tropical shade plants is the enhancement of light harvesting for photosynthesis (Bone *et al.*, 1985; Lee, 1986). This was achieved in *Selaginella uncinata* by directing radiation, incident on the epidermis at off-normal angles, towards chloroplasts situated within the epidermal cell or, in *Anthurium warocqueanum*, by focusing radiation towards the chloroplast-rich regions beneath the epidermis. The uneven surface in such light-focusing leaves probably improves light-harvesting by decreasing specular reflection, as suggested by Bone *et al.* (1985), who observed lower reflectance values in light-focusing shade leaves compared with non-focusing sun leaves.

Focusing of radiation, however, is not confined to shade plants (Vogelmann *et al.*, 1996). Using image analysis, these authors demonstrated that collimated light, transmitted by isolated epidermal strips from sun plants, was highly concentrated within focal spots below the epidermis. Clearly, chloroplasts located in focal spots may be photo-damaged in exposed leaves so that epidermal focusing could be detrimental under certain conditions. Similarly, as in the case of focusing effects of water droplets, it is not yet clear how plants cope with the potential photo-damage at spots of extreme radiation intensities; therefore, more information on surface optics is needed to better understand the role of epidermal focusing in leaves.

Many flower petals posses lens-like epidermal cells, which protrude above the adaxial surface as conical structures (Kay *et al.*, 1981). By comparing flowers of wild-type *Antirrhinum majus* with a mutant, which shows only slightly domed epidermal cells (Noda *et al.*, 1994), Gorton and Vogelmann (1996) elucidated the optical properties of the wild-type petal surface. They suggested that absorption of light is optimised in wild-type petals because of efficient focusing of radiation into anthocyanin-containing epidermal vacuoles; mutant cells, however, were less efficient in concentrating radiation and the focal plane was in the unpigmented mesophyll. In agreement with Bone *et al.* (1985), who suggested that the presence of convex epidermal cells reduces specular reflection, the wild-type petals exhibited lower reflectance values than the mutant; different flavonoid concentrations in the wild-type and mutant lines might also have contributed to the differences in reflectance properties.

Conical epidermal cells, besides intensifying floral colour by optimising absorption, also scatter light reflected back from the petal interior resulting in a velvety appearance of the petal surface (Kay *et al.*, 1981; Mol *et al.*, 1998). Both enhanced light absorption and scattering of reflected light could be important signals for attraction of pollinating insects (Glover and Martin, 1998).

The sieve effect. The optical sieve effect is a peculiarity of the epidermal layer which arises when epidermal vacuoles accumulate highly absorbing concentrations of pigments while the interstitial spaces, anticlinal cell walls and intervacuolar protoplasm are relatively transparent (Butler and Norris, 1962; Fukshansky, 1981; McClendon and Fukshansky, 1990; Evans *et al.*, 2004). A distinct property of the sieve effect is that these transparent spots generally increase transmittance values