

8/06/2019

STOMATA

EXPERIMENT

Objective :

To prepare a temporary mount of a leaf peel to show stomata.

NFR

CONCEPTS

'Leaf' is commonly called the "kitchen of the plant". Since leaves need sunlight for photosynthesis, they are arranged on branches in such a way that each one of them receives maximum sunlight. The epidermal tissue is the outermost layer that extends over the entire surface of the plant body. Epidermal cells are thin walled and parenchymatous. In a transverse section they appear more or less rectangular.

In leaves (and in young shoots also) epidermis contains minute openings called 'stomata'. The outer wall of the epidermis is often thickened and cuticulated. This layer is called 'cuticle' and checks evaporation of water. Many a times the epidermis gets hairs of different kinds.

Epidermis is basically protective in nature. It protects the inner tissues against excessive evaporation of water, bacterial and fungal attack and in some cases against even grazing animals (sometimes the epidermal hair may be sharp or stinging).

Stomata are usually broken lacunae in the epidermis surrounded by special cells called 'guard cells'. They are usually 'semi-lunar' or bean-shaped. The guard cells contain chloroplast. Their inner walls are thicker and their outer walls are thinner. It is these guard cells that control the opening and closing of stomata. When fully stretched, the guard cells expand, thereby opening the stomata. The reverse happens when the guard cells lose water and shrink. The stomata thus close shut.

Materials required :

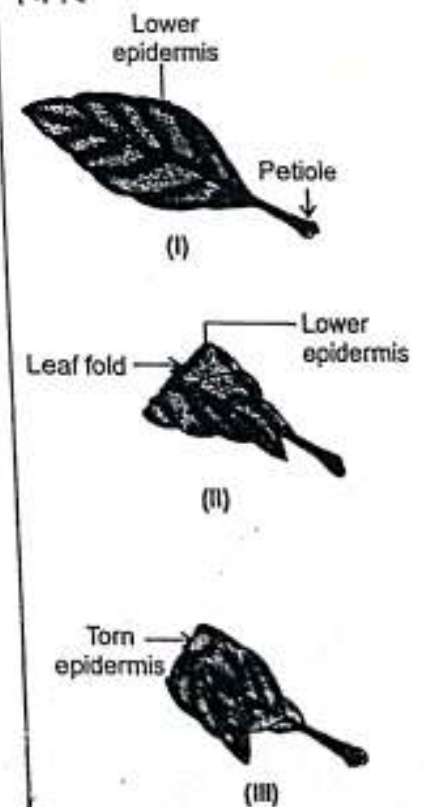
1. Freshly plucked leaf (preferably leaf of lily plant)
2. Plain slides
3. Cover slips
4. Petri dish
5. Forceps
6. Needles
7. Brush
8. A pair of sharp scissors
9. Safranin solution
10. Filter paper
11. Watch glass
12. Glycerine

Procedure :

1. Hold a freshly plucked lily leaf, stretched between your thumb and fore-finger in such a way that the lower part of the leaf remains at the top.
2. Break the leaf from front to back by putting suitable pressure.
3. While breaking the lower side, stretch gently, so as to stretch the lower epidermis into projections from the break.
4. Cut small pieces of the epidermis into petri dish filled with water.
5. Put a few drops of water in a watch glass.
6. With the help of a brush transfer the pieces of epidermis into watch glass.
7. Add a few drops of safranin over the epidermal tissue.
8. Wait for about 2 minutes for the peel to take up the stain.
9. Transfer the peel back to the petri dish containing water. This will remove the extra stain sticking to the peel.
10. Now take a clean slide and put a drop of glycerine on it. Transfer a piece of peel on it with the help of a brush.

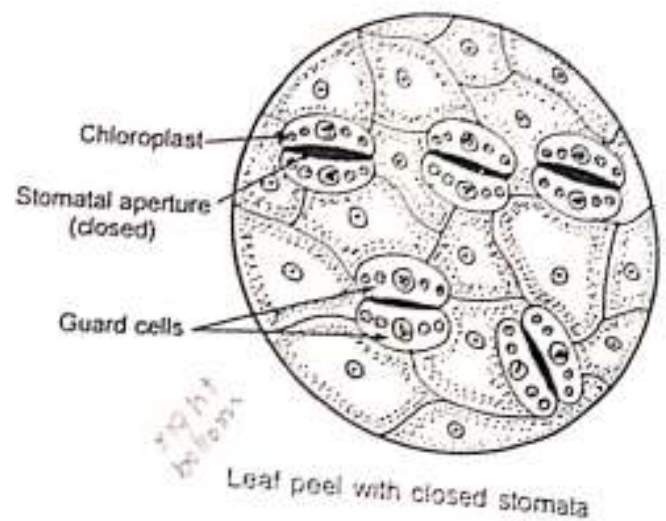
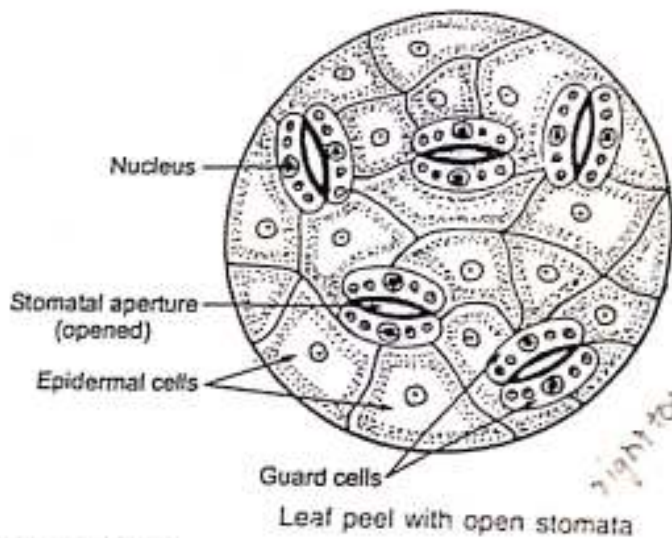
2. Plain slides

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Removing of leaf peel from a leaf

- Put the cover slip over the epidermis gently.
- Drain out the excess stain with the help of blotting paper.
- Examine the slide first under the low power (i.e., 10x) of the microscope and then under high power (i.e., 45x).



Observations :

- The epidermis is made of uniseriate layers of cells.
- The cells are closely packed together with distinct cell walls.
- No prominent nucleus is present in the centre of the cell.
- The epidermal layer is broken at places. These lacunae are called 'stomata' (singular — stoma).
- Each stoma is guarded by a pair of bean shaped cells called 'guard cells.'
- Guard cells are rich in chloroplasts. One nucleus is present in each guard cell.

Precautions :

- Ensure that you are taking the epidermis from the lower side as the lower surface is rich in stomata.
- Always use a brush to transfer the peel to the slide.
- The peel should never be folded.
- Always use a clean slide and a coverslip.
- Place the coverslip on the slide gently and gradually to avoid the entry of air bubbles.

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Viva-Voce

1. What is the role of the cuticle over the epidermis?

Ans. The function of cuticle is purely protective in nature, protecting the inner tissues against evaporation, bacterial infection and excessive heat and cold.

2. What actually controls the opening and closing of stomata?

Ans. Guard cells actually controls the opening and closing of stomata, i.e., the guard cells get stretched (turgid) or shrink (plasmolysed).

3. Suggest any two factors that lead to the closing of stomata.

Ans. The two factors that lead to the closing of stomata are
(i) high evaporation
(ii) lesser light (usually at night).

4. What is the usual shape of the guard cells?

Ans. The guard cells are bean shaped in dicots and dumb-bell shaped in monocots.

5. Why are the stomata present only on the aerial parts of the plant?

Ans. Since gaseous exchange is likely to be more in the aerial parts and not in underground parts like roots, therefore, stomata are present more in the aerial parts of the plant.

6. What covers epidermis?

Ans. The layer that covers epidermis is cuticle.

7. What do you think is the colour of stomata?

Ans. Since stomata are lacunae, they have no colour of their own.

8. What is special about the walls of the guard cells?

Ans. Guard cells have thick walls in the inside and thin walls on the outside.

24/06/2019

EXPERIMENT NO: 2

Aim:

To show experimentally that carbon dioxide is given out during respiration by germinating seeds.

Materials required:

1. Conical flask
2. Germinating gram seeds
3. Potassium hydroxide solution
4. Small test tube
5. A cork with one hole
6. A glass tubing bent twice at right angles
7. A 100 cc beaker half filled with water

Procedure:

1. Place about 50 germinating gram seeds in a conical flask and add a few drops of water to keep them moist.
2. Tie a cotton thread to the neck of small tube. Pour about 4 ml of KOH solution in it and suspend it in the con flask.
3. Close the mouth of conical flask with a cork in which a delivery tube is fitted, such that thread tied to the test tube is held firmly.
4. Place a beaker containing water under the other end of test tube as shown in Fig. I.
5. Apply vaseline on the cork so as to make the apparatus airtight.
6. Leave the apparatus undisturbed for two hours.

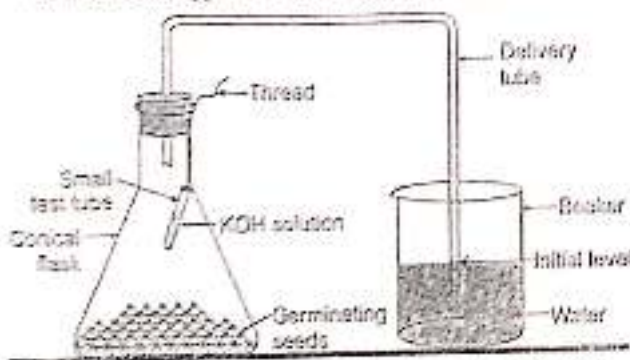


Fig. I: Experimental set-up at the start of experiment.

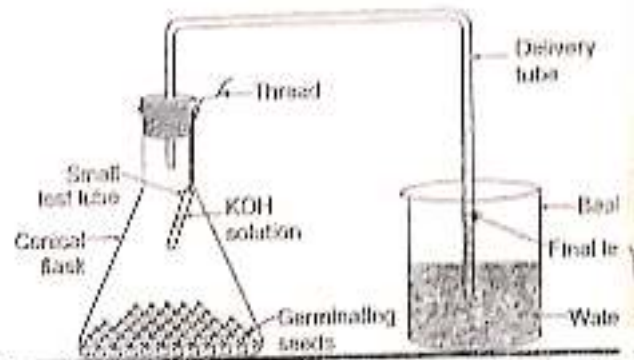


Fig. II: Experimental set-up at the end of experiment (Level of water rises in the delivery tube.)

Observations:

After two hours the level of water in the delivery tube rises up as compared to level of water in the beaker.

Conclusion:

The rise in level of water in the delivery tube indirectly proves that germinating seeds produce carbon dioxide. It can be explained as follows:

The carbon dioxide produced by the germinating seeds is absorbed by the potassium hydroxide solution. Now carbon dioxide is produced due to the consumption of oxygen during respiration, therefore, pressure of air within the flask falls. To make up for this loss in pressure, the air from outside exerts pressure, and hence, forces up water within the delivery tube.

Precautions:

1. Potassium hydroxide should be freshly prepared and concentrated.
2. The seeds should be germinating and remain moist.
3. The apparatus should be airtight.
4. The other end of the delivery tube should be completely dipped into water.

Viva-Voce

1. Justify the statement cellular respiration to be the opposite of photosynthesis.

Ans. During respiration glucose ($C_6H_{12}O_6$) reacts with oxygen to form carbon dioxide and water with the release of heat energy, whereas during photosynthesis the carbon dioxide and water react in the presence of chlorophyll and with absorption of light energy to form glucose and oxygen.

2. What is the other name of anoxygenic respiration?

Ans. Anoxygenic respiration is also known as fermentation.

3. Why should the limewater be kept in an airtight bottle?

Ans. If the limewater is not kept in an airtight bottle, it slowly reacts with atmospheric carbon dioxide and slowly turns it milky.

4. How is respiration different from breathing? Give four points.

Ans.

Respiration	Breathing
1. Respiration is a cellular biochemical process.	1. Breathing is a mechanical process of gas exchange.
2. Respiration is a continuous process.	2. Breathing involves alternate inhalation and exhalation.
3. Respiration results in release of energy.	3. Breathing involves gaseous exchange with the atmosphere.
4. Respiration occurs in both plants and animals.	4. Breathing occurs only in animals and not in plants.

15/7/2019

REPRODUCTION:-

Aim:- To study using permanent slides:-

a) binary fission in amoeba (b) budding in yeast

MATERIALS REQUIRED:-

Compound microscope, permanent slides, showing binary fission in amoeba and budding in yeast.

PROCEDURE:-

1. Focus the slide first under low power of the microscope and then under high power.
2. Observe the organisms clearly and draw a labelled diagram.

OBSERVATION:-

1. A) Binary fission in amoeba

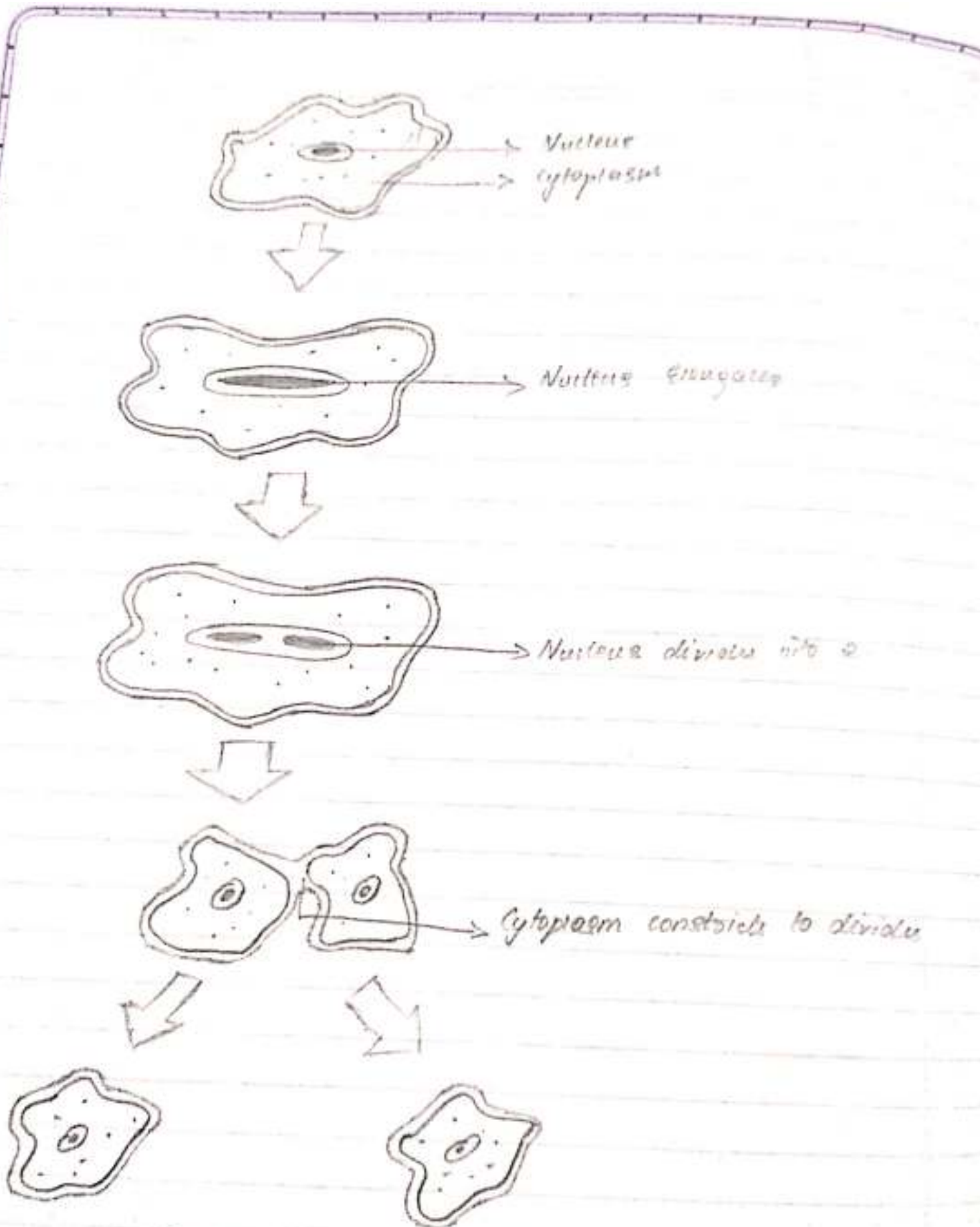
a) Binary fission is a type of asexual reproduction in some unicellular organisms, in which 2 individuals are formed from single parent organisms and the parental identity is lost.

b) The nucleus of the parent cell divides amitotically into two which is then followed by division of cytoplasm.

c) It is noticed in organisms like paramecium, euglena, trypanosoma, bacteria, etc.

d) In fission in Amoeba it may happen in any place.

PTO.



2 Daughter Amoebae are formed

Bud in *paramecium*, it happens in transverse plane and in *Euglena* and *Leishmania* it happens in vertical plane.

2. Budding in yeast

- a) Budding is a type of asexual reproduction that happens in yeast when conditions are favourable. i.e., when food is available in plenty.
- b) Initially a bud like protuberance arises from the parent yeast cell.
- c) The nucleus divides by mitosis and daughter nucleus moves into the bud.
- d) The bud gradually detaches from the parent cell and enlarges to full size to form a new individual.
- e) Sometimes, the newly formed bud stays attached to the parent cell and forms a new chain of yeast cells.