Stream insect acclimation to artificial light at night

Great strides have been made in the past 1-20 years in identifying the behaviors and physiological processes in organisms that are affected by artificial light at night (ALAN), and current research is making progress in understanding how relationships between organisms might be changing under exposure to ALAN. However, many of these studies hinge on comparing the responses of “light naïve” organisms under lit and “naturally dark” conditions. Given the prevalence and spread of ALAN, it is increasingly difficult to find appropriate control populations, and it is unclear how easily organisms may acclimate or populations may adapt in response to exposure to ALAN, whether acclimation or adaptation is even possible, and how acclimation or adaptation may influence the results of ALAN research.

The goal of this research was to find evidence for acclimation or adaptation to ALAN in the drifting behavior of stream invertebrates. Normally, aquatic invertebrates will drift when the chance for detection by visual predators is low. Previous studies have found that stream invertebrates are less likely to engage in drifting behavior when ALAN is present; however, some studies were unable to find evidence of decreased drift rates under ALAN. I hypothesized that one of the causes for the lack of response in drift to ALAN may be acclimation and/or adaptation by the studied invertebrate populations.

To test this hypothesis, I sampled the drift rates of stream invertebrates in streams across a light gradient. Drift samples were taken during the day and night, so comparisons across the light gradient could be made as a ratio of night:day drift rates. In this talk, I will present the results from a full study on eleven streams, as well as discuss the implications for acclimation/adaptation to ALAN study design and for future research on the potential evolutionary effects of ALAN.