Introductory Remarks to Symposium 17

## Dissection of a central brain circuit: structure, plasticity and functions of the Drosophila mushroom body

*André Fiala and Bertram Gerber, Göttingen and Magdeburg*

Deciphering how central-brain circuits control behavior is a key task in modern neuroscience. However, an analysis that comprehensively describes how the cellular and synaptic machineries within a complex brain circuit function together as an integrated system in the organization of behavior has not been achieved so far - in any model system. The *Drosophila* mushroom body represents a paradigmatic, leanly-designed and functionally dense study case that allows for such an integrated analysis of these different levels of brain organization.

The mushroom body of *Drosophila* offers several key advantages for such an endeavor. It features i) numerically few, genetically tractable neurons that often are individually identifiable and experimentally accessible one at a time, ii) neurons with known numbers of synaptic connections, and iii) a behavioral repertoire and neuronal complexity rich enough to allow for a conceptual comparison with mammals. In particular, the role of the mushroom body circuitry in associative learning and memory is subject of intense research. The recent progress in techniques such as optogenetics, optical imaging using DNA-based probes and EM-based connectomics has driven forward this field of research substantially.

The Symposium specifically covers the relationship between age-related memory impairment and mushroom body function (Stephan Sigrist), the processes by which distinct memory phases are induced (Lisa Scheunemann), detailed structure-function analyses of individual, mushroom body-related neurons (Yoshinori Aso), and recent progress in computationally modeling the mushroom body (Barbara Webb). Two young investigators (Nino Mancini and Radostina Lyutova) will present their work on the functional dissection of the mushroom body in *Drosophila* larvae.

# Symposium 17

*Thursday, March 21, 2019*
*14:30 - 16:30, Lecture Hall 8*

Chairs: André Fiala and Bertram Gerber,
Göttingen and Magdeburg

14:30 **Opening Remarks**

14:35 Stephan Sigrist, Berlin
MECHANISMS UNDERLYING AGE-INDUCED
MEMORY IMPAIRMENT IN RELATION TO
MUSHROOM BODY FUNCTION (S17-1)

14:55 Lisa Scheunemann, Paris, France
SEROTONERGIC MODULATION OF MEMORY
CIRCUITS (S17-2)

15:15 Nino Mancini, Magdeburg
FUNCTION OF THE ANTERIOR PAIRED
LATERAL (APL) NEURON IN ASSOCIATIVE
OLFACTORY LEARNING IN LARVAL *DRO-
SOPHILA* (S17-3)

15:30 Radostina Lyutova, Würzburg
REWARD SIGNALING IN A RECURRENT
CIRCUIT OF DOPAMINERGIC NEURONS AND
KENYON CELLS IN THE *DROSOPHILA* LARVA
(S17-4)

15:45 Barbara Webb, Edinburgh, UK
MODELLING THE MECHANISMS OF
LEARNING IN THE MUSHROOM BODY (S17-5)

16:05 Yoshinori Aso, Janelia, USA
MECHANISMS TO DIVERSIFY LEARNING RULES
IN PARALLEL MEMORY CIRCUITS (S17-6)

16:25 **Concluding Remarks**



Symposia