GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

GGNB Göttingen Graduate School for Neurosciences and Molecular Biosciences

E 03 - GGNB Extended Methods Course 2013

Electrophysiology

ELECTRAIN 2013

(6 – 17 May 2013)

European Neuroscience Institute Göttingen ENI-G

Faculty:

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E 03 - GGNB Extended Methods Course 2013

ENI Electrophysiology Training (ENI-ELECTRAIN)

Date: 6 – 17 May 2013
Loaction: European Neuroscience Institute (ENI-G), Grisebachstr. 5, 37077 Göttingen
Participants: 8 for practical course (lectures are open for all PhD students)
(2 groups A+B of 4 participants each, groups switch topics after 1st week, participation for both weeks mandatory, topics will be assigned during the course)

TOPIC 1: *In vitro* Electrophysiology of Expressed Ion Channels in *Xenopus laevis* oocytes (STÜHMER + PARDO)
(4 participants)

TOPIC 2: *In vivo* Electrophysiology of Identified Neurons in *Hirudo medicinalis* (HÖRNER + FERBER)
(4 participants)

TOPIC 3: Measurement of synaptic parameters in mouse hippocampal organotypic slices (SCHLÜTER + NN)
(4 participants)

Week 1/2 (6 – 10 May 2013 and 13 – 17 May 2013) ENI Lecture Hall, ENI Teaching Labs

Topic: Expression and electrophysiological characterization of different ion-channels in the *Xenopus* oocyte expression system

Techniques: cDNA expression techniques in *Xenopus* oocytes, Two-electrode voltage clamp configuration and measurements, Quantitative evaluation and statistical analysis of different ion channels/conductances

Lectures: see separate schedule from 9-11h, ENI Lecture Hall (open to all GGNB students)
Practical Training: Monday through Friday from 13-18h, ENI Teaching Labs
Presentation of results: Friday 9-12h, ENI Lecture Hall, Friday afternoon: Cleaning-up

Week 1/2 (6 – 10 May 2013 and 13 – 17 May 2013) ENI Lecture Hall, ENI Teaching Labs

Topic: In-vivo electrophysiology of identified neurons in *Hirudo medicinalis*

Techniques: Single and double intracellular recording techniques, single cell fluorescent labeling and 3d-imaging, Characterization of spontaneous and stimulus-evoked electrical activity patterns in identified neurons, Analysis of synaptic connectivity and network properties, Pharmacological characterization of different electrical conductances

Week 1/2 (6 – 10 May 2013 and 13 – 17 May 2013) ENI Lecture Hall, ENI Teaching Labs

Topic: Measurement of synaptic parameters in mouse hippocampal organotypic slices

Techniques: Miniature EPSC recording of CA1 pyramidal cells, evoked AMPA receptor and NMDA receptor mediated synaptic transmission of Schaffer collateral CA1 pyramidal cell synapses, lentiviral-mediated molecular manipulation of CA1 pyramidal cells

Lectures: Monday and Tuesday from 9-11h, ENI Lecture Hall (open to all GGNB students)
Practical Training: Monday through Thursday from 13-18h, ENI Teaching Labs
Presentation of results: Friday 9-12h, ENI Lecture Hall, Friday afternoon: Cleaning-up

SELECTED LITERATURE:

TOPIC 1: *In vitro* Electrophysiology of Expressed Ion Channels in *Xenopus laevis* oocytes

Stühmer, W. (1998) Electrophysiological recordings from *Xenopus* oocytes.
Methods in Enzymol. 293, 280-300.

TOPIC 2: *In vivo* Electrophysiology of Identified Neurons in *Hirudo medicinalis*

Carretta, M. (1988) The Retzius Cells in the Leech: A Review of their Properties and Synaptic Connections.
Comp. Biochem. Physiol. 91A, 3: 405-413
Gaudry,Q., Kristan, W.B. (2009) Behavioral choice by presynaptic inhibition of tactile sensory terminals.
Nature Neuroscience. 2009;12(11): 1450-57; doi:10.1038/nn.2400)
Nicholls, J.G., van Essen, D. (1974): The nervous system of the leech. *Sci. American, 230: 38-48*
Rose, T, Gras, H, Hörner, M (2006) Activity-dependent suppression of spontaneous spike generation in the Retzius neurons of the leech, *Hirudo medicinalis L..*
Invertebrate Neuroscience 6: 169-176 (DOI 10.1007/s10158-006-0030-2)

TOPIC 3: Measurement of synaptic parameters in mouse hippocampal organotypic slices

Stein, V., House, D.R.C., Bredt, D.S., Nicoll, R.A. (2003): Postsynaptic Density-95 Mimics and Occludes Hippocampal Long-Term Potentiation and Enhances Long-Term Depression.
J. Neuroscience, July 2, 2003 • 23(13):5503–5506 • 5503