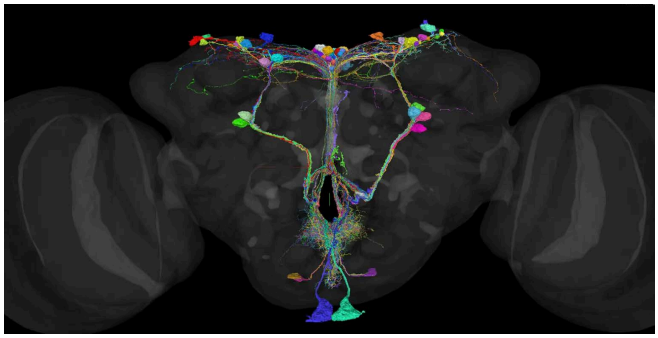
QUANTITATIVE AND SYSTEMS BIOLOGY COLLOQUIUM:
Synaptic and peptidergic pathways governing feeding and metabolism in Drosophila

Meet Zandawala

University of Nevada, Reno & University of Würzburg (Germany)

About the Speaker:

My research is focused on invertebrate neuropeptide signaling. I obtained my PhD from the University of Toronto on the roles of neuropeptides and their receptors in the post-feeding physiology of the kissing bug Rhodnius prolixus. Following my graduate studies, I moved to Queen Mary University of London to investigate the evolution and functions of neuropeptides in echinoderms such as starfish. Over the last few years, I have been utilizing Drosophila melanogaster to understand the functions and mechanisms of neuropeptide signaling. I completed my postdoctoral fellowships with Dick Nässel at Stockholm University and Gilad Barnea at Brown University. I focused on neuropeptide signaling pathways that regulate feeding, metabolism and stress responses in Drosophila and also developed novel genetic tools to decipher neural circuits and visualize neuromodulation. Presently, I am a Research group leader in the Department of Neurobiology and Genetics (Universität Würzburg) and an Assistant Professor in the Department of Biochemistry and Molecular Biology (University of Nevada, Reno).



Date:
9/26/2024

Time:
10:30 AM - 11:45 AM

Location:
SSM 104

Abstract:

The endocrine or hormonal systems in animals play a pivotal role in regulating development and a multitude of physiological processes including growth, metabolism, and reproduction. In addition, hormones can target neuronal circuits to modulate diverse behaviors such as feeding and locomotion. Hormones also enable organisms to adapt to changing external environments and internal states by permitting communication between the nervous system and peripheral tissues. This inter-organ signaling is crucial in orchestrating the functions of different tissues to attain homeostasis. Our lab is interested in understanding the regulation of hormonal signaling and deciphering the pathways via which hormones orchestrate metabolic physiology. To address this, we have leveraged connectomics to characterize the first synaptic connectome of an adult neuroendocrine network in the Drosophila brain. Our analysis has uncovered major direct and indirect sensory input pathways to the endocrine system, providing insights on how smell and taste influence organismal physiology. Moreover, we have also generated a complete connectome of the circadian clock network in Drosophila. We utilize this resource to postulate synaptic and peptidergic clock output pathways that influence rhythmic feeding and hormonal signaling, respectively. In addition to deciphering the inputs to the hormonal system, we are also interested in the endocrine output. Specifically, we have recently identified an elusive receptor for the ITP hormone, and elucidated the pathways via which this multifunctional hormone regulates systemic homeostasis. Lastly, we have developed a powerful genetic tool, Tango-Map MkII, to resolve the spatial and temporal dynamics of hormonal signaling in-vivo. We showcase the power of this technique by utilizing Tango-Map MkII sensors to visualize modulation of tissues associated with feeding and metabolic physiology under different contexts. Our multipronged approach provides the framework to unravel the complexity of hormonal signaling networks.

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