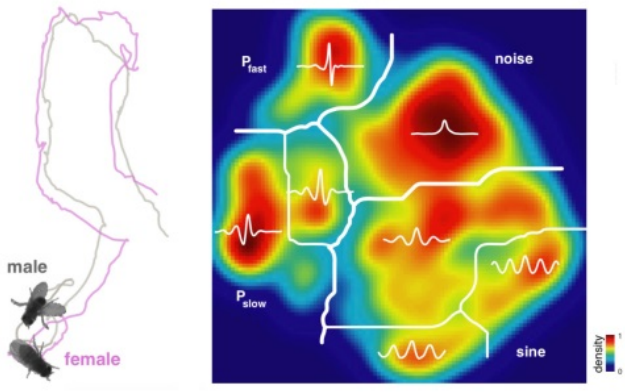

DANDRITE TOPICAL SEMINAR

From song to behavior in *Drosophila*

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Thursday, August 16th, 10am
Biomedicine Auditorium 6, Building 1170
Host: Anne von Philipsborn

ABSTRACT

A major goal of systems neuroscience is to causally link particular neurons and circuits to behavior. But solving the neural basis for behavior requires the correct parsing of behaviors in order to generate meaningful connections with the neural activity patterns that drive them. For instance, if distinct behaviors are lumped together, separate modes of brain activity may falsely appear to produce the same behavior.

We use a highly quantifiable and robust behavior – acoustic communication in *Drosophila* – to investigate how the brain processes sensory information to generate behavior. I will demonstrate the value of carefully parsing behaviors using two studies that focus on 1) song production and 2) song evaluation.

1) Fully understanding an acoustic communication system requires a complete dictionary of the utterances employed. For almost 50 years, *Drosophila melanogaster* song was thought to consist of two song modes: sine song – sustained sinusoidal oscillations – and pulse song – trains of Gabor-like wavelets produced at a species-specific interval. Based on a statistical analysis of song waveforms we discovered that pulse song consists of two, clearly distinct pulse types. I will show that these pulse types are not only statistically but also functionally separate: they are conserved across species, produced in different contexts, controlled by distinct circuits, and discriminated by the female.

2) To understand how the brain processes and evaluates communication signals, we need to identify the behaviorally-relevant features of these signals. We developed an automated, high-throughput assay to identify the song features driving behavior in females and males. By combining our behavioral results with two-photon Calcium imaging in the auditory system, we a) identify song detector neurons in the brain and b) provide insight into the organization of the sex-specific neural pathways driving the behavioral responses to song.