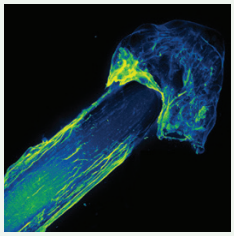
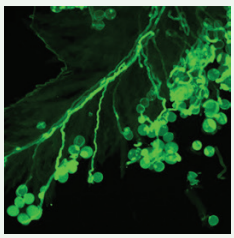


Extensin, an underestimated key component of cell wall defence?

Annals of Botany 127:
709–713, 2021
doi: 10.1093/aob/mcab001

Extensins are plant cell wall hydroxyproline-rich glycoproteins involved in root defence. The intra- and intermolecular cross-linking of extensins, which requires correct glycosylation and specific peroxidases, lead to a modulation of cell wall architecture that allows for enhanced protection of root cells against invading pathogens. Here, **Castilleux *et al*.** report that PEROXIDASES 33 and 34 are good candidates to catalyse the cross-linking of extensins and thus participate in root defence responses.

Authors: Romain Castilleux, Barbara Plancot, Maité Vicré, Eric Nguema-Ona, and Azeddine Driouich



A new independent self-compatibility locus is identified

Annals of Botany 127:
715–722, 2021
doi: 10.1093/aob/mcaa140

Lolium perenne (Poaceae) possesses a two-locus self-incompatibility mechanism preventing self-fertilization, yet natural self-compatible (SC) mutations of these loci and additional loci occur. SC ensures survival in newly colonized habitats where compatible individuals might be scarce and, practically, these mutations are useful for improving the breeding efficiency of outcrossing crops. **Slatter *et al*.** report on the identification of a new source of SC. Physiological and genetic analyses of an F2 population derived from two inbred grandparents demonstrated a previously unreported locus unlinked to the incompatibility loci, expressed gametophytically in the pollen. Selfed F2 plants are as fertile as open-pollinated clonal replicates.

Authors: Lucy Slatter, Susanne Barth, Chloe Manzanares, Janaki Velmurugan, Iain Place, and Daniel Thorogood

For a commentary on this article see this issue, pp.iv-v

Full sib diallels to study late-acting self-incompatibility

Annals of Botany 127:
723–736, 2021
doi: 10.1093/aob/mcab031

Bianchi *et al.* use diallel crosses with three full-sib progeny arrays of a precociously flowering variant of the tree *Handroanthus heptaphyllus* (Bignoniaceae) to investigate the genetic control of late-acting self-incompatibility (LSI) in this species. All diallels produced similar results, with reciprocally compatible, reciprocally incompatible, and non-reciprocally compatible crosses indicated in almost equal proportions. They propose a model with a single self-incompatibility locus and allelic dominance in the pistil to explain LSI in our species.

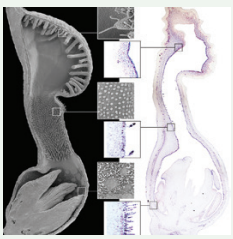
Authors: Marta Bianchi, Thomas Meagher, and Peter Gibbs

Mating system shifts and floral scent

Annals of Botany 127:
737–747, 2021
doi: 10.1093/aob/mcab007

Transitions from outcrossing to selfing among flowering plants favour the evolution of reduced floral signalling, but few studies have assessed such effects on floral scent. Investigating floral scent variation among 17 different populations of the plant *Arabis alpina* that vary in mating system, **Petrén *et al*.** find that plants from self-compatible populations smell substantially less and emit partly different compounds, than self-incompatible populations. In contrast, there were no differences between self-compatible plants from populations with high or low levels of autonomous selfing. This suggests that factors other than just pollinator dependence shape intraspecific variation in chemical floral signalling.

Authors: Hampus Petrén, Per Toräng, Jon Ågren, and Magne Friberg

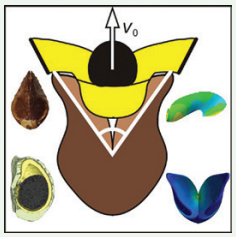


Gene expression underlying floral epidermal specialization

Annals of Botany 127:
749–764, 2021
doi: 10.1093/aob/mcab033

Highly elaborate flowers of *Aristolochia fimbriata* (Aristolochiaceae) develop specialized trichomes to temporarily trap or feed insect pollinators. **Suárez-Baron *et al.*** investigate the genetic basis of trichome development in the perianth by screening the expression of all trichome identity genes (reported from model species) in the non-model A. *fimbriata*. They discovered that floral trichomes use a small subset of genes compared to extra-floral trichomes. These results re-evaluate the core genetic network controlling floral trichome formation of an early-diverging angiosperm, and suggest that canonical trichome gene expression is more conserved in vegetative than in floral tissues across flowering plants.

Authors: Harold Suárez-Baron, Juan F. Alzate, Favio González, Soraya Pelaz, Barbara A. Ambrose, and Natalia Pabón-Mora



A water drop-shaped slingshot in plants

Annals of Botany 127:
765–774, 2021
doi: 10.1093/aob/mcab017

Seed dispersal in plants plays an important role in the survival of species, and many plants use a physical mechanism to disperse their seeds autonomously. **Huang and Fu** study the mechanism of explosive seed dispersal in a *Orixa japonica* (Rutaceae). They observe the fruit morphology and seed dispersal process, analyse the geometric deformations of peels and simulate the mechanical process of peel movement. They find that the water drop-shaped peels of *O. japonica* form a structure similar to a slingshot, which can eject its seed at a high speed during fruit dehiscence.

Authors: Lan-jie Huang and Wen-Long Fu

Seed longevity of maize conserved under germplasm bank conditions for up to 60 years

Annals of Botany 127:
775–785, 2021
doi: 10.1093/aob/mcab009

Conservation of plant genetic resources is of key importance for food security. There is, however, scarce information about seed longevity under seedbank conditions. Through germination experiments and analysis of historical data, **Guzzon *et al.*** study seed longevity in 1,000 maize (*Zea mays* subsp. *mays*) seed accessions conserved for an average of 48 years at the CIMMYT seedbank under two storage conditions: an active and a base conservation chamber (−3 and −15°C, respectively). The more rapid loss of viability detected in the active chamber suggests that base conditions should be preferred. Significant differences were detected in seed longevity among accessions with different grain types.

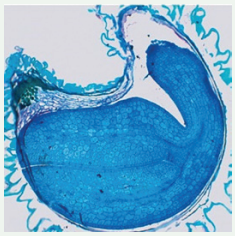
Authors: Filippo Guzzon, Maraeva Gianella, Jose Alejandro Velazquez Juarez, Cesar Sanchez Cano, and Denise Costich

Predation on oak seeds and seedlings

Annals of Botany 127:
787–797, 2021
doi: 10.1093/aob/mcab010

Rodents and molluscs are major predators of oak seeds and seedlings. **Deniau *et al.*** investigate how oaks and their environment affect this predation. They experimentally monitored seed removal and seedling herbivory, finding that rodents removed seeds around oaks surrounded by distantly related trees and dense herb cover, and that molluscs attacked seedlings around large oaks surrounded by scarce herb cover. They conclude that rodents and mollusks might prevent oaks from recruiting around old adults and in the niches of distantly related species.

Authors: Maud Deniau, Mickael Pihain, Benoît Béchade, Vincent Jung, Margot Brunellière, Valérie Gouesbet, and Andreas Prinzing

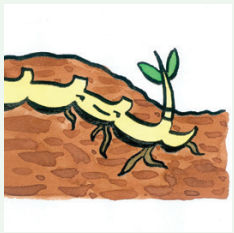


The ecological significance of the seed internal morphology of Amaranthaceae

Annals of Botany 127:
799–811, 2021
doi: 10.1093/aob/mcab012

Vandelook *et al*. investigate the adaptive nature of seed internal structures such as the size of the embryo and nutritive tissues. They relate seed traits to germination characteristics and habitat preference. Focussing on Amaranthaceae species – many of which are adapted to saline or very dry environments – they find that species growing in dry and/or saline environment have larger, sometimes even spirally coiled, embryos, while few nutrient reserves are stored outside the embryo. This may benefit the seeds by enabling faster germination in extreme habitats, where the suitable period for germination and establishment can be very short.

Authors: Filip Vandelook, Rosemary J Newton, Nadine Bobon, Katharina Bohley, and Gudrun Kadereit

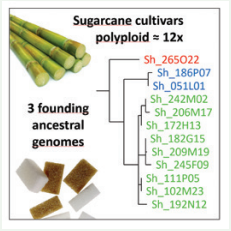


A plant growing through the soil and storing carbon belowground

Annals of Botany 127:
813–825, 2021
doi: 10.1093/aob/mcab014

Herbaceous plants must decide how to best use their acquired carbon, wherever they live. They keep this in belowground storage organs that can differ in morphology, anatomy and carbohydrate type. **Lubbe *et al.*** compare these three groups of traits with the better known aboveground traits. Aboveground traits were linked to anatomy and carbohydrate type but not to morphology. The three types of belowground traits were independent from each other, and importantly, the relationships of different traits did not follow the fast-slow continuum previously described.

Authors: F. Curtis Lubbe, Adam Klimeš, Jiří Doležal, Veronika Jandová, Ondřej Mudrák, Štěpán Janeček, Alena Bartušková, and Jitka Klimešová



The ancestral genomes involved in the origin of sugarcane

Annals of Botany 127:
827–840, 2021
doi: 10.1093/aob/mcab008

Of all crops, sugarcane (*Saccharum* spp.) is probably the one with the most complex genome, as it is high polyploid and aneuploid with 2n=ca12x=ca120, and derived from interspecific hybridizations between the domesticated *S. officinarum* and the wild *S. spontaneum*. **Pompidor *et al.*** analyse the sequences of all 12 hom(oe)ologous haplotypes (BAC clones) from two distinct genomic regions of a modern cultivar and monitored their distribution among *Saccharum* germplasm. The results revealed the existence of three founding genomes in modern cultivars; two of these genomes contributed by *S. officinarum*. This suggests that *S. officinarum* and its suspected wild ancestor *S. robustum* are derived from interspecific hybridization between two unknown ancestors.

Authors: Nicolas Pompidor, Carine Charron, Catherine Hervouet, Stéphanie Bocs, Gaëtan Droc, Ronan Rivallan, Aurore Manez, Therese Mitros, Kankshita Swaminathan, Jean-Christophe Glaszmann, Olivier Garsmeur, and Angélique D'Hont