

Highlighted Articles for August 2023

Annual monkeyflower evolves a surprising suite of drought resistance strategies



Annual plant species typically evolve to complete their life cycles prior to the onset of stressful conditions, with populations that experience earlier stress evolving faster life cycles. **FitzPatrick et al. used five annual populations of *Mimulus guttatus* (syn. *Erythranthe gutatta*), collected across its range, to gain insight into variations in adaptive responses to drought stress. The authors find that only the most mesic annual population of *M. guttatus* surveyed exhibits the classic escape pattern—while populations from more xeric regions are able to avoid low water availability.** These responses to drought differ among populations, with some populations speeding up growth, others flowering at earlier developmental stages, and still others allocating fewer resources to flowering. **While these results highlight the evolution of an amazing diversity of potential drought resistance strategies, these strategies do not necessarily complement one another and could constrain adaptive potential in local regions predicted to have increasingly frequent and severe droughts.**

Joshua A. FitzPatrick et al. 2023. Unique drought resistance strategies occur among monkeyflower populations spanning an aridity gradient. *American Journal of Botany* <https://doi.org/10.1002/ajb2.16207>

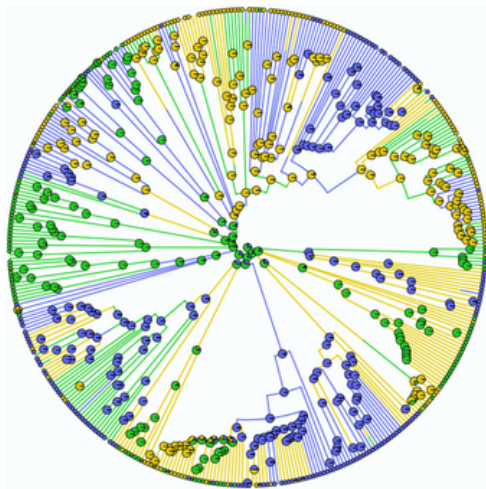
A novel hypothesis: The adaptive function of a second pollen emission phase is related to female function

Chestnuts are one of the few plants that emit pollen twice during flowering. The adaptive function of this unusual flowering strategy, called duodichogamy, is unclear. Pauly et al. present a novel hypothesis that duodichogamy increases female, rather than male, mating success. To test this hypothesis, the authors monitored pollinator visits to chestnut flowers throughout the entire flowering season. The numerous unisexual male catkins release pollen first, followed by the less numerous bisexual catkins. In chestnut, only male inflorescences produce nectar and attract insects. Observations revealed that most pollinator visits to female inflorescences take place during the second male flowering phase. This suggests that duodichogamy plays a key role in female mating success by ensuring pollen deposition on stigmas due to the attractiveness of closely associated male flowers—and effectively limiting self-pollination. This work on chestnut thus shows that the consideration of intersexual mating facilitation results in a better understanding of the evolution of flower or inflorescence organization.



Grégoire Pauly et al. 2023. Adaptive function of duodichogamy: Why do chestnut trees have two pollen emission phases?. *American Journal of Botany* <https://doi.org/10.1002/ajb2.16204>

Variability in evolutionary rates of floral characters and modules provides insights about floral diversity



Julian Herting et al. 2023. Profile of a flower: How rates of morphological evolution drive floral diversification in Ericales and angiosperms. *American Journal of Botany* <https://doi.org/10.1002/ajb2.16213>

Ericales are a highly diverse order of flowering plants, especially in terms of flower morphology. The androecium is the most morphologically diverse of the three floral modules (e.g., perianth, androecium, and gynoecium) in Ericales. However, it is not yet known whether patterns in morphological diversity are connected to heterogeneous rates of evolution. Herting et al. estimated evolutionary rates for floral characters of Ericales and across angiosperms to explore their influence on disparity and the differences among flower modules. The authors find that, on average, androecium characters evolve faster and gynoecium characters evolve slower than other floral characters. However, they also find heterogeneity of rates among characters of the same module. Surprisingly, floral characters displaying high disparity can have either slow or fast evolutionary rates—and slow evolving, highly disparate characters also have high phylogenetic signal and vice versa. This study shows that discussing floral disparity in light of morphological rates allows for a more detailed interpretation of the origin of floral diversity.