

Doug Schemske – Michigan State University

“Why are the tropics so diverse?”



One of the major unresolved questions in biology concerns the factors responsible for the extraordinary diversity of tropical regions. Consider this single observation: there are more species of tropical and semi-tropical figs (approx. 700) than there are species of trees in all of North America (approx. 620). While numerous studies have investigated the ecological processes that contribute to such high tropical diversity, few have addressed its origins. Dobzhansky's "Evolution in the Tropics" (American Scientist. 1950. 38:209-221) remains the most influential contribution, but he provided few specifics in support of his hypothesis that the greater importance of biotic interactions in the tropics was the cause of latitudinal diversity gradients.

The talk will contain rampant speculation fueled by a passionate interest in organismal diversity and a desire to convince the audience that this is a subject that demands attention. I will briefly review the evidence and traditional explanations for high tropical diversity, then discuss a new evolutionary hypothesis that expands on Dobzhansky's ideas regarding the role of biotic interactions. The central premise is that geographic differences in the importance of biotic factors will influence the opportunity for coevolution, and hence rates of divergence. In the tropics, strong biotic interactions and spatial variation in community composition promote coevolution, and as a result, the optimal phenotype is a “moving target”. In contrast, evolutionary divergence in temperate populations is governed primarily by spatial differences in abiotic factors, which do not coevolve; hence, the optimum phenotype represents a “fixed target”. Thus, adaptive divergence and speciation in tropical environments will proceed faster than in temperate regions. New analyses of the geographic distribution of endemic fish provide support for this hypothesis. Finally, I will highlight possible directions for future research in a final attempt to garner enthusiasm for studies that compare biological processes in temperate and tropical regions.

Friday, Feb 17, 2016; Room 307, SERF; 3:30 - 4:30PM. - Pre-talk reception: 3:00 PM in Dabney 568