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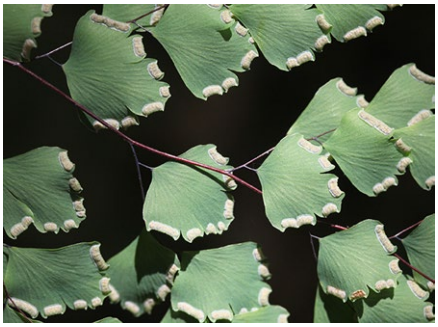
HIGHLIGHTS

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



A HIDDEN GEM IN THE WELL-STUDIED PLASTOME: DISCOVERY OF A HIGHLY CONSERVED OPEN READING FRAME IN A FERN PLASTID

Genomes of plastids are very similar across all plants and are well characterized and annotated, with only a few unrecognized open reading frames (ORF) remaining. In sequencing the complete plastome of the fern *Adiantum shastense*, Song et al. (p. 117) discover a previously unknown ORF in the fern lineage and show that it is highly conserved across flagellate plants. The degree of sequence conservation, together with the presence of a distinct transmembrane domain and RNA-editing sites, suggests that this is a protein-coding gene of functional significance in ferns and, potentially, bryophytes and lycophytes. Although the origin and exact function of this gene require further investigation, this study demonstrates that undiscovered aspects still exist to this highly conserved and well-characterized organellar genome. Such studies augment data already available from hundreds of complete plant plastomes, and aid in comparative and molecular evolutionary research. (Photo credit: John Game.)

Michael Song et al. 2018. A novel chloroplast gene reported for flagellate plants. *American Journal of Botany* **doi: 10.1002/ajb2.1010**

OLDEST SEED FOSSIL OF SOLANACEAE RE-IDENTIFIED AS A COMMELINID MONOCOT: THE VALUE OF RE-ASSESSING FOSSILS WITH NEW TECHNIQUES

Fossils are the primary source of evidence for understanding the evolution of our modern biota and are often used to time-calibrate molecular phylogenies. Using x-ray-based scanning techniques, Särkinen et al. (p. 95) re-evaluate several fossil seeds, including a specimen previously thought be the earliest seed fossil record of Solanaceae, a family of major agricultural importance. Based on cellular-level preservation of morphological and anatomical structures of the fossil seed, the authors demonstrate that *Cantisolanum daturoides* does not in fact represent the nightshade family as previously thought, but is likely an extinct member of the commelinid monocots. This study showcases the value of using new techniques to re-examine fossils and provides key information for understanding the phylogeny and evolution of Solanaceae.

Tiina Särkinen et al. 2018. A new commelinid monocot seed fossil from the early Eocene previously identified as Solanaceae. *American Journal of Botany* **doi: 10.1002/ajb2.1009**

https://doi.org/10.1002/ajb2.1015

NORTHERN CALIFORNIA'S PYGMY FOREST: PLANT GROWTH UNDER EXTREME NUTRIENT LIMITATION

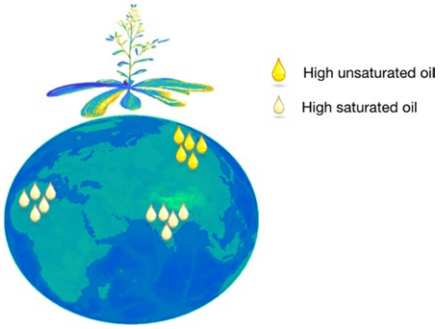
In natural ecosystems, nutrient limitation often constrains plant growth and affects many aspects of plant physiology, survival, interactions with other species, and ecosystem functioning. The pygmy forest in Northern California, with its acidic and nutrient-poor soils, supports a community with severely stunted growth. In order to understand how plants in these forests survive and what physiological changes cause their stunting, Cary and Pittermann (p. 50) compare physiological traits of several species with conspecifics growing in nearby richer soils. They find that photosynthetic rates per unit leaf area of pygmy plants are similar to their richer-soil counterparts, indicating they are not constrained by leaf-level photosynthesis. Instead, pygmy plants exhibit increased investment in leaf non-photosynthetic tissue and overall low leaf area, which restricts whole-plant carbon assimilation. These conservative resource-use strategies slow the growth rates of the pygmy plants while increasing their likelihood of surviving herbivory and mechanical damage.

Katharine L. Cary and Jarmila Pittermann. 2018. Small trees, big problems: Comparative leaf function under extreme edaphic stress. *American Journal of Botany* **doi: 10.1002/ajb2.1007**

YOU SNOOZE, YOU LOSE… OR MAYBE NOT IF YOUR NEIGHBORS ARE LARGER: UNEXPECTED FITNESS BENEFITS OF DELAYING GERMINATION

Seed germination phenology can profoundly influence plant fitness. In theory, early emerging seedlings should have a head start over neighbors compared with later emerging seedlings that must compete against already larger individuals. While many studies have demonstrated advantages of early germination, it is less clear whether germinating later in response to the presence of neighbors may also be advantageous. In a series of laboratory and outdoor experiments, Leverett et al. (p. 20) assess seed germination, seedling survival, and fecundity of *Arabidopsis thaliana* in response to the presence of neighbors. They find that seeds can delay germination in response to neighbor cues, and that seedlings compete less with—and are actually facilitated by—their neighbors if they delay germination until those neighbors are larger. The authors conclude that such phenological shifts can promote resource partitioning and facilitation with important implications for community-level effects in the face of climate change.

Lindsay D. Leverett et al. 2018. The fitness benefits of germinating later than neighbors. *American Journal of Botany* **doi: 10.1002/ajb2.1004**



BIOGEOGRAPHY OF SEED OIL CONTENT IN BRASSICACEAE

Nearly all spermatophytes rely on energy reserves stored in seeds prior to photosynthesis. The quantity and quality of these reserves affect germination, seedling growth, and plant fitness, and may vary along latitudinal gradients or among biomes. Using 360 accessions of *Arabidopsis thaliana* and 216 accessions of Brassicaceae species, Sanyal et al. (p. 85) assess the relationships among seed oil content and life history, latitude, and biome. They find that seed oil content varies significantly with life history and increases significantly with latitude and from temperate to tropical biomes. Moreover, the absence of a phylogenetic signal for seed oil traits in Brassicaceae combined with a high seed oil content across several of the tribes indicates the evolutionary lability of seed oil traits in this group. The authors conclude that biogeographic distribution of seed oil traits is fundamental to understanding the mechanisms of adaptive evolution in seed plants.

Anushree Sanyal et al. 2018. Intraspecific and interspecific adaptive latitudinal cline in Brassicaceae seed oil traits. *American Journal of Botany* **doi: 10.1002/ajb2.1014**