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Highlighted Articles for October 2024

Flower color cline in a perennial desert bush

Sonal Singhal et al. 2024. Population structure and natural selection across a flower color polymorphism in the desert plant *Encelia farinosa*. *American Journal of Botany* https://doi.org/10.1002/ajb2.16413

In this study, Singhal et al. characterize a transition in flower color in the desert brittlebush plant *Encelia farinosa*. This transition begins in southern California, where the brittlebush has flowers with yellow centers. Over a span of ~100 km, the species transitions to having brown-purple centers. **Using a diversity of methods including fieldwork, genomics, and machine learning, the authors examined how this transition formed and how it is being maintained.** Their results suggest that the change in flower color is the result of selection, not drift, and that it overlaps with a change in climatic conditions. Interestingly, the same transition occurs at smaller spatial scales within the same species and in its close relative *E. californica.* **In the future, the authors hope to better understand both the potential adaptive significance and the genetic basis of this variation.**

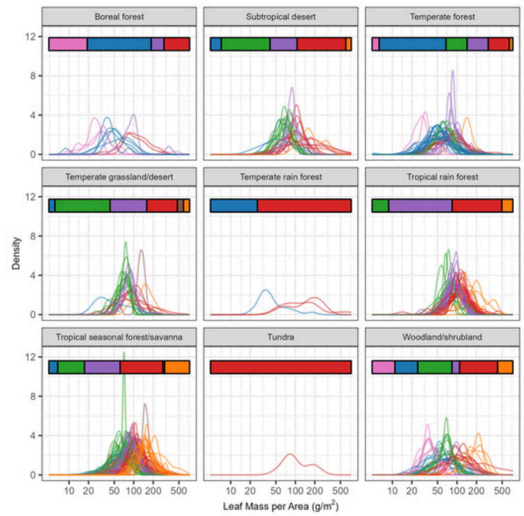
Insights into the complex evolution of seed dispersal strategy

Plants have a wide range of dispersal strategies, including species that specialize in wind dispersal. **Using a morphologically diverse tribe of grasses, Brightly et al. tested the classic hypothesis that wind dispersal preferentially evolves in lineages that occupy open and frequently disturbed habitats.** Using a novel approach that incorporates robust quantitative measures of dispersal potential and habitat preference, the authors found that open and disturbance-adapted species have evolved traits that facilitate wind dispersal. However, they also find that these species acquire traits, like shorter heights, that concurrently reduce wind dispersal potential, suggesting there may be trade-offs with other important plant functions. **Although the results support classic hypotheses about the evolution of seed dispersal, they also suggest the evolution of dispersal strategy in these habitats is more complicated than previously thought.** Nevertheless, this study provides promising results and a framework for disentangling the complex drivers of dispersal strategy evolution.

William H. Brightly et al. 2024. Correlated evolution of dispersal traits and habitat preference in the melicgrasses. *American Journal of Botany* https://doi.org/10.1002/ajb2.16406

What can leaf mass per area alone tell us about plant communities and their environments?

Leaf mass per area (LMA) is a widely used trait that reflects the combined effects of the forces that shape how a plant interacts with its environment. This raises the question: Without context, what does LMA tell us? The question particularly plagues paleobotanists, who can reconstruct LMA from fossil leaves, but often cannot reconstruct the factors that influence LMA. As a result, paleobotanical research tends to go the other direction, seeking to use LMA as a proxy for the factors that shape it. **Butrim et al. use an extensive modern and fossil dataset to investigate the relationship between LMA and LMA drivers like climate, phylogenetics, and deciduousness.** Their results suggest that while LMA varies predictably with many of these forces, most of the primary drivers of LMA have similar levels of influence, making it difficult to attribute a shift in LMA to any one factor. Instead, **the authors suggest that as the culmination of all these influences, fossil LMA should be understood as a reflection of plant strategy rather than as a predictor of plant environment.**



Matthew J. Butrim, et al. 2024. Leaf mass per area: An investigation into the application of the ubiquitous functional trait from a paleobotanical perspective. *American Journal of Botany* https://doi.org/10.1002/ajb2.16419

Why are legumes more sensitive to freezing than other species in northern temperate grasslands?

Samuel Rycroft and Hugh Henry. 2024. The roles of root-nodulating bacterial associations and cyanogenesis in the freezing sensitivities of herbaceous legumes. *American Journal of Botany* https://doi.org/10.1002/ajb2.16424

Legumes provide important nitrogen inputs into grasslands, but in northern temperate regions they are often more sensitive than other species to increases in soil frost caused by reduced snow cover and increased temperature variability. The underlying causes of this reduced freezing tolerance, however, remain largely unknown. **Rycroft and Henry examined the roles of root-nodulating bacterial associations and cyanogenesis, two proposed mechanisms for high legume freezing sensitivity.** The authors observed legumes that survived frost had fewer root-nodulating bacterial associations, and the growth advantage provided by nodulation decreased with increasing freezing severity. In contrast, cyanogenesis was detected in only a few of the legume species that were sensitive to freezing. **These results suggest the freeze tolerance of root-nodulating bacteria may play a key role in the sensitivity of legumes to freezing.** This work has important implications for changes in soil fertility, community composition, and plant productivity in northern temperate ecosystems in the context of a changing winter climate.