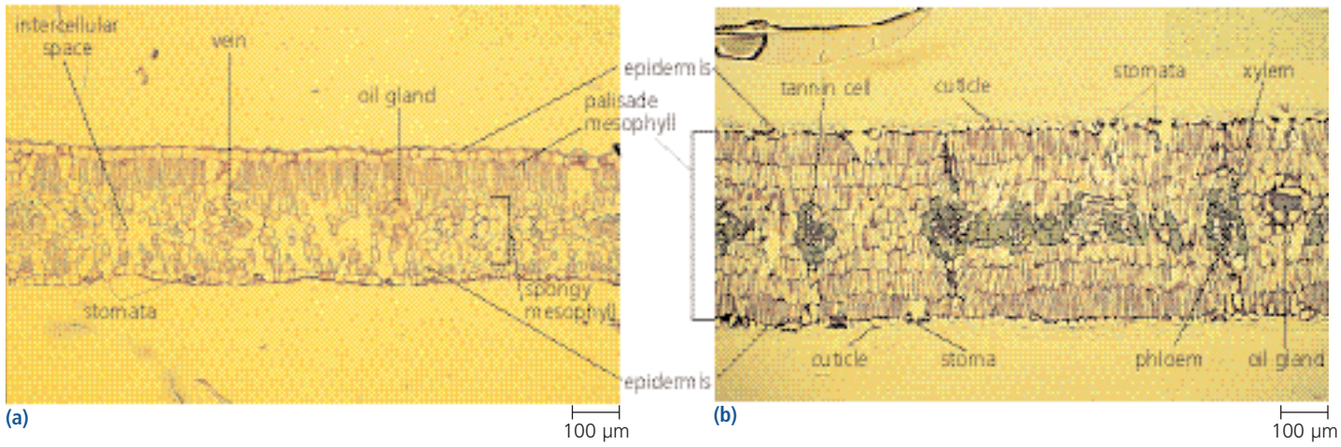

Fig. 15.33 Leaf anatomy of *Eucalyptus globulus*, viewed in cross-section. **(a)** Dorsiventral juvenile leaf. **(b)** Isobilateral adult leaf.

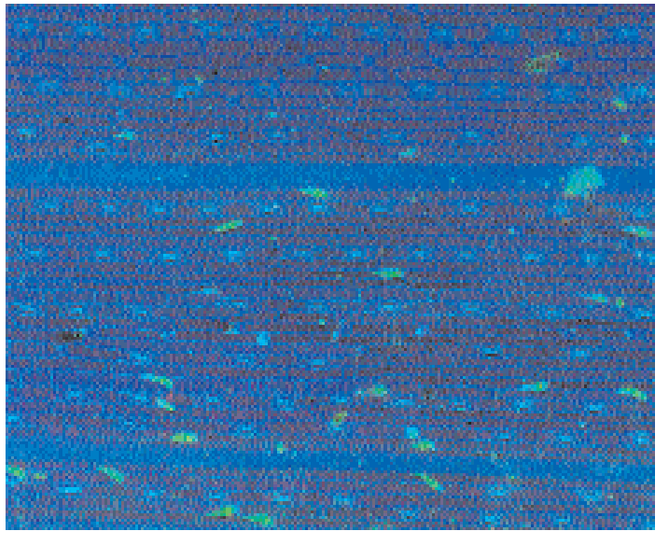

Fig. 15.34 Fluorescent micrograph of the surface of a leaf of kikuyu grass, a monocotyledon, showing parallel veins, stomata (closed) and small hairs fluorescing green. Patterns of epidermal cells can also be seen.

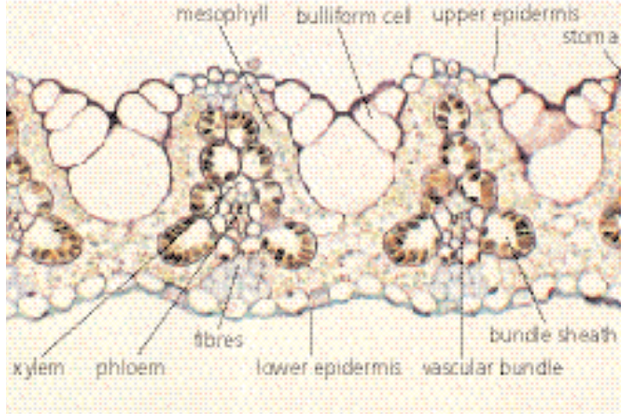

Fig. 15.35 Structure of the leaf of love grass, *Eragrostis brownii*, a monocotyledon, viewed in cross-section. The vascular bundle (xylem above phloem) is surrounded by a prominent bundle sheath, comprising large cells containing chloroplasts, indicating a C_4 pathway of photosynthesis. There are large bulliform cells on the upper surface responsible for rolling and unrolling the leaf.

suberin and, when the guard cells fill with water and become turgid, the differential thickening of their walls causes a gap to open between them, the stomatal pore, exposing mesophyll cells inside the leaf to the atmosphere. The stomatal opening is very small, typically 7–40 µm long, and 3–12 µm wide when fully open. Guard cells contain chloroplasts but other epidermal cells are devoid of photosynthetic pigments.

The number of stomata on leaf surfaces varies. On the lower surface, numbers of 15–1000 per mm^2 are typical, the lower number referring to plants with large stomata. For example, cabbage, a leafy vegetable, has about 600 per mm^2. In Australian plants, the number of stomata varies from about 28 per mm^2 in geebung, *Persoonia*, to 100–340 per mm^2 in eucalypts.

As well as stomata, there may be one or more types of specialised cells present in the epidermis, such as leaf hairs (Fig. 15.34), secretory gland cells and crystal-containing cells. Grass leaves possess several unique cell types. Dumbbell-shaped cells with silicate crystals in their walls form in rows on the epidermis, giving many grasses a knife-edge quality and abrasive texture, which deters grazing animals. The stomata are also dumbbell-shaped, thin-walled at the ends and thick-walled in the central region. Bubble-shaped bulliform cells in the epidermis of grass leaves are long and thin-walled, and contain a large vacuole (Fig. 15.35). Change in turgor of these cells appears to cause the lateral rolling and unrolling of a grass leaf in response to environmental conditions.