# Leaf Structure & Function

Name:

**Purpose:** What are the structures that make up a leaf and how do they function?

**Background:** In most vascular plants, leaves are the principal organs for photosynthesis. Although leaves vary in their shapes and sizes, most have a thin, flat blade and veins. Some of the variation in leaf structure is related to habitat. Aquatic leaves and leaves of dry habitats have special modifications to permit survival in those different habitats. Leaf shapes, margins, and vein patterns are characteristics used to identify different species of flowering plants. In this investigation, you will identify the structures in a leaf and learn their functions.

<u>Materials:</u> Leaf cutaway slide Zebrina Plant Colored pencils for sketching

# **Procedure:**

### **Part I: Leaf Structure and Function**

1. Use the leaf cutaway slide on the board and identify the structures using the graphic below as a guide:



- 2. <u>Sketch</u> the leaf cutaway and <u>label</u> the parts you are able to identify. Try to get them all!
- 3. Complete table 1 by matching the leaf structure to its function.

Table 1. Watching structures to their function	
Leaf Structure	Function
1. Stomata	A. Light can easily pass though this layer
2. Xylem	B. Open and close the stomata
3. Upper epidermis	C. Where most of the photosynthesis takes place
4. Guard cells	D. Transports carbon compounds like sugars
5. Phloem	E. Waxy layer that protects the leaf surface
6. Palisade layer	F. Pores that allow carbon dioxide to pass into the leaf
7. Cuticle	G. Transports water and dissolves nutrients
8. Spongy layer	H. Air space between cells allow carbon dioxide to pass through

### Table 1: Matching structures to their function

#### Stop & Think

- a. Most of the structures in a leaf are related to a process. What is the process called?
- b. To a leaf, what is the advantage to being thin?
- c. Why do the stomata need to be able to open or close?

### Part II: Observing Stomata

- 1. A portion of the leaf from a Zebrina plant has been cut.
- 2. The lower epidermis has been peeled away from the leaf. The lower epidermis has a purple pigment while the upper epidermis is silver and green-striped.
- 3. The lower epidermis has been placed on a slide. Here it is on **medium** power.
- 4. Sketch the guard cells and stomata on **medium** power.

### **Analysis Questions:**

- a. Can you see the chloroplast in the guard cells? (If so, label it in your drawing above.)
- b. What is the shape of the guard cells? Note the thickness of the inner walls of the guard cells. Are any of the stomata open? (If so, mark the opening in your drawing above.)
- c. Recall for you observations of the prepared slide of a leaf (part 1) that a stoma opens into an air space of the spongy layer. How does this arrangement help the process of photosynthesis?
- d. If the plant has been given plenty of water and looks healthy, do you think the stomata will be open or closed? Explain.
- e. What would happen if a plant could not close the stomata?
- f. BONUS: Why does the carbon dioxide enter the plant?