



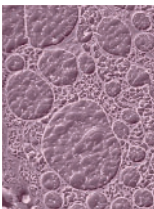
## Co-ordination of photosynthesis and respiration at elevated CO<sub>2</sub> (Invited Review)

An increase in plant photosynthetic activity and biomass often results in faster respiration rate. However, a large literature also reveals that specific respiration rates do not increase in plants that enhance photosynthesis and biomass in response to elevated levels of atmospheric CO<sub>2</sub>. **Gonzalez-Meler *et al.*** (pp. 647–656) propose that this apparent contradiction may be a matter of the scale at which measurements are taken.



## Petal shape variation in *Primula sieboldii*

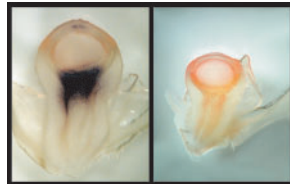
Petal morphology in *Primula sieboldii* is important because of the commercial value of the inflorescence. Consequently, petal shape is a target characteristic for breeders of new cultivars. **Yoshioka *et al.*** (pp. 657–664) evaluate petal shape variation quantitatively and investigate genotypic and environmental effects on petal morphology using elliptical Fourier descriptors and principal component analysis.



## Anatomy of frost tolerance

Using cryo-SEM, **McCulley *et al.*** (pp. 665–674) reveal the impact of repeated frost-freezing and thawing on tissues and occurrence of ice/water in petioles of clover and poppy. They

observe parenchyma to shrink to a fraction of its normal volume, with the attendant cell separation allowing ice to accumulate under the epidermis, which remains attached at specific anchorages. On thawing, the tissues return to their original positions and turgescence.



## Invertase and aborting maize ovaries

At the time of pollination, maize ovaries process sucrose with invertase that loses activity when water is in short supply. Although abortion usually results, this can be partially prevented with stem-fed sucrose. **McLaughlin and Boyer** (pp. 675–689) localize the enzyme activities and link them to gene transcription, sucrose feeding, subsequent senescence, and abortion.



## Light quality and stomatal conductance of lettuce

Stomatal regulation of gas exchange by leaves is of great importance, but the long-term effects of light quality on stomata are poorly understood. **Kim *et al.*** (pp. 691–697) show that stomatal conductance is responsive to spectral quality during growth and is not directly coupled to dry matter accumulation.



## Genetic diversity in a threatened wheat landrace

'Barbela', a Portuguese wheat landrace, performs well under stress

and is thus a promising source for genes and gene combinations in breeding. However, its existence is threatened by changing farming practice. Analysis of genetic diversity in 59 accessions of 'Barbela' by **Ribeiro-Carvalho *et al.*** (pp. 699–705), using 34 microsatellites, shows that diversity is homogenous throughout the geographical range, exceeds that found within wheat cultivars, but is less than that across collections of cultivars.



## Unique pseudopollen in *Eria* orchids

The pseudopollen-forming hairs of all eight species in the *Eria* Lindl. section *Mycaranthes* Rchb.f. are shown by **Davies and Turner** (pp. 707–715) to be unicellular, clavate and stalked, but to differ significantly from those of other orchid genera by being unicellular and bearing raised cuticular ridges and wax-like flaky deposits. This suggests that pseudopollen evolved independently in *Eria* in response to similar pollinator pressures to those experienced by other pseudopollen-producing orchids.



## Regulation of low-temperature tolerance in wheat

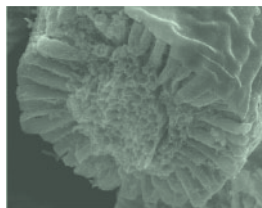
Low-temperature tolerance in wheat is determined by a complex, developmentally regulated genetic mechanism. **Fowler and Limin** (pp. 717–724)

quantify the effects of the genetic factors responsible for the duration and rate of acclimation and demonstrate that minimum survival temperatures are determined by complicated time/temperature relationships and unexplained genetic interactions.



### Gradients in spectral quality and in irradiance as signals for photosynthate partitioning

Plants adjust the partitioning of photosynthetic resources according to canopy density. **Pons and de Jong-van Berkel (pp. 725–732)** show that, in five species, the spectral quality gradient in canopies is less important for the perception of density than the irradiance gradient. A sedge was found to be completely unresponsive to changes in red : far red ratio when this was manipulated independently of irradiance.



### Structure of colleters in Rubiaceae species

Colleters are secretory structures found near the shoot apex. **Klein *et al.* (pp. 733–740)** described the morphology, anatomy and cytology of the colleters of *Simira* species, and also the biochemistry of its secretion. Several differences between the species are described, for example, the presence of vascular traces.



### Floral development of *Berberidopsis* as a crucial step in the evolution of flowers in the core Eudicots

Floral ontogeny of *Berberidopsis* investigated by **Ronse De Craene**

**(pp. 741–751)** supports the shift in floral bauplan from basal to core Eudicots as a transition from a spiral undifferentiated flower to pentamerous flowers with sepals and petals. The position of *Berberidopsidales* is either critical in the evolution of pentamerous flowers or its floral structure may be basal to the evolution of other Eudicots.



### Stature of sub-arctic birch

Birch at the arctic front varies in size from prostrate shrubs to sizeable trees. **Jónsson (pp. 753–762)** examines the role of growth rate, age-related growth rate, stem shape and life span on the stature of sub-arctic birch communities. The extent to which birch stature may respond to changes in growth conditions is also considered.