Change in stable carbon isotope ratio during leaf development (Research in Context)

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doi: 10.1093/aob/mcaa114

Vogado *et al.* compiled literature and unpublished data to examine a previously reported pattern of the stable carbon isotope ratio of leaf dry matter decreasing during leaf development. The pattern is widespread in C_3 plants, and more pronounced in deciduous than in evergreen species. Measurements of ^{13}C discrimination were used to provide evidence for the idea that the decrease in ^{13}C content results from the addition of carbon fixed through the developing leaf's own photosynthesis. As C_3 leaves develop, they show high photosynthetic discrimination against ^{13}C, until leaf expansion is completed and the photosynthetic apparatus matures.

Authors: Nara O. Vogado, Klaus Winter, Nerea Ubierna, Graham D. Farquhar and Lucas A. Cernusak

Multiple reproductive barriers in a tetraploid–octoploid contact zone

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Polyploidy is an important contributor to sympatric speciation. Many studies report contact zones between cytotypes in polyploid complexes, but a few studies quantify reproductive isolation across multiple barriers. **Castro *et al.*** quantify assortative mating due to different reproductive barriers in a tetraploid–octoploid *Gladiolus communis* L. (Iridaceae) contact zone. They observe weak pre-pollination reproductive isolation and strong gametic selection against the alternate cytotype reducing inter-cytotype mating. Although ploidy composition in stigmatic pollen loads determined the levels of reproductive isolation, a gametic barrier may enable cytotype coexistence in mixed-ploidy populations by weakening the disadvantages for the minority cytotype.

Authors: Mariana Castro, João Loureiro; Brian C. Husband and Sílvia Castro.

For a Commentary on this article, see this issue pp. iv–v

Flowering onset and reproductive allocation in an annual invasive plant

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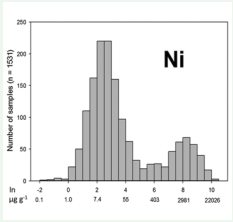
Can invasive species maintain both high biomass and reproductive output? Along latitudinal gradients, contrasting hypotheses predict either a reduction in reproductive output due to faster flowering onset or increased reproductive investment to overcome reproductive uncertainty. **Helsen *et al.*** grew *Impatiens glandulifera* (Balsaminaceae) individuals from several European locations in a greenhouse and found that northern plants flowered earlier and consequently had lower biomass. However, reproductive output varied independently from flowering onset, resulting in higher reproductive allocation in the north. This genetic decoupling between vegetative and reproductive traits likely contributes to this species' invasion success.

Authors: Kenny Helsen, Kamal Prasad Acharya, Bente Jessen Graae, Hanne De Kort, Jörg Brunet, Olivier Chabrerie, Sara A. O. Cousins, Pieter De Frenne, Martin Hermy, Kris Verheyen and Christophe Pélabon



Foliar nickel has bimodal frequency

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The nickel hyperaccumulation threshold set at >1000 mg/kg is an empirical assessment based on field observations and has no relation to knowledge about any critical physiological concentration that may differentiate 'hyperaccumulator behaviour' from 'normal plant behaviour'. **van der Ent *et al.*** test the frequency distributions of foliar elements from a large dataset from Kinabalu Park (Malaysia) for departure from unimodality, indicative of a distinct ecophysiological response associated with hyperaccumulation. The nickel frequency distribution was bimodal and the separation point for the two modes was between 250 and 850 mg/kg. Accounting for statistical probability, the established empirical threshold value (>1000 mg/kg) remains appropriate.

Authors: Antony van der Ent, Guillaume Echevarria, Philip Nti Nkrumah and Peter D. Erskine

Yam geographical diversification and dispersal

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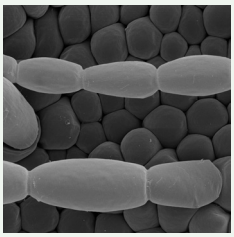
doi: 10.1093/aob/mcaa122

Greater yam, *Dioscorea alata* (Dioscoreaceae), is one of the longest established edible tubers and an important starchy source in traditional farming systems worldwide. **Sharif *et al.*** analysed 643 accessions spanning four continents to disentangle the polyploid and clonal components of yam genomic diversity and address its demographic history. Their findings suggest two independent domestication origins, in Mainland Southeast Asia and the Pacific region. The African germplasm has an Indian Peninsula genetic origin, which in turn gave

rise to the Caribbean one. They also uncovered a narrow worldwide diversity, which likely threatens the adaptive capacity of the crop.

Authors: Bilal Muhammad Sharif, Concetta Burgarella, Fabien Cormier, Pierre Mournet, Sandrine Causse, Kien Nguyen Van, Juliane Kaoh, Mamy Tiana Rajaonah, Senanayake Ravinda Lakshan, Jeffrey Waki, Ranjana Bhattacharjee, Gueye Badara, Babil Pachakkil, Gemma Arnau and Hana Chaïr



Do food trichomes occur in *Pinguicula* flowers?

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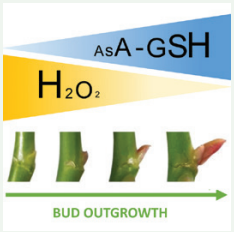
Floral food bodies are a form of floral nutritive reward for pollinators, recorded in several angiosperm families. **Lustofin *et al***. studied the floral non-glandular trichomes of *Pinguicula* (Lentibulariaceae). They show that the trichomes act as edible trichomes in some *Pinguicula* species, mainly those classified as bee-pollinated species from Central and South America. In *Pinguicula* that are pollinated by other pollinator groups (Lepidoptera, hummingbirds), the non-glandular trichomes in the flowers do not act as rewards for their pollinators. Edible trichomes are symplesiomorphic for the *Pinguicula* species.

Authors: Krzysztof Lustofin, Piotr Świątek, Piotr Stolarczyk, Vitor F. O. Miranda and Bartosz J. Płachno



H_2O_2 scavenging is an important process in bud outgrowth in rosebush

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doi: 10.1093/aob/mcaa130

A few studies have established a relationship between redox metabolism and bud outgrowth, known to be controlled by different metabolisms (e.g. hormones, sugar, nitrogen). Here, **Porcher *et al.*** identify the contribution of H_2O_2 in bud outgrowth, using both *in vitro* and *in planta* approaches. They show that H_2O_2 present in large quantities in dormant buds decreases rapidly after bud outgrowth initiation after the activation of the detoxification pathways dependent upon ascorbate and glutathione. Furthermore, H_2O_2 supply or scavenging inhibition inhibited the bud outgrowth. These results consolidate the crucial role of H_2O_2 in the outgrowing process that should be integrated into the bud outgrowth functional scheme.

Authors: Alexis Porcher, Vincent Guérin, Françoise Montrichard, Anita Lebrec, Jérémy Lothier and Alain Vian

Grain maternal tissues control wheat seed growth

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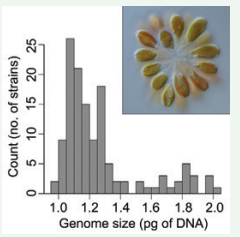
Maternal tissues are a key for the setting of potential grain weight in wheat. It has been postulated that, after anthesis, the pericarphas sets the upper limit of the endosperm growth and subsequently starch accumulation. **Herrera *et al.*** show that pericarp maximum dry weight is reached before other grain traits and pericarp maternal tissues associate to final grain weigh; this reinforces the control of grain growth and size by maternal tissues and provides a key to a complete understanding of this major grain yield component of wheat. Better growing conditions increased maximum pericarp weight, while higher temperature negatively affected this trait.

Authors: Jaime Herrera and Daniel F. Calderni



Intraspecific genome size variation and phenotypic consequences in golden-brown algae

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Genome size variation is understudied in microscopic algae. **Čertnerová and Škaloud** survey 67 localities across the Northern hemisphere and assess genome size of golden-brown algae *Synura petersenii* and its putative phenotypic correlates. They report two-fold, continuous, genome size variation, associated with genomic DNA base composition (% GC content). Genome size variation is further reflected in cell size and growth rate, possibly providing some strains with competitive advantage. No clear patterns in eco-geographical distribution of genome size diversity were detected.

Authors: Dora Čertnerová and Pavel Škaloud

Light, competition and plant–soil feedbacks

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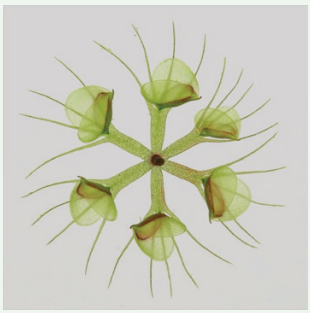
Understanding how soil microbes alter plant performance in relation to light availability is of particular interest for forest systems since seedlings may experience variable light environments in the

forest understorey. **Xi *et al.*** investigate interactions between conspecific soil microbes, plant competition and light availability on tree seedling performance using seedlings of two *Bauhinia* (Fabaceae) tree species in a two-phase feedback experiment. They demonstrate both the context dependency of plant–soil feedbacks for these two species, and the importance of conspecific soil microbes for plant competitive ability, with potential implications for seedling recruitment and plant community dynamics.

Authors: Nianxun Xi, Juliette M. G. Bloor and Chengjin Chu



MicroCT insights into the carnivorous waterwheel plant *Aldrovanda vesiculosa*

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The functional morphology of the delicate underwater snap-traps (2–4 mm in length) of the carnivorous waterwheel plant (*Aldrovanda vesiculosa,* Droseraceae) is challenging to study. **Westermeier *et al.*** introduce two protocols for microCT analyses: one for improving the general visibility of the non-lignified trap tissues while minimizing artefacts, and the other for visualizing the 'motor-zone', which is essential for the fast trap closure. Additionally, caught prey in the trap 'stomach' is presented in detailed 3D volume renderings for the first time, illustrating the versatility and adaptability of the trap of this underwater predatory plant. Their research contributes to the understanding of a complex, fast and reversible underwater plant movement and supplements preparation protocols for computed tomography analyses of other non-lignified and sensitive plant structures.

Authors: Anna S. Westermeier, Natalie Hiss, Thomas Speck and Simon Poppinga