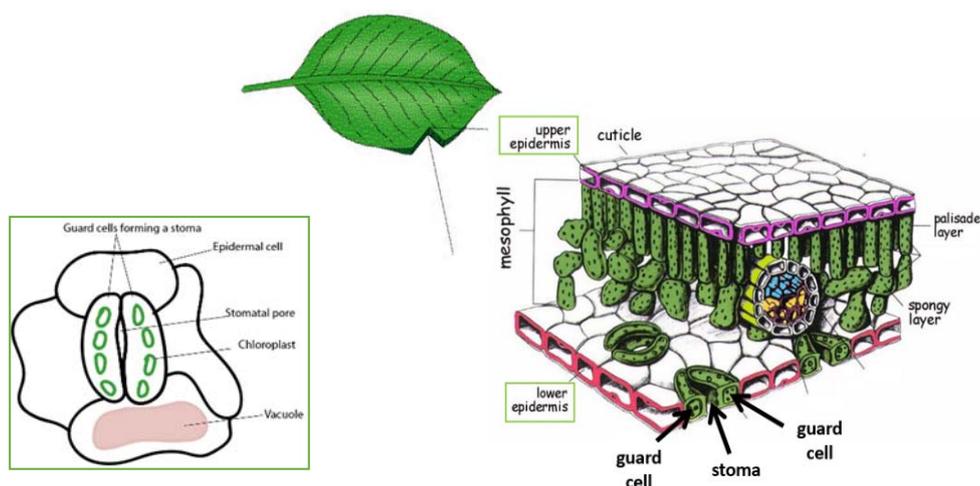


Prepare a Leaf Epidermal Peel

The cells on the surface of a leaf, the epidermal cells, form the barrier between air or water and the inner cells of the leaf. The surface may have a wax coating or hairs as protective structures. Stomata are specialised structures found on the surface of leaves. They are formed from two guard cells (bean-shaped cells) joined at their ends. Guard cells, which contain chloroplasts, swell or shrink in association with osmotic changes. When guard cells are turgid (swollen) a space between the cells opens – this is the stoma or stomatal pore through which CO₂ enters the plant and O₂ and H₂O vapour leave the plant. Plants need to regulate the amount of time the pore is open to maximise CO₂ entry for photosynthesis and limit water loss (transpiration). Between the epidermal layers are the mesophyll cells, which carry most of the chloroplasts and where photosynthesis occurs.

This method describes how to prepare a peel of the leaf epidermis for microscopic observation of the epidermal cells, guard cells and leaf hairs if they are present. Plants vary in the shape of epidermal cells and size and number of stomata on each surface. If a good peel is obtained it is possible to estimate density of stomata. In leaves that have pigment in the vacuole, an epidermal peel can also be used to observe osmosis.



Materials

- Plants with suitable leaves. Smooth leaves without many leaf hairs are usually best
- Compound microscope with magnification up to 400x
- Microscope slides
- Coverslips
- Water dropper bottle or beaker and transfer pipette
- Forceps and scalpel blades
- Marker pen
- Digital camera to capture microscope images of the leaf surfaces – this greatly aids in counting stomata and is a record of the results for future reference

Method - Leaf epidermal peel

- Collect a suitable leaf and all other materials. Label a microscope slide
- Bend the leaf to break the surface or tear the leaf from the edge
- Tear off some epidermis, the transparent thin layer of surface cells
- Cut the epidermal layer from the leaf, place on a microscope slide
- Add a drop or two of water
- Place a coverslip on the sample
- View under the compound light microscope at an appropriate magnification (usually 100x or 400x)

Note: in an unstained epidermis it helps to close the iris diaphragm a little to increase contrast and see the cell walls clearly. Alternatively, methylene blue stain can aid in viewing cell walls but interferes with the identification of chloroplasts (green).

Guard cells that form stomata are identified by the bean-shaped cells joined at the ends. Guard cells contain chloroplasts (green organelles). The shape of the epidermal cells around stomata varies in different plants. In most plants, the epidermal cells surrounding the stomata lack chloroplasts.

Limitations of peel method:

- Not all leaves are easy to peel
- Frequently mesophyll cells come off with the epidermal layer, giving more than one cell layer and making identification of the epidermal cells difficult and confusing.

Results

- Draw or photograph the cells in the microscope view. Label all structures observed.
- Record the magnification.
- Estimate the cell sizes (based on previous calibration of the microscope).

