

Stomata

Stomata are tiny openings or pores in plant tissue that allow for gas exchange. Stomata are typically found in plant leaves but can also be found in some stems. The continuity of the epidermis of aerial organs is interrupted by the presence of stomata, through which exchange of gases takes place between the internal tissues and the outer atmosphere. The pore is bordered by a pair of specialized parenchyma cells known as guard cells that are responsible for regulating the size of the stomatal opening. Often other epidermal cells adjacent to the stoma undergo modifications. They differ from other epidermal cells and become associated with the stoma functionally. These are referred to as subsidiary or accessory cells. Though gaseous interchange actually occurs through the pore, called stomatal aperture or opening, the term stoma includes the whole thing, the pore, guard cells and subsidiary cells, when present.

In surface view the guard cells look crescent or kidney-shaped in appearance, being attached to each other at the margin of the concave side with the aperture lying in between them. They may be easily distinguished from ordinary epidermal cells, because they possess dense cytoplasm, prominent nuclei, chloroplasts, and even starch grains. A cavity is present just beneath the stoma, what is called sub-stomatal chamber or cavity. It is in communication with the intercellular space system of the internal tissues. The walls of the guard cells are unevenly thickened, the wall along the aperture being strongly built and that away from the aperture being thin and extensible. The guard cells have cutinised outer walls with a layer of cuticle which extends through the aperture and joins the inner wall. Due to strong cutinisation often ledges of wall materials are noticed on the upper and lower sides of the ventral wall, so that in sectional view they appear like horns or beaks. The ledges project above and below and overarch the two chambers, referred to as the front cavity and back cavity, which communicate with each other through the pore.

Types of Stomata:

In dicotyledons following four main types of stomata are found:

1. Anomocytic or Type A

- i. No subsidiary cells are present.

ii. Stoma remains surrounded by several irregularly arranged ordinary epidermal cells.

iii. This type is also called Ranunculaceous type or irregular-celled type. These types of stomata are found commonly in several dicotyledons, including *Tridax*, *Citrullus*, *Ranunulus*, etc.

2. Anisocytic or Type B:

i. Stoma remains surrounded by three subsidiary cells.

ii. Of the three subsidiary cells, one is distinctly- smaller than the other two.

iii. This type of stomata is also called unequal- celled type or Cruciferous type. These types of stomata are seen commonly in genera such as *Brassica*, *Sedum* etc.

3. Paracytic or Type C:

i. One or more subsidiary cells are present.

ii. Subsidiary cells flank the stoma parallel with the long axis of the guard cells.

iii. This type of stomata are also called parallel- ceiled type or Rubiaceous type.

This type is commonly seen in members of Rubiaceae, and genera such as *Vigna*, etc.

4. Diacytic or Type D:

i. Stoma remains surrounded by a pair of subsidiary cells.

ii. Common walls of subsidiary cells remain at right angles to the long axis of the guard cells.

iii. This type is also called cross-celled type or Caryophyllaceous type. These types of stomata are commonly seen in *Ocimum*, Caryophyllaceae (e.g., *Dianthus*), etc.

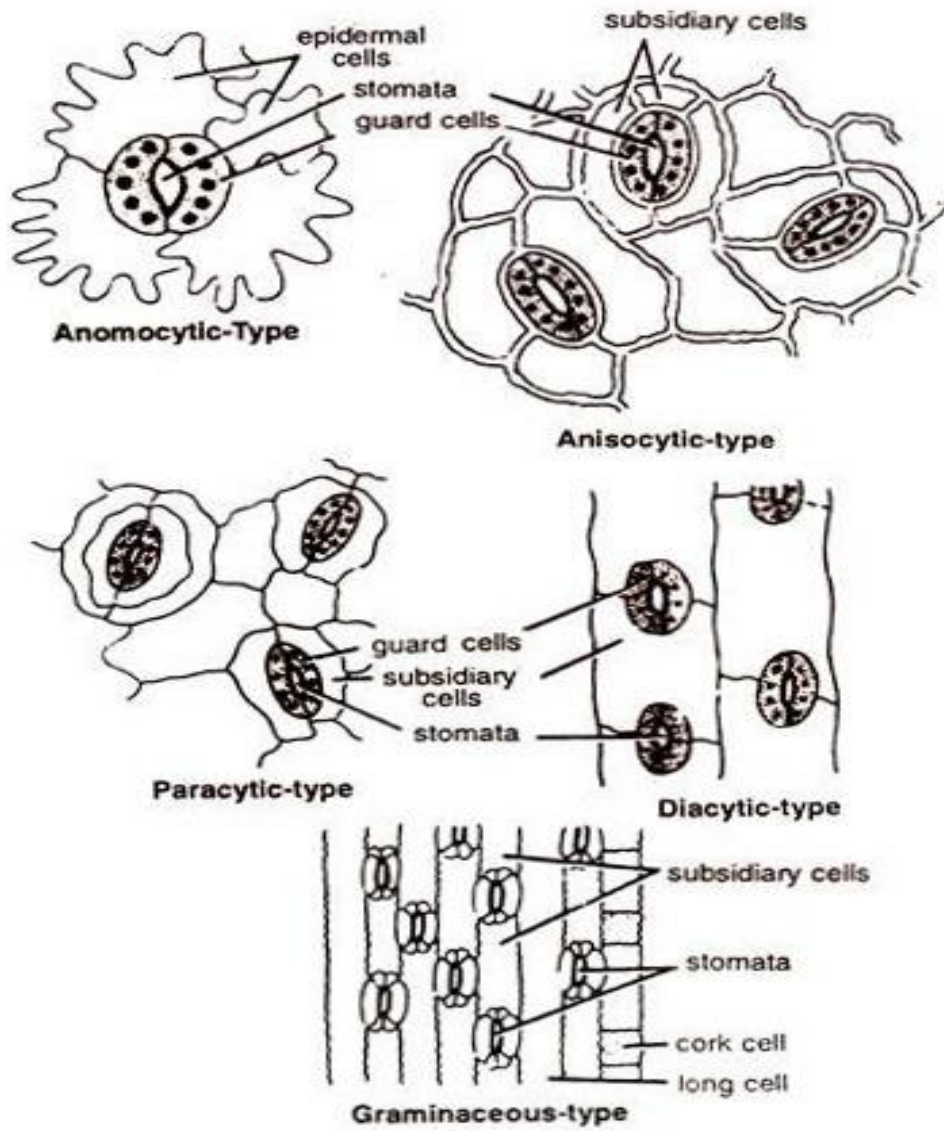


Fig. 137. Major types of stomata.

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