Heterospecific Competition in Early Development Leads to Changes in Adult Morphology

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Which Plays a More Significant Role in diversification of *Spea* Species – Environment or Competition?

• Previous studies have shown that both competition and environment can play a significant role in the diversification of species by influencing developmental plasticity, an evolutionary mechanism that allows the organisms to alter their phenotypic (outer) characteristics.

• To understand whether environment or competition during larval stage has more effect on adult morphology, different species of spadefoot toads from various populations (across southwestern US region) were researched.
  
  ➢ Spadefoot toads have a diverse range of development time which affects the relative length of appendages.
  
  ➢ In allopatry, where a region is separated by a geographical barrier, *Spea multiplicata* and *Spea bombifrons* produce both omnivores and carnivores that greatly differ in development time as omnivores develop more slowly than carnivores.

  ➢ In sympatry, where there is no geographic isolation and has an environment in which one species cannot outcompete other species, *S. multiplicata* produce omnivores and *S. bombifrons* carnivores exclusively in order to reduce competition.

• Reducing competition and faster development are critical for *Spea* species, especially in arid environment where ponds dry up fast, because they directly influence the survival of the species.
Results

• Across similar environments, *Spea multiplicata* and *Spea bombifrons* exhibit shorter hind limbs relative to body size presumably as a result of a shortened development time when both species are in direct contact with one another (sympatry). It appears early competition plays a more significant role in modifying adult morphology, thus resulting in diversification of *Spea* species.

• By understanding the morphological difference within toad species, we can then research how it affects the fitness and overall activities such as hunting and swimming that are directly related to the survival of the species. If shorter hind limbs trend continues on with the species, we can also study the long term consequences of a shift in developmental plasticity of spadefoot toads.