Camp Evolution 2016 – February 21-25
Summaries of Lectures & Readings
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8) The influence of clonality on sexual reproduction

Flowering plants possess an unrivaled diversity of mechanisms for achieving sexual and asexual reproduction, often simultaneously. The commonest type of asexual reproduction is clonal growth (vegetative propagation) in which parental genotypes (genets) produce vegetative modules (ramets) that are capable of independent growth, reproduction, and often dispersal. Clonal growth leads to an expansion in the size of genets and increased fitness because large floral displays increase fertility and opportunities for outcrossing. Moreover, the clonal dispersal of vegetative propagules can assist "mate finding," particularly in aquatic plants. However, there are ecological circumstances in which functional antagonism between sexual and asexual reproductive modes can negatively affect the fitness of clonal plants. Populations of heterostylous and dioecious species have a small number of mating groups (two or three), which should occur at equal frequency in equilibrium populations. Extensive clonal growth and vegetative dispersal can disrupt the functioning of these sexual polymorphisms, resulting in biased morph ratios and populations with a single mating group, with consequences for fertility and mating. In populations in which clonal propagation predominates, mutations reducing fertility may lead to sexual dysfunction and even the loss of sex. Recent evidence suggests that somatic mutations can play a significant role in influencing fitness in clonal plants and may also help explain the occurrence of genetic diversity in sterile clonal populations. Finally, I present recent studies of gender strategies and sex-ratio variation in the clonal aquatic macrophyte *Sagittaria latifolia*. Using genetic markers, I show a close correspondence between sex ratios based of ramets and genets and that clone sizes in monoecious populations are significantly larger than in dioecious populations. Highly polymorphic genetic markers offer outstanding opportunities for gaining novel insights into clonality and for studying functional interactions between sexual and clonal reproduction in flowering plants.

Barrett, S.C.H. (2015). The influences of clonality on plant sexual reproduction. *Proceeding of the National Academy of Sciences, USA.* 112: 8859-8866.

Vallejo-Marín, M., Dorken, M.E., Barrett, S.C.H. (2010). The ecological and evolutionary consequences of clonality for plant mating. *Annual Review of Ecology, Evolution and Systematics* 41: 193-213.

Yakimowski S.B. & Barrett S.C.H. (2014). Clonal genetic structure and diversity in populations of an aquatic plant with combined vs. separate sexes. *Molecular Ecology* 23: 2914-2928.