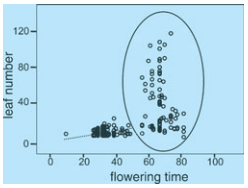
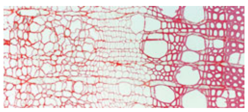
Content*Snapshots*



Finding your way in phenotypic space (Invited Review)

Why do living organisms look the way they do? What constrains the evolution of organismal form? These questions are explored by **Pigliucci (pp. 433–438)** through the concept of 'phenotypic space' and by using a model species such as *Arabidopsis thaliana*.

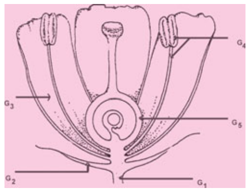


Cambial reactivation model system

Localized heating breaks cambial winter dormancy in stems of hybrid poplar (*Populus sieboldii* × *P. grandidentata*). **Begum *et al.* (pp. 439–447)** propose this cambial reactivation as a promising model system for investigating cambial biology because division of phloem cells and differentiation of cambium into secondary xylem can be readily followed.

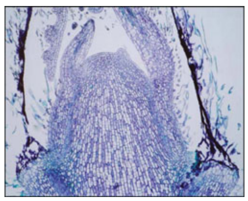
Genetic diversity and population structure of wild olives

Belaj *et al.* (pp. 449–458) use eight microsatellite markers to report genetic variation within and between 11 wild olive populations from the north-western Mediterranean. The structure of these populations is shown to reflect their evolutionary history, although possible hybridization events between true oleasters and cultivated varieties is assumed to play a role.



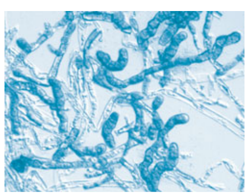
Ontogeny of the 'water gap' in Convolvulaceae seed

Breaking of physical dormancy in Convolvulaceae can involve disruption of 'water gaps' in the seed coat adjacent to the micropyle. **Jayasuriya *et al.* (pp. 459–470)** show that in *Ipomoea lacunosa* the gaps result from bulges derived from the two outermost cell layers of the integument, while seed-coat separation results from further divisions.



Shoot-tip development and abortion in kiwifruit

In kiwifruit (*Actinidia deliciosa*), the number of nodes per shoot is variable and influenced by genotype and environment. Using microscopy and modelling, **Foster *et al.* (471–481)** conclude that organogenesis and shoot-tip abortion are independent, that all buds have the potential to become long shoots and that increased early growth postpones shoot-tip abortion.



Desiccation- and cryopreservation-tolerant moss propagules

Asexual propagules from the threatened moss *Ditrichum plumbicola* induced by treatment with abscisic acid and sucrose can withstand extreme desiccation and low temperature stress **(Rowntree *et al.*, pp. 483–496)**. Their formation confers an additional survival strategy on the moss. This is being exploited for *ex situ* conservation via cryopreservation.

Nitric oxide (NO) and nitrate sensing in maize

Zhao *et al.* (pp. 497–503) show that inhibition of root elongation in *Zea mays* by high external nitrate is alleviated by exogenous NO and auxin and that these effects are closely correlated with endogenous NO levels in root cells. These results indicate that NO is involved in nitrate-mediated root growth.

Genome size and chromosome numbers in Indian *Curcuma*

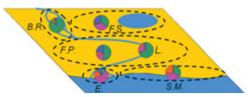
Karyology and flow cytometry can help establish taxonomic alliances between morphologically similar species of *Curcuma* and also indicate evolutionary relationships among some cytotypes based on the parity of homoploid genome sizes and geographical grouping **(Leong-Škorničková *et al.*, pp. 505–526)**. The basic chromosome number in *Curcuma* subg. *Curcuma* is $x = 7$.

Carnivorous syndrome in *Nepenthes*

Carnivorous *Nepenthes* leaves comprise a photosynthetic lamina and a pitcher trap. **Pavlovič *et al.* (pp. 527–536)** show that both leaf and pitcher have less photosynthetic capacity than those of other carnivorous species because of differences in leaf chemistry and anatomy. The results are discussed in relation to a cost–benefit model of carnivory.

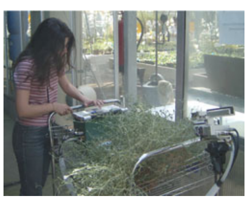
Resistance to *Orobanche minor* is activated by salicylate but not by jasmonate

Orobanche minor parasitizes red clover. **Kusumoto *et al.* (pp. 537–544)** demonstrate that applications of salicylic acid but not methyl jasmonate enhance red clover resistance. This is achieved through two distinct mechanisms, one operating within the root and one outside the root.



Mid-Cretaceous plant ecology of Europe

An analysis of the floristic composition from the Lower Cretaceous of European localities leads **Coiffard *et al.* (pp. 545–553)** to propose a new explanation for the rise to dominance of angiosperms. They suggest early angiosperms were first aquatic plants, and later radiated along floodplains to reach either more disturbed or constrained terrestrial habitats.



Growth responses of *Atriplex portulacoides* to salt

Redondo-Gómez *et al.* (pp. 555–563) examine salt tolerance in this coastal salt-marsh shrub. They show stimulation of growth and net assimilation rate by 200 mol m^{-3} NaCl and demonstrate that slowing of photosynthesis at higher salt is mediated by stomatal closure rather than by a less-efficient photosystem II (F_v/F_m or Φ_{PSII}).

Carbon budget for reproduction in a spring ephemeral herb

Resources for fruit production in *Adonis ramosa* do not depend on current foliage photosynthesis. **Horibata *et al.* (pp. 565–571)** show that most photosynthate is stored in below-ground parts for next season and that about one-third of the resources used for seed production come directly from photosynthesis by fruit.

Molecular phylogeny and biogeography of *Cedrus*

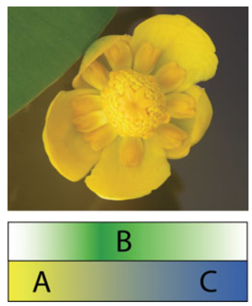
The phylogeny of *Cedrus*, a horticulturally important genus, has been reconstructed from sequence analyses of paternal chloroplastic and maternal mitochondrial DNA. **Qiao *et al.* (pp. 573–580)** find that Himalayan cedar, *C. deodara*, is sister to the other three congeners and further separates into a North African and an eastern Mediterranean clade.

Hummingbird flower mites and nectar availability in *Heliconia*

Hummingbird flower mites compete with pollinators for nectar. **Cruz *et al.* (581–588)** reveal that, in two sympatric species of *Heliconia*, patterns of nectar production coincide with pollinator behaviour, with visits being more frequent in the mornings. Hummingbird flower mites are shown to affect strongly the availability of nectar for hummingbirds.

Nodulation vs. root growth in N accumulation in pea

Based on field performance of five spring pea (*Pisum sativum*) lines, **Bourion *et al.* (pp. 589–598)** show that hypernodulating mutants accumulate less N than cultivars with increased root development. This reflects the high cost of nodule over-production and indicates a need to balance nodule production with root proliferation in enhancing exogenous N supply.



Flower origin and diversification (Invited Review)

The ABC and floral quartet models are two major hypotheses for explaining the genetic basis of flower development. **Theissen and Melzer (pp. 603–619)** propose that these models also shape our understanding of floral evolution. While the origin of floral quartets might be connected to flower origin, changes in ABC-gene expression domains appear to have contributed to floral diversity.

Are petals sterile stamens or bracts?

The origin of petals from tepals or stamens remains controversial. **Ronse De Craene (pp. 621–630)** suggests petals have a bract origin in major lineages of core eudicots and that staminodial petals are rare. The extent to which petals form corresponds to changes in B-gene expression controlling petaloidy, explicable by an altered sliding-boundary hypothesis.

Evolution of floral symmetry in the Ranunculales

Detailed evaluations of six floral characteristics enable **Damerval and Nadot (pp. 631–640)** to compile a composite phylogenetic tree for the Ranunculales using maximum parsimony. They conclude that the evolution of floral symmetry is disconnected from changes in merism and stamen number and propose an overall scheme of floral evolution in the Papaveraceae.

Virus-induced gene silencing (VIGS) in California poppy

Wege *et al.* (pp. 641–649) test the utility of VIGS to down-regulate *Phytoene Desaturase* gene expression in *Eschscholzia californica*. The resulting patterns of photobleaching in vegetative rosettes and flowers indicate that VIGS based on appropriately transformed *Agrobacterium tumefaciens* is an effective means of down-regulating gene expression in eschscholzia.

Functional evolution of *CRABS CLAW* transcription factor

The *crabs claw-1* (*crc-1*) mutant of *Arabidopsis thaliana* can be transformed using various *CRC* coding sequences, including that of *Amborella trichopoda*, the putative sister to all other angiosperms. By these means, **Fourquin *et al.* (pp. 651–657)** indicate an ancestral role for *CRC* in carpel development and suggest that novel roles for *CRC* in monocots and core eudicots resulted from molecular changes other than to its coding sequence.

Evolution of inflorescence architecture (Review)

LFY, *AP1* and *TFL1* largely account for inflorescence architecture in *Arabidopsis thaliana*, determining which meristems adopt a floral fate. **Benlloch *et al.* (pp. 659–676)** review the role of these genes across the dicots and assess how changes in their expression/function could contribute to the huge diversity of inflorescence types found in nature.