

Introductory Remarks to Symposium 30

Glia-neuron interactions sculpting functional circuit architecture; insights from genetic animal models

Christian Klämbt and Georgia Rapti, Muenster and Heidelberg

The cellular and molecular architecture of neural circuits relies on the orchestrated interactions of its components, neurons and glial cells. Macroglial cells, the neuroectoderm-derived lineage sisters of neurons, compose a large part of all bilaterian nervous systems, including humans and classical genetic model organisms. Like neurons, glial cells are highly specialized cells with diverse cell fates, and intricate shapes. Importantly, glial cells show manifold interactions with neurons and greatly influence their development, differentiation, and function. Glial cell biology, physiology or gene expression are also among the earliest features disrupted in neurodevelopmental disorders, neurodegenerative disease and aging. However, mechanisms underlying glia cell development and neuron-glia interactions towards patterning circuit architecture have been long understudied and often remain elusive. Glial cells were long thought to be passive circuit components providing metabolic support to neurons and tools to study their non-metabolic roles were sparse. Nowadays, glial cells are under intense investigation and they emerge as essential engineers of circuit architecture, contributing to neuronal birth, pathfinding, and connectivity, neuronal homeostasis, circuit activity, animal behavior and aging.

This symposium will explore how fundamental aspects of glial biology, including gene expression and molecular organization, cell differentiation and architecture, cell signaling, and interactions of glial cells with neurons and the extracellular matrix are deployed to pattern the heterogeneous architecture and dynamic functions of neural circuits. The speakers will highlight important progress made in these fronts, and discuss current mechanistic understandings, while presenting various experimental settings in invertebrate models (*C. elegans*, *Drosophila*) and in vertebrate systems. A particular focus will be given to the use of sophisticated genetic and genomics tools combined with advanced microscopy to decipher the mechanism underlying the dynamics of *in vivo* neuron-glia interactions in their intact environment. By integrating information across diverse genetic model organisms, we will highlight unique examples and shared biological principles at the center of glia-neuron interactions.

Symposium 30

Friday, March 28, 2025
14:30 - 16:30, Lecture Hall 105

Chairs: Christian Klämbt and Georgia Rapti,
Muenster and Heidelberg

- 14:30 **Opening Remarks**
Christian Klämbt and Georgia Rapti
- 14:35 Georgia Rapti, Heidelberg
GLIAL CELLS, INTEGRATORS OF NEURAL CIRCUIT ARCHITECTURE THROUGHOUT LIFE: INSIGHTS FROM *C. ELEGANS* (S30-1)
- 15:00 Vilaiwan Fernandes, London, UK
EXPLORING THE RELATIONSHIP BETWEEN GLIAL MORPHOLOGIES AND TRANSCRIPTOMES (S30-2)
- 15:25 Christian Klämbt, Muenster
INFLUENCE OF GLIAL CELLS IN POSITIONING VOLTAGE-GATED ION CHANNELS ALONG *DROSOPHILA* AXONS (S30-3)
- 15:50 Antonella Damiana Recchia, Roma, Italy
PHARMACOLOGICAL TARGETING OF SMOOTHENED RECEPTOR AS A PROMISING APPROACH TO ENHANCE OLIGODENDROCYTE DIFFERENTIATION (S30-4)
- 16:02 German Sumbre, Paris, France
RADIAL ASTROCYTE SYNCHRONIZATION MODULATES THE VISUAL SYSTEM DURING BEHAVIORAL-STATE TRANSITIONS (S30-5)
- 16:27 **Closing Remarks**