

HIGHLIGHTS

A quick glance at noteworthy articles in this month's issue



INTRINSIC GENETIC AND EXTRINSIC CLIMATIC FACTORS INFLUENCE THE BIOGEOGRAPHY OF COMPLEX POLYPOIDS: THE CASE OF *CAMPANULA ROTUNDIFOLIA*

Campanula rotundifolia is a widespread, highly variable polyploid complex that is phylogenetically and taxonomically challenging. Using chloroplast and next-gen nuclear markers, Sutherland and Galloway demonstrate that its phylogeography has been mediated by both whole-genome duplication and glacial cycles. Notably, European populations persisted both north and south of the Alps during glaciation, whereas North American populations were restricted to a relatively small Midwestern refugium and have recolonized much of the continent since the last ice age. These findings indicate the important contribution of both intrinsic (polyploid formation) and extrinsic (glaciation) factors in shaping the distribution and genetic patterns of polyploid complexes.

Brittany L. Sutherland and Laura F. Galloway. 2018. Effects of glaciation and whole genome duplication on the distribution of the *Campanula rotundifolia* polyploid complex. *American Journal of Botany* <https://doi.org/10.1002/ajb2.1162>



WHOLE-GENOME DUPLICATION DECREASES CLONALITY IN NEOPOLYPOID STRAWBERRY, BUT NOT ALWAYS

Clonal reproduction has long been associated with polyploidy and is expected to influence autopolyploid establishment success within primarily diploid populations. Yet the immediate effects of whole-genome duplication (WGD) on investment in clonal reproduction are currently unknown. Using colchicine to synthesize polyploids, Van Drunen and Husband assess the effect of whole genome duplication (WGD) on clonal reproduction of wild strawberry, *Fragaria vesca*. They find that compared to diploids, WGD in neotetraploids (newly formed tetraploids) decreases stolon and plantlet production. However, variation among neotetraploid lines from independent WGD events resulted in some neotetraploids that were more clonal than their diploid counterparts, demonstrating that the phenotypic results of WGD are often not uniform. This study contains the first empirical measure of clonal reproduction in newly synthesized polyploids, offering a novel perspective on the impact of clonality on polyploid evolution.

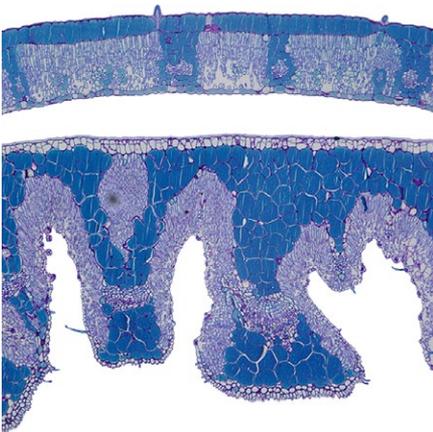
Wendy E. Van Drunen and Brian C. Husband. 2018. Whole-genome duplication decreases clonal stolon production and genet size in the wild strawberry *Fragaria vesca*. *American Journal of Botany* <https://doi.org/10.1002/ajb2.1159>



COMMUNITY PHYLOGENETIC ANALYSIS PROVIDES INSIGHTS INTO THE ECOLOGICAL AND EVOLUTIONARY RELATIONSHIPS OF THE IMPERILED PINE ROCKLAND ECOSYSTEM

Pine rocklands host a unique flora rich in endemic, threatened, and endangered species. Recent explosive growth of metropolitan areas in southern Florida has led to severe habitat fragmentation, fire suppression, and influxes of invasive species into this ecosystem. Using field-based collections of 538 taxa including endemic and invasive plant species, Trotta et al. construct the first community phylogeny for pine rocklands in order to gain insight into the evolutionary and ecological relationships of this globally imperiled ecosystem. They find that taxa endemic to pine rocklands show a strong signal of phylogenetic clustering, meaning they are closely related, while invasive taxa show no significant pattern. Interestingly, they find that the native species are equally represented by Caribbean and North American lineages, while invasive species are predominantly Asian or African in origin. Incorporating evolutionary information into ecological studies of imperiled ecosystems such as pine rocklands provides additional information that can facilitate their management and restoration.

Lauren B. Trotta et al. 2018. Community phylogeny of the globally critically imperiled pine rockland ecosystem. *American Journal of Botany* <https://doi.org/10.1002/ajb2.1168>



DECRYPTING DROUGHT TOLERANCE: EVOLUTION OF LEAF MORPHOLOGY IN CALIFORNIA LILACS IN RESPONSE TO DRY CLIMATES

As climate change ensues, many plants worldwide are threatened by increasing droughts. Plant survival and drought tolerance depend on the properties of leaves and of the cells within the leaves. Using detailed leaf measurements of 10 species of California lilacs (*Ceanothus*, Rhamnaceae) grown in a common garden, as well as genetic data to account for phylogenetic relatedness, Fletcher et al. test the degree that leaf anatomy and composition can predict the dryness of species' native range. They find a striking diversity in leaf type across species, with the most drought tolerant species possessing deep grooves or "crypts" in the leaf surface, and saltier cell sap, enabling them to thrive in drier soil without wilting. This study emphasizes the feasibility of using detailed leaf traits to predict drought tolerance among closely related species, and highlights the unique anatomical specialization that evolved in this diverse lineage.

Leila R. Fletcher et al. 2018. Evolution of leaf structure and drought tolerance in species of Californian *Ceanothus*. *American Journal of Botany* <https://doi.org/10.1002/ajb2.1164>



DISENTANGLING THE DOMESTICATION HISTORY OF MELONS: GEOGRAPHIC ORIGINS AND POTENTIAL AVENUES FOR NEW CULTIVARS

The domestication histories of many crop species, such as melon, are still incomplete. Previous studies suggest an African or Asian origin for melon, but a recent report that its closest wild relative is in Australia added confusion to debates about the origin of this economically important crop. Using DNA sequencing of over 90% of the worldwide *Cucumis* species, plus all major cultivars, Endl et al. find at least one independent melon domestication event in both Africa and Asia, but none in Australia. The African lineage is still fully crossable with Asian melons, and because of its high genetic diversity, is an especially interesting source of new traits for melon breeders. Moreover, the discovery that a perennial, drought tolerant species from India is one of the closest living wild relatives of our modern melons provides important avenues for potentially breeding new climate-change-tolerant cultivars.

Josef Endl et al. 2018. Repeated domestication of melon (*Cucumis melo*) in Africa and Asia and a new close relative from India. *American Journal of Botany* <https://doi.org/10.1002/ajb2.1172>