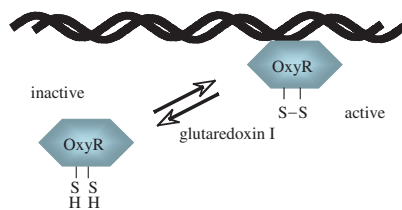


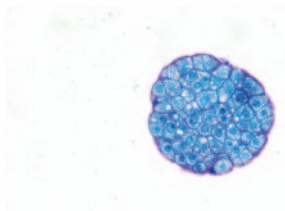
Heat shock transcription factors (Hsfs) as hydrogen peroxide sensors (Invited Review)

Miller and Mittler (pp. 279–288) assess the function of Hsf genes based on research with arabidopsis and tomato. They propose a network of interacting genes that responds to various external factors to govern adaptive outcomes. Some Hsf genes probably function as sensors of reactive oxygen species that regulate a suite of oxidative stress response genes.



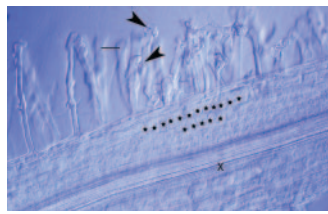
Redox regulation in stress responses (Invited Review)

Reactive oxygen species are produced in a highly localized and specific pattern in biological stress responses. **Fedoroff (pp. 289–300)** describes many molecular stress responses in bacteria, plants and animals that are regulated by the reduction and oxidation of disulfide bonds in response to reactive oxygen species.



Globular somatic embryo of date palm

Undifferentiated calli from leaf tissue give rise to isolated embryos enveloped in a thick polysaccharide layer. **Sané et al. (pp. 301–308)** liken this ‘blackberry-like’ stage to the morula stage of human embryo development and identify a subset of somatic cells possessing the ability to form these somatic embryos.



Frankia nodule development in alder

By manipulating nodulation rate with N and P supply and adopting a new method to quantify early nodulation stages in root hairs of intact root systems of actinorhizal *Alnus incana*, **Gentili et al. (pp. 309–315)** reveal that cortical cell divisions can begin within 2 days of inoculation with *Frankia*.



Pollination system in the Ogasawara Islands

Pollination disturbance in oceanic islands threatens biodiversity conservation. **Abe (pp. 317–334)** describes native plant–pollinator interactions at the community level and highlights the island syndrome on the Ogasawara Islands. Decline of native visitors and introduction of honeybees seem to be responsible for the disturbed pollination network.



Three-pronged approach to Veronica systematics

Muñoz-Centeno et al. (pp. 335–350) use a molecular phylogenetic hypothesis to test the significance of seed coat ultrastructure in the systematics of monophyletic subgenus of *Veronica*. The results reveal that this character combined with base chromosome number and chemical data help diagnose subgenera vs. clades.



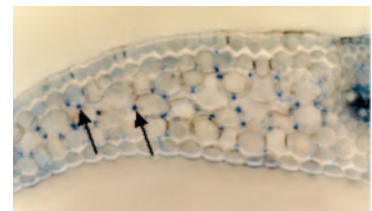
Self-fertilization and purging of inbreeding depression

Genetic theory predicts that self-fertilization can purge inbreeding depression—the outcome of a positive feedback loop that leads to the evolution of higher rates of selfing. **Goodwillie and Knight (pp. 351–360)** give empirical support to the purging hypothesis by comparing populations of an annual plant that vary in their timing of self-fertilization.



Heat stress and metabolic crosstalk

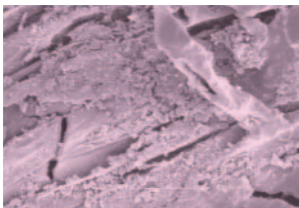
Electrolyte conductivity measurements on leaf discs of *Populus euphratica* are used by **Ferreira et al. (pp. 361–377)** to establish temperatures inducing moderate heat stress. Leaf proteome analyses and protein identification provide evidence of crosstalk between metabolic pathways that leads to photostasis of the moderately heat-stressed tissue.



Effect of the fungal endophyte Neotyphodium lolii on photosynthesis and growth rate in perennial ryegrass

Decreases in mid-log growth and CO₂-limited rates of net photosynthesis of *Lolium perenne* infected with *N. lolii* are shown by **Spiering et al. (pp. 379–387)** to be independent of fungal concentration but strongly dependent on the growth phase of the host.

Unexpectedly, host plants initiate regrowth more rapidly than uninfected plants.



Response of rice with iron plaque (IP) under Al stress

IP on the root surface is ubiquitous in rice. **Chen *et al.* (pp. 389–395)** find that, in roots with IP, Al content is greatest on the surface but least in their tips while Al-induced secretion of citrate from roots is depressed. Thus, IP may afford some protection from Al stress.



Heterodichogamous flowering in a walnut

Heterodichogamy involves protogyny and protandry mating types. In *Juglans mandshurica*, a wind-pollinated heterodichogamous tree, **Bai *et al.* (pp. 397–402)** find large airborne pollen loads, no pollen limitation and no within-individual overlap between sexual functions. Heterodichogamous flowering in *J. mandshurica* effectively avoids selfing and leads to efficient pollination.



Three-dimensional thermal-germination models

The predictive accuracy of germination-rate and germination-time estimates can be improved by using empirical models that have few *a priori* shape assumptions. **Hardegree and Winstral (pp. 403–410)** demonstrate that statistical gridding is more accurate and efficient in estimating germination time than either three-dimensional regression or iterative probit optimization.



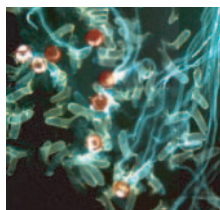
Genetic architecture of ecotype differences

Serpentine soils are highly selective substrates for growth and represent an ideal system for studying the evolution of ecotypes. **Bratteler *et al.* (pp. 411–419)** use QTL analysis to identify the genetic architecture of morphological traits that distinguish serpentine from non-serpentine ecotypes of *Silene vulgaris*. The role of trait architecture and directional selection for ecotype evolution is discussed.



Seed germination and dormancy break after fire require stratification in Leucopogon

Puzzlingly, primary dormancy in fire-prone areas is not necessarily broken by direct fire cues even though germination occurs mainly after fire. Using three *Leucopogon* species with previously unknown dormancy mechanisms, **Ooi *et al.* (pp. 421–430)** reveal that physiological dormancy is not broken by smoke or heat shock alone but by stratification at seasonal temperatures typical of south-eastern Australia.



Population structure is related to pollen performance

Microsatellite analysis of gynodioecious *Silene vulgaris* by **Glaettli *et al.* (pp. 431–437)** reveals the existence of a population structure, while differences in *in vivo* pollen tube migration performance are shown to increase with increasing distance between mates. This indicates that

population structure is likely to influence mating patterns by favouring cross-pollinations between unrelated plants.



Effect of root morphology on root-sprouting and shoot-rooting

A study of root systems of 123 species by **Guerrero-Campo *et al.* (pp. 439–447)** shows that the main morphological features of plants adapted to eroded land relate to an ability to sprout from their roots and to form roots from the shoots. Advantages and limitations of this strategy are discussed.



Genetic variation of bat-plants

Botanists are puzzled by the conspicuous floral design of *Tacca chantrieri* which yields seeds mostly by selfing. **Zhang *et al.* (pp. 449–457)** find considerable spatial genetic variation among populations and attribute this to vicariance along the Tanaka line.



Explaining absence of seed set in Oxalis debilis (Short Communication)

Tristyloous *Oxalis debilis*, a South American species, is invasive in China. All eight populations examined by **Luo *et al.* (pp. 459–464)** fail to set seed even though bees visit frequently. The populations are shown to be monomorphic and their pollen mostly sterile even though chromosome number is the same as in South American populations where seed sets readily.