Evolutionary Community Ecology

- We have discussed various ways populations can evolve in response to the biotic and abiotic environment
  - Character displacement
  - Evolution of predator/prey systems (optimal foraging)
  - Life history evolution
  - Various trade-offs

Guppy Evolution

- *Poecilia reticulata* evolutionary response to predation
  - Early maturation
  - Higher fecundity, greater energy allocation to reproduction
  - Greater food selectivity (preference for invertebrate food, less algae)

Ecosystem Effects

- Evolution of guppy traits has ecosystem effects.
- In mesocosm trials, guppies from high predation populations:
  - Trophic cascade
    - Larger standing stock of algae
    - Lower invertebrate biomass
    - Lower decomposition rate
    - Greater NH₄ excretion (higher protein diet)

Community Phylogenetics

- We expect stronger intraspecific competition than interspecific competition.
- Recall that “species” is an arbitrary delimiter.
- What we really expect then, is for competition pressure to decrease with greater phenotypic or genetic distance.
- Put this in a phylogenetic context:
  - Niche conservatism: tendency for closely related species to have similar niches.
Community Phylogenetics

- We also expect similar habitats (similar niche) to favor similar species.
- Sets up two different expectations:
  - Habitat filtering – similar habitats will present similar niches, resulting in similar species occupying. Implication is competition is not a strong factor, communities should feature many closely related species.
  - Phylogenetic overdispersion – Closely related species have similar niches and can’t coexist. Competition is strong. Communities do not feature closely related species.
  - Recall Hutchisonian Ratios

Experimental Evidence

- Simple 2-species experiments in mesocosms.
- More closely related species more likely to result in competitive exclusion. Competitive exclusion faster with more closely related species.

Environmental Input

- Humming bird communities tend to show stronger patterns of phylogenetic clustering, phylogenetic overdispersion rare.
- A) benign, B) harsh habitats
- Y-axis is the proportion times a clade is present in the community.
- Arid habitats are harsh resulting in high habitat filtering (similar trends in other datasets).
- Less harsh lowlands are phylogenetically dispersed.