STRUCTURE AND FUNCTION OF THE STOMATE

OBJECTIVE: To study the structure of the stomata in the lettuce leaf and from that get a better understanding of its function.

INTRODUCTION: In the lower epidermis of the green leaf are stomates. ***Stomates or stomata*** are **pores** in the surface of the leaf. The pore is surrounded by **two guard cells**. When these two guard cells take up water, they bend and open up the pore between them. When these guard cells begin to lose water, they shrink back, and the pore closes up. The green plant depends on these stomates to enable the passage of materials and products of ***Respiration*** and ***Photosynthesis.*** There are two major functions of stomata.

- The first function is exchange of gases with the atmosphere.
- Stomata also allow controlled release of water molecules into the atmosphere.

MATERIALS: A lettuce leaf, a slide, cover slip, Methylene Blue Stain, forceps, lens paper, microscope.

PROCEDURE:

1. Using lens paper, clean a slide and a cover slip.
2. Hold a crisp piece of lettuce with the underside facing you.
3. Fold the leaf in such a way to "snap" the mid-vein.
4. At the broken mid-vein, carefully strip off a small transparent piece of epidermis.
5. Place the transparent strip of epidermis on your cleaned slide. **Be sure** that it lies flat with no twists or folds.
6. Place a drop of METHYLENE BLUE Stain on the specimen.
7. Cover with a cover slip using the correct technique so as not to trap air bubbles.
8. Adjust your microscope for LOW POWER and be sure the diaphragm is set for the greatest amount of light.
9. Set your slide on your microscope and locate stomates and their guard cells.
10. Make a clear, simple diagram of what you see in the space below

Label the cells and the stomates

11. Find one stomate and its guard cell and center them in the LOW POWER field.
12. Carefully switch to HIGH POWER and examine the stomata and its guard cells
13. Make a clear, simple diagram of the stomata and its guard cells below

Label all the parts you know

As you examine the stomate and its guard cell, can you find a nucleus in the guard cell? _____ Explain _____

Can you find a nucleus in the stomata? _____

If you can't, why not? _____

What are the other round bodies in the guard cell? _____

What color are they? _____

Why? _____

14. **Be sure** to throw the lettuce leaf in the garbage, separate the cover slip from the slide, rinse it with water, put back in the container and clean your desk.

QUESTIONS

1. Describe the appearance of the guard cell.

2. Explain, in detail, how guard cells open and close stomata?

3. At what time of day would stomata be closed and why?

4. Why does the lower epidermis have more stomata than the upper epidermis of a leaf?

5. Define transpiration.

6. What two gases move in and out of the leaf stomata?

7. What does a larger number of leaf stomata indicate about the growing climate of that plant?