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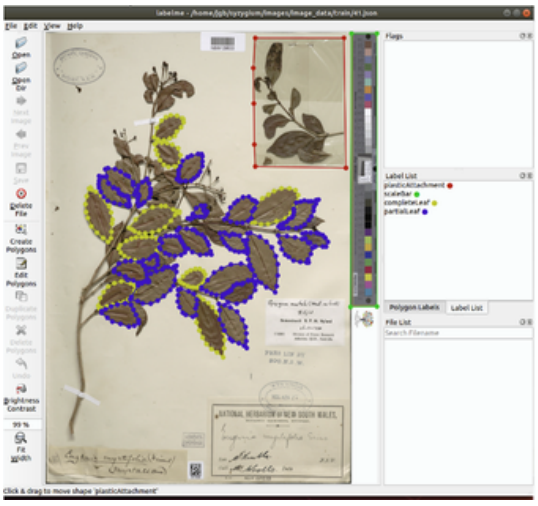
# Highlighted Articles for May 2023

## AI unlocking large-scale data assembly from herbarium collections

Herbaria contain massive collections of preserved plants gathered over centuries and thus represent a wealth of available data encompassing a broad range of time and taxonomic scales. In a blend of nature and technology, **Wilde et al. used artificial intelligence (AI) to analyze digitized herbarium specimens to automate the detection and measurement of leaves in scanned herbarium sheets**. Using machine learning, the authors found that leaf size generally increases with higher temperature and rainfall, though other factors come into play within individual species. **This approach unlocks the potential of herbaria, with AI working as a high-speed botanist, to reveal patterns and insights on a scale that was previously unimaginable.** This method paves the way for a deeper understanding of plant traits, evolution, and how plants may respond to future climate changes. **Simply put, it's a technological key to vast botanical time capsules.**



Brendon C. Wilde et al. 2023. Analyzing trait-climate relationships within and among taxa using machine learning and herbarium specimens. *American Journal of Botany* https://doi.org/10.1002/ajb2.16167

## Domestication of squash plants changes flowers and pollinator preferences

Sonja K. Glasser et al. 2023. Influence of plant domestication on plant-pollinator interactions: Floral attributes and floral visitor communities in wild and cultivated squash plants. *American Journal of Botany* https://doi.org/10.1002/ajb2.16170

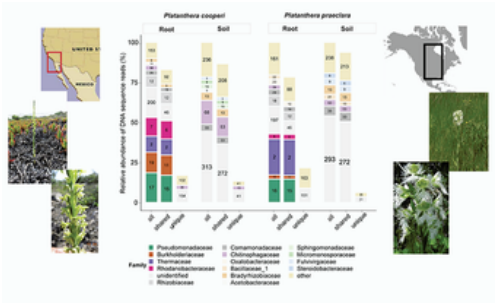
Plant domestication is a process in which artificial selection results in human-desired traits such as better taste, higher nutritional content, and adaptation to agricultural practices. Plant domestication may also indirectly change non-target plant traits and interactions with other living organisms. **In this study, Glasser et al. ask how plant domestication influences plant-pollinator interactions.** With at least six independent domestication events of squash from gourd plants in Mesoameria (~10,000 years ago), this is an excellent system to study the effects of domestication on flowers and their interaction with bees. **The authors compared flower shape, size, and floral rewards (nectar and pollen) between domesticated and wild squash and monitored pollinator visitation.** Flowers of domesticated squash were larger and had more rewards than wild squash. Flowers of domesticated squash received more visitation by specialist squash bees and other bees. Domesticated squash seems to invest more resources in attractive floral traits that increase plant reproductive output. **These findings suggest that floral traits of domesticated and wild squash plants have different selection pressures and highlight the need to conserve wild ancestor populations to preserve plant-pollinator interactions.**

## The first Gondwanan spurges shed new light on biogeographic history

The spurge family (Euphorbiaceae) has over 6000 species and is abundant in tropical rainforests, especially in Asia. The biogeographic origins of the family and its major groups are poorly understood, and no reliable macrofossils have been found to date in Gondwana. **Wilf et al. report exquisitely preserved 52 million-year-old fossil infructescences and leaves of Euphorbiaceae from southern Argentina, which was part of West Gondwana at the time.** These fossils include compound infructescences with up to 50 attached capsules, preserving fine diagnostic features such as paired axile seeds and plumose stigmas. **The new fossils are the first to show that the spurges once inhabited Gondwana.** They are the oldest known of the diverse *Macaranga-Mallotus* clade, an ecologically important Old World understory element that ranges from Africa to Southeast Asia and Oceania. Previously thought to have tropical Asian origins, **this discovery changes ideas of the *Macaranga* group's origins and potential dispersal routes and adds significantly to the Gondwanan legacy of endangered Asian rainforest vegetation.**

Peter Wilf et al. 2023. The first Gondwanan Euphorbiaceae fossils reset the biogeographic history of the *Macaranga-Mallotus* clade. *American Journal of Botany* https://doi.org/10.1002/ajb2.16169

## The assembly of bacterial root endophytes is linked to phenological stage, population size, and habitat soil



Jaspreet Kaur et al. 2023. Congeneric temperate orchids recruit similar-yet differentially abundant-endophytic bacterial communities that are uncoupled from soil, but linked to host phenology and population size. *American Journal of Botany* https://doi.org/10.1002/ajb2.16168

Like mycorrhizal fungi, root-associated bacteria can also promote seed germination, seedling growth and population fitness in orchids, though fundamental questions about their ecology remain unanswered. Therefore, as a first step, **Kaur et al. studied whether orchids exhibit specificity toward root-associated bacterial communities, and if their recruitment is tied to the soil bacterial communities or other factors such as population size or phenological stage of the host species.** Bacterial surveys that focused on *Platanthera cooperi* and *P. praeclara* indicated that these two host orchids indeed show differences in the recruitment of endophytic root bacterial communities, and within each orchid the communities showed differences based on the population size and phenological stage of the host plant. This study also showed the rarity of root-associated bacteria in the habitat soils of each host species. While the importance of orchid mycorrhizal fungi in orchid ecology is well established, **this study underlines the importance of orchid root- associated bacteria in orchid ecology that could potentially help explain the enigmatic distributions and population dynamics of orchid species—and may provide an important new component for orchid conservation programs.**