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Development, remodeling and plasticity of a brain circuit - The Drosophila mushroom body as a comprehensive study case

Initiative: zukunft.niedersachsen (nur ausgewählte Ausschreibungen)

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The neuronal circuits that together form the brain consist of many neurons that are precisely connected with each other. How does the wiring of these neuronal circuits form during development? And how are they shaped by experience? While our understanding on how individual neurons develop and undergo remodeling has increased significantly during the past three decades, it remains poorly understood how complex neuronal circuits develop and remodel. One reason for this limitation is the lack of reliable tools to visualize and manipulate multiple circuit components at the same time. The scientists wish to employ new tools to study development, remodeling and synapse formation of multiple components of neuronal circuits. To do so, they focus on a favorable ?model circuit" that shares similarities with many circuits of the mammalian brain: the mushroom body of the Drosophila melanogaster brain, which is particularly important for associative learning. While the structure of this circuit and the individual neurons that make it up are well known, how the circuit develops and undergoes remodeling is not understood. In the proposed collaborative project the researcher want to determine when and how those populations of neurons that form the functional circuit arise, when they establish functional synaptic connections and how they undergo remodeling. Furthermore, they want to identify which cellular factors determine the precise, spatially restricted innervation during the wiring of the brain. Clarifying these questions synergistically employs the specific expertise of the two partner laboratories in developmental cell biology of neurons on the one hand and in behavioral neuroscience and neurophysiology on the other hand.

Projektbeteiligte

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