

### 3. Study of structure and distribution of stomata on upper and lower surfaces of leaf.

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**Stomata** are the minute, elliptical pores present on the epidermis of young stem, leaves and fruit wall.

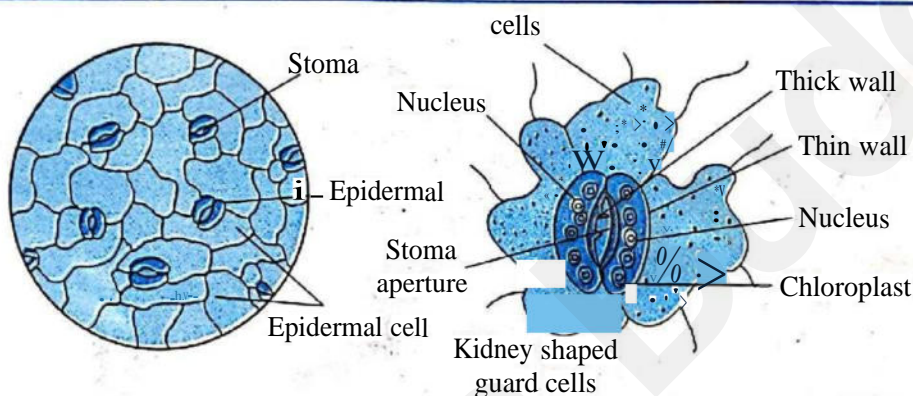
**Aim :-** To study structure and distribution of stomata In upper and lower epidermis of leaf.

**Requirements-** Fresh leaf of Betel (dicot plant) and grass or maize (monocot leaf), glass slides, cover slips, watch glass, blades, glycerine, etc.

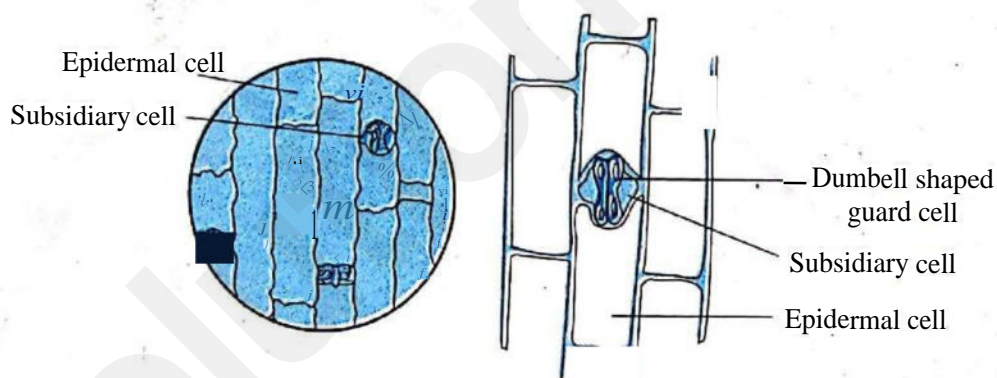
**Principle :-**

Loss of excess water in the form of vapour from aerial parts of the plant body, is known as transpiration. The main plant organ involved, is leaf and it carries out this process with stomata present on both of its epidermal layers. Dicot leaf shows the difference in the number of stomata on its upper and lower epidermal surfaces whereas monocot leaf shows equal number of stomata on both surfaces.

**Figure :-**



**Fig. Structure of stomatal apparatus (Dicot plant)**



**Fig. Structure of stomatal apparatus (Monocot plant)**

**Procedure :-**

1. Take a betel leaf and a maize or a grass leaf, fold these leaves and peel off them on both surfaces.
2. Using a blade, cut the peel on both the surfaces of leaf.
3. Mount these peels on slide, add a drop of glycerine over it and put a cover slip.
4. Observe both the slides under microscope.

### Observation :-

1. The peel of betel (dicot leaf) shows presence of kidney shaped guard cells surrounded by scattered, irregularly shaped subsidiary cells. The number of stomata on upper epidermis is less than those on lower epidermis.
2. The peel of maize or grass leaf (monocot leaf) shows presence of dumb-bell shaped guard cells surrounded by two subsidiary cells which are triangular and show parallel arrangement. The number of stomata on upper epidermis and lower epidermis is generally equal.

### Inferences :->

1. dicot leaf lower surface has a greater number of stomata than upper surface,
2. while in a monocot leaf they are more or less equal on both surfaces.
3. In most of the floating plants, stomata are found only on the upper epidermis.

### Questions !

1. Which type of leaf you will use to study comparative rates of transpiration? Why?

Monocot and dicot leaves are used for comparative study of transpiration. In both these plants number of stomata are different on both the surfaces. In Monocot leaf some what equal on both the surfaces while, in Dicot leaf more number of stomata are present on the lower surface of leaf than the upper surface.

2. What are stomata?

Stomata are minute pores found on the epidermis of leaves and young shoots of plants that are used to control exchange of gases. The pore is surrounded by a pair of specialised cells called the guard cells that are responsible in regulating the size of the opening.

3. What are the functions of stomata?

1. Water is released through the stomata into the atmosphere in the form of water vapour through the process called transpiration
2. the exchange of oxygen and carbon dioxide in the leaf also occurs through the stomata.

4. What is guttation?

Guttation is the process of secretion of excess water in the form of droplets from the pores of some vascular plants during night time.

5. Which structures are known as 'water stomata' and where are they located?

Hydathodes are known as water stomata.

Hydathodes are specialized pores (openings) particularly present on the leaf margins.

6. Why is that there is differential number of stomata on the lower surface in betel leaf?

Stomata are small pores present on the surface of leaves which are useful for exchange of gases. They open during the day in presence of sunlight. If the numbers of stomata are present at the upper surface of the dicotyledonous leaves, it will lead to more water loss during daytime and high temperature. This may lead to wilting of leaves. Hence, to prevent excessive water loss in terrestrial plants, the large number of stomata are present at the lower surface of leaves.

### Multiple Choice Questions

- Stomata open due to
  - influx of calcium ions
  - influx of potassium ions
  - efflux of potassium ions
  - influx of hydrogen ions
- Loss of water in the early morning from tips of leaves, is called
  - guttation
  - transpiration
  - respiration
  - bleeding
- Maximum water loss occurs through
  - stomata
  - lenticels
  - hydathodes
  - cuticle
- In a free floating hydrophyte, stomata are
  - absent
  - present on upper surface
  - present on lower surface
  - present on both surfaces
- Which of the following is Not an Isobilateral leaf?
  - Rice
  - Wheat
  - Sugarcane
  - Mango
- The leaf showing stomata on both the surfaces is known as
  - astomatic leaf
  - epistomatic leaf
  - hypostomatic leaf
  - amphistomatic leaf

Observe the slides and draw the diagram.

*Remark and Signature of Teacher* .....

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