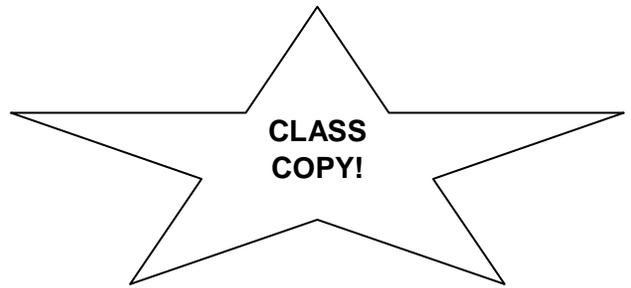


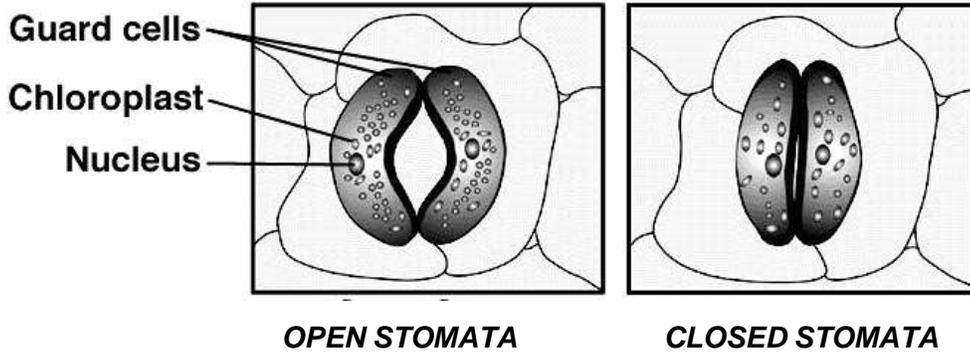
# Leave Impressions



## Background:

*What are the stomata?*

Stomata are microscopic pores found on the under side of leaves. The stomata are bounded by two half moon shaped guard cells that function to vary the width of the pore. It is the guard cells that regulate the opening and closing of the stoma.

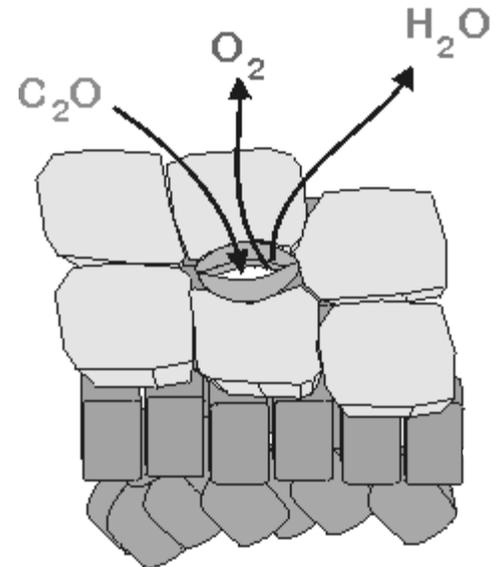


*Why do plants have stomata?*

Plants carry on the process of photosynthesis by combining together several ingredients in their leaves (carbon dioxide, water, sunlight). The stomata is the way in which this transfer of ingredients can occur, transferring carbon dioxide, oxygen, light and water from the surrounding atmosphere into and out of the plant.

Typically, during the day the guard cells swell, causing the stomata to open, and  $\text{CO}_2$  diffuses into the leaf and into the cells to be assimilated in photosynthesis. At night or under drought conditions the guard cells are not turgid, the stomata are closed and no photosynthesis takes place. Opening of the stomata not only allows  $\text{CO}_2$  to diffuse into the leaf, but allows water vapor and oxygen to diffuse out of the leaf.

The stomata are typically situated on the underside of the leaf for the reason that if it were on the top side the plant would lose too much water. Because the guard cells are partially light activated, plants under direct sunlight would constantly have their stomata open and would thus lose too much water.



## Purpose:

To view and compare the stomata from the leaves of several species of plant.  
(write this purpose in your lab book)

## Materials:

- ❖ Leaves from 5 plants
- ❖ Microscope
- ❖ 3 microscope slides
- ❖ Clear fingernail polish
- ❖ Tape
- ❖ Paper towel
- ❖ Metric ruler
- ❖ Pen

**Procedure:**

1. Paint a small section of the underside of each leaf with clear fingernail polish.
2. Place each leaf, painted side up, on a paper towel to dry. Allow the polish to dry for about 10 minutes.
3. Cut three small sections of tape. Label the corner of each tape with an appropriate letter for each plant type.
4. Stick the tape on the painted section of each leaf. You do not want to cover the whole painted section with tape. You are merely using the tape as a means for lifting the polish off the leaf (similar to peeling the residue from a dusted fingerprint off an object found at a crime scene).
5. Carefully pull the tape off. The tape should pull the dried polish off the leaf. Be careful to not touch the dried polish with your fingers (you don't want to leave fingerprints).
6. Stick each piece of tape on a separate microscope slide.
7. Put the first slide on the microscope stage and focus on low power. Switch to medium power to observe the impressions of the stomata, guard cells, and surrounding epidermal cells.
8. Count the number of stomata from each plant type as seen in a single field of view under the microscope. Repeat for a total of 5 distinct fields of view (using the same slide, but moved to a new FOV).

**Analysis:** *answer in complete sentences in your lab book*

1. Statistically analyze your data to determine if there is a difference in the number of stomata.
2. Create a graphical representation of your analysis.
3. Which leaf had the most stomata? Why do you think this was so?
4. Explain how guard cells open and close stomata?
5. At what time of day would stomata be closed and why?
6. Why does the lower epidermis have more stomata than the upper epidermis of a leaf?
7. What two gases move in and out of the leaf stomata?
8. What does a larger number of leaf stomata indicate about the growing climate of that plant?