7 MICROSCOPIC OBSERVATIONS ON THE OPENING AND CLOSING OF STOMATA

7.1 INTRODUCTION

The exchange of carbon dioxide and oxygen gases and loss of water in a plant occur via stomata present in the epidermal layer of the leaf. The stomatal pore is surrounded by a pair of guard cells which control its opening. When the turgor pressure in guard cells increases stomata opens and when it decreases the guard cells collapse together and close the stomata. The change in turgor pressure occurs due to entry and exit of K^+ ions in the guard cells from the surrounding epidermal cells. The uptake of K^+ ions requires ATP. Negatively charged ions like malate may also move along with K^+ ions maintaining electrical balance and contributing to the change in osmotic potential of the guard cells.

In this exercise you will observe stomatal movement under the light microscope induced by 0.5 M KCl solution.

Objectives

After doing this experiment you will be able to:

- demonstrate opening and closing of stomata by inducing changes in turgor pressure.

7.2 MATERIALS REQUIRED

leaves of *Rhoeo discolor*

distilled water

light microscope

petridishes (two)

dropper

slides

cover slips

0.5 M KCl solution

7.3 PROCEDURE

Peel off lower epidermal layer of leaf (lower side) with the help of a forceps. Cut 1 mm square piece and mount it in a drop of water. Observe it under the microscope and study stomata. Draw a rough diagram and record your observations. Now add from one side of the cover slip solution of 0.5 M KCl and remove water from the other side

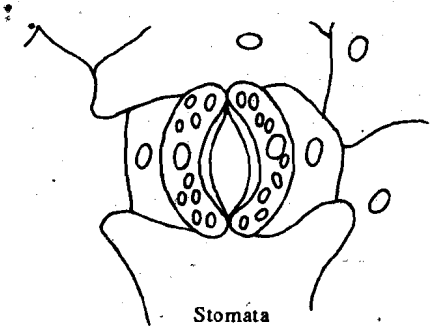

Fig. 7.1 : Structure of Stomata

with the help of filter paper. Observe changes in stomatal aperture. Now you may remove KCl solution and add distilled water. Observe it again after 5 or 10 minutes.

7.4 RESULTS

1. Structure of stomatal apparatus of the leaf before any treatment.
2. Changes in the stoma cells after the addition of:
   i) KCl solution and
   ii) distilled water.

Draw the structure of stomata as observed in the space provided below.

7.5 PRECAUTIONS

1. Wash your hands thoroughly before working with slide and microscope.
2. Spread neatly a clean white paper on the working bench to keep slides, coverslips, dropper, forceps etc.
3. Keep underside of the leaf up while preparing mount.
4. Do not mess up the slide with KCl Solution. Try to be very clean.
5. Hold the coverslip only by edges.

SAQ

1. Suppose a student uses NaCl solution instead of KCl. Will he observe the same results? Justify your answer.

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2. What changes would occur in the water potential of guard cells on entry of K^+ and malate ions?

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