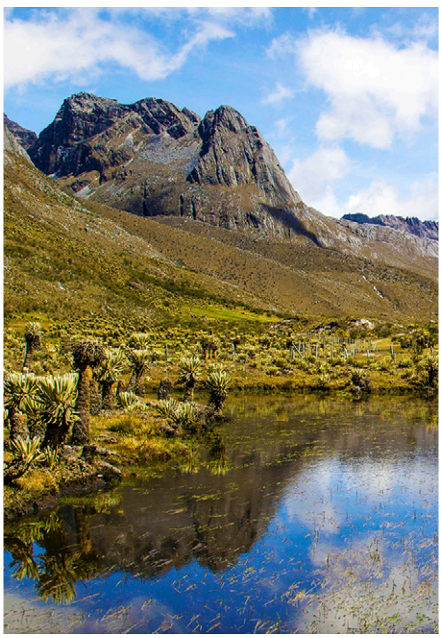
HIGHLIGHTS

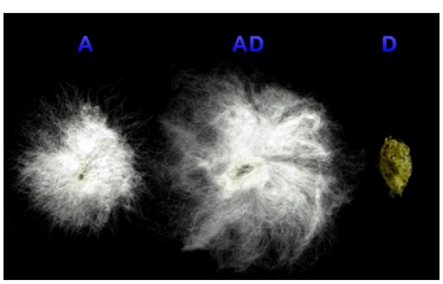
A quick glance at noteworthy articles in this month's issue



DISPERSAL INTO NEWLY EMERGING ENVIRONMENTS CAN INCREASE SPECIES DIVERSIFICATION RATE

Accelerated rates of net diversification (speciation minus extinction) have often been associated with the appearance of a novel morphological character, or key innovation, that allows a group of organisms to use a niche in a new way. Recently, an alternative mechanism, dispersification (dispersal and diversification), has been proposed; movement into a new geographic area triggers an increase in the net diversification rate without any apparent morphological changes. Uribe-Convers and Tank (p. 1854) test this hypothesis using chloroplast and nuclear ribosomal sequence data of 49 species in the Rhinantheae clade of Orobanchaceae, including 15 Andean species of the genus *Bartsia*. They find that the net diversification rate for this South American clade is up to four times higher than the background rate of the tree, and that biogeographical dispersal of this group to the New World corresponded temporally with emergence of an alpine Andean environment, the páramo. These findings provide phylogenetic and biogeographic support for a rapid radiation via dispersification.

Uribe-Convers, S. and D. C. Tank. 2015. Shifts in diversification rates linked to biogeographic movement into new areas: An example of a recent radiation in the Andes. *American Journal of Botany* 102: 1854. doi:10.3732/ajb.1500229



THE UBIQUITOUS, CYCLICAL, NATURE OF POLYPLOIDY

Botanists have long appreciated that chromosome number doubling is important in angiosperm diversification and that it remains an active mode of speciation in many groups. Yet genomic studies now reveal that the prevalence of polyploidy in angiosperms has been vastly underestimated. Wendel (p. 1753) highlights the evolutionary history of polyploidy: polyploidy sets in motion a myriad of genomic and epigenomic responses on both short and long-term timescales, and can ultimately generate the highly "diploidized" but massively restructured derivatives seen in many extant plants. He points out an emerging key realization, namely that *all* modern flowering plants have a history of repeated, episodic whole-genome doubling, and provides an overview of the many processes now known to play a role in this "wash-rinse-repeat" cycle of polyploidization.

Wendel, G. W. 2015. The wondrous cycles of polyploidy in plants. *American Journal of Botany* 102: 1753. doi:10.3732/ajb.1500320

doi:10.3732/ajb.1500860

CUTTING-EDGE TECHNOLOGY REVEALS COMPLEX CHARACTERS OF SEEDS IN THE GINGER FAMILY AND PROVIDES NEW INSIGHTS INTO PHYLOGENY

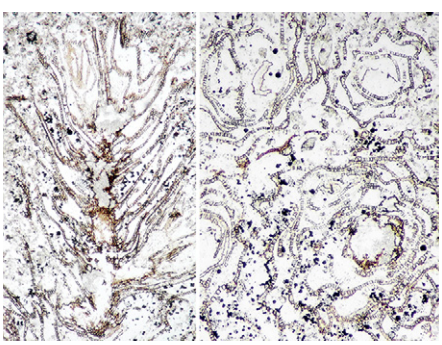
The ginger family, Zingiberaceae, has some of the most complex seeds found among flowering plants, yet little is known about the diverse structure of these seeds. Using synchrotron X-ray tomographic microscopy, a cutting-edge, non-destructive, three-dimensional imaging technology, Benedict et al. (p. 1814) overcome the hurdles of sectioning the hard brittle seed coat typical of this family to describe seed morphological and anatomical characters for 75 species across three subfamilies. While no single seed character distinguishes each subfamily, a combination of multiple seed characters well supports the current, molecularly based, phylogenetic circumscription, where no other robust morphological characters exist to date. This study highlights the importance of seed structure as a rich, yet underused, resource for morphological characters, and its critical role in understanding plant biodiversity and evolution.

Benedict, J. C., et al. 2015. Seed morphology and anatomy and its utility in recognizing subfamilies and tribes of Zingiberaceae. *American Journal of Botany* 102: 1814. doi:10.3732/ajb.1500300

HOW ARE SPECIES BOUNDARIES MAINTAINED IN THE DIVERSE HAWAIIAN *CYRTANDRA?*

Recent reviews suggest that boundaries between closely related plant species are maintained predominantly through prezygotic barriers. Few studies, however, have explored patterns of reproductive isolation in long-lived species. The Hawaiian genus *Cyrtandra* presents an intriguing challenge to our understanding of reproductive isolation, as it comprises 60 shrub or small tree species that are almost exclusively restricted to wet forests, where sympatry of multiple species is common. Using the main Hawaiian Islands' natural island-age gradient, Johnson et al. (p. 1870) assess the relative strengths of pre- and postzygotic barriers among four species of *Cyrtandra*. They find that boundaries between sympatric *Cyrtandra* species in Hawaii are maintained predominantly through postzygotic barriers, and suggest that postzygotic barriers may have been important in the initial divergence of these populations.

Johnson, M. A., et al. 2015. Postzygotic barriers isolate sympatric species of *Cyrtandra* (Gesneriaceae) in Hawaiian montane forest understories. *American Journal of Botany* 102: 1870. doi:10.3732/ajb.1500288



NEW DISCOVERY INCREASES THE KNOWN AGE AND DIVERSITY OF FOSSIL MOSSES

Bryophytes are thought to have arisen before vascular plants, more than 400 million years (Ma) ago, yet the bryophyte fossil record is intriguingly sparse. Even mosses, better represented than liverworts and hornworts, are rare in the fossil record, especially in pre-Cenozoic rocks (>66 Ma). Shelton et al. (p. 1883) describe the first of several exceptionally preserved mosses from the Lower Cretaceous (Valanginian, ca. 136 Ma) rocks on Vancouver Island, a site that hosts a rich, and extremely diverse, anatomically-preserved fossil flora. The new moss is the oldest unequivocal pleurocarpous moss and representative of the Hypnanae, providing a hard minimum age for the group. This moss features a combination of characters that required the erection of a new family, confirming that the fossil record hosts moss diversity unaccounted for in extant floras. These reaffirm the important contribution of paleontology to efforts aimed at documenting the history of biodiversity on Earth. (Photo shows gametophyte stems of the new moss, *Tricosta plicata* gen. et sp. nov., in longitudinal [left] and cross section [right].)

Shelton, G. W. K., et al. 2015. Exploring the fossil history of pleurocarpous mosses: Tricostaceae fam. nov. from the Cretaceous of Vancouver Island, Canada. *American Journal of Botany* 102: 1883. doi:10.3732/ajb.1500360