



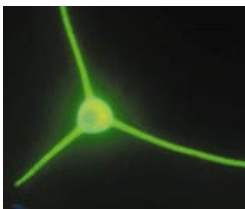
## Can plants be considered to be intelligent? (Two Viewpoint papers)

**Anthony Trewavas (University of Edinburgh, UK)** published 'Aspects of Plant Intelligence' in the August 2003 issue of *Annals of Botany* (vol. 92, pp. 1–20). In the current issue, **Richard Firm (University of York, UK, pp. 345–351)** challenges Trewavas's view that applying the term intelligence can usefully be applied to plants. A considered response to Firm's critique by Trewavas also appears in this issue (pp. 353–357).



## Root type-specific developmental programmes in maize (Invited Review)

The current status of genetic analysis of root formation in maize is reviewed by **Hochholdinger et al. pp. 359–368**). They highlight recently identified root-specific mutants in the context of maize root morphology and anatomy. These mutants reveal that different developmental programmes control the formation of the various types of root present in maize.



## Fast pollen tube growth in *Conospermum* species

**Stone et al. (pp. 369–378)** report that pollen tubes of several *Conospermum* species can elongate at rates of up to  $55 \mu\text{m s}^{-1}$  within the first 2 s of emergence

from the grain. Thirty seconds later, extension growth slows to  $2 \mu\text{m s}^{-1}$ . Ultrastructural observations suggest that initial pollen tube wall constituents are synthesized and stored in the grain prior to germination, and that subsequent tube-wall elongation is achieved by means of previously reported mechanisms but at high speed.



## ITS phylogeny of *Bupleurum*

Umbellifer classification is notoriously difficult and the large, entire-leaved genus *Bupleurum* is no exception. **Neves and Watson (pp. 379–398)** are the first to apply molecular methods to resolve relationships within a genus where traditional methods have so far failed. Phylogenies show early evolutionary separation of *Bupleurum* into two groups (subgenera), and highlight biogeographic origins and relationships.



## Adaptability linked to flexible nitrogen nutrition

Cultivated *Vaccinium* species are limited to acidic, high organic matter soils that are often located in or adjacent to wetlands. However, the wild species, *V. arboreum*, is adapted to a wide range of upland soils. **Poonnachit and Darnell (pp. 399–405)** show that the wider soil adaptation of *V. arboreum* appears related to an increased ability for nitrate uptake and reduction.



## Root morphology and phylogeny of African and Malagasy Perilocoideae

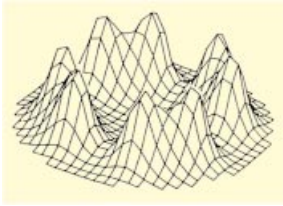
A phylogeny of predominantly tuberous taxa generated by **Mevé and Liede (pp. 407–414)** from analyses of cpDNA and nrDNA markers indicates that the formation and structure of root tubers is phylogenetically informative.

*Raphionacme* and its sister group *Schlechterella* are shown to be the most advanced genera in the 'tuberous clade', while the mostly non-tuberous Malagasy taxa are placed basally in most trees. African *Petopentia* is reinstated against Malagasy *Ischnolepis*.



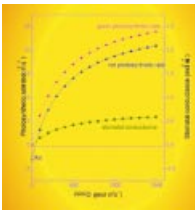
## Raphides in palm embryos

The embryos of palms are small and poorly differentiated at the time of seed dispersal. Nevertheless, the presence or absence of raphides (bundles of needle-shaped crystals of calcium oxalate) is a trait that varies across the palm family. **Zona (pp. 415–421)** surveys the family for raphides in embryos.



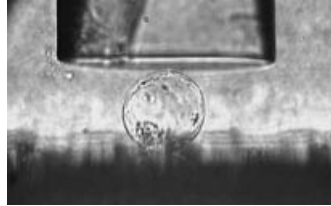
### Waveforms and variable cotyledon number in somatic embryos

Cotyledon number varies linearly with apex diameter within a clonal population of somatic embryos of a hybrid larch. **Harrison et al. (pp. 423–434)** show that patterning of cotyledon primordia resembles waveforms on a circular disc, and discuss mechanisms such as reaction-diffusion dynamics to account for this.



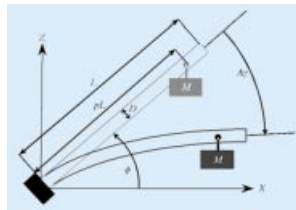
### Simulation of stomatal conductance

In some models, stomatal conductance is conditioned jointly by both physiological and environmental variables. **Yu et al. (pp. 435–441)** integrate several existing models with the hyperbolic equation of photosynthesis to construct a new model with a sound physiological basis and fewer parameters. The model can be used successfully to predict stomatal conductance from environmental variables.



### Modelling the mechanical properties of single suspension-cultured tomato cells

By modelling the compression of single suspension-cultured tomato cells **Wang et al. (443–453)** have estimated their Young's modulus. The authors show that Young's modulus is lowest at pH 4-5, the optimum pH for expansin activity in cell wall loosening.



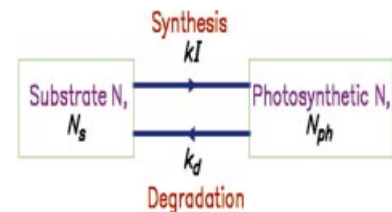
### Biomechanical analysis of tree stem shape

The shape of tree stems depend on parameters such as dimension, growth pattern and the mechanical properties of the wood. **Almeras et al. (455–468)** propose a biomechanical model that clarifies the influence of these factors and evaluate it using apricot trees. Their analysis shows that inter-varietal variation in shape is mainly an outcome of load/diameter and length/diameter ratios.



### Metaxenia in vine cacti

**Mizrahi et al. (pp. 469–472)** found that pollinating flowers of *Hylocereus polyrhizus* with pollen from *Selenicereus grandiflorus* and *S. megalanthus* delayed fruit ripening as compared with that of fruits derived from pollination with *H. undatus* pollen. The results indicate the existence of metaxenia in cacti fruits. This pollen effect may be used for extending the marketing period of *H. polyrhizus* fruits.



### Photosynthetic acclimation (Short Communication)

Proportionality between light-saturated photosynthesis and leaf irradiance is interpreted by **Thornley (pp. 473–475)** using a simple mathematical model. Assumptions are (i) local irradiance drives synthesis of photosynthetic protein from metabolic N; (ii) photosynthetic protein degrades over approx. 6 d; and (iii) metabolic N is equally available through the canopy. The kinetics of acclimation at different light levels may provide a way of parameterizing and testing the model.