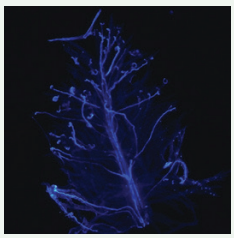


Characterization and practical use of self-compatibility in outcrossing grass species

Annals of Botany 127:
841–852, 2021
doi: 10.1093/aob/mcab043

The self-incompatibility mechanism operating in the Gramineae (grass) family is controlled by two self-incompatibility loci: *S* and *Z*. In self-pollinations, pollen- and stylar-part genes of both loci are matched between the pollen gametophyte and the receiving stigma, causing pollen tube growth to stop at the stigma surface. Mutations at either *S* or *Z* can disrupt the incompatibility mechanism leading to compatible self-pollination. Additional genes at unlinked loci can also lead to self-pollination. **Cropano *et al.*** review current knowledge of grass self-compatibility mutations and discuss their use as tools in fundamental studies and their practical use in plant breeding programmes.

Authors: Claudio Cropano, Iain Place, Chloé Manzanares, Javier Do Canto, Thomas Lübberstedt, Bruno Studer, and Daniel Thorogood

Mating system and life history differentiation in *Incarvillea*

Annals of Botany 127:
853–864, 2021
doi: 10.1093/aob/mcaa178

Theory predicts that outcrossing should be more prevalent among perennial than annual life histories, but this association has not been investigated experimentally in any detail at the species level. ***Ma et al.*** use *Incarvillea sinensis* (Bignoniaceae), an insect-pollinated herb with annual and perennial populations, to investigate relations between mating system, life history and floral traits. They find that outcrossing rates and herkogamy were considerably higher in perennial than annual populations, and also at sites where both life histories co-occur. Their results suggest that mating system transitions may also often be associated with correlated changes to life-history and floral traits.

Authors: Yue Ma, Spencer Barrett, Fang-Yuan Wang, Jun-Chen, Deng, and Wei-Ning Bai

For a commentary on this paper see this issue: mcab023

The use of herbarium specimens in global change research

Annals of Botany 127:
865–873, 2021
doi: 10.1093/aob/mcab016

Herbaria store valuable information regarding historical changes in plant traits and biotic interactions. **Kozlov *et al.*** ask whether this information could be biased by shifts in collector's attitudes towards particular traits of herbarium specimens. They reveal substantial changes in many characteristics of 515 herbarium specimens of common European trees and shrubs between 1558 and 2016 caused by shifts in plant collection practices. These shifts create patterns which could be erroneously attributed to environmental changes or obscure real historical trends in plant traits. As such, utmost care ought to be taken to guard against the misinterpretation of data obtained from herbarium specimens.

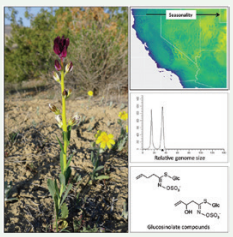
Authors: Mikhail Kozlov, Irina Sokolova, Vitali Zverev, and Elena L. Zvereva

Species delimitation and hybridization history of a hazel species complex

Annals of Botany 127:
875–886, 2021
doi: 10.1093/aob/mcab015

Hybridization may obscure species boundaries. **Lu *et al.*** examine species delimitation and hybridization history of one Chinese hazel species complex (*Corylus chinensis–Corylus fargesii*) with two species and four varieties based on morphological and molecular evidence at the population level. Four statistically distinct clusters were revealed, but these clusters were highly inconsistent with the traditional taxonomic groups. One of the clusters was shown to have an admixed genetic composition derived from the other three through repeated hybridization.

Authors: Zhiqiang Lu, Yongshuai Sun, Ying Li, Yongzhi Yang, Gaini Wang, and Jianquan Liu

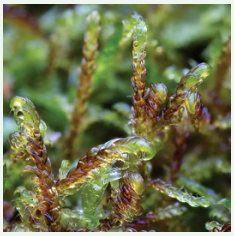


Genome size evolution across a clade of mustards

Annals of Botany 127:
887–902, 2021
doi: 10.1093/aob/mcab028

Cacho *et al.* evaluate the role of many proposed agents acting on genome size evolution in plants, using the Jewelflower clade (*Streptanthus* and close relatives) as a model. They find that genome size is associated with climate seasonality and glucosinolates (secondary compounds that can serve as a defence against herbivores), but not life history, soil nutrients or range size. Specifically, they find that larger genomes are associated with greater thermal seasonality and with a lower production of aliphatic glucosinolates. The results suggest a role of genome size in climate adaptation and possibly a role for biotic interactions in shaping the evolution of genome size.

Authors: N. Ivalú Cacho, Patrick McIntyre, Daniel Kliebenstein, and Sharon Strauss



Horizontal gene transfer between land plant plastids

Annals of Botany 127:
903–908, 2021
doi: 10.1093/aob/mcab021

Horizontal Gene Transfer may move traits or functions between species or genomes. **Hedenäs *et al.*** demonstrate transfer of one molecular marker between plastid genomes of two land plant species in 14 individuals of *Scorpidium cossonii* (Bryophyta: Calliergonaceae). They sequenced two additional molecular markers in five additional individuals, none of which contained all three foreign markers, demonstrating the transfer of plastid genome fragments rather than entire plastids. They found gene transfer at several disturbed and recently colonized localities, and in mosses with a filamentous protonema phase, suggesting that gene transfer is facilitated when protonema of different species intermix during establishment.

Authors: Lars Hedenäs, Petter Larsson, Bodil Cronholm, and Irene Bisang

Image Credit: Lars Hedenäs

Vulnerability to xylem cavitation of Hakea species (Proteaceae)

Annals of Botany 127:
909–918, 2021
doi: 10.1093/aob/mcab020

Extreme drought conditions across the globe are impacting biodiversity with serious implications for the persistence of native species. However, quantitative data on physiological tolerance is not available for diverse flora to inform conservation management. **Oyanoghafo *et al.*** quantified physiological resistance to cavitation in the diverse *Hakea* (Proteaceae) to test predictions based on climatic-origin, life history and functional traits. They observed that climate-origin drives genetically determined variation in vulnerability to xylem cavitation among *Hakea* species rather than life histories and functional traits. Drought avoidance strategy; terete leaf form and greater Huber value may provide an alternative way for species to colonize and persist in the arid biome.

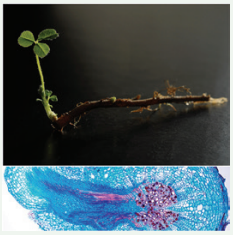
Authors: Osazee O. Oyanoghafo, Corey O' Brien, Brendan Choat, David Tissue, and Paul D. Rymer

Intra-specific trait coordination in a nurse cushion plant

Annals of Botany 127:
919–929, 2021
doi: 10.1093/aob/mcab036

Cushion plants are often engineer species in alpine habitats. They improve the microclimate underneath their canopies, which is crucial for many other species that find shelter there. In this study, **García-Cervigón *et al.*** evaluate coordination between xylem anatomy, plant architecture and leaf functional traits in the nurse cushion *Arenaria tetraquetra I* (subsp. *Amabilis*). Xylem anatomy and plant architecture were the most responsive to environmental conditions, showing the highest mutual coordination. Trait coordination was weaker under more demanding environmental conditions, which agrees with the hypothesis that trait independence allows plants to better optimize different functions, likely entailing higher adjustment potential against future environmental changes.

Authors: Ana García-Cervigón, María García-López, Nuria Pistón, Francisco Pugnaire, and José Miguel Olano

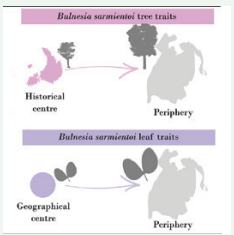


Sprouting from roots in temperate herbs: the role of anatomy and environment

Annals of Botany 127:
931–941, 2021
doi: 10.1093/aob/mcab030

A number of plant species sprout from their roots through the production of adventitious shoots that support vegetative regeneration after injury or spatial expansion via clonal growth. **Bartušková *et al.*** present the first experiments where the ability and vigour of root sprouting (RS) in 182 temperate herbs is tested. One quarter of the species examined showed RS ability, preferred dry open habitats and were characterized by secondary thickening of roots. Plants with more vigorous RS had no special anatomical characteristics and tended to prefer dry, frequently disturbed habitats.

Authors: Alena Bartušková, Arinawa Liz Filartiga, Tomáš Herben, Jianqiang Qian, and Jitka Klimešová



Tree and leaf traits variation under centre-periphery approaches

Annals of Botany 127:
943–955, 2021
doi: 10.1093/aob/mcab034

Camps *et al.* focus on understanding plant population dynamics in terms of the centre vs. the periphery of distribution range. With the study of morphological traits of an emblematic tree of Gran Chaco Americano, *Bulnesia sarmientoi* (Zygophyllaceae), they propose three centre-periphery approaches: geographical, ecological and historical, based on climatic stability. They find that tree traits vary in a historical centre-periphery gradient, while leaf traits vary in a geographic gradient. This suggests that delimitation of the centre-periphery should be based not only on current geographical and ecological perspectives, but also on historical ones, allowing for recognition of the processes that underlie trait variation.

Authors: Gonzalo A. Camps, Andrea Cosacov, and Alicia N. Sérsic