Phylogenetics of Ornithogaloideae

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The taxonomy of subfamily Ornithogaloideae (Hyacinthaceae) has been a matter of controversy in recent decades, with several contradictory taxonomic treatments having been proposed. **Martínez-Azorín *et al.* (pp. 1–37)** present a phylogenetic analysis of Ornithogaloideae based on a combination of plastid and nuclear regions and a detailed morphological study. A new taxonomic arrangement is presented in which 19 clades are recognized as genera, well defined by clear morphology and biogeography. Over 100 new combinations are made and two new names are proposed to accommodate the taxa in the new arrangement.

Orchid reproductive isolation and pollination success

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Few studies have investigated whether non-rewarding plants affect the pollination success of rewarding plants when they grow in close proximity. **Sun *et al.* (pp. 39–47)** investigate floral isolation and mutual effects in orchids between rewarding *Galearis diantha* and non-rewarding *Ponerorchis chusua* and find a combination of mechanical isolation and incomplete ethological isolation eliminates the possibility of pollen transfer between the two species. Fruit set of non-rewarding species is independent of rewarding species and vice versa.

Post-submergence recovery dynamics of wetland plants

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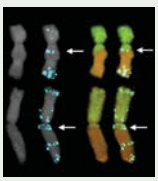
Fast growth recovery post-submergence is important for establishment of riparian species in zones where water level fluctuates. **Luo *et al.* (pp. 49–63)** investigate recovery patterns of two wetland plants, *Alternanthera philoxeroides* and *Hemarthria altissima*, characterized by 'escape' and 'quiescence' strategies of flood tolerance, respectively. They find that a stem-elongation escape strategy depletes carbohydrate reserves but recovery of photosynthesis after flooding is rapid and growth soon resumes. It contrast, conservation of resources in the quiescent species allows rapid regrowth soon after submergence before photosynthesis fully recovers.



Translocation breakpoints in SSR-rich chromosomal regions

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Repetitive DNA sequences are thought to be involved in the formation of chromosomal rearrangements, which are important in polyploid speciation. **Molnár *et al.* (pp. 65–76)** analyse the chromosomal distribution of microsatellite clusters in relation to the intergenomic translocations in the allotetraploids *Aegilops biuncialis* and *Ae. geniculata.* They find that translocation breakpoints are frequently mapped to SSR-rich chromosomal regions, suggesting that microsatellite sequences may facilitate the formation of chromosomal rearrangements.

Coexistence of multiple cytotypes of an orchid

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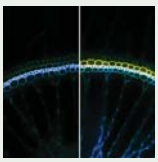
Large-scale cytotype surveys have indicated that intraspecific ploidy diversification is much more common than previously thought. **Trávníček *et al.* (pp. 77–87)** examine inter- and intrapopulational ploidy diversity in the fragrant orchid, *Gymnadenia conopsea* agg., in Central Europe and find that this species represents a remarkable example of ploidy coexistence in a natural environment, with up to five different cytotypes occurring at the same locality. The scarcity of minority cytotypes suggests the existence of strong pre- or postzygotic mating barriers, and the species offers unique opportunities to study processes governing the formation and establishment of polyploids



Radial O_2-loss barrier induction and aerenchyma formation

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Many wetland species form both aerenchyma and a barrier to radial oxygen loss (ROL) in roots, which enhance internal O_2 diffusion to the root apex. **Shiono *et al.* (pp. 89–99)** study the dynamics of these features for short or long roots of rice, *Oryza sativa*, when they are exposed to non-aerated conditions and find that barrier induction commences more quickly in longer roots; there are no differences in aerenchyma formation. ROL barrier induction occurs before histochemically detectable changes in putative suberin and lignin deposits can be seen, suggesting that the structural changes required for barrier functioning are subtle.

Sunflower nitrogen-stress response and gene expression

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The hybrid sunflower *Helianthus anomalus* is endemic to desert sand dunes, which have lower nutrient availability than the habitats of its parental species. **Brouillette and Donovan (pp. 101–108)** use a cDNA microarray to compare the gene expression of *H. anomalus* to that of its parents under contrasting nutrient treatments, and identify five candidate genes for its ecological speciation. One of the genes may play a role in nutrient use by affecting leaf lifespan.

Oxidative stress responses in two lichen phycobionts

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The epiphytic lichen *Ramalina farinacea* contains two genetically distinct *Trebouxi*a phycobionts. **Del Hoyo *et al.* (pp. 109–118)** analyse the effects of oxidative stress on the photosynthetic behaviour in each isolated alga and observe a better physiological response to stress in one of them, which may reflect its greater capacity to increase non-photochemical quenching and antioxidant protection, and to induce repair mechanisms. The relative abundance of each phycobiont may vary among different populations of *R. farinacea* depending upon environmental conditions.

Patterns of resource allocation in a dioecious species

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Resource allocation between vegetative and reproductive growth will vary over time, and dioecious species may also adopt different strategies for allocation between male and female plants. **Sanchez Vilas and Pannell (pp. 119–126)** show that males and females of the annual *Mercurialis annua* differ in temporal patterns of resource allocation to roots, shoots and reproduction. These differences are likely to be the consequence of the different demands for resources required for producing pollen versus seeds at different times.

Mating system of dwarf eelgrass

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Seagrasses exhibit extensive clonal growth and kinship structure among neighbouring genets**. Zipperle *et al.* (pp. 127–133)** demonstrate a predominantly outcrossing mating system and multiple paternity in the intertidal seagrass *Zostera noltii.* They find geitonogamy intrinsic to the clonal life-history of *Z. noltii*, whereas biparental inbreeding is negligible. Pollen dispersal distance matches average clone size; however, natural disturbance in the intertidal habitat potentially selects for small clone sizes and increased relative pollen dispersal distance, thereby indirectly affecting the mating system.

Polyploidy and mating patterns in the moss *Atrichum*

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Evolutionary transitions from unisexuality to hermaphroditism in mosses are associated with polyploidy. **Jesson *et al.* (pp. 135–143)** investigate this association in populations of *Atrichum undulatum s.l.* Unisexual individuals are haploid, diploid or triploid, while hermaphrodites are diploid or triploid; however, many diploid populations are strictly separate-sexed, suggesting that hermaphroditism is not a necessary result of genome doubling.

Nitrogen and water effects on functional traits

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Changes in resource supply can have significant effects on plant functional traits. **Ren *et al.* (pp. 145–155)** conduct a field study to examine the responses of five herbaceous perennial steppe species to variations in nitrogen and water supply. They find that addition of N and water both reduce leaf longevity, and soil water availability may play a fundamental role in determining this and other leaf traits, with its effects being modified by soil N availability in semi-arid areas.

Plant diversity and functional trait variation

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Variation in plant traits may potentially influence niche segregation at increasing plant diversity. **Gubsch *et al.* (pp. 157–169)** investigate above-ground traits associated with light and nitrogen acquisition among 12 species of Poaceae in grasslands of varying plant diversity, and find that species' identity plays an important role in shaping the relationship between biodiversity and ecosystem functioning. The results suggest that even among closely related species such as grasses different strategies are used to cope with neighbours, and this lack in redundancy in turn may facilitate complementary resource use and coexistence.

Seeds of alpine plants are short-lived in storage

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Alpine ecosystems are considered as being particularly vulnerable to the effects of climate change. **Mondoni *et al.* (pp. 171–179)** report that seeds of alpine plants are short-lived in storage compared with those from related lowland taxa. The lower resistance to ageing may arise from low natural selection pressure in the alpine environment for seed resistance to ageing and/or damage incurred during seed development. Long-term seed conservation of several alpine species using conventional seed banking methods will thus be problematic.