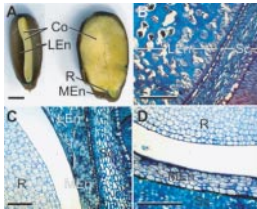




The epigenetic network in plants (Invited Review)

Grant-Downton and Dickinson (pp. 1143–1164) explain how epigenetic systems were discovered and how they operate to control such essential biology as chromosomal architecture, gene expression patterns and defence against parasites. Epigenetic systems are shown to work through cross-talk between (i) DNA methylation, (ii) histones and their post-translational modifications and (iii) RNA species.



Emergence of embryos from hard seeds

Embryos of many hard-seeded species are surrounded by a thick-walled endosperm through which their radicle must penetrate to complete germination.

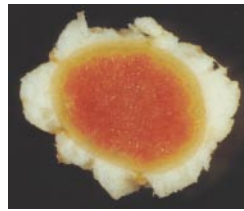
Gong *et al.* (pp. 1165–1173) show endosperm cells around the radicle to have unusually thin walls, thereby facilitating penetration by the radicle. Mannan-degrading enzymes do not increase during germination.



Morphology of extrafloral nectaries in Mexican coastal plants

Díaz-Castelazo *et al.* (pp. 1175–1189) characterize the morphology and

secretion of the extrafloral nectaries of coastal plants of Veracruz, Mexico. Four types of vascularized nectaries and four of glandular trichomes are revealed. First descriptions are given of unicellular and peltate trichomes functioning as extrafloral nectaries. Implications of gland attributes are discussed from a functional perspective.



Aerenchyma formation in flooded roots of nodulated soybean

Nitrogen fixation of soybean is seriously impaired under flooded conditions. **Thomas *et al.* (pp. 1191–1198)** examine aerenchyma formation and nitrogen fixation activity under such conditions. They evaluate nitrogen fixation through changes in xylem-sap organic nitrogen and show that aerenchyma formation leads to at least partial recovery of nitrogen fixation.



Genecology of coastal Douglas fir

Geographic patterns of adaptive traits of Douglas fir in Washington, USA, are described and mapped. **St Clair *et al.* (pp. 1199–1214)** show clinal variation in bud-set, emergence and growth is strongly related to elevation and cold temperatures while clinal variation in bud-burst is more weakly related to latitude and summer

drought. Discontinuities across the Cascade mountains suggest an interior variety of Douglas fir.



Pre- and post-germination determinants of recruitment in annuals

Natural recruitment process and path analysis are used by **Li *et al.* (pp. 1215–1223)** to test effects of pre- and post-germination determinants on recruitment of annuals of moving sandy land. They conclude that post-germination determinants influence the final pattern of recruitment directly while pre-germination determinants contribute indirectly through density-dependent emergence of seedlings.



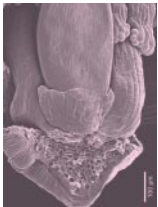
Dormancy cycling in fire ephemerals

Actinotus leucocephalus (Apiaceae) and *Tersonia cyathiflora* (Gyrostemonaceae) are difficult to germinate. **Baker *et al.* (pp. 1225–1236)** demonstrate that dormancy is released during summer burial and reimposed during winter burial. Seeds germinate in smoke-water following dormancy release. Dormancy cycling in *A. leucocephalus* is driven by temperature while wetting/drying cycles accelerate the rate of dormancy release.



Species distinction of oak populations in Ireland

Oak species in Irish populations lack significant distinction at the molecular level even though they are easily distinguished morphologically. **Kelleher et al. (pp. 1237–1246)** propose that population dynamics could be masking species difference in these highly fragmented oak populations.



Spikelet and floral ontogeny in *Ficinia* and *Isolepis*

Floral ontogeny in the seven species studied by **Vrijdaghs et al. (pp. 1247–1264)** follows a typical scirpoid pattern although no perianth parts are formed. The gynoecium that originates as a hypogynous stalk in *Ficinia*, and from which the typical gynoecium lobes develop, is shown not to be homologous with the perianth.



Genetics of endangered aquatic quillwort *Isoetes sinensis*

Kang et al. (pp. 1265–1274) show that populations of *I. sinensis* have recently declined sharply in its wetland habitat. For populations in disequilibrium, genetic drift is found to be more important than gene flow in explaining the current population genetic structure. *In situ* and *ex situ* conservation strategies are proposed.



Cluster roots in the Fynbos

Fynbos vegetation in South Africa is adapted to highly weathered, mostly acidic soils where mineral nitrogen is low. **Hawkins et al. (pp. 1275–1282)** examine whether cluster roots of *Leucadendron laureolum* (Proteaceae), a common Fynbos plant, and the crop plant *Lupinus albus* (Fabaceae), take up organic nitrogen (glycine) as an adaptive strategy to low mineral nitrogen in these soils.



Genetic diversity in germplasm reservoirs of endangered species

Segarra-Moragues et al. (pp. 1283–1292) examine genetic variation at microsatellite loci in five seed bank stocks of critically endangered Iberian *Borderea chouardii*. They conclude that genetic diversity of the only known wild population is not adequately represented in these stocks and propose specific management actions to improve the collections and prevent further loss of genetic diversity.



Genome size in New Zealand grasses

Genome size and chromosome number are shown by **Murray et al.**

(pp. 1293–1305) to be highly variable amongst these grasses. The measurements substantially expand known data for the Poaceae overall and represent the first major survey of plants from New Zealand. The variation shows a systematic bias that appears not to be correlated with rarity or distribution.



Evolution of NADP malate dehydrogenase in a C₄ plant

To help understand the molecular evolution of C₄ photosynthesis, **Rondeau et al. (pp. 1307–1314)** investigate the evolution of NADP-MDH in the Panicoideae. Phylogenetic trees indicate that gene duplication followed by episodic selection occurred during Andropogoneae diversification. Gene duplicates are thought to have been maintained because original NADP-MDH functions became partitioned across different copies.



First nuclear DNA C-values for 18 eudicot families

A key goal of genome size research is to achieve complete familial representation for angiosperms. **Hanson et al. (pp. 1315–1320)** report first nuclear DNA C-values for 20 families, thereby increasing eudicot and angiosperm familial representation substantially.



Is leaf strategy co-ordinated with nuclear DNA content?

Species with large genomes tend to have large-volume cells. **Morgan and Westoby (pp. 1321–1330)** propose that leaves of these species are constructed of lower density tissue that is short-lived. This prediction is tested by combining previously published and new genome size data. The latter include many sclerophyllous Australian evergreens new to the literature.