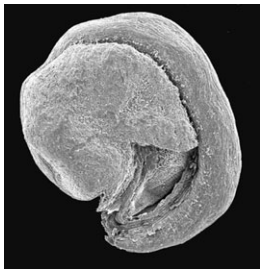


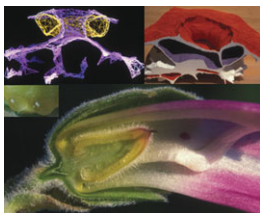
The evolving picture of the chloroplast division machinery (Invited Review)

The study of chloroplast division has expanded rapidly in the last decade. In this review [Maple and Møller \(pp. 565–579\)](#) discuss how the recent identification and analysis of new division components is shaping our picture of the evolution and mechanism of chloroplast division in higher plants.



Opuntia tomentosa seed has no physical dormancy

[Orozco-Segovia et al. \(pp. 581–592\)](#) reveal that a germination valve and a water channel are formed in the hilum–micropyle region during dehydration and ageing of *O. tomentosa* seed. These features are requirements for germination. The funicular envelope also plays a role in germination by restricting water uptake and resisting embryo expansion mechanically.



Nectary development and anatomy in Digitalis purpurea

Ultrastructural changes occurring during nectary development are investigated by [Gaffal et al. \(pp. 593–607\)](#) in relation to nectar secretion and to the post-secretory fate of the floral nectary. A three-dimensional reconstruction of anatomical details of the nectary is given and evidence for the involvement of programmed cell death presented.



Branch abscission and xylem constriction in Wollemi pine

Wollemia nobilis appears unique in having unbranched branches that subsequently separate cleanly at the base by abscission. [Burrows et al. \(pp. 609–623\)](#) link separation to a marked constriction of the xylem at the base. Theoretical estimates of hydraulic conductances suggest the constriction inhibits water supply to the foliage.



Species status for varieties of Chamaecrista desvauxii?

Post-zygotic reproductive barriers between sympatric varieties of *C. desvauxii* are identified by [Costa et al. \(pp. 625–635\)](#) using observations of floral biology, phenology, pollinators, experimental pollinations and allozyme markers. The authors conclude that these two morphologically distinct varieties should be considered as distinct species.



Limits on the invasiveness of Oxalis pes-caprea

Abandoned fields in Menorca (Balearic Islands, Spain) are invaded by the winter

geophyte *Oxalis pes-caprae*. Although it forms flowers, reproduction is exclusively by bulbs. However, [Sala et al. \(pp. 637–645\)](#) show *O. pes-caprae* to be a weak competitor that prefers disturbed or abandoned farmland that is high in nutrients and low in competitor species.



Alpine reproduction by 'smallest tree in the world'

Many alpine plant species combine both sexual and asexual reproduction. *Salix herbacea* forms large mats in alpine snowbed communities. Using molecular markers, [Reisch et al. \(pp. 647–651\)](#) reveal spatial genetic structure and clonal diversity suggesting both clonal and sexual propagation give rise to repeated seedling recruitment in established populations.



Intraplant nectar-sugar variation in Aquilegia

In field-grown *Aquilegia vulgaris* and *A. p. cazortensis*, nectar-sugar composition varies widely especially between nectary spurs. In contrast, [Canto et al. \(pp. 653–660\)](#) find that nectar-sugar composition is constant across plants, flowers, and nectary spurs of either species when plants are grown in a glasshouse.



Flexistylly in Alpinia blepharocalyx (ginger)

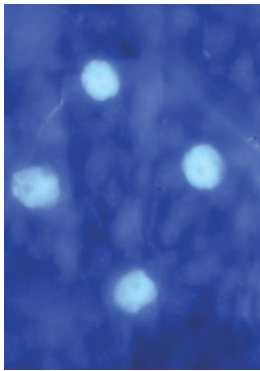
Flexistylly is a sexual dimorphism involving heterodichogamy and reciprocal style movements. Hand-pollination experiments

by [Sun et al. \(pp. 661–666\)](#) indicate that this is sufficient to suppress selfing while the stylar movements appear to reduce sexual interference.



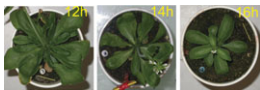
Temperature cues, shade and germination in Kalahari savannah

[Kos and Poschlod \(pp. 667–675\)](#) show that germination by seeds of fleshy fruited Kalahari savannah species depends on shade and associated cooler temperatures; germination success of seed deposited by birds being related to the distribution of shade. This leads to preferential establishment in shady patches.



Nuclear DNA C-values of green algal lineages

Estimates of nuclear DNA content have been published for less than 1 % of green algae. [Kapraun \(pp. 677–701\)](#) expands the list of 2C nuclear DNA contents for green algae by 72 to 157 and compares C-values with emerging molecular phylogenies for Chlorophyta and Streptophyta, which is a sister group of land plants.



Day length and leaf expansion in arabidopsis

[Cookson et al. \(pp. 703–711\)](#) analyse day-length-induced plasticity of leaf area development in *Arabidopsis thaliana*. In addition to the well-known effect of day length on leaf production, the dynamics and cellular bases of individual leaf expansion are also altered by

differences in day length. These responses are associated with the onset of flowering.



Local taxon separation in oaks

Nuclear capture through introgression has been proposed to occur in European white oaks. In complementary large-scale studies, [Gugerli et al. \(pp. 713–722\)](#) here apply spatial analyses at the local scale. In a mixed stand, they report species-specific tree clusters where morphological and genetic delimitation coincide well. This does not support the hypothesis of introgression.



Local adaptation and seedling recruitment in *Silene ciliata*

In harsh environments, evolutionary adaptation to the home site may favour local populations. Using reciprocal sowing experiments, [Giménez-Benavides et al. \(pp. 723–734\)](#) support this notion by showing that seedling recruitment is higher for home seeds than for foreign ones along an elevational/moisture gradient in high mountains.



Ethylene and seed dormancy in red rice

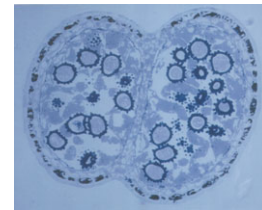
Red rice seed has a strong dormancy. Eventual germination is associated with

ethylene production. Using ethylene inhibitors and sensitive laser-photoacoustics allowing high time resolution, [Gianinetti et al. \(pp. 735–745\)](#) demonstrate that the onset of ethylene is not involved in the breaking of dormancy but may accelerate post-germination growth.



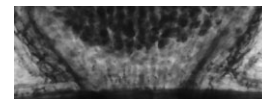
Reconstruction of chloroplast genome revealed in mosses

An inversion of a 71 kb fragment in the large single-copy region of the chloroplast genome of *Physcomitrella patens* is reported by [Goffinet et al. \(pp. 747–753\)](#). This appears to be the largest inversion documented in plants. This major structural rearrangement is shared with other Funariales and Encalyptales but not by the Gigaspermaceae (Funariales).



Pollen, tapetum and orbicules of *Modiolastrum malvifolium*

Using transmission electron microscopy and light microscopy, [Galati et al. \(pp. 755–763\)](#) make the first report of orbicules on peritapetal membranes in a species with an invasive non-syncytial tapetum. This refutes the long-held view that orbicules are limited to the secretory type of tapetum.



Cytokinins, nodulation and vascular connections in pea

The R50 mutation of *Pisum sativum* forms few nodules and accumulates abnormally large amounts of cytokinin. [Pepper et al. \(pp. 765–776\)](#) find these features are associated with an abnormal vasculature of the primary root, lateral

roots and nodules that appears to be linked to anomalous cytokinin perception.



Non-destructive estimation of biomass in grasses (Technical Article)

A non-destructive method based on digital image analysis is described by [Tackenberg \(pp. 777–783\)](#) after testing with 582 individuals of 27 grass species using generalized linear models developed with destructively measured parameters. The presented models can be applied directly to herbaceous grasses without further calibration to estimate vertical biomass distribution of total above-ground fresh mass.