Introductory Remarks to Symposium 35

The presynaptic active zone: converging and diverging mechanisms across species

Noa Lipstein and Robert J. Kittel, Göttingen and Leipzig

Synaptic transmission is the fundamental process controlling information transfer in the nervous system. Synaptic function determines the speed, efficacy and reliability of neuronal communication and recent findings indicate that even minor changes in these parameters may lead to neurological or neuropsychiatric diseases. Therefore, substantial efforts are devoted to deciphering the molecular, morphological, and functional features of the synapse.

Chemical synapses are equipped with a highly specialized protein machinery that functions in a coordinated manner to determine functional characteristics. This protein-dense structure at the transmitting, presynaptic neuron is referred to as the 'active zone', and it defines the location of synaptic vesicle release. The basic principles of synaptic transmission and the protein machinery of the active zone are highly conserved throughout the evolution of neuronal systems, and therefore, a valuable approach in elucidating the core mechanisms of transmitter release has been to compare basic molecular assemblies and functions at different synapse types and in different organisms, from *C. elegans* to humans. Indeed, the remarkable conservation of the core machinery extends in large to evolutionary conservation of function, and converging mechanisms of activity have been demonstrated in various synapse types of various organisms. However, synapses display a large array of synaptic outputs with different plastic and dynamic features. The complex relationship between synaptic plasticity, acting on short- and long-time scales, and variations in the molecular composition and physiology of active zones is only beginning to emerge. This symposium aims to highlight the remarkable functional similarity of active zone proteins in different synaptic subtypes and to discuss how modifications of this conserved machinery result in a wide range of synaptic outputs. The selected speakers represent the international presynaptic community, with a particular emphasis on the unique and complementary methodological advantages of diverse experimental systems. Accordingly, their work covers a variety of synaptic subtypes, ranging from the neuromuscular junction in *C. elegans* and *Drosophila* to the mammalian central nervous system. We hope to trigger discussions about converging and diverging mechanisms of synaptic plasticity, with the ultimate goal of initiating new collaborations to expand our understanding of synaptic transmission.

Symposium 35

Saturday, March 23, 2019
8:30 - 10:30, Lecture Hall 9

Chairs: Noa Lipstein and Robert J. Kittel,
Göttingen and Leipzig

08:30 **Opening Remarks**

08:35 Janet Richmond, Chicago, USA
MOLECULAR MACHINERY REQUIRED FOR SYNAPTIC ORGANIZATION AND RELEASE (S35-1)

09:00 Joshua Kaplan, Boston, USA
FROM COMPOST TO THE CLINIC: USING *C. ELEGANS* TO STUDY PSYCHIATRIC DISORDERS (S35-2)

09:25 Nadine Ehmann, Leipzig
ACTIVE ZONE PHYSIOLOGY IN THE CONTEXT OF OLFACTORY INFORMATION PROCESSING IN *DROSOPHILA*
(S35-3)

09:40 Martin Baccino-Calace, Zurich, Switzerland
THIN PROMOTES PRESYNAPTIC HOMEOSTATIC PLASTICITY AT THE *DROSOPHILA* NEUROMUSCULAR JUNCTION (S35-4)

09:50 Pascal Kaeser, Boston, USA
DISSECTING RELEASE SITE ARCHITECTURE FOR FAST NEUROTRANSMITTERS AND FOR NEUROMODULATORS (S35-5)

10:15 Lydia S. B. Maus, Göttingen
RESOLVING THE ULTRASTRUCTURAL ORGANIZATION OF SYNAPTIC VESICLE POOLS AT HIPPOCAMPAL MOSSY FIBER AND SCHAFFER COLLATERAL SYNAPSES (S35-6)

10:25 **Concluding Remarks**