



Seewiesen Colloquia

Speaker invited by: Dept. Gahr

Thursday, December 3rd, 2009, 13:00 h, in House 4, Lecture Room

The avian midbrain: Cells, Circuits, Concepts

Harald Luksch

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The avian visual midbrain (optic tectum) is a model system for the analysis of developmental, physiological and computational issues. With a high degree of structural order, known inputs and function and identifiable cell types, the network analysis with a combined experimental-computational approach can lead to a mechanistic understanding of sensory computation. By integrating additional tectal cell types and projections with other visual and non-visual nuclei in the brain, the basic neuronal computations can be gradually extended to generate more complex functions.

While the focus of research in the past was on the processing of visual input, we have recently begun to study feedback loops between the optic tectum and the isthmus nuclei in the chick. Since many elements of that reciprocal connection are preserved in a slice preparation, we can study the circuit *in vitro* and build a realistic model to assess the influence of specific network parameters. We have also started to look at timing issues with optical imaging methods.

In addition, we will investigate the integration of auditory and visual input on the cellular level. Starting with the delineation of the cells involved in bimodal processing, we will attempt to work out the synaptic mechanisms and the integration rules for bimodal stimuli and study the influence of feedback on these features.

Who is Harald Luksch?

- 1994 PhD University of Cologne, Germany
- 1995 Postdoctoral fellow at the Brain Research Institute, Bremen, Germany
- 1996 Postdoctoral fellow at the School of Medicine, University of California at San Diego, USA
- 1997 Research Assistant at the Rheinisch-Westfälische Technische Hochschule Aachen, Germany
- 2007 Professor of Zoology, Technische Universität München, Germany

Selected publications:

- Luksch, H., Khanbabaie, R., Wessel, R. (2004) Synaptic depression mediates form-cue invariant motion analysis. *Nature Neuroscience* 7, 380-388.
- Wang, Y., Luksch, H., Brecha, N.C., Karten, H.J. (2006) Nucleus isthmi and columnar cholinergic endings in the optic tectum in chicks (*Gallus gallus*): A possible substrate for correlation of parallel tectal channels (*Journal of Comparative Neurology* 494, 7-35).
- Heyers, D., Manns, M., Luksch, H., Güntürkün, O., Mouritsen H. (2007) A putative magnetosensory pathway in migratory birds (*PLOS One*, 2(9) e937).
- Meyer, U., Shao, J., Chakrabarty, S., Brandt, S.F., Luksch, H., Wessel, R. (2008) Distributed delays stabilize neural feedback systems (*Biol Cybern* 99:79-87)
- Luksch, H. (2009) Sensorimotor integration: optic tectum. *Encyclopedia of Neuroscience*. (L.R. Squire, Editor). Oxford: Academic Press, Vol. 7, 263-269.