

Institut für Biologie, 'Neurobiologie'

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**Characterization of Mushroom Body Extrinsic Neurons  
of the Honeybee: Odor Specificity, Response Reliability,  
and Learning Related Plasticity**

Dissertation zur Erlangung des akademischen Grades des Doktors der  
Naturwissenschaften (Dr. rer. nat.)

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1. Gutachter: Prof. Dr. Dr. h. c. Randolph Menzel
2. Gutachter: Prof. Dr. Martin Nawrot

**This dissertation is based on the following manuscripts:**

**I.** Odor specificity and response reliability of mushroom body extrinsic neurons in the honeybee

by Martin Fritz Strube-Bloss, Farzad Farkhooi, Martin Paul Nawrot and Randolph Menzel

**II.** Recruitment and learning induced plasticity in alpha-lobe extrinsic neurons of the honeybee

by Martin Fritz Strube-Bloss, Martin Paul Nawrot and Randolph Menzel

**III.** Side-specific odor representation in alpha-lobe extrinsic neurons

by Martin Fritz Strube-Bloss, Martin Paul Nawrot and Randolph Menzel

The contributions of the different authors were as follows:

**I.** The experimental design was discussed with M Nawrot and R Menzel. All experiments and the pre-processing (filtering, spike sorting) of the extra cellular recorded data as well as the visualization of the recording position were performed by me. Data analysis was performed under the supervision of M Nawrot who designed and implemented the software tools. S Stiller contributed to parts of the analyses and graphical display of the results in the course of his Bachelor Thesis. F. Farkhooi analysed the spontaneous activity and separated the PE1 neuron. The results were discussed with my supervisor R. Menzel. The manuscript was written by me.

**II.** The experimental design was discussed with M Nawrot and R Menzel. I performed all experiments, did the pre-processing (filtering, spike sorting) of the extracellular recorded data, and wrote the manuscript. M. Nawrot and myself designed the data analysis and the graphical display of the results. M Nawrot performed the programming and data analysis together. I discussed the results with my supervisor R. Menzel.

**III.** I discussed the experimental design with R Menzel. All experiments and the pre-processing of the extra cellular recorded data (filtering, spike sorting) were performed by me. I wrote the manuscript. The programming and data analysis was performed by M. Nawrot. M Nawrot and myself discussed and produced all steps of analysis and the visualization of the results. I discussed the results with my supervisor R. Menzel.

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