree of Dr. rer. nat. in Zoology
1976 Degree of Dr. rer. nat. habil. in Zoology
Since 1991 Head of the Neurobiology Department at the German Primate Center, Göttingen, and Professor of Zoology at the University of Göttingen

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Major Research Interests:

The aim of our research is to better understand the central control of phonation. Phonation is a complex behaviour, consisting of essentially three components: vocal fold adduction, expiration and articulation. It is still unclear where in the brain and in which way these three components are integrated into a specific vocal pattern. We are approaching this problem in three ways. First, we are looking for brain areas showing vocalization-correlated activity. This search is carried out by the help of a recently developed telemetric technique which allows us to record the electrical activity of single neurones in freely moving squirrel monkeys during spontaneous vocal communication. Second, we are studying the neuroanatomical connections of electrophysiologically identified vocalization-related brain structures using anterograde and retrograde tracing techniques in the squirrel monkey and rhesus monkey. Third, we try to characterize vocalization-controlling pathways neuropharmacologically by testing the effects of stereotactically injected transmitter antagonists on electrically elicited vocalization or vocal fold movements, respectively.

Selected Recent Publications:

Grohrock P, Häusler U, Jürgens U (1997) Dual-channel telemetry system for recording vocalization-correlated neuronal activity in freely moving squirrel monkeys. J Neurosci Methods 76: 7-13

Jürgens U (1999) Primate communication: Signaling, vocalization. In: Adelman G, Smith B H (Eds.) Encyclopedia of Neuroscience. Elsevier Amsterdam p 1694-1697

Jürgens U (2000) Localization of a pontine vocalization-controlling area. J Acoust Soc Amer 108: 1393-1396

Lüthe L, Häusler U, Jürgens U (2000) Neuronal activity in the medulla oblongata during vocalization. A single-unit recording study in the squirrel monkey. Behav. Brain Res 116: 197-210

Düsterhöft F, Häusler U, Jürgens U (2000) On the search for the vocal pattern generator. A single-unit recording study. Neuroreport 11: 2031-2034

Bernhard U. Keller

Professor of Neurophysiology

Dr. rer. nat., University of California, San Diego / University of Göttingen, 1986
Postdoctoral fellow, Max-Planck-Institute for biophysical Chemistry, Göttingen, 1987
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Extraordinary Professor (apl.), Neurophysiology, University of Göttingen, 2001

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Major Research Interests:

Calcium signals represent a key information processing system in the central nervous system, and defined changes in cytosolic calcium levels have been associated with multiple neuronal processes including learning, memory, synaptic plasticity and neurodegenerative disease. While the last years have provided significant information about the molecular elements that control calcium signals in identified cells, little is known about how Ca-dependent signal cascades are processed, superimposed and integrated in a functionally intact neuronal net.

Based on a functionally intact neuronal network that controls rhythmic-respiratory activity in the brain stem of mice, we have addressed three questions:

i) which molecular elements control Ca-dependent signal cascades underlying rhythmic-respiratory activity in identified brain stem neurones ?

ii) how does the spatio-temporal profile of cytosolic Ca signaling modulate neuronal activity in this interconnected neuronal net ?

iii) how are cytosolic Ca signals affected in transgenic mouse models of human neurodegenerative disease (e.g. SOD1 G93A mouse model of human amyotrophic lateral sclerosis) that specifically affect brain stem neurones ?

In our present research, we address these questions by a combined research approach. For example, we employ techniques from molecular biology and classical electrophysiology like patch clamp recordings from slice preparations and combine these recordings with up-to date imaging techniques including fast CCD imaging and IR-laser based multiphoton measurements. Accordingly, the central focus of our research is to increase our understanding of Ca signaling in a functionally intact neuronal system, and achieve a better understanding of the disruptions of Ca-dependent signal cascades characteristic for human neurodegenerative disease.

Selected Recent Publications:

Lips M B and Keller B U (1998) Endogenous calcium buffering in motoneurones of the nucleus hypoglossus from mouse. J Physiol 511 (1): 105-117

Palecek J, Lips M B and Keller B U (1999) Calcium dynamics and buffering in motoneurones of the mouse spinal cord. J Physiol 520 (2): 485-502

Lips M and Keller B U (1999) Activity-related calcium dynamics in motoneurones of the nucleus hypoglossus from mouse. J Neurophysiol 82 (6): 2936-2946

Paarmann I, Frermann D, Keller B U and Hollmann M (2000) Expression of fifteen glutamate receptor subunits and various splice variants in tissue slices and single neurones of brainstem nuclei, and potential functional implications. Journal of Neurochemistry 74 (4): 1335-45

Ladewig T and Keller B U (2000) Simultaneous patch clamp recording and calcium imaging in a rhythmically active neuronal network in the brain stem slice preparation from mouse. Pflügers Arch 440: 322-332

Vanselow B and Keller B U (2000) Calcium dynamics and buffering in oculomotor neurones from mouse, that are particularly resistant during amyotrophic lateral sclerosis (ALS)-related motoneuron disease. J Physiol 525: 433-445

Jürgen Klingauf

Research Group Leader at the Max Planck Institute for Biophysical Chemistry

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Dr. rer. nat. (Ph.D.) 1999, University of Göttingen.
Since 2000 junior group leader at the Max Planck Institute for Biophysical Chemistry.

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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.

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

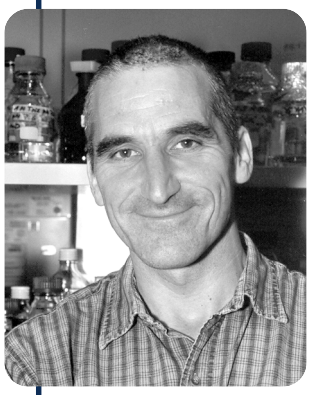
Choi S, Klingauf J, Tsien RW (2000). Postfusional regulation of cleft glutamate concentration during LTP at 'silent synapses'. Nature Neurosci 3: 330-336

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

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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.

Selected Recent Publications:

Krieglstein K, Henheik P, Farkas L, Jaszai J, Galter D, Krohn K and 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

Strelau J, Sullivan A, Böttner M, Lingor P, Falkenstein E, Suter- Crazzolara C, Galter D, Jaszai J, Krieglstein K, Unsicker K (2000) GDF-15/MIC-1 is a novel trophic factor for midbrain dopaminergic neurons *in vivo.* J Neurosci 20: 8597-8603

Dünker N, Schuster N, Krieglstein K (2001) Transforming Growth Factor Beta Modulates Programmed Cell Death in the Retina of the Developing Chick Embryo. Development 128: 1933-1942

Professor of Zoology

Dr. rer. nat., University of Marburg, Germany, 1988
Postdoctoral fellow, McGill University Montreal, Canada 1989 - 1990
Since 1991 at the Faculty of Biology, University of Göttingen, Germany

Major Research Interests:

Hearing organs are extremely sensitive to mechanical stimulation and provide the organism with crucial information for communication and survival. The information processing in the central nervous system requires highly specific synaptic connections. All this is especially interesting for the small ears of insects. The smallness causes special problems, like that of directionality, but also provides the opportunity to work with individually known cells. The function, development and evolution of these sophisticated systems are in focus of our research.
We investigate the development of the sensory organ, especially that of the sensory cells in respect to soma position, axogenesis and synaptogenesis. These primary sensory cells establishing a topographic order which is a prerequisite for precise information processing. The rules underlying this process are analysed on a cellular and molecular level. After the embryonic development, developmental processes are repeated during regeneration. During regeneration the formation of individual synapses for behavioural recovery can be followed. The function of sensory cells are investigated *in vivo* and *in vitro*. The main keywords are the biophysics, the peripheral modulation via second messengers and the sensory transduction of the auditory organs. The functional analyses include experiments with a systems approach: investigations of behaviour and of the sensory ecology reveal the evolutionary selection pressures which resulted in the specific properties of the sense organs.

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Selected Recent Publications:

Schäffer S & Lakes-Harlan R (2001) Embryonic development of the central projection of auditory afferents (*Schistocerca gregaria*, Orthoptera, Insecta) J Neurobiol 46: 97-112

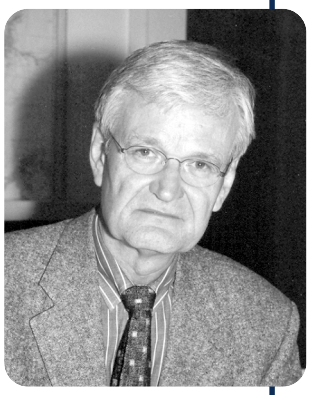
Köhler U & Lakes-Harlan R (2001) Auditory behaviour of a parasitoid fly (Emblemasoma auditrix, *Sarcophagidae, Diptera*) J Comp Physiol A 187: 581-587

Jacobs K & Lakes-Harlan R (2000) Pathfinding, target recognition and synapse formation of single regenerating fibres in the adult grasshopper *Schistocerca gregaria*. J Neurobiol 42: 394-409

Jacobs K & Lakes-Harlan R (1999) Axonal degeneration within the tympanal nerve of *Schistocerca gregaria*. Cell Tiss Res 298: 167-178

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

Gerd Lüer



Professor of Psychology

Diploma in Psychology at the University of Hamburg, Germany (1963)
Dr.rer.nat. (1966) and Habilitation (1971) at the Christian Albrechts University at Kiel, Germany
Professor of Psychology at the Universities Kiel (1973),
Düsseldorf (1974 - 1978) (chairman),
Aachen (1979 - 1982) (chairman),
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Major Research Interests:

Experimental psychology; Cognitive psychology: Problem solving; Memory: Working memory; Iconic memory. Language and language disturbance (aphasia); Eye movement research, visual perception and mental imagery; Word recognition in different writing systems (cross-cultural approach): Language and memory; Spatial cognition.

Selected Recent Publications:

Lüer G, Becker D, Lass U, Fang Y, Chen G & Wang Z (1998) Memory span in German and Chinese: Evidence for the phonological loop. European Psychologist 3: 102-112

Werner S, Saade Chr & Lüer G (1998) Relations between the mental representation of extrapersonal space and spatial behavior. In Chr. Freksa, Chr. Habel & K. F. Wender (Eds.), Spatial Cognition (Pp. 107-127). Berlin: Springer

Lass U, Fang Y, Chen G, Becker D & Lüer G (1999) Is memory for shapes subject to language-specific effects? An experimental study of memory span in German and Chinese subjects. - Zeitschrift für Sprache & Kognition 18: 136-145

Lass U, Lüer G, Becker D, Fang Y, Chen G & Wang Z (2000) Kurzzeitgedächtnisleistungen deutscher und chinesischer Probanden mit verbalen und figuralen Items: Zur Funktion von phonologischer Schleife und visuell-räumlichen Notizblock. Zeitschrift für Experimentelle Psychologie 47: 77-88

Elsner N & Lüer G (Hrsg.) (2000) Das Gehirn und sein Geist. Göttingen: Wallstein

Kluwe R, Lüer G & Rösler F (Eds.) (2003) Principles of Human Learning and Memory. Basel: Birkhaeuser

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), since 1999

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Major Research Interests:

In the nervous system synaptic function requires both, (i) temporally and spatially correct development of synaptic junctions as cell-cell interaction sites and (ii) assembly of the fusion maschinery to ensure regulated exocytosis of neurotransmitters at those contact sites. Our group is currently interested in the "interphase" of these two processes by investigating the physiological role of α-neurexins, a family of highly polymorph cell surface molecules using neurogenetic (null mutant and transgenic mice), biochemical and morphological techniques. Recent data from our lab show that neurexins are located presynaptically, and that they are essential for synaptic function by influencing high-voltage activated calcium channels. The molecular mechanism of these events will be one of our main interests in the near future.
Additional projects in the group focus on the function of neurexophilins, a family of secreted glycoproteins, that may act as local signaling molecules by binding to the extracellular domain of α-neurexins. We currently use a combination of neurogenetic (knock-in, knockout mice) and biochemical (recombinant proteins, *in vitro* essays) methods to analyze their putative role in synaptic interaction.

Selected Recent Publications:

Rosahl T W, Spillane D, Missler M, Herz J, Selig D K, Wolff J R, Hammer R E, Malenka R C, Südhof T C (1995) Essential functions of synapsins I and II in synaptic vesicle regulation. Nature 375: 488-493

Missler M, Südhof T C (1998) Neurexins: three genes and 1001 gene products. Trends Genet 14: 20-26 (review)

Missler M, Südhof T C (1998) Neurexophilins form a highly conserved family of neuropeptide-like glycoproteins. J Neurosci 18: 3630-3638

Missler M, Hammer R E, Südhof T C (1998) Neurexophilin binding to α-neurexins: A single LNS-domain functions as independently folding ligand-binding unit. J Biol Chem 273: 34716-34723

Verhage M, Maia A S, Plomp J J, Brussard A B, Heeroma J H, Vermeer H, Toonen R F, Hammer R E, van den Berg T K, Missler M, Geuze H J and Südhof T C (2000) Synaptic assembly of the brain in the absence of neurotransmitter secretion. Science 287: 864-869

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

Tobias Moser

Research Group Leader at the Department of Otolaryngology

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

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Major Research Interests:

The main focus of our group is the normal function of cochlear hair cells and their dysfunction which causes hearing impairment in animals and men. We use cell-physiological techniques: patch-clamp, uncaging of caged signal molecules and fluorimetric imaging to study hair cell ion channels, homeostasis of cytosolic Ca^{2+}, exocytosis of synaptic vesicles and endocytosis of inner hair cells as well as the electromotility of outer hair cells. So far we have focused our research on the presynaptic function of the inner hair cells (IHCs) of the cochlea, which transform sound-induced mechanical signals into auditory nerve activity by Ca^{2+} triggered exocytosis of neurotransmitter. Our current and future research aims on an improved understanding of normal presynaptic hair cell function, including the characterization of the molecular players e.g. by investigation of IHCs from mouse mutants for synaptic proteins. In addition, we try to identify pathomechanisms of deafness by investigating different aspects of hair cell function (see above) in mouse models of human deafness.

Selected Recent Publications:

Moser T und 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 and Moser T (2001) Calcium dependence of exocytosis and endocytosis at the cochlear inner hair cell afferent synapse. Neuron 29: 681-90

Beutner D and Moser T (2001) The Presynaptic Function of Mouse Cochlear Inner Hair Cells during Development of Hearing. J Neurosci 2001 21: 4593-4599

Voets T, Brain E, Toonen R, Moser T, Verhage M, Rettig J, Südhof T and Neher E (2001) Munc18-1 promotes large dense-core vesicle docking. Neuron 31(4): 581-91

Voets T, Moser T, Lund P E, Chow R H, Geppert M, Sudhof T C, Neher E (2001) Intracellular calcium dependence of large dense-core vesicle exocytosis in the absence of synaptotagmin I. Proc Natl Acad Sci U S A 98 (20): 11680-11685

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, ZMBH
2000 Director, Department of Neurogenetics Max Planck Institute of Experimental Medicine, Göttingen and Adj. Professor of Molecular Biology, Heidelberg

Major Research Interests:

Transgenic and natural mouse mutants are useful tools to study human genetic diseases. Focussing on the nervous system, we are interested in diseases involving myelin-forming glial cells. These highly specialized cells enwrap neuronal axons with multiple layers of membranes and provide the electrical insulation that is necessary for rapid impulse propagation. We are studying the principles of these neuron-glia interactions and the genes that are required for normal myelin assembly and maintenance. One gene of interest encodes PMP22 (a myelin membrane protein of Schwann cells) and is frequently duplicated in patients with Charcot-Marie-Tooth disease. Mutations of another myelin protein gene, termed PLP, underlie Pelizaeus-Merzbacher disease, a lethal white matter disease. A third neurological disorder under study is adrenoleukodystrophy, caused by a dysfunction of peroxisomes. We have generated mouse mutants that accurately model these human diseases to study disease mechanism at the cellular levele and to explore possible treatment strategies

Future Projects and Goals
Identification of disease modifier genes; epigenetic factors of disease expression; novel transgenic strategies to obtain conditional mouse mutants;
Mechanisms of neuron-glia signalling; transcriptional control genes of neuronal differentiation

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Selected Recent Publications:

Sereda M, Griffiths I, Pühlhofer A, Stewart H, Rossner M J, Zimmermann F, Magyar J P, Schneider A, Hund E, Meinck H-M, Suter U and Nave K-A (1996) A transgenic rat model of Charcot-Marie-Tooth disease. Neuron 16: 1049-1060

Rossner M, Doerr J, Druffel-Augustin S, Schwab M and Nave K-A (1997) Novel mammalian enhancer-of split /hairy related proteins (SHARPs) coupled to neuronal stimulation. Mol Cell Neurosci 9: 460-475

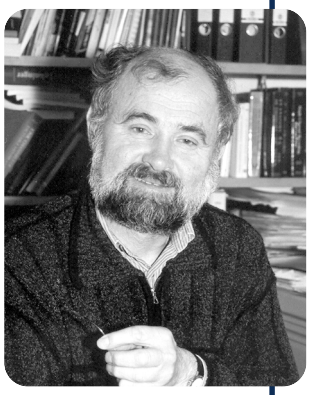
Klugmann M, Schwab M, Pühlhofer A, Schneider A, Zimmermann F , Griffiths I and Nave K-A (1997) Assembly of CNS myelin in the absence of proteolipid protein. Neuron 18: 59-70

Griffiths I, Klugmann M, Anderson T, Yool D, Thomson C, Schwab M H, Schneider A, Zimmermann F, McCulloch M, Nadon N and Nave K-A (1998) Axonal swellings and degeneration in mice lacking the major proteolipid of myelin. Science 280: 1610-1613

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

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

Erwin Neher



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Professor, Director at the Max Planck Institute for Biophysical Chemistry

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

Major Research Interests:

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

In order to understand how the brain handles its information flow and adjusts synaptic connections on the second and subsecond timescale, one has to understand all aspects of synaptic transmission ranging from availability of vesicles for exocytosis, presynaptic electrophysiology, Ca^{++} signalling, the process of exocytosis, and postsynaptic neurotransmitter action. Our work concentrates on presynaptic aspects. We 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 and 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

Xu T, Binz T, Niemann H and Neher E (1998) Multiple kinetic components of exocytosis distinguished by neurotoxin sensitivity. Nature Neuroscience 1: 192-200

Xu T, Rammner B, Margittai M, Artalejo A R, Neher E and Jahn R (1999) Inhibition of SNARE complex assembly differentially affects kinetic components of exocytosis. Cell 99: 713-722

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

Voets T, Toonen R F, Brian E C, deWit H, Moser T, Rettig J, Suedhof T C, Neher E and Verhage M (2001) Munc-18-1 promotes large dense-core vesicle docking. Neuron 31: 581-591

Voets T, Moser T, Lund P-E, Chow R H, Geppert M, Suedhof T C and Neher E (2001) Intracellular calcium dependence of large dense-core vesicle exocytosis in the absence of synaptotagmin I. PNAS 98: 11680-11680

Harald Neumann

Group Leader at the European Neuroscience Institute Göttingen

M.D., University of Würzburg, 1991
Internship, Department of Neurology, University Ulm, 1990 - 1992
Postdoctoral fellow and research associate, Max Planck Institute of Neurobiology, 1992 - 2001
Appointed 2001 as group leader of the Neuroimmunology Unit of the European Neurosience Institute Göttingen

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Major Research Interests:

The immunoprivileged status of the central nervous system (CNS) is conditional. In the healthy organism, immune responsiveness of the brain tissue is kept to a minimum. However, under pathological conditions, genes are turned on which change non-reactive CNS tissue to a pro-inflammatory milieu supporting bi-directional interactions between CNS and immune cells. Striking examples are disorders as diverse as CNS autoimmune diseases, injury and neurodegenerative diseases.

Our group has demonstrated that neuronal lesions recruit inflammatory cells to the pathologically changed tissue. Furthermore, neurons are stimulated by inflammatory cytokines to express MHC (major histocompatibility complex) class I molecules and are susceptible to cytotoxic attack by T lymphocytes. In particular, neurites are highly susceptible to T lymphocyte cytotoxicity.

Our group is currently interested in the role of the innate immune response in neurodegenerative and neuroinflammatory diseases such as multiple sclerosis. We are analyzing the cytotoxic and growth inhibitory effects of activated murine microglia and macrophages on neurites. In particular, we are studying the immune-mediated modulation of the axonal transport of synaptic molecules by time-lapse confocal microscopy.

Furthermore, we are assessing the use of the genetically modified hematopoietic precursor and stem cells as a new therapy in animal models of neuroinflammatory diseases. Bone marrow derived hematopoietic stem cells and mesenchymal cells will be modified by retroviral vectors to express chemokine receptors for attraction to lesioned brain tissue and release of growth factors after differentation into resident brain cells.

Selected Recent Publications:

Neumann H, Medana I, Bauer J, Lassmann H (2002) Cytotoxic T lymphocytes in autoimmune and degenerative CNS diseases. Trends in Neurosci 25 (6): 313-319

Neumann H, Schweigreiter R, Yamashita T, Rosenkranz K, Wekerle H and Barde Y-A (2002) Tumor necrosis factor inhibits neurite outgrowth and branching of hippocampal neurons by a Rho-dependent mechanism. J Neurosci 22: 854-862

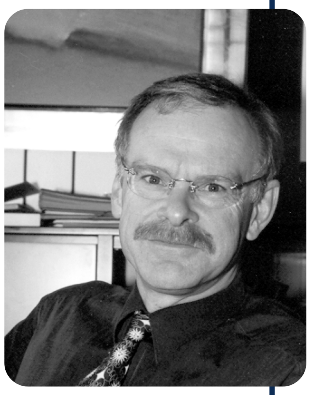
Medana I, Li Z, Flügel A, Tschopp J, Wekerle H and Neumann H (2001) Fas Ligand (CD95L) protects neurons against perforin-mediated T lymphocyte cytotoxicity. J Immunol 167: 674-681

Neumann H, Misgeld T, Matsumuro K and Wekerle H (1998).Neurotrophins inhibit major histocompatibility class II inducibility of microglia: Involvement of the p75 neurotrophin receptor. Proc Natl Acad Sci USA. 95: 5779-5784

Neumann H, Schmidt H, Cavalié A, Jenne D and Wekerle H (1997) Major histocompatibility complex (MHC) class I gene expression in single neurons of the central nervous system: Differential regulation by interferon (IFN)-γ and tumor necrosis factor (TNF)-α. J Exp Med 185 (2): 305-316

Neumann H, Schmidt H, Wilharm E, Behrens L and Wekerle H (1997). Interferon-γ gene expression in sensory neurons: Evidence for autocrine gene regulation. J Exp Med 186 (12): 2023-2031

Walter Paulus



Professor of Clinical Neurophysiology

Dr. med., Heinrich-Heine Universität Düsseldorf, 1978
Resident in Neurology, University of Düsseldorf, 1978 - 1979
National Hospital for Nervous Diseases London, 1980
University of Düsseldorf 1981 - 1982
Alfried Krupp Hospital 1982 - 1984
Senior registrar Ludwig Maximilians University of Munich 1984 - 1992
Habilitation (Neurology and Clinical Neurophysiology) in Munich 1987
Prof. and Head of the Department of Clinical Neurophysiology 1992

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Major Research Interests:

Neuroplastic changes are defined as any enduring changes in the organisation of the central nervous system such as the strength of connections, representational patterns, or neuronal properties, either morphological or functional. At present we study how to induce and control plasticity in the human nervous system, and to derive new therapeutic strategies from this research.

Present research focuses on transcranial magnetic stimulation (TMS) (5) and transcranial direct current stimulation (TDCS) (3). TMS induces a short electric current in the human brain. It may be used to measure excitability changes (5) in the motor cortex or alterations in visual perception thresholds (4). It may also induce plastic changes of excitability when used repetitively (rTMS). At present a multicenter blinded rTMS protocol is applied in epilepsy patients. TDCS offers the prospect of inducing LTD and LTP like effects in the human brain when applied at least with a stimulation duration of 3 minutes(3). At present we investigate underlying mechanisms both in human and animal experiments. TDCS induced changes in motor cortex excitability may be detected by functional MR imaging (1). Other functional imaging studies trace the epileptic focus in epileptic patients in space and time(2). We extended our research field to dopaminergic, and, in future to GABA-ergic stem cells for the prospect of treating patients with Parkinson's disease and epilepsy.

Selected Recent Publications:

Baudewig J, Nitsche M A, Paulus W and Frahm J (2000) Regional modulation of BOLD MRI responses to human sensorimotor activation by transcranial direct current stimulation. Magnetic resonance in medicine 2001: 1196-1200

Herrendorf G, Steinhoff B J, Kolle R, Baudewig J, Waberski T D, Buchner H and Paulus W (2000) Dipole-source analysis in a realistic head model in patients with focal epilepsy. Epilepsia 41: 71-80

Nitsche M A and Paulus W (2000) Excitability changes induced in the human motor cortex by weak transcranial direct current stimulation. J Physiol 527: 633-9

Paulus W, Korinth S, Wischer S and Tergau F (1999) Differential inhibition of chromatic and achromatic perception by transcranial magnetic stimulation of the human visual cortex. Neuroreport 10: 1245-8

Ziemann U, Tergau F, Wassermann E M, Wischer S, Hildebrandt J and Paulus W (1998) Demonstration of facilitatory I wave interaction in the human motor cortex by paired transcranial magnetic stimulation. J Physiol (Lond) 511: 181-90

Evgeni Ponimaskin

Group Leader at the Centre for Molecular Physiology of thr 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, Schmidt M F, Heine M, Bickmeyer U and Richter D W (2001) 5-Hydroxytryptamine 4(a) receptor expressed in Sf9 cells is palmitoylated in an agonist-dependent manner. Biochemical Journal 353: 627-634

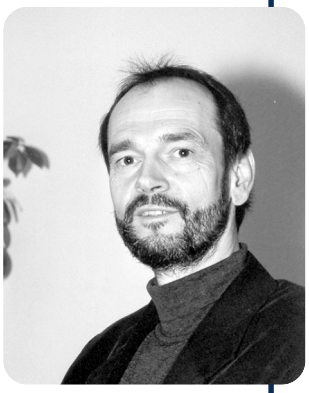
Ponimaskin E and Schmid M F G (2001) Fusogenic viral envelopes as potent vehicles for gene transfer. Current Genomics 2: 261-267 Review

Heine M, Ponimaskin E, Bickmeyer U and Richter D W (2002) 5-HT-receptor-induced changes of the intracellular cAMP level monitored by a hyperpolarization-activated cation channel. Pflügers Archive European Journal of Physiology 443: 418-426

Ponimaskin E, Heine M, Joubert L, Sebben M, Bickmeyer U, Richter D W and 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 D W and Voyno-Yasenetskaya T (2002) 5-hydroxytryptamine(4a) receptor is coupled to Galpha subunit of heterotrimeric G13 protein. Journal of Biological Chemistry 277: 20812-20819

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 T H (1998) Extraversion and dopamine: Individual differences in responsiveness to changes in dopaminergic activity as a possible biological basis of extraversion. European Psychologist 3: 37-50

Rammsayer T (1999) Neuropharmacological evidence for different timing mechanisms in humans. Quarterly Journal of Experimental Psychology, Section B: Comparative and Physiological Psychology 52: 273-286

Rammsayer T H (2001) Effects of pharmacologically induced changes in NMDA-receptor activity on long-term memory in humans. Learning and Memory 8: 20-25

Rammsayer T & Ulrich R (2001) Counting models of temporal discrimination. Psychonomic Bulletin & Review 8: 270-277

Rammsayer T H, Rodewald S & Groh D (2000) Dopamine-antagonistic, anticholinergic, and GABAergic effects on declarative and procedural memory functions. Cognitive Brain Research 9: 61-71

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., Univ. Saarland, 1969 - 1970
Wiss. Assistent, I. Physiol. Inst., Univ. Saarland, 1970 - 1972
Wiss. Assistent, I. Physiol. Inst., Univ. Munich, 1972 - 1974
1974 Universitätsdozent, I. Physiol. Inst., Univ. Munich, 1974
Universitätsdozent, I. Physiol. Inst., Univ. Heidelberg, 1975 - 1976
C-3 Professor, I. Physiol. Inst., Univ. Heidelberg, 1976 - 1988
C-4 Professor, II. Physiol. Inst., Univ. Göttingen, 1988

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.

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Selected Recent Publications:

Zhang W, Elsen F, Bambrock A, Richter D W (1999) Postnatal development of $GABA_B$ receptor-mediated modulation of voltage-activated Ca^{2+} currents in mouse brain-stem neurons. Europ J Neurosci 11: 2332-2342

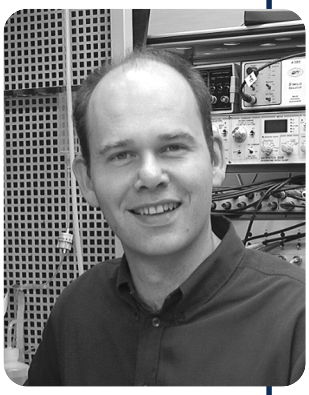
Hülsmann S, Oku Y, Zhang W, Richter D W (2000) Metabotropic glutamate receptors and blockade of glial Krebs cycle depress glycinergic synaptic currents of mouse hypoglossal motoneurons. Europ J Neurosci 12: 239-246

Mironov S L, Richter D W (2001) Oscillations and hypoxic changes of mitochondrial variables in neurons of the brainstem respiratory center. J Physiol 533: 227-236

Ponimaskin E G, Schmidt M F G, Heine M, Bickmeyer U, Richter D W (2001) 5-Hydroxytryptamine 4(a) receptor expressed in Sf9 cells is palmitoylated in an agonist-dependent manner. Biochem J 353: 627-634

Heine M, Ponimaskin E, Bickmeyer U, Richter DW (2001) 5-HT-receptor-induced changes of the intracellular cAMP level monitored by a hyperpolarization-activated cation channel. Europ J Physiol DOI 10: 1007

Christian Rosenmund



Group Leader at the Max Planck Institute for Biophysical Chemistry

PhD Neurosciences, Vollum Institute, Portland, OR, USA 1993
Postdoctoral fellow Salk Institute, La Jolla, CA, USA 1993 - 1995
Helmholtz fellow, MPI biophysikalische Chemie 1995 - 1997
Heisenberg fellow and independent group leader, Dept. Membranbiophysik at the Max Planck Institute for Biophysical Chemistry, since 1998

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Major Research Interests:

Neurotransmission at the central synapse involves a series of functional highly coordinated steps. On the presynaptic site, synaptic vesicles tether, prime to fusion competence, and fuse Ca^{2+} triggered with the plasma membrane to release the neurotransmitter in the synaptic cleft. Postsynaptically, ionotropic receptors respond to binding of the neurotransmitter with distinct conformational steps that shape the postsynaptic response. We characterize synaptic properties with standard patch-clamp electrophysiology and optical techniques from cultured primary hippocampal neurons of transgenic mice that bear deletions or mutations of pre- or postsynaptic proteins. We have identified and/or characterized the vesicular neurotransmitter transporters VGLUT and VGAT, the vesicle priming factor Munc13, and the core complex associated proteins synaptotagmin 1 and complexin. Furthermore, knock-out mice are used to examine protein-domain and -residue function by gain of function rescue experiments by viral overexpression of wildtype and mutant proteins. Postsynaptically, we examine structural principles that control the gating properties of AMPA-type glutamate receptors.

Selected Recent Publications:

Varoqueaux F, Sigler A, Rhee SJ, Brose N, Enk C, Reim K, Rosenmund C (2002) Total arrest of spontaneous and evoked synaptic transmission but normal synaptogenesis in the absence of Munc13 mediated vesicle priming. PNAS 99: 9037-9042

Rosenmund C, Sigler A, Augustin I, Reim K, Brose N, Rhee JS (2002) Differential control of vesicle priming and short term plasticity by Munc13 isoforms. Neuron 33: 411-424

Rhee JS, Betz A, Pyott S, Reim K, Varoqueaux F, Augustin I, Hesse D, Südhof TC, Takahashi M, Rosenmund C, Brose N: β-phorbol ester- and diacylglycerol-induced augmentation of neurotransmitter release from hippocampal neurons is mediated by Munc13s and not by PKCs. Cell 108: 121-133

Mansour M, Nagarajan N, Nehring R, Clements J, Rosenmund C (2001) Heteromeric AMPA receptors assemble with a preferred subunit stoichiometry and spatial arrangement. Neuron 32: 841-853

Takamori S, Rhee JS, Rosenmund C, Jahn R (2000) Identification of a vesicular glutamate transporter that defines a glutamatergic phenotype in neurons. Nature 407: 189-94

Marjan Rupnik

Research Group Leader at the European Neuroscience Institute Göttingen

Ph.D. 1996, University of Ljubljana
Assistant Professor of Pathophysiology and Physiology, 1997
Junior group leader since 2000, European Neuroscience Institute Goettingen

Major Research Interests:

Our group is interested in function in neuroendocrine cells. The main emphasis is on studying the secretory activity in endocrine cells during development. Our research activity has two major aims. Firstly, we would like to characterize the molecular machinery involved in secretory activity in developing endocrine tissue and secondly, we would like to use this knowledge to test genetically modified endocrine cells before they are, for example, used to replace impaired function in endocrine disorder like diabetes.
Many genetically modified phenotypes with impairment in endocrine activity are severe and can be studied only shortly after birth. During this period cells change rapidly and are therefore very sensitive. Therefore we developed tissue slice approach where we shortened the isolation/preparation times as well as eliminated enzymatic digestion of the tissue. In our current approaches we use thin slices from endocrine tissue, both pituitary and pancreas and we study them on a single cell level using patch-clamp based membrane capacitance measurements, amperometry, photometry and imaging as well as cell population studies using advanced approaches to imaging. In addition to measuring processes of exocytosis and endocytosis, we monitor dynamic changes in membrane potential, intracellular chloride and calcium concentration in control and in cells expressing modified amounts of proteins involved in these processes, like Rab3, dynamin, NCS-1, etc…

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Selected Recent Publications:

Rupnik M, Kreft M, Sikdar S K, Grilc S, Romih R, Zupancic G, Martin T F J, Zorec R (2000) Rapid regulated dense-core vesicle exocytosis requires the CAPS protein. Proceedings of the National Academy of Sciences of the United States of America 97(10): 5627-5632

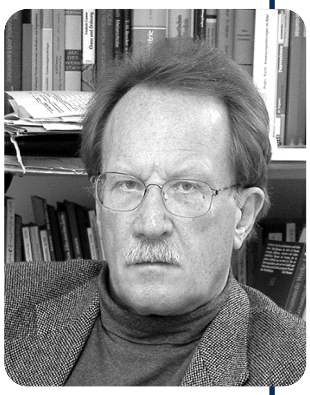
Kreft M, Gasman S, Chasserot-Golaz S, Kuster V, Rupnik M, Sikdar S K, Bader M F, Zorec R (1999) The heterotrimeric Gi(3) protein acts in slow but not in fast exocytosis of rat melanotrophs. Journal of Cell Science 112(22): 4143-415

Zhang X J, Ogorevc B, Rupnik M, Kreft M, Zorec R (1999)Cathophoresis paint insulated carbon fibre ultramicro disc electrode and its application to *in vivo* amperometric monitoring of quantal secretion from single rat melanotrophs. Analytica Chimica Acta 378(1-3): 135-143

Rupnik M, Zorec R (1995) Intracellular Cl^- modulates Ca^{2+}-induced exocytosis from rat melanotrophs through GTP binding proteins. Pflugers Archiv - European Journal of Physiology 431(1): 76-83

Graf J, Rupnik M, Zupancic G, Zorec R (1995) Osmotic swelling of hepatocytes increases membrane conductance but not membrane capacitance. Biophysical Journal 68(4): 1359-1363

Eckart Rüther



Professor of Psychiatry

Dr. med. LMU Munich
Prof. of Psychiatry LMU Munich
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Major Research Interests:

Psychopharmacology
Sleep Medicine
Dementia
PTSD
Schizophrenia
Biological Psychiatry

Selected Recent Publications:

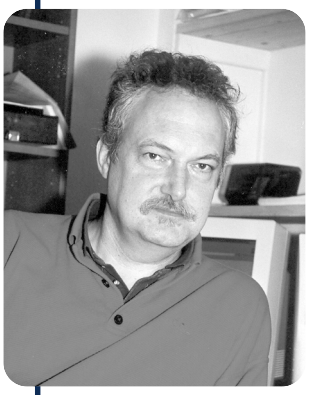
Rüther E, Ritter R, Apecechea M, Freytag S, Gmeinbauer R, Windisch M (2000) Sustained improvements in patients with dementia of Alzheimer´s type (DAT) 6 months after termination of Cerebrolysin therapy. J Neural Trans 1-15

Rüther E and Glaser A (2000) A prospective PMS study to validate the sensitivity for change of the C-Scale in advanced stages of dementia using the NMDA-antagonist memantine. Pharmacopsychiatry 33: 1-6

Moll G H, Mehnert C, Wicker M, Bock N, Rothenberger A, Rüther E, Huether G (2000) Age-associated changes in the densities of presynaptic monoamine transporters in different regions of the rat brain from early juvenile life to late adulthood. Dev Brain Res 119: 251-257

Bandelow B, Wedekind D, Pauls J, Brooks A, Hajak G, Rüther E (2000) Salivary cortisol in panic attacks. Am J Psych 157 (3): 454-456

Wiltfang J, Otto M, Baxter H C, Bodemer M, Steinacker P, Bahn E, Zerr I, Kornhuber J, Kretzschmar H A, Poser S, Rüther E, Aitken A (1999) Isoform pattern of 14-3-3 proteins in the cerebrospinal fluid of patients with Creutzfeldt-Jakob disease. J Neurochem 73,6: 2485-2490



Professor of Physiology

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

Cesnik D, Nezlin L, Rabba J, Müller B, Schild D (2001) Noradrenergic modulation of calcium currents and synaptic transmission in the olfactory bulb of *Xenopus laevis* tadpoles. Eur J Neurosci 13: 1093-1100

Schild D, Restrepo D (1998) Transduction mechanisms in vertebrate olfactory receptor cells. Physiol Reviews 78: 429-466

Nezlin L, Schild D (2000) Structure of the olfactory bulb in tadpoles of *Xenopus laevis*. Cell & Tissue Res 302: 21-29

Peters F, Generich A, Czesnik D, Schild D (2000) Slow voltage clamp allows current clamp measurements at constant average command voltage. J Neurosci Meth 99: 129-135

Gennerich A, Schild D (2000) Fluorescence correlation spectroscopy in small cytosolic compartments depends critically on the diffusion model used. Biophys J 79: 3294-3306

Ralf Schneggenburger

Research Group Leader at the Max Planck Institute for Biophysical Chemistry

Dr. rer. nat. (PhD) 1993, University of Göttingen
1994 - 1996 Postdoctoral fellow at the Neurobiology Laboratory, Ecole Normale Supérieure, Paris
1996 - 2000 Research Assistant at the Max Planck Institute for Biophysical Chemistry, Göttingen
since 2001 Heisenberg fellow and leader of the Research Group "Synaptic Dynamics and Modulation" at the Max Planck Institute for Biophysical Chemistry

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Major Research Interests:

Fast communication between nerve cells in the brain is mediated by chemical synaptic transmission. During this process, a presynaptic action potential is translated via Calcium dependent membrane fusion of small synaptic vesicles into the release of neurotransmitter substances. Interestingly, upon repeated presynaptic activity, the responses in most postsynaptic cells show a pronounced dynamic behavior. The strength of synaptic responses either grows, or declines with time, and this short term synaptic plasticity is expected to modulate the information flow in neural networks.

We study a synapse in the auditory pathway which has an unusually large presynaptic terminal with hundreds of active zones. This synapse is unique because patch-clamp recordings can be made directly from the presynaptic terminal. This allows us to apply Calcium imaging and Calcium uncaging methods directly to the presynaptic nerve terminal. We have shown that the sensitivity of the vesicle fusion reaction for intracellular Calcium ions is significantly higher than previously assumed. This has direct consequences for our understanding of different forms of synaptic plasticity, such as facilitation and depression. In collaborative studies, we also use gene knock-out approaches to analyze the precise role of proteins in presynaptic Calcium signalling and plasticity of transmitter release.

Selected Recent Publications:

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

Meyer A C, Neher E & Schneggenburger R (2001) Estimation of quantal size and number of functional active zones at the calyx of Held synapse by nonstationary EPSC variance analysis. J Neuroscience 21: 7889-7900

Schneggenburger R, Sakaba T & Neher E (2002) Vesicle pools and short-term synaptic depression: lessons from a large synapse. Trends in Neurosci 25: 206-212

Professor of Zoology

1967 Doctor rer.nat., University of Münster)
1967 - 1970 Research Fellow (Assistent) at the Max Planck Institute of Brain Research, Department of General Neurology/ Köln
1970 - 1977 Research Assistant at the Institute of Zoology, Department of Experimental Morphology, University of Köln
1975 - 1976 Visiting Fellow at the Research School of Biological Sciences, Department of Neurobiology, Australian National University, Canberra, Australia)
1977 Professor and Head of the Department of Cell Biology at the Zoological Institute, University of Göttingen

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Major Research Interests:

Neurobiology of invertebrate nervous systems, mainly central nervous system of insects; work on insects, crayfish, earthworms and onychophora. Cellular neurobiology: Structure and function of interneurons, giant fibre systems, synaptic networks, neuroactive compounds with emphasis on biogenic amines in crickets and bees; olfactory brain systems in *Drosophila* wild type and mutants; electrophysiological and behavioural studies: walking and escape behaviour of crickets and cockroaches.
Currently used techniques in the department:Neurocytology, Neuroanatomy, Immunocytology, Electron microscopy, Electrophysiology, Tissue culture of identified neurons, Setups for quantitative registration of behaviours.

Selected Recent Publications:

Killmann F, Gras H, Schürmann F-W (1999) Types, numbers and distribution of synapses on a dendritic tree of an identified phasic neuron in the brain of an insect. Cell Tiss Res 296: 645-665

Schürmann F-W, Ottersen O P, Honegger H-W (2000) Gluatamate-like immunoreactivity marks compartments of the mushroom bodies in the brain of the cricket. J comp Neurol 418: 227-239

Watson A H D, Schürmann F-W (2002) Synaptic structure, distribution, and circuitry in the central nervous system of the locust and related insects. Microsc Res Technique 56: 210-226

Yasuayama K, Meinertzhagen J A, Schürmann F-W (2002) Synaptic organisation of the mushroom body calyx in *Drosophila melongaster*. J comp Neurol 445: 211-226

Stephan J. Sigrist

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Research Group Leader at the European Neuroscience Institute Göttingen

Dr. rer. nat (PhD) 1997, University of Tübingen
Since 2001 Independent group leader position group located at the European Neuroscience Institute Göttingen (ENI-G), Max Planck Society
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 S J, Thiel P R, Reiff D, Lachance P E, Lasko P and Schuster C M (2000) Postsynaptic translation affects the morphology and efficacy of neuromuscular junctions. Nature 405 (6790): 1062-1065

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

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

Sigrist S J, Jacobs H, Stratmann R, Lehner C F (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

Sigrist S J, Ried G, Lehner C F (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

Anastassia Stoykova

Research Group Leader at the Max Planck Institute for Biophysical Chemistry

M.D. Bulgarian Medical Academy, Plovdiv, Bulgaria, 1972
Research Associate in Neurochemistry, Regeneration Research Laboratory, Bulgarian Academy of Sciences, Sofia, Bulgaria, 1972 - 1988
PhD (Biology), Bulgarian Academy of Sciences, Institute of Molecular Biology, Sofia, Bulgaria, 1985
Habilitation in Neurobiology (1989) and Assistant Research Professor at the Institute of Molecular Biology, Bulgarian Academy of Sciences, Sofia, Bulgaria, 1989 - 1991
Guest investigator and Alexander von Humboldt grant holder at the Max Planck Institute of Experimental Medicine (1980 - 1981) and the Max-Planck Instutute of Biophysical Chemistry, Department of Molecular Cell Biology, Göttingen, Germany, 1988 - 1989
Permanent Staff Research Scientist at the the Max-Planck-Institute of Biophysical Chemistry, Department of Molecular Cell Biology, Göttingen, Germany, 1991- 2001
Group leader, "Molecular Developmental Neurobiology" , Department Molecular Cell Biology, Max Planck Institute of Biophysical Chemistry, 2002 - present

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Major Research Interests:

We are interested in the molecular mechanisms involved in forebrain morphogenesis with a special recent interest towards corticogenesis. The mammalian cortex is a highly differentiated structure that is ordered radially into six layers and tangentially into distinct functional domains. It is generally assumed that the cortical area specification is determined by intrinsic factors (graded and/or restricted expression of transcription factors and regulatory molecules in cortical progenitors) together with extrinsic cues, spacipotemporally regulated by the ingrowing thalamocortical axons. Only few molecular determinants are known so far to play a role in these processes.
Our analysis and results from other laboratories indicated that the transcription factor *Pax6* is an intrinsic determinant of a subpopulation of the cortical radial glial cells which are multipotent progenitors. *Pax6* is involved in endowing the progenitors with a neuronogenic capacity and has a pivotal role for the corticogenesis, including its functional arealization. To get a deeper insight into the mechanisms for cell fate specification and functional arealization that are controlled by *Pax6*, we are currently using the Cre-LoxP recombinantion strategy for conditional inactivation and/or overexpression of *Pax6* in transgenic mice *in vivo*.
We have recently performed a large scale microarray screen using the Affymetrix oligonucleotide chip technology to identify new regulatory molecules that are involved in the functional arealization of the developing mammalian cortex. The application of this genomic approach allowed us to score more than 500 candidates with possible regionalized expression in the presumptive anlagen of five functional domains, either before or after arrival of the thalamic inputs into the embryonic cortex. The restricted expression of the selected genes and ESTs are presently evaluated by a large scale *in situ* hybridization analysis. The function of the best candidates will be studied by classical and conditional gene inactivation. Additionally, the functional analysis of these genes will be tested by using in utero electroporation in mouse embryos and in cortical slices *in vitro*. Furthermore, we will attempt to identify the set of genes involved in distinct cell fate decision pathways that are controlled by the transcription factor *Pax6* during mammalian corticogenesis.

Selected Recent Publications:

Stoykova A, Fritsch R, Walther C and Gruss P (1996) Forebrain patterning defects in the *Small eye* mutant mice. Development 122: 3453-3465

Stoykova A, Götz M, Price J and Gruss P (1997) PAX6-dependent regulation of adhesive patterning, R-cadherin expression and boundary formation in developing forebrain. Development 124: 3765-3777

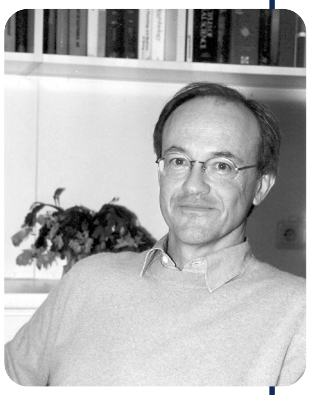
Götz M, Stoykova A and Gruss P (1998) Pax6 controls radial glia differentiation in the cerebral cortex. Neuron 21: 1031-1044

Stoykova A, Treichel D, Hallonet M and Gruss P (2000) Pax6 modulates the patterning of the mammalian telencephalon. J Neuroscience 20: 8024-8050

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

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

Walter Stühmer



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

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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:

Oheim M and Stühmer M (2000) Tracking chromaffin granules on their way through the actin cortex. Eur Biophys Journal 29: 67-89

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

Soto F, Lambrecht G, Nickel P, Stühmer W and Busch A E (1999) Antagonistic properties of the suramin analogue NF023 at heterologously expressed P2X receptors. Neuropharmacology 38: 141-149

Pardo L A, Brüggemann A, Camacho J and Stühmer W (1998) Cell-cycle related changes in the conducting properties of r-eag K^+ channels. J Cell Biol 143: 767-775

Terlau H and Stühmer W (1998) Structure and function of voltage-gated ion channels. Naturwissenschaften 85: 437-444

Andreas Stumpner

Assistant 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

Heinrich Terlau

Research Group Leader at the Max Planck Institute for Experimental Medicine

Dr. rer. nat. (Ph.D.) 1990, University of Tübingen
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Major Research Interests:

The research of our group focuses on the identification and characterization of pharmacological active substances interacting with ion channels. A biophysical description and the investigation of the potential physiological implications of this interaction is performed by using mainly electrophysiological techniques and expression systems. Due to the key role of ion channels in different physiological processes, substances interacting with these proteins may have a great variety of possible pharmacological or even clinical implications. The main focus of our research is the analysis of the interaction of conotoxins with certain ion channels. Conotoxins are neurotoxic peptides from the venoms of the predatory cone snails. These cysteine rich peptides are usually between 10 to 30 amino acids long. Conotoxins are heavily used in neuroscience research and are known to be highly selective and specific for their target molecules. Due to these properties conotoxins are also used for trying to understand the structure and function of ion channels.

Selected Recent Publications:

Terlau H, Shon K-J, Grilley M, Stocker M, Stühmer W and Olivera B M (1996) Strategy for rapid immobilization of prey by a fish-hunting marine snail. Nature 381: 148-151

Shon K-J, Olivera B M, Marsh M, Jacobson R, Gray W R, Floresca C Z, Cruz L J, Hillyard D, Brink A, Terlau H and Yoshikami D (1998) µ-conotoxin PIIIA, a new peptide for discriminating among tetrodotoxin-sensitive Na channel subtypes. J Neuroscience 18: 4473-4481

Terlau H and Stühmer W (1998) Structure and function of voltage-gated ion channels. Naturwissenschaften 85: 437-444

Terlau H, Bocaccio A, Olivera B M and Conti F (1999) The block of *Shaker* K^+ channels by µ-conotoxin PVIIA is state dependent. J General Physiology 114: 125-140

Jacobson R B, Koch E D, Lange-Malecki B, Stocker M, Verhey J, Van Wagoner R M, Vyazovkina A, Olivera B M and Terlau H (2000) Single amino acid substitutions in µ-conotoxin PVIIA disrupt interaction with the *Shaker* channel. J Biological Chemistry 275: 24639-24644

Stefan Treue

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, Univ. of Tübingen, 1995 - 2001
Professor of Animal Physiology, Univ. of Tübingen, 2000 - 2001
Professor of Cognitive Neuroscience and Biological Psychology, Univ. 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 are planning to use functional brain imaging in the future. 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.

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Selected Recent Publications:

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

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

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

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

Hol K and 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

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

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

Waldmann M R (1996) Knowledge-based causal induction. In D. R. Shanks, K. J. Holyoak, & D. L. Medin (Eds.), The psychology of learning and motivation, Vol. 34: Causal learning (pp. 47-88). San Diego: Academic Press

Waldmann M R, Holyoak K J & Fratianne A (1995) Causal models and the acquisition of category structure. Journal of Experimental Psychology: General 124: 181-206

Waldmann M R & Holyoak K J (1992) Predictive and diagnostic learning within causal models: Asymmetries in cue competition. Journal of Experimental Psychology: General 121: 222-236

Fred Wouters

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.

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Major Research Interests:

Our group is interested in 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 its sensing function also performs a structural function in that it provides the cell with a means to exter force on its substrate. The latter information is mediated by cell adhesion molecules for direct cell-cell contact and neurotrophic receptors for secreted chemotactic factors. These processes also play a role in the fully differentiated cell in the form of neuronal plasticity, *e.g.* in dendritic spines and inter-synaptic contact. We are primarily interested in the signal transduction processes that regulate these effects and the cross-talk between the different motility systems.
We apply advanced microscopic techniques (primarily fluorescence lifetime imaging microscopy; FLIM and total internal reflection fluorescence microscopy; TIRFM) in combination with a range of GFP-based optical biosensors and protein biochemical/ molecular biological techniques to resolve and quantify the biochemical reactions that underly the neuronal response to these motility ques.

Selected Recent Publications:

Wouters F S, Bastiaens P I H, Wirtz K W A & Jovin T M (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 F S. & Bastiaens P I H (1999) Fluorescence lifetime imaging of receptor tyrosine kinase activity in cells. Curr Biol 9: 1127-1130

Wouters F S, Verveer P J, Reynolds A R & Bastiaens P I H (2000) Quantitative imaging of lateral ErbB1 receptor signal propagation in the plasma membrane. Science 290: 1567-70

Harpur A, Wouters F S & Bastiaens P I H (2001) Imaging FRET between spectrally similar GFP molecules in single cells. Nat Biotechnol 19: 167-9

Wouters F S, Verveer P J & Bastiaens P I H (2001) Imaging biochemistry inside cells. Trends Cell Biol 11: 203-11

Wolfgang Wuttke

Professor of Clinical and Experimental Endocrinology

Dr. med. 1967
Post-doc, Michigan State University and UCLA, 1969 - 1971
Habilitation (Physiology) 1972
Apl. Professor 1976
Professor of Clinical and Experimental Endocrinology 1985

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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:

Roth C, Jung H, Kim K, Arias P, Moguilevsky J, Jarry H, Leonhardt S, Wuttke W (1997) Involvement of gamma amino butyric acid (GABA) in the postnatal function of the GnRH pulse generator as determined on the basis of GnRH and GnRH-receptor gene expression in the hypothalamus and the pituitary. Exp Clin Endocrinol Diab 105: 353-358

Cho S, Han J, Sun W, Choi D, Kwon H B, Jarry H, Wuttke W, Kim K (1997) Evidence for autocrine inhibition of gonadotropin-releasing hormone (GnRH) gene transcription by GnRH in hypothalamic GT1-1 neuronal cells. Mol Brain Res 50: 51-58

Roth Ch, Leonhardt S, Theiling K, Lakomek M, Jarry H, Wuttke W (1998) Ontogeny of the GNRH-, glutaminase- and glutamate decarboxylase-gene expression in the hypothalamus of female rats. Developmental Brain Research 110: 105-114

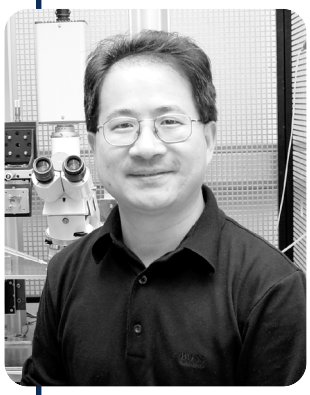
Leonhardt S, Shahab M, Luft H, Wuttke W and Jarry H (1999) Reduction of luteinizing hormone secretion induced by long-term feed restriction in male rats is associated with increased expression of GABA-synthesizing enzymes without alterations of GnRH gene expression. Journal of Neuroendocrinology 11: 613-619

Kang S S, Kim S R, Leonhardt S, Jarry H, Wuttke W, Kim K (2000) Effect of Interleukin-1ß on Gonadotropin-Releasing Hormone (GnRH) and GnRH Receptor Gene Expression in Castrated Male Rats. J. Neuroendocrinol. 12:421-429, 2000

Leonhardt, S., Böning, B., Luft, H., Wuttke, W., Jarry, H. Activation of Gene Expression of the -Aminobutyric Acid Rather than the Glutamatergic System in the Preoptic Area during the Preovulatory Gonadotropin Surge of the Rat. Neuroendocrinology 71: 8-15

Roth Ch, Schricker M, Lakomek M, Strege A, Heiden I, Luft H, Munzel U, Wuttke W, Jarry H (2000) Autoregulation of the GnRH system during puberty: Effects of antagonistic versus agonistic GnRH analogues in a female rat model. Submitted to J Endocrinology

Weiqi Zhang



Research Group Leader at the Center of Physiology

Dr. med. (M. D.) University of Bonn, 1987
Intership, Department of Neurology, University of Bern, Switzerland, 1988
Postdoctoral fellow, Department of Physiology, University of Bern, Switzerland, 1989 - 1992
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, University of Göttingen, since 1997

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Major Research Interests:

The modulation of synaptic activity represents one of the essential feature 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 the requirements 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 and internalisation, and regulation of intracellular RNA- and protein-synthesis. We currently use a combination of electrophysiological, immunocytochemical and molecular biological methods to investigate the molecular mechanisms responsible for $GABA_B$-receptor-mediated modulation of calcium channels and neurotransmitter release machinery, for intracellular regulation of $GABA_B$-receptor targeting and internalisation in a functional brainstem respiratory network. Furthermore, knock-out mice are used to directly examine the synaptic function of membrane-binding proteins and protein-protein interactions.

Selected Recent Publications:

Zhang W, Pombal M A, El Manira A and Grillner S (1996) Rostrocaudal Distribution of 5-HT Innervation in The Lamprey Spinal Cord and Differential Effects of 5-HT on Fictive Locomotion. Journal of Comparative Neurology 374 (2): 278-290

El Manira A, Zhang W, Svensson E and Bussières N (1997) 5-HT Inhibits Calcium Current and Synaptic Transmission from Sensory Neurons in Lamprey. Journal of Neuroscience 17 (5): 1786-1794

Zhang W, Elsen F, Barnbrock A and Richter D W (1998) Postnatal development of $GABA_B$ receptor-mediated modulation of voltage-activated Ca^{2+} currents in mouse brain stem neurones. European Journal of Neuroscience 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 Journal of Neuroscience 12: 2975-2984

Zhang W, Barnbrock A, Gajic S, Pfeiffer A and 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 Journal of Physiology 540 (2): 435-446

Annette Zippelius

Professor of Theoretical Physics

Dr. rer. nat., Technical University of Munich, 1977
Postdoctoral Fellow, Universities of Harvard and Cornell, 1978 - 1981
Habilitation at the Technical University of Munich, 1982
Research Associate, Forschungszentrum Jülich, 1983 - 1988
Professor at the Institute of Theoretical Physics, University of Göttingen, since 1988

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Major Research Interests:

A semi-microscopic model of synaptic transmission and plasticity

A stochastic model of synaptic transmission has been designed on the basis of electrophysiological experiments and is currently analysed with help of Monte Carlo simulations. The transmission process is decomposed into three steps: 1) release of neurotransmitter from presynaptic vesicles, 2) diffusion of transmitter molecules in the cleft, and 3) kinetics of postsynaptic receptors.

The model of presynaptic vesicle dynamics has been designed on the basis of experimentally observed patterns of synaptic depression (and facilitation) at the Calyx of Held in the mammalian auditory pathway and comprises recruitment and calcium related release of vesicles. Transmitter dynamics within the cleft can be effectively modeled by a two-dimensional diffusion process, where absorbing boundary conditions reflect the effect of transmitter uptake by transporters and diffusion into extra-synaptic space. On the postsynaptic membrane the neurotransmitter interacts with individual spatially distributed receptors, which are included in the model on the basis of kinetic Markov models. The modeling steps of presynaptic vesicle dynamics, transmitter motion in the cleft and its interaction with postsynaptic receptors are combined to create a model of a single synaptic connection between two neurons. Postsynaptic responses are studied as function of input-frequency and possible physiological determinants. It is shown that the specific combination of release-probability, receptor desensitization and presynaptic release-machinery determines whether synaptic connections facilitate or depress and sets the range of input-rates, i.e. frequencies, that can be transmitted towards the postsynaptic side.

Selected Recent Publications:

Marienhagen J, Keller B U and Zippelius A (1997) Kinetic model of excitatory synaptic transmission to cerebellar Purkinje cells. J Theor Biology 188: 227

Broderix K, Goldbart P M and Zippelius A (1997) Dynamical signatures of the vulcanisation transition. Phys Rev Lett 79: 3688

Trommershäuser J, Marienhagen J and Zippelius A (1999) Stochastic model of central synapses: slow diffusion of transmitter interacting with spatially distributed receptors and transporters. J Theor Biol 198: 101

Broderix K, Löwe H, Müller P and Zippelius A (1999) Shear viscosity of a crosslinked ploymer melt. Europhys Lett 48: 421

Trommershäuser J, Titz S, Keller B and Zippelius A (2001) Variability of excitatory currents due to single channel noise, receptor number and morphological heterogeneity. J Theor Biol 208

In addition to faculty on the previous pages the following scientists organized and supervised the methods courses:

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