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Highlighted Articles for October 2023

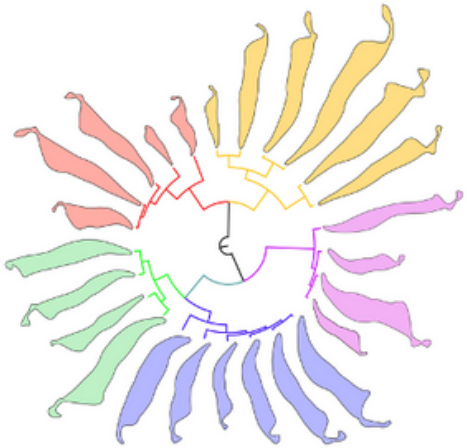
Using quasi-isogenic lines identifies effects of individual scent compounds on pollination

Ying-Ze Xiong et al. 2023. Testing the effect of individual scent compounds on pollinator attraction in nature using quasi-isogenic *Capsella* lines. *American Journal of Botany* https://doi.org/10.1002/ajb2.16237

It is well established that volatile blends in floral scent together contribute to pollinator attraction. However, due to the complexity of isolating the effect of single compounds by traditional methods, few previous studies have disentangled the effect of individual floral scent compounds on pollination. Using available quasi-isogenic lines (qILs) that were generated as part of the original mapping of the floral scent volatile-related loci CNL1 (benzaldehyde; BAld) and *TPS2* (β-ocimene) in *Capsella*, **Xiong et al. successfully generated a segregating population that includes four genotypes specifically differing only in BAld and/or β-ocimene emissions and introduced these genotypes to a common garden.** The data revealed no effect of genotype on the overall pollinator visitation rate or the rate of outcrossing. This result may be explained by the observation that different pollinators had inconsistent or even opposite preferences for BAld and β-ocimene, indicating that individual floral scent compounds may act as attractants for different types of pollinators. **This study's construction of scent-manipulated materials using qILs provides a framework for other studies to examine the ecological effects of individual floral scent compounds in natural environments.**

Unveiling the mystery of pitcher evolution in *Heliamphora*

The evolution of carnivorous pitcher traps across multiple angiosperm lineages represents a classic example of morphological convergence. Yet few comparative studies have focused on the morphological evolution of these structures. **Venturing deep into the intricacies of the carnivorous South American marsh pitcher plants (*Heliamphora*), Liu and Smith used phylogenetic comparative approaches to quantify the morphospace occupied by *Heliamphora* pitchers.** The authors traced evolutionary trajectories and uncovered repeated radiations of *Heliamphora* pitchers in distinct Tepui regions (table-top mountains) in South America, leading to frequent convergence in pitcher size and shape across the genus. These results highlight that the diversification and convergent evolution of traits related to carnivory persist even at finer evolutionary scales. **These findings strengthen the argument that ecological specialization is not necessarily an evolutionary dead end.** *[Diagram: Morphological evolution of* Heliamphora *pitchers]*



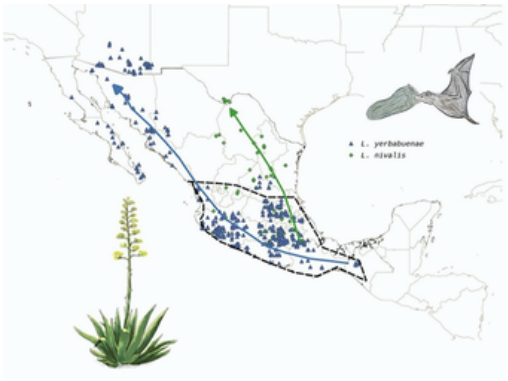
Sukuan Liu and Stacey D. Smith 2023. Replicated radiations in the South American marsh pitcher plants (*Heliamphora*) lead to convergent carnivorous trap morphologies.. *American Journal of Botany* https://doi.org/10.1002/ajb2.16230

Decoding the evolutionary history of *Boechera*

***Boechera* (Boechereae, Brassicaceae) has recently emerged as a model system in plant ecological genomics and evolutionary biology.** However, its full potential is yet to be achieved due to the lack of a well-resolved phylogeny of the sexual diploid taxa that form the foundation of the highly reticulate species complexes ubiquitous within *Boechera*. **Here, Hay et al. resolve the basic patterns of divergent evolution in *Boechera* and its close relatives by employing a "diploids-first" approach and combining target enrichment and genome skimming from two Hyb-Seq bait sets (Angiosperms353 and Brassicaceae-specific).** Genomic data analyzed from 1114 low-copy nuclear genes taken from 81 sexual diploids resulted in a robust phylogeny for the tribe Boechereae. **This effort yields the first well-resolved evolutionary framework for *Boechera*, providing a roadmap for future research endeavors.**
[Photo credit: Doug Waylett, Boechera retrofracta, *https://www.flickr.com/photos/dougcwaylett/2556880984]*

Nikolai M. Hay et al. 2023. A Hyb-Seq phylogeny of *Boechera* and related genera using a combination of Angiosperms353 and Brassicaceae-specific bait sets. *American Journal of Botany* https://doi.org/10.1002/ajb2.16226

In the search for nectar: Bat-Agave interactions reveal insights into the coevolution between species



Roberto-Emiliano Trejo-Salazar et al. 2023. Historical, temporal, and geographic dynamism of the interaction between *Agave* and *Leptonycteris* nectar-feeding bats. *American Journal of Botany* https://doi.org/10.1002/ajb2.16222

The interaction between plants and pollinators has been recognized as an important factor of evolutionary diversification. **One of the most interesting and charismatic cases of plant-pollinator interactions is between nectarivorous bats and Agave species.** Both groups show a broad geographic congruence, as well as a phenological correspondence between Agave flowering and female bat migration timing. During this long-distance migration, approximately 100 Agave species play a crucial role by providing nectar to sustain the bats' flights, and in return the plants benefit from bat-pollination services. **Using Ecological Niche Models, Trejo-Salazar et al. investigated the dynamics of the interaction between 94 Agave species and two Mexican *Leptonycteris* bat species in response to three Pleistocene climatic changes.** The authors found that this ecological relationship was extremely dynamic throughout these time periods. **Surprisingly, many Agave species showed a broad codistributional pattern with both migratory and non-migratory components of nectarivorous bats regardless of climate changes.** These findings strongly support the hypothesis of diffuse coevolution between nectarivorous bats and Agave species.