Collin B. Edwards^1, Yang, L. ^2”

(1. Dept. of Ecology and Evolutionary Biology, Cornell University; 2. Dept. of Population Biology, UC. Davis)

**Evolution of emergence strategies in a changing climate**

As the earth’s climates continue to change at increasing rates, phenologies are shifting, leading to fitness consequences for many species due to changing biotic and abiotic interactions. It is becoming increasingly important to understand how organisms can evolve and adapt to deal with these new (and potentially less consistent) optimal emergence times (or germination, hatching, breeding, etc times). In particular, it is important to understand how different climatic regimes select for different emergence strategies, and how the evolutionary history of a population influences how resilient it will be to changes in phenology or climatic variability.

We constructed a general mathematical model to represent the adaptive evolution of emergence strategies that integrate multiple phenological cues. We applied this model to real and simulated climatic data to test hypotheses about which phenological strategies would evolve under climatic regimes with different patterns of inter- and intra-annual variation. In general, temperature was a valuable cue in climates with high year-to-year variation but low day-to-day variation. Degree days was the most useful cue when the climate had even small amounts of day-to-day variation, regardless of the level of year-to-year variation. Our work provides a framework for thinking about evolution of emergence, and offers intuitions for how changes in climates may influence the organisms in different regions differently.