

Introductory Remarks to Symposium 9

Correlating synaptic structure and plasticity at the nanoscale*Benjamin Cooper and Cordelia Imig (Göttingen)*

Plastic changes in transmission efficacy during short-term facilitation and depression as well as during activity-dependent long-term potentiation (LTP) and depression are hypothesized to be the neural substrate of learning and memory processes. A growing body of evidence indicates that such changes in functional synaptic properties are correlated with morphological alterations and changes in the structural organization of pre- and postsynaptic compartments. In this symposium, we focus on forms of synaptic plasticity and examine their respective influence on synaptic morphology in vertebrate and invertebrate model synapses. We further aim to highlight recent methodological advances in electron microscopy (EM) and super-resolution imaging techniques. Speakers have been selected to present distinct methodological approaches and to discuss how they impact our understanding of ultrastructure-function relationships in the context of connectivity, subsynaptic organization, and molecular composition of synaptic release sites.

Kristen Harris is a pioneer of serial section EM and the generation of large-volume 3D reconstructions of synaptic neuropil. She will present her work on pre- and postsynaptic structural changes associated with the induction and augmentation of LTP. Cordelia Imig will present an experimental approach combining cryo-preparation techniques and 3D electron tomography to reveal the spatial organization of functionally and morphologically distinct vesicle pools in different neurosecretory systems. Kevin Staras will focus on presynaptic synaptic vesicle pools as attractive potential substrates to support plastic changes in synaptic efficacy. He will present his work on how synaptic labeling techniques combined with ultrastructural methods offer powerful strategies to read out functional synaptic pool properties down to nanoscale resolution in acute hippocampal slices. Robert Kittel, will focus on the *Drosophila* NMJ and the molecular composition of the AZ cytomatrix. In particular, he will talk about how Bruchpilot shapes short-term synaptic plasticity by promoting synaptic vesicle attachment.

Symposium 9

Thursday, March 23, 2017
11:30 – 13:30, Lecture Hall 9

Chairs: Benjamin Cooper and Cordelia Imig (Göttingen)

11:30 **Opening Remarks**

11:40 Kristen Harris, Austin, USA
SILENT SYNAPTIC GROWTH AND THE AUGMENTATION OF LTP (S9-1)

12:05 Cordelia Imig, Göttingen
PRESYNAPTIC ULTRASTRUCTURE-FUNCTION RELATIONSHIPS RESOLVED BY ELECTRON TOMOGRAPHY (S9-2)

12:30 Kevin Staras, Brighton, UK
ULTRASTRUCTURAL CHANGES IN FUNCTIONAL VESICLE POOLS ACCOMPANYING LONG-TERM POTENTIATION IN HIPPOCAMPUS (S9-3)

12:55 Robert Kittel, Würzburg
EXPLORING PROTEIN INTERACTIONS INVOLVED IN VESICLE TETHERING TO THE ACTIVE ZONE CYTOMATRIX (S9-4)

13:20 **Concluding Remarks**