

Highlighted Articles for June 2025

Hairy nectaries: A look into the development of the nectar-producing organ in *Penstemon barbatus*

Many flowering plants provide a nectar reward to their pollinators to encourage visitation. Nectar is produced by nectary glands, which have been found on every organ type in the flower and can have many types of secretion methods. The gene CRABS CLAW (CRC) is needed for nectary development in many core eudicots that excrete nectar through modified stomata. Katzer et al. investigated whether this gene, along with other nectary developmental genes, is expressed in the modified plant-hair nectaries of the lamiid *Penstemon*. They characterized the stages of nectary development using histology, and used a transcriptomics approach to uncover that *CRC* is not expressed in nectaries from early-stage flowers where modified plant hairs have not yet developed; it is also not expressed in the nectaries of fully mature flowers. In contrast, previously known nectar production genes such as SWEET9 and CWINV4 are expressed in fully mature Penstemon nectaries. Excitingly, this research suggests that nectaries with varying secretion methods may be patterned by different developmental genetic pathways, but that the mechanisms controlling nectar sugar metabolism and secretion are likely conserved across a diversity of nectary forms.



Amanda M. Katzer et al. 2025. CRABS CLAW-independent floral nectary development in Penstemon barbatus. American Journal of Botany https://doi.org/10.1002/ajb2.70058

Collaborations between citizen scientists and expert botanists on iNaturalist facilitate species discovery



 Thomas Mesaglio et al. 2025. Citizen science records are

 fuelling exciting discoveries of new plant species.

 American
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 of
 Botany

 https://doi.org/10.1002/ajb2.70048

Thousands of new plant species are described each year from around the world, many of them from herbarium specimens first collected decades or even centuries ago. **However, there are still thousands of plant species waiting to be discovered and collected in the field for the first time, and the global biodiversity citizen science platform iNaturalist offers a powerful tool to facilitate these new discoveries.** In the last few years, at least 12 new plant species have been discovered and described thanks to photographs uploaded to iNaturalist, including species from the Americas, southern Africa, and Australia. In this On **the Nature of Things essay, Mesaglio et al. emphasize that these discoveries are only possible through the contributions of both citizen scientists, who can explore and photograph plants across a vast spatiotemporal range, and expert botanists, who have the knowledge to recognize taxonomic novelties.** Maximizing the utility of iNaturalist for plant species discovery will involve meaningful collaborations between the two parties, including involving citizen scientists in plant collection and descriptions.

Biotrophic nutrition evolved repeatedly in the Cantharellales

Chanterelles and their relatives (order Cantharellales) are a species-rich and morphologically diverse group of fungi that have diverse strategies for acquiring nutrients: they include many plant- and algae-associated lineages that can be ectomycorrhizal, orchid mycorrhizal, or lichenized. Few studies have examined phylogenetic relationships among members of the Cantharellales, and little is known about when these varied nutritional ecologies evolved across the order. This study by Swenie et al. uses a fivegene dataset and high-throughput sequencing of specimens and cultures to infer the first densely sampled Cantharellales phylogeny, and to reconstruct the evolutionary history of biotrophic nutritional modes. The resulting phylogeny supports a four-family taxonomic arrangement and shows that the Cantharellales diverged from a saprotrophic common ancestor during the Carboniferous period. The authors infer that biotrophic lifestyles arose independently in the order from saprotrophic ancestors multiple times over the past 230 million years. These findings uncover a dynamic picture of nutritional evolution in this important group of fungi.



Rachel A. Swenie et al. 2025. A phylogenetic study of the Cantharellales supports recognition of four families and independent gains of biotrophic nutritional modes. *American Journal of Botany* <u>https://doi.org/10.1002/ajb2.70054</u>

[The lichenized coralloid basidiomycete fungus Multiclavula mucida (Pers.) R.H. Petersen (Hydnaceae, Cantharellales) growing with its algal symbiont on a decorticated log.]

First South American Araliaceae fossils illuminate Gondwanan heritage of endangered Malesian rainforests



Peter Wilf. 2025. Osmoxylon-like fossils from early Eocene South America: West Gondwana-Malesia connections in Araliaceae. American Journal of Botany https://doi.org/10.1002/gjb2.70045

[One of the namesakes of the new fossils, Mariano Caffa, preparing a new specimen of Caffapanax canessae at the Museo Paleontológico Egidio Feruglio, Trelew, Argentina.] The ginseng family Araliaceae, well known for its ornamental and medicinal plants, includes prominent understory components of tropical rainforests worldwide, often inhabiting threatened and biodiverse areas. Early Cenozoic records of this family are extremely rare, and none previously came from the ancient supercontinent Gondwana. In this issue, Wilf reports on 52-million-year-old enormous, palmately lobed *Caffapanax* leaves and an umbellate *Davidsaralia* infructescence from the West Gondwanan Laguna del Hunco locality in Patagonian Argentina. Both new fossil taxa of Araliaceae are similar to the east Malesian rainforest genus *Osmoxylon*, for which ~70% of species are threatened with extinction. These discoveries represent the oldest fossils of the family, the first from Gondwana, and the first with relationships to Malesian endemic genera of Araliaceae. The new fossils highlight the biogeographic and conservation significance of Patagonian fossil floras, which have ancient austral connections through Antarctica to imperiled Indo-Pacific, everwet tropical rainforests.