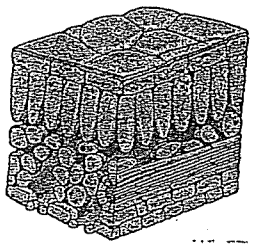
Name: _____ Period: _____



# IN CLASS LAB - Investigating Leaf Anatomy

## Introduction

Have you ever wondered what leaves look like on the inside? Leaves are not all alike in appearance or structure. However, they all have the same **function** – *food production for the plant.* Parts within the leaf may help directly or indirectly in the process of food production. Those leaf parts, which *contain chlorophyll and are green, aid directly in food production.* Those leaf parts that are not green may aid indirectly by supplying a pathway for needed raw materials to the green cells.

### Pre-Lab questions:

1. What is the major function, or job, of leaves? _____

2. What pigment is present in leaf tissue that allows it to perform this function? _____

3. Examine Figure 1 below – it is a cross section of a lilac leaf as it appears under a microscope. The cells with small dots are used for photosynthesis. The small dots within these cells represent chloroplasts.

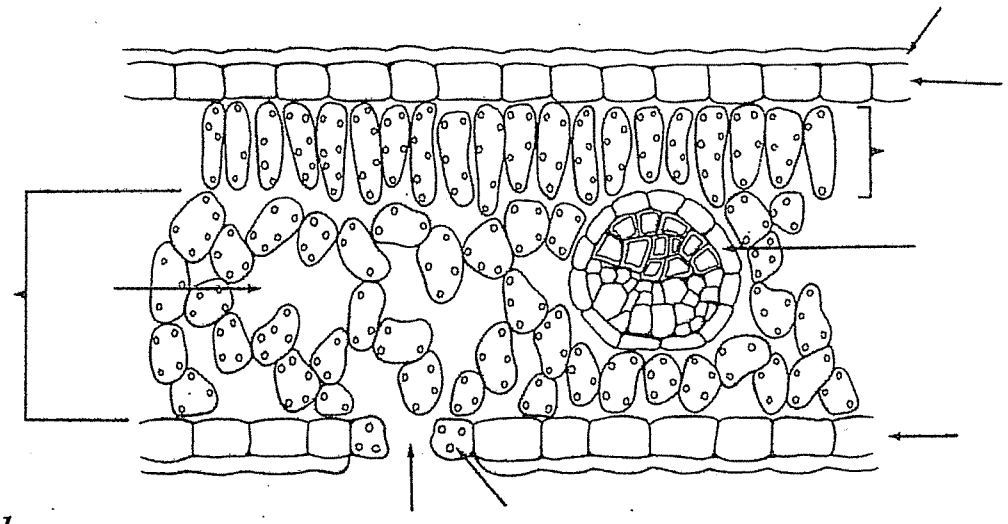


***Figure 1***

**Identify and label the following leaf structures on the cross section above:

- *cutin* – a thin, waxy layer which covers the leaf (not composed of cells). Cutin may be present on both top and bottom or just on the top surface of the leaf. Cutin helps prevent water loss.
- *upper epidermis* – single protective layer of cells along the top edge of the leaf.
- *palisade layer* – rectangular photosynthetic cells directly below the upper epidermis (green).
- *spongy layer* – loosely arranged photosynthetic cells below palisade layer (green).
- *lower epidermis* – thin, protective single layer of cells along bottom edge of leaf.
- *stomata* – openings along lower epidermis that allow gas exchange.
- *guard cells* – cells surrounding the stomata that control stomata opening and closing.
- *veins* – groups of thick-walled cells forming round tubes within the spongy layer, usually surrounded by a single layer of cells forming a tube which transports needed materials throughout the leaf.
- *air space* – large empty spaces within spongy layer.

## Materials

- microscope
- microscope slide
- razor blade (single-edge)
- water
- coverslip
- green onion leaf (leek)
- prepared slide of a leaf cross section

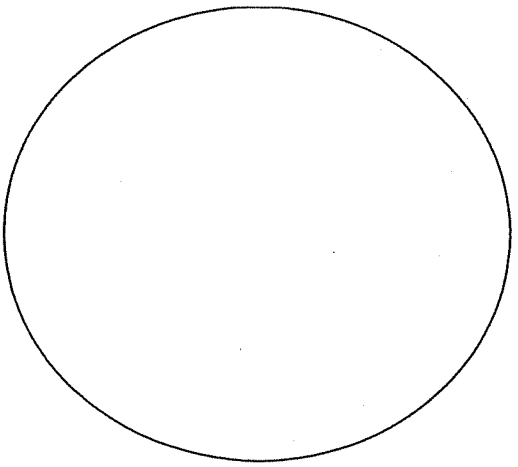
## Procedure

Part A – Observing a Typical Leaf Cross Section

1. Obtain a slide of a leaf cross section. Using your microscope, focus the cross section under LOW, THEN MEDIUM, THEN HIGH power, trying to locate a similar view as the cross section provided on the previous page.

2. **Sketch** what you observe on HIGH power in the circle below, labeling any structures visible from the list provided on the previous page.

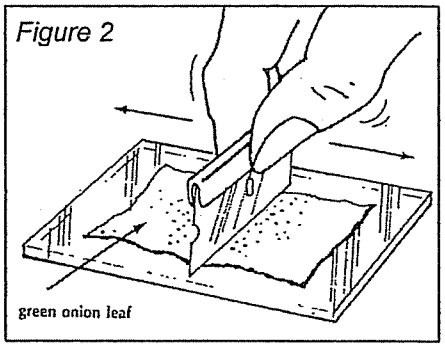
Leaf Cross Section _____X



Part B – Observing Stomata

1. Obtain a piece of green onion leaf that has been prepared by your teacher.

   CAUTION: Blades are sharp! Cut *away* from fingers.




2. Scraping GENTLY in ONE direction only, use a single edge razor blade to gently scrape away the fleshy, white cellular material from the inside of the leaf. *Use Figure 2 as a guide if necessary.*
3. Continue scraping the leaf until only the outer, *transparent* epidermis remains (until it looks as thin as saran wrap!).
4. Call your teacher over to examine your onion epidermis.
5. *Prepare* a wet mount of the onion epidermis after it has been approved by your teacher.

6. View the wet mount under low, then medium, then high power.
7. Under high power, identify structures using Figure 3, and the following descriptions as a guide.
   - *epidermal cells* – long, diamond-shaped cells.
   - *guard cells* – half circle-shaped cells.
   - *stomata* – small spaces or openings between two guard cells.
   - *chloroplasts* – green dot-like parts within the guard cells

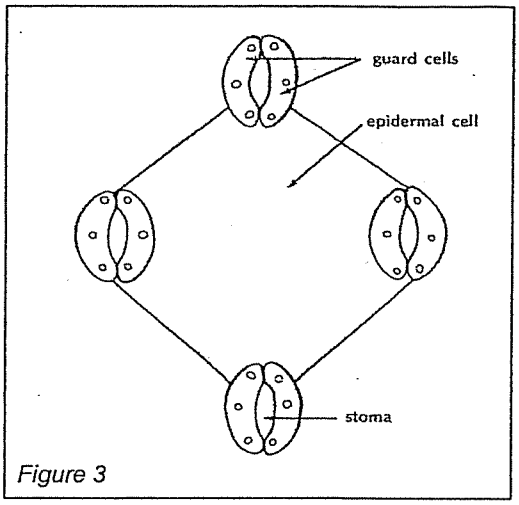
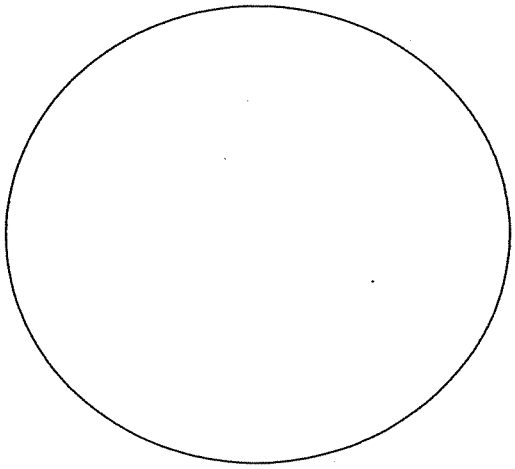


Figure 3

8. Make a detailed sketch in the circle below of what you see under high power.
9. Label the *guard cells, stomata, chloroplasts* and *epidermal cell.*

Onion Epidermis _____X



10. When finished, return the microscope to low power, lower the stage, and remove the slide. Wash your wet mount slide, dry both the slide and coverslip and return all materials to the middle lab table.

## Lab Analysis

1. *Identify* the function of each of the following tissues or structures. *(Hint: see the Introduction!)*
   a. Epidermis: _____
   b. Veins: _____
   c. Guard Cells: _____
   d. Stomata: _____
   e. Palisade Layer: _____
   f. Spongy Layer: _____
   g. Cutin: _____

A cactus leaf cross-section is shown in Figure 4-A below. The leaf of a cactus is actually a needle. This diagram is quite different from the lilac leaf drawing (Figure 1).

2. By looking at the diagram on the *front page* (LILAC) and *below* (CACTUS), which leaf: CACTUS or LILAC ...
   a) has thicker cutin? _____
   b) has deep set stomata in its cutin? _____
   c) has both spongy and palisade layers? _____
   d) has a flat shape? _____
   e) has air spaces within the leaf? _____

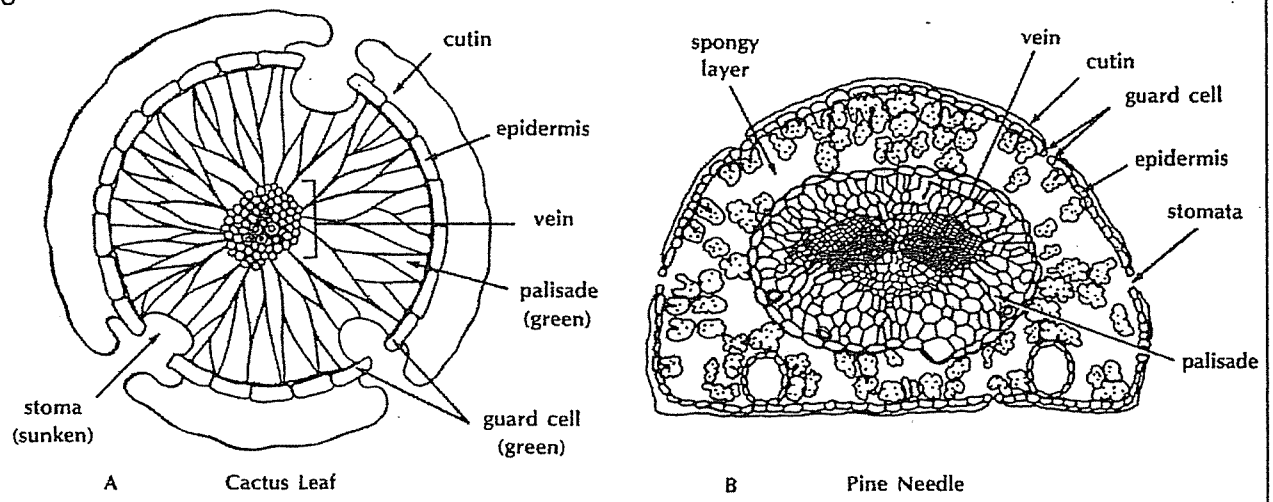
3. Consider where cacti live. How might... *(answer in complete sentences)*
   a) thicker cutin give an adaptive advantage allowing it to survive? _____
   _____
   b) no spongy layers give an adaptive advantage? _____
   _____

4. A pine leaf cross section is shown in Figure 4-B below on the right.

   By looking at the diagram on the *front page* (LILAC) and *below* (PINE), which leaf: PINE or LILAC ...
   a) has thicker cutin? _____
   b) has deep set stomata in its cutin? _____
   c) has both spongy and palisade layers? _____
   d) has a flat shape? _____
   e) has air spaces within the leaf? _____

   f) Look at the structure of pine leaves and cactus needles below :
      a. How are they similar? _____
      b. How do they differ?

*Figure 4*




Upper and lower epidermis are not identified because leaves are round.