

Introductory Remarks to Symposium 2**Levels of olfactory plasticity in insects**

Sylvia Anton and Wolfgang Rössler, Versailles (France) and Würzburg

Olfaction is one of the most important senses across the animal kingdom. Peripheral detection and central processing of olfactory information follows common principles across many taxa including mammals and insects. Recent work has shown that a high degree of neuronal plasticity is an important feature of olfactory systems, allowing organisms to adapt to changing environmental conditions, developmental or physiological states, or to learn and memorize olfactory information. Increasing knowledge on the molecular, anatomical and physiological bases of olfaction in insects has set the stage to investigate mechanisms of olfactory plasticity at different levels - in the course of development, during maturation, after mating, and as a function of learning, experience and aging.

Speakers investigating olfactory plasticity at these different levels will highlight latest developments in this field. Molecular, structural and functional aspects of synaptic plasticity will be discussed as well as physiological and anatomical changes at the level of individual neurons, neuronal ensembles and their consequences for behaviour. Work on highly complementary insect model systems for the study of olfactory plasticity in primary and secondary olfactory centers will be presented. In *Drosophila melanogaster*, due to a variety of genetic tools, new functional imaging approaches with the expression of genetically encoded sensors are used to investigate learning and memory dependent plasticity. Moths possess a highly specific sex-pheromone communication system, which allows a wide array of approaches from the molecular mechanisms to the neurophysiological and neuroanatomical basis of behaviour. In *Manduca sexta*, the well characterised processes during larval-adult metamorphosis provide a fascinating window into the developmental plasticity of the olfactory system. The honeybee is a unique social-insect model system, and a variety of social pheromones, brood care, different castes, division of labour and excellent learning capacities allow to investigate olfactory plasticity at multiple levels. Special features of the Locust olfactory system and phase transition between solitary and gregarious lifestyle provide novel insights into plasticity of olfactory coding and processing. The symposium will thus provide new insights into fundamental principles and mechanisms of olfactory plasticity and its importance for behaviour.

Symposium 2

Thursday, March 24, 2011
9:00 – 12:00, Lecture Hall 10

Chair: Sylvia Anton and Wolfgang Rössler, Versailles (France) and Würzburg

9:00 Opening Remarks

- 9:05 Lynne Ann Oland, Tucson (USA)
NOT JUST HARD-WIRED: DEVELOPMENTAL PLASTICITY IN THE *MANDUCA* OLFATORY SYSTEM (S2-1)
- 9:30 Claudia Groh, Würzburg
DEVELOPMENTAL PLASTICITY AND ADULT MATURATION OF OLFATORY SYNAPTIC MICROCIRCUITS IN THE MUSHROOM BODIES OF THE HONEYBEE (S2-2)
- 9:55 Romina Barrozo, Versailles (France)
MATING-INDUCED DIFFERENTIAL PROCESSING OF SEX PHEROMONE, PLANT ODOURS AND THEIR MIXTURE IN A MALE MOTH (S2-3)
- 10:20 **Coffee Break**
- 10:45 Jean-Marc Devaud, Toulouse (France)
STRUCTURAL PLASTICITY IN THE HONEYBEE BRAIN RELATED TO MEMORY FORMATION (S2-3)
- 11:10 Mark Stopfer, Bethesda (USA)
ADAPTIVE DYNAMICS ON DIFFERENT TIME SCALES THROUGHOUT THE OLFATORY PATHWAY ENHANCES EFFICIENT CODING OF ODOR FEATURES (S2-4)
- 11:35 André Fiala, Göttingen
OLFATORY CODING AND OLFATORY LEARNING IN *DROSOPHILA*: AN OPTICAL IMAGING APPROACH (S2-5)