May 19th, 11:00 AM - 11:30 AM

The dynamic consequences of evolution in response to environmental disturbances

Amy Veprauskas
University of Louisiana at Lafayette, aveprauskas@louisiana.edu

Prolonged exposure to a disturbance such as a toxicant has the potential to result in rapid evolution of toxicant tolerance in many short-lived species. This evolution may allow a population to persist at higher levels of the toxicant than is possible without evolution. Here we apply evolutionary game theory to Leslie matrix models to obtain Darwinian equations that couple population and evolutionary dynamics. We use these models to consider how the evolution of tolerance to a disturbance may change the population dynamics of both the focal population and interacting populations. We provide an application to Daphnia and determine the conditions under which a Daphnia population can persist by evolving toxicant tolerance. We then extend this idea to a predator-prey system in which the prey evolves in response to a toxicant but the predator does not due to different time scales. We consider how evolution in the prey species impacts the population dynamics of the predator species. This model is inspired by marine mammals which have significantly longer lifespans relative to their food sources.