

Camp Evolution 2016 – February 21-25
Summaries of Lectures & Readings
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2) The form and function of flowers

The reproductive organs of angiosperms, flowers and inflorescences, exhibit more variation in size and structure than the sexual organs of any other group of organisms. Why should organs that serve but one main purpose – mating – evolve such matchless variety? The answer of course largely lies in their interaction with the numerous types of pollen vectors that mediate cross-pollination and also mechanisms to reduce the harmful consequences of selfing and pollen wastage. Most of the reproductive diversity of angiosperm involves traits that function during pollination and mating. Therefore, the search for adaptive explanations for this variation should focus on mating as a process and its consequences for maternal and paternal reproductive success within and between populations, and the evolution of mating systems within species and lineages. In this lecture, I will discuss the significance of floral design and display for plant fitness and review experimental studies on a range of floral adaptations that use floral manipulations, and often genetic markers, to investigate floral form and function. These include mirror-image flowers (enantiostyly), heteranthy, diplostigmaty, adaptations promoting cross-fertilization in ornithophilous species, and diverse mechanisms of reproductive assurance that function when pollinator service is unreliable. My examples will be drawn from a wide range of animal-pollinated taxa of diverse origins including *Wachendorfia*, *Solanum*, *Babiana*, *Sebaea*, *Acampe*, *Tacca* and *Incarvillea*. Although functional studies of floral biology have a long and venerable history since the seminal work of Darwin, many novel floral adaptations await to be discovered and most plant scientists still fail to recognize that the evolution of flowers is strongly influenced by sexual selection on male function.

Harder, L.D., S.C.H. Barrett, & W. Cole. (2000). The mating consequences of sexual segregation within inflorescences of flowering plants. *Proceedings of the Royal Society Ser. B.* 267: 315-320.

Jesson, L.K. & Barrett, S.C.H. (2002). Solving the puzzle of mirror-image flowers. *Nature* 417: 707.

Zhang, L., S.C.H. Barrett, J-Y. Gao, J. Chen, W.W. Cole, Y. Liu, Z-L. Bai, & Q-J. Li. (2005). Predicting mating patterns from pollination syndromes: the case of "sapromyophily" in *Tacca chantrieri* (Taccaceae). *American Journal of Botany* 92: 517-524.