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Q. What is ^{stomata?} Glycolysis or EMP Pathway? Describe in detail the various mechanisms involved in stomatal movement.

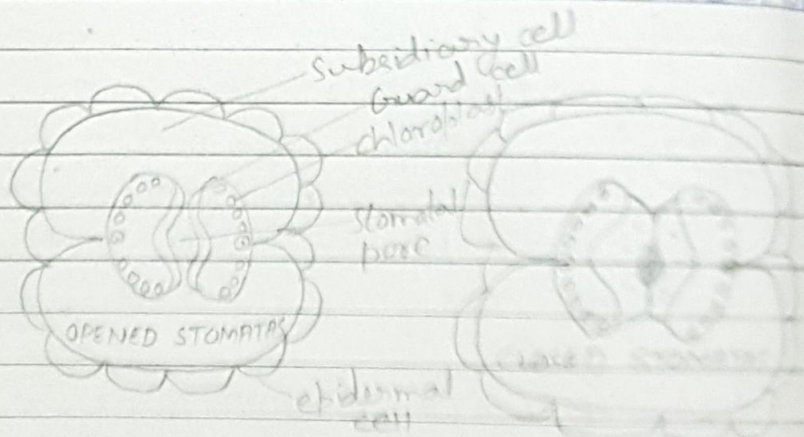
Ans: **INTRODUCTION** → The epidermal surfaces of the leaves have several tiny, microscopic pores involved in transpiration and gaseous exchange. These pores are called stomata. The stomata are more frequent on the lower surface of the leaves but may occur on both the surfaces. Further, they have been also recovered from stem, branch surface together with steminal filament, style and stigma, but stomatas occurring on other plants parts rather than leaf surfaces are mostly non-functional.

STRUCTURE OF STOMATA → The stomata play a very important role in transpiration. They provide passage for the gaseous exchange in photosynthesis and respiration. Further, they also play an important regulatory role in the passive absorption of water. Ascent of sap and absorption of mineral salt by regulating the transpiration.

The typical stomata is microscopic. It usually consist of two kidney shaped or dumbbell shaped (C₃ Graminae and C₄ Cyperaceae) guard cells.

The guard cells are surrounded by two or more modified epidermal cells. These are called subsidiary or accessory cells which on touch remain surrounded by epidermal cells. The guard cells have following important characteristics -

- Ⓐ They are living.
- Ⓑ They contain chloroplast.
- Ⓒ They have dense and granular protoplasm.
- Ⓓ The cell wall bordering the stomatal pore is thicker than the outer one.



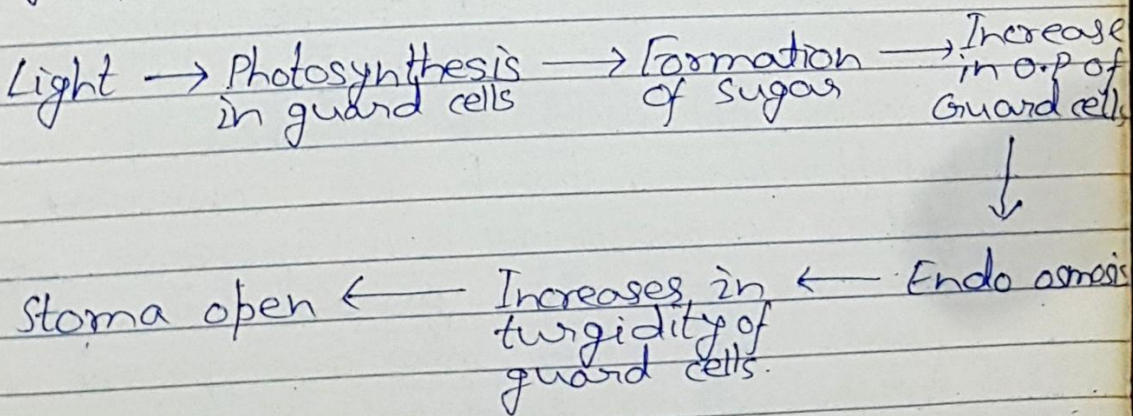
MECHANISM OF STOMATAL MOVEMENT -

The turgidity of the guard cells results in the opening of the stomata, whereas the flaccidity favours closing of the stomata. But the mechanism governing turgidity and flaccidity of the stomata are not known. Various views of stomatal movement have been advanced to explain the mechanism of stomatal movement.

Some important hypotheses are the followings —

- 1) Photosynthetic production in Guard cell.
- 2) Starch - sugar hypothesis.
- 3) Permeability change hypothesis.
- 4) Proton transport hypothesis.
- 5) Multisystems control hypothesis.

1) Photosynthetic production in Guard cells →
This view has been put forth by Von Mohl (1856). He advanced the idea that photosynthesis in guard cells increases the osmotic pressure of the cell. It results in endosmosis the guard cells become turgid to open the stoma. The reverse reaction occurs in absence of light. It can be illustrated with the help of following graph.



OBJECTION →

1. The guard cells contain little sugar is capable of increasing their osmotic pressure.
2. The hypothesis fails to explain stomatal movement in Albino leaves.