

Preliminary programme
of the International Summer School on Comparative and Functional Neuroanatomy
and Neurobiology of Invertebrates,
28.08-08.09, 2012, The White Sea Biological Station, MSU, Russia

Morning lectures (40-45 min)

1. Dr. Alexander Tzetlin, director of the WSBS
<http://wsbs-msu.ru>

- The ecosystem of the White Sea and history of the station.



2. Dr. Leonid Nezlin, Inst. of Developmental Biology, RAS
leading research scientist ;
expert in confocal microscopy

- Basics of fluorescence and laser scanning confocal microscopy.
- All-In-One Digital Microscopy: A novel trend in biomedical research

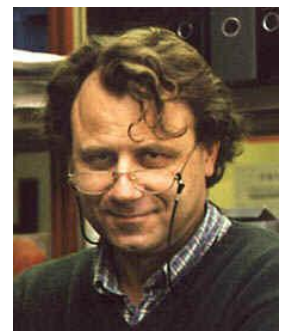


3. Dr. Hans-Joachim Pflüger, Berlin, Germany, Free University, Institute for Biology, Neurobiology;

<http://www.neurobiologie.fu-berlin.de/pflueger/pflueger.html>

Methods established in Pflüger laboratory

- ✓ extra- and intracellular electrophysiology including neuroanatomical tracing methods (cobalt and fluorescent dyes),
 - ✓ *patch-clamp, calcium-imaging, isolated neurones, cell culture,*
 - ✓ methods of behavioural physiology (force and movement measurement)
 - ✓ neuroanatomical methods (paraffine and plastic serial sections)
 - ✓ immunocytochemistry, confocal microscopy including techniques of 3D analysis
- Neuroanatomical techniques for the examination of simple nervous systems.
 - Introduction to Invertebrate Nervous Systems.
 - The concept of Neuromodulation and its functional role for invertebrate behavior.



Prof. Dr. Andreas Wanninger, University of Vienna, AUSTRIA;

Head of the Department of Integrative Zoology

<http://zoology.univie.ac.at/home/>

- Evolution of the bilaterian central nervous system: a developmental perspective
- Neurogenesis and the evolution of segmentation



4. Prof. Dr. Paul Katz, Georgia State University, Atlanta, GA, USA

Director of the [Center for Neuromics](#);

Co-director of the [Neural Systems and Behavior Course](#) at the MBL at Woods Hole, MA

The Katz Laboratory <http://www2.gsu.edu/~biopsk/index.html>

Techniques: electrophysiology, confocal microscopy, calcium imaging, and computer simulation

- Evolution of neural circuits in Opisthobranchia (Mollusca)



5. Dr. Elena Temereva, MSU, Department of Invertebrate Zoology

leading research scientist

<http://invert.bio.msu.ru/>

expert in phoronids

- Development of the nervous system in phoronids: mixture of protostomian and deuterostomian features



6. Dr. Natalia Biserova, MSU, Department of Invertebrate Zoology;

deputy director,

leading research scientist

<http://invert.bio.msu.ru/>

expert in ultrastructure

Techniques: transmission and scanning electron microscopy; immunoGold staining; confocal microscopy; immunocytochemistry.
Objects: flatworms, parasites, insects

- Parasitic flatworms as an object of neurobiology researches: useful methods
- Cestodes brain: morphology and terminology



Dr. Swiddert Ott, University of Cambridge, UK

expert in neuroanatomy and 3D reconstruction methods

- Functional Neuroanatomy of nitric oxide - cyclic GMP signaling in insects
- Synapsin immunofluorescence staining in whole mounts as a tool to reveal the 3D architecture of the CNS of marine invertebrates



7. Dr. Thomas Stach, Freie Universitaet Berlin, Germany

- Evolution of nervous systems in Deuterostomes



Practical courses

For training and performing the practical tasks, students will be divided into 4 groups of 3 persons each. Each group will pursue an independent task, and each group will execute all tasks within 12 days. Special time is reserved for the presentation of results by students, and for evening discussions.

Part 1 Functional neuroanatomy (*L. Nezlin, N. Biserova, H-J. Pflüger, P. Katz, T. Stach, S. Ott*)

1. Multi-label immunostaining techniques.

Participants will learn in detail how to select primary and secondary antibodies, the strategy of fixation and antigen retrieval, immunostaining, embedding, data acquisition and processing.

2. Tracer injection techniques in neuromorphology and neurophysiology.

Participants will learn the technique of back-filling (tracer injection into the nerve) and front-filling (tracer injection into the cell body) using various tracers and their visualization with fluorescent markers.

Part II Neurophysiology (*D. Abramochkin, V. Kuzmin, A. Malishev*)

3. Registration of miniature end-plate potentials in longitudinal muscle fibers of the lobworm *Arenicola marina*.

4. Analysis of the regulation of calcium-dependent luminescence in the polychaete *Harmothoe imbricata*.