



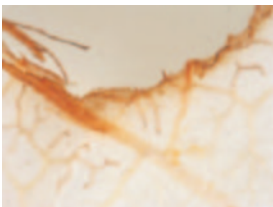
Nitrate signalling of dry matter partitioning (Viewpoint)

It is often stated that nitrate acts as a signal to regulate dry matter partitioning between shoots and roots of higher plants. **Andrews et al.** (pp. 3–10) challenge this hypothesis and present evidence that nitrate and other environmental effects on shoot : root dry weight ratio are often related mechanistically to changes in shoot protein concentration.



The epigenetic network in plants (Invited Review)

Grant-Downton and Dickinson (pp. 11–27) examine the implications of plant epigenetics outside of cellular and molecular biology. They predict that discoveries in this field will have a major impact on disciplines such as evolutionary biology, taxonomy, population biology and conservation. The review focuses on current data that support this perspective.



Rapid induction of resistance to herbivory in mountain birch

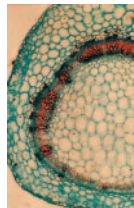
This phenomenon is not well understood. **Ruuhola and Yang** (pp. 29–37) find that herbivory by *Epirrita autumnata* induces H_2O_2 and polyphenoloxidase and peroxidase activity within 24 h together with decreased activity of antioxidative catalases. These oxidative changes are thought to be involved in the rapid

induction of resistance to herbivores and pathogens.



Short photoperiods induce dormancy in *Nelumbo nucifera*

The need for large areas for cultivation inhibits extensive physiological research with lotus. **Masuda et al.** (pp. 39–45) use seedlings to circumvent this difficulty and report on temperature and daylength responses. Their findings include identifying short days as inducers of rhizome enlargement.



Anatomical significance of hydrochastic movement in *Anastatica hierochuntica*

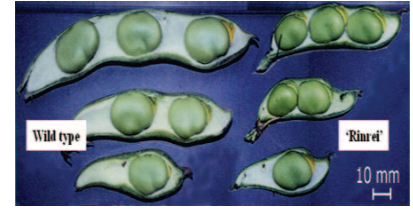
Hygrochasy involves curling and uncurling of branches in response to moistening. **Hegazy et al.** (pp. 47–55) study the lignified conducting tissue of the stem that controls hydrochastic movement. Movement is found associated with a rise in water and hydrochastic efficiency, notably in basal- and middle-order branches.



Stigma receptivity in almond

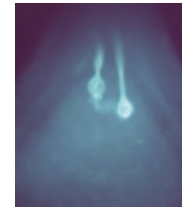
Stigma receptivity is a limiting factor in the reproductive success of many species and limits crop production in almond. The relationship between stigma morphology, pollen growth and nut-set is evaluated by **Yi et al.** (pp. 57–63). They show that stigmas are still receptive

and nut-set is maintained in older flowers even when petals are abscinding.



Physical restriction of pods reduces seed size in brassinosteroid-deficient *Vicia faba*

Fukuta et al. (pp. 65–69) propose that seed size of brassinosteroid-deficient mutant faba bean 'Rinrei' is suppressed by physical restriction within abnormally small double- or triple-seeded pods. When 'Rinrei' seeds are arranged in single-seeded pods and are thus without physical restriction, they attain a normal size.



Myrica rubra exhibits delayed fertilization

Sogo and Tobe (pp. 71–77) show that, as in other Fagales, pollen-tube growth is temporarily arrested, resulting in a 2-week delay in fertilization. *Myrica* differs from other families in that pollen tubes arrest their growth on the nucellar surface.



What are the limits to plant height and do they differ among clades possessing different growth forms and anatomy?

Niklas et al. (pp. 79–83) address these questions by analysing record-sized dicots, conifers, palms, cacti and cycads allometrically. Each clade is shown to be

allometrically distinct due to growth form and anatomical differences.



Root–shoot co-ordination in young apple plants

Emergence and elongation of new organs is compared in two apple varieties by **Costes *et al.* (pp. 85–96)**. Synchrony between leaf emergence and primary root growth is revealed together with a feedback effect of lateral root emergence on leaf emergence. Secondary-root lifespan, branching density and mean root length differ between the two varieties.



Leaf size–twig size allometric relationship

Sun *et al.* (pp. 97–107) show that environmental gradients change the allometric constant (γ -intercept) of the relationship between leaf size and twig size, while keeping the scaling exponent an invariant constant. Allometric growth in the twig size–leaf size spectrum

appears to be related to many components of a plant's life history strategy.



Nitrogen reserves and cold-inducible genes in alfalfa

Alfalfa persistence depends on the accumulation of organic reserves in roots during cold-acclimation in autumn. **Dhont *et al.* (pp. 109–120)** analyse variations in specific amino acids and cold-inducible gene expression in roots of over-wintering alfalfa in response to autumnal defoliation. This variation is linked to winter survival and spring regrowth.



Atmospheric NH₃ and plant functioning

High levels of atmospheric NH₃ can partially replace pedospheric N in the inorganic nutrition of a plant. However, NH₃ can also be toxic. The physiological basis of this phytotoxicity is still largely unknown, and is discussed by **Castro *et al.* (pp. 121–131)** using results with *Brassica oleracea*.



Ascorbate peroxidase and water deficit in cowpea

Dehydration stimulates potentially damaging active oxygen species which ascorbate can help deactivate. **D'Arcy-Lameta *et al.* (pp. 133–140)** compare gene expression of four ascorbate peroxidases in cowpea cultivars differing in drought tolerance. They find that leaf water deficit and abscisic acid induce differences in transcript accumulation that relate to drought tolerance.



Pollen transfer by multiple visitors

Most plant species are visited by diverse floral visitors. **Adler and Irwin (pp. 141–150)** compare pollen transfer and loads of four pollinating and one nectar-robbing bee of a distylous plant and test fluorescent dye as an analogue for pollen movement. Results demonstrate that floral visitors vary in their effectiveness as pollinators.