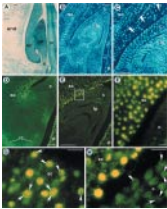




Leaf evolution (Botanical Briefing)

Leaves are such ubiquitous photosynthetic organs that it is easy to take them for granted. But, for the first 50 million years of their existence, plants struggled to evolve leaves. **Beerling (pp. 345–352)** describes a new hypothesis to explain this inordinately long delay using findings from plant physiology, palaeontology, evolutionary development biology and geochemistry.



Genetic analysis of maize seed development (Invited Review)

Three phases of seed development (polarization; differentiation; maturation) create the embryo and endosperm, a seed's two principal compartments. **Consonni et al. (pp. 353–362)** see the co-ordinated expression of specific genes, and interactions between the two compartments, as fundamental for orderly seed development and analyse these processes in the light of recently published genetic and molecular data.



Blackleg disease (Invited Review)

Recurring outbreaks of blackleg disease have frustrated canola farmers in Australia over many years. **Sivasithamparam et al. (pp. 363–377)** summarize the history of the disease in Western Australia and describe how a large diversity of races of the pathogen has overwhelmed strategies to replace

current use of polygenic resistance and appropriate cultural practices with reliance on monogenic resistance to the disease.



Apical root structure of a basal monocot angiosperm

The development and structure of *Acorus* roots are investigated by **Soukup et al. (pp. 379–385)** with particular attention to apical meristem organization. As monocotyledonous *Acorus* belongs to basal angiosperms and some root traits are similar to Nymphaeaceae (dicotyledonous basal angiosperms), the results are discussed in a phylogenetic context.



Reproductive biology of Eriocaulaceae species

Occurrence of anemophily and entomophily is disputed in the Eriocaulaceae. The family is nested in the largest clade of Poales and characterized as mostly anemophylous and lacking nectaries. In a pioneering study, **Ramos et al. (pp. 387–397)** present evidence for self-compatibility, and for nectar-rewarding insect pollination in two *Syngonanthus* species that is effected by flies, beetles and wasps.



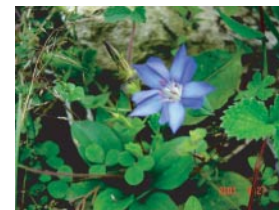
Adaptation of *Suaeda physophora*, *Haloxylon ammodendron* and *H. persicum* to saline environments **Song et al. (pp. 399–405)** show that high soil salinity suppresses germination more

strongly in halophytic *S. physophora* and *H. ammodendron* than in the xerophyte *H. persicum*. Although each species lacks endosperm, more Na^+ is present in the seed coats of the two halophytic species. These differences may affect the geographical distribution of *H. ammodendron* and *S. physophora*.



Unusual metaxylem tracheids

Petioles of the huge solitary leaves of *Amorphophallus* are anatomically unusual. **Hejnowicz (pp. 407–412)** shows their vascular bundles to contain extremely long metaxylem tracheids (length > 30 mm) comprising thin unligified lateral walls surrounded by turgid parenchyma. Only end walls of the tracheids (steeply orientated partitions between tracheids in a file) are found to be lignified.



Molecular systematics and biogeography of *Crawfordia*, *Metagentiana* and *Tripterosperrum*

The systematic position of *Crawfordia*, *Metagentiana* and *Tripterosperrum* has been unclear. Based on molecular analyses, **Chen et al. (pp. 413–424)** conclude that the status of separate genus for each is unwarranted. The rapid radiation of these plants is shown to have occurred in western China as a result of upthrust of the Himalayas during the Pleistocene.



Redistribution of heavy metals in wheat

Xylem and phloem transport of heavy metals acting as micronutrients or as pollutants affects the quality of harvested grain. **Page and Feller (pp. 425–434)** compare the redistribution of cadmium, cobalt, manganese, nickel and zinc in the roots and in the shoot of wheat, and find that nickel is the metal most efficiently transferred to growing plant parts.



Storage wall is mobilized by a single exo-hydrolase

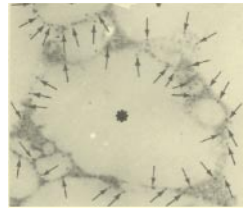
The cotyledons of *Lupinus angustifolius* contain a storage (1→4)- β -linked D-galactan that is hydrolysed by an exo-galactanase. Using enzymatic hydrolysis of cell wall ghosts, **Buckeridge et al. (pp. 435–444)** confirm that this enzyme alone can take approx. 90% of the storage from the cotyledon walls. Localizing galactan in ultrathin sections by exo-galactanase–gold complexing reveals that wall texture changes during storage mobilization.



Phenology of *Plathymenia reticulata*

Plathymenia reticulata is a Brazilian tree that occurs in the Atlantic Forest and Cerrado (savanna) biomes. **Goulart et al.**

(pp. 445–455) examine the phenology of individuals from different sites and evaluate diversity in patterns among and within biomes, habitat and populations. They also assess the similarity among populations for both vegetative and reproductive phenophases.



PIP and γ -TIP aquaporins in soybean nodules

Fleurat-Lessard et al. (pp. 457–460) analyse PIP and TIP distribution, and link their high abundance to water channels that control expansion and contraction of inner cortical cells. These size changes are thought to help regulate nodule conductance to oxygen, thereby affecting subsequent ATP-dependent nitrogenase activity.



Fertility restorer genes in rice

Fertility restorer genes (FRGs) are used in commercial hybrid production that harnesses cytoplasmically inherited male sterility in a parent line. **Li et al. (pp. 461–466)** investigate the extent to which FRGs exist in wild rice species that are ancestors of modern cultivated rice.



Genetic variation along a climatic gradient

The causes of genetic diversity are of long-standing interest in evolutionary

biology. Despite strong spatial autocorrelation, **Still et al. (pp. 467–477)** show that genetic divergence in the widespread species *Echinacea angustifolia* along a climatic gradient is due to isolation-by-distance and is independent of selection pressures associated with annual mean precipitation.



Seedling resources determine resprouting potential

Kabeya and Sakai (pp. 479–488) show that the ability of *Quercus crispula* seedlings to resprout depends on the amount of stored carbohydrate and nitrogen, especially carbohydrate. The size of the emerging shoots is also found to be affected by the availability of these resources.



Molecular phylogeny and recent radiation of the rhubarb genus

Rheum is a highly diversified genus of approx. 60 species that is mainly confined to mountainous and desert regions of Asia. **Wang et al. (pp. 489–498)** suggest that its radiation and diversification are paralleled by the recent large-scale uplift of the Qinghai–Tibetan Plateau. This provides further demonstration that convergent evolution of gross morphology in this genus is under habitat pressure.