Camp Evolution 2016 – February 21-25
Summaries of Lectures & Readings
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5) Plant reproductive systems, life histories, colonization and range margins

Flowering plants display an enormous range of life histories and reproductive systems. Patterns of mating and the longevity of plants are commonly associated; annuals are frequently predominantly selfing and long-lived woody trees are usually highly outcrossing. These patterns indicate that ecology must play an important role in the evolution of plant reproductive systems. A particularly valuable ecological context for the study of reproductive systems are geographical range margins as they can provide opportunities to investigate how species respond to novel environmental conditions. Changes in the ecology and demography of marginal populations may lead to evolutionary changes in diverse features of the reproductive biology of populations. Such changes are particularly evident in flowering plants with broad geographical ranges. In this lecture I will examine the evolution of reproductive traits in a geographical context in three contrasting unrelated plant species with different life histories at varying spatial scales. First, I begin by discussing the genetics consequences of transitions from outcrossing to selfing in island populations. In *Eichhornia paniculata*, selfing has evolved from outcrossing on multiple occasions resulting in the colonization of the Caribbean and Central America from Brazil by long-distance dispersal. Using population genomic data, I provide evidence that the transition to selfing and migration to the Caribbean is accompanied by a reduction in the efficacy of selection consistent with the effects of reduced N_e in island populations. Second, alterations in ecological conditions in marginal populations have the potential to result in the origin of novel sexual systems by changes in patterns of gene flow. In clonal *Sagittaria latifolia*, monecious and dioecious populations predominate throughout much of the geographical range in eastern N. America but are reproductive isolated by life history and habitat. At northern range margins, this separation breaks down resulting in mixed sex populations. I provide molecular evidence showing how these populations have originated and discuss the broader implications for sexual-system evolution in plants. Finally, invasive species often experience different growing season lengths associated with the colonization of new territory. I provide evidence for the re-establishment of clinal variation in flowering time and size in invasive *Lythrum salicaria* associated with northern migration in eastern N. America. Range margin populations flower ~20 days earlier at half the size compared with southern populations, as a result of contemporary climatic selection. In each of these examples I consider lessons that can be drawn from these patterns of genetic differentiation and provide suggestions for potential future work.

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