



# R. Omar & Evelyn Rilett Family Life Sciences Public Lecture Series

*School of Biological Sciences*



## **Phylogenetic and individual variability of neural circuits underlying swimming behaviors in sea slugs**

**Dr. Paul S. Katz**  
**University of Massachusetts Amherst**

Darwin puzzled over the origin of behavior. However, Darwin had little knowledge about how nervous systems produce behavior. Modern neuroscience has made great strides in understanding the neural basis of behavior but has focused on a limited number of species. To understand how behaviors and neural circuits evolved, it is necessary to examine more closely related species to determine similarities and differences. We have been studying the neural basis of swimming behaviors in several species of nudipleura molluscs. These sea slugs have brains with a relatively small number of neurons, many of which are individually identifiable. Furthermore, the same neurons can be identified across species, allowing neural circuits to be compared. We have studied two distinct forms of swimming that each evolved independently several times. We found convergent evolution in the use of particular neurons and even in the expression of orthologous serotonin receptors. However, details of the circuitry differs. We have also found examples of divergence of the neural circuitry while the homologous behavior is conserved. This suggests that behavior and neural circuitry represent separable levels of hierarchical organization that can have independent evolutionary histories. In summary, it is essential to compare species in order to understand which components of the circuit are essential and which are subject to evolutionary change.

*Contact Wolfgang Stein (wstein@ilstu.edu) for appointments with this speaker*

**Thursday, March 7, 2019 at 6:00 p.m.**  
**Prairie Room, Bone Student Center**