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# LECTURE SERIES

FALL/WINTER 2018/19

Max Planck Institute  
for Ornithology



MAX-PLANCK-GESELLSCHAFT

THURSDAY | April 4th, 2019 | 10.00 | HOUSE 4 LECTURE ROOM

## JOHN TUTHILL

University of Washington | Host: Baldwin Research Group

### Neural mechanisms of proprioception and motor control in *Drosophila*

Animals rely on an internal sense of body position and movement to effectively control motor behavior. This sense of proprioception is mediated by diverse populations of internal mechanosensory neurons distributed throughout the body. My lab is trying to understand how proprioceptive stimuli are detected by sensory neurons, integrated and transformed in the brain, and used to guide motor output. We approach these questions using genetic tools, in vivo two-photon imaging, and patch-clamp electrophysiology in the fruit fly, *Drosophila*. We recently found that fly leg proprioceptors are organized into distinct functional projections that contain topographic representations of specific kinematic features: one group of axons encodes tibia position, another encodes movement direction, and a third encodes bidirectional movement and vibration frequency. Overall, our findings reveal how a low-dimensional stimulus – the angle of a single leg joint – is encoded by a diverse population of mechanosensory neurons. This architecture may help to maximize information transmission, processing speed, and robustness, which are critical for feedback control of the limbs during adaptive locomotion.

#### WHO IS JOHN TUTHILL?

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| 2016-   | Assistant Professor, University of Washington, Department of Physiology & Biophysics |
| 2012-15 | Postdoctoral Fellow, Harvard Medical School; Advisor: Dr. Rachel I. Wilson           |
| 2008-12 | Ph.D. Biology, Janelia/University of Chicago; Advisor: Dr. Michael Reiser            |

#### SELECTED PUBLICATIONS

- Mamiya A, Gurung P, Tuthill JC. (2018) Neural coding of leg proprioception in *Drosophila*. *Neuron* 100(3): 636-650.
- Tuthill JC and Azim EA. (2018) Proprioception. *Current Biology* 28(5):194-203
- Tuthill JC and Wilson RI. (2016) Parallel transformation of tactile signals in central circuits of *Drosophila*. *Cell* 164(5):1046-1059.

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