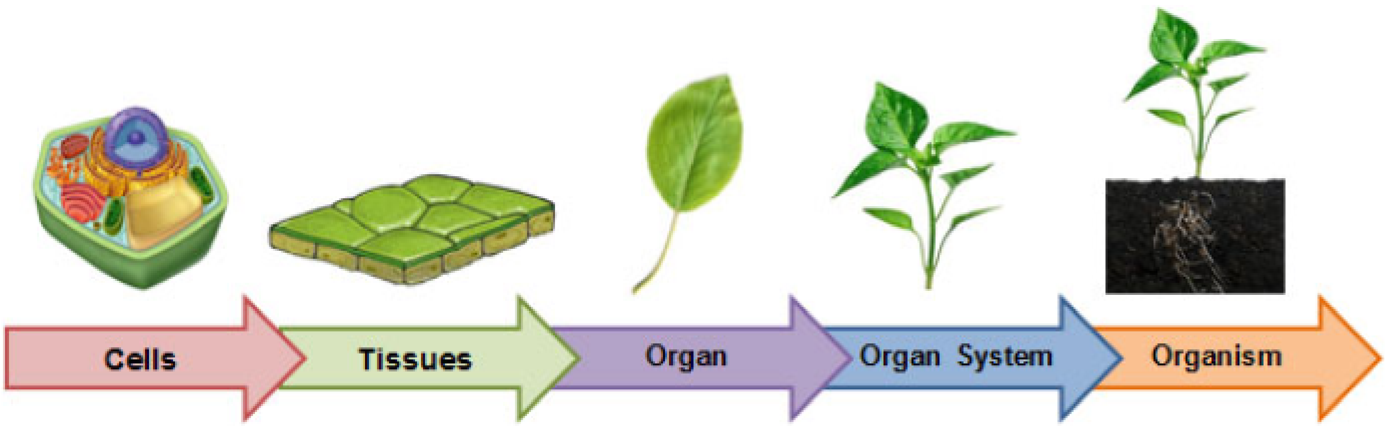
Internal Leaf Anatomy of the Common Lilac *(Syringa vulgaris)*

BACKGROUND:

You will be examining the cells of the Common Lilac *(Syringa vulgaris)*, a hardy plant known for its fragrant flowers.

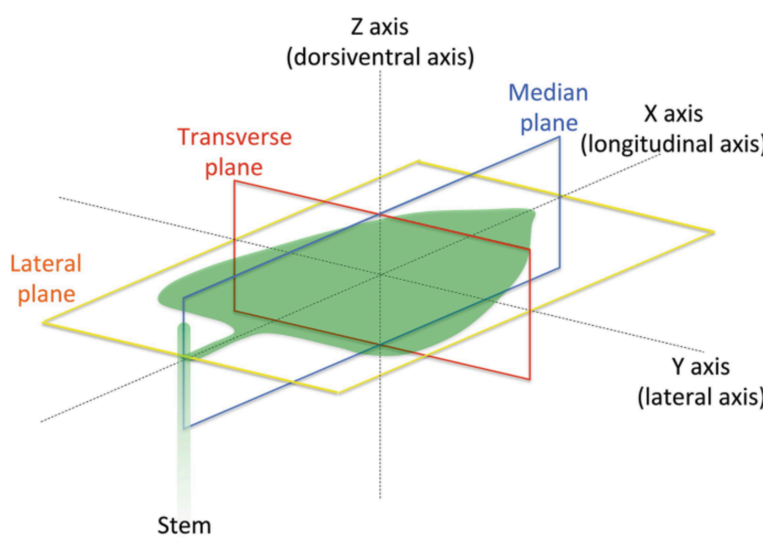
Plants are **photoautotrophs**, meaning they make their own food using light as an energy source and carbon dioxide as a carbon source. Leaves are the main **organ** that produce food for the plant by **photosynthesis**.



Leaves have a large surface area that helps in promoting photosynthesis. This is because light energy is needed for photosynthesis, and when the surface area of a leaf is large, more light coming from the sun can enter the leaf.

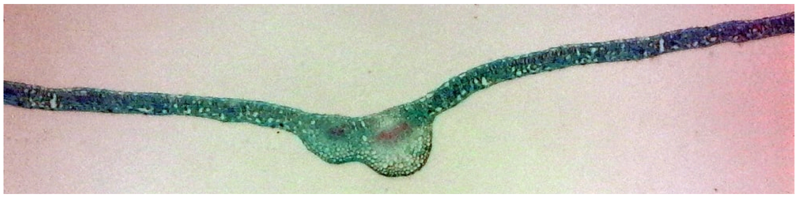
Another important adaptation of plants to photosynthesis is the thinness of their leaves. This adaptation helps the leaves get more sunlight. The sunlight easily penetrates the leaves and easily reaches the chloroplasts present in the cells in the leaf. The thinness of leaves also helps in gas exchange because carbon dioxide and oxygen have to cover a short distance to diffuse in and out of the leaves.

The leaf you will look at in the microscope has been cut and preserved on the microscope slide. It has been cut along the **transverse** plane.

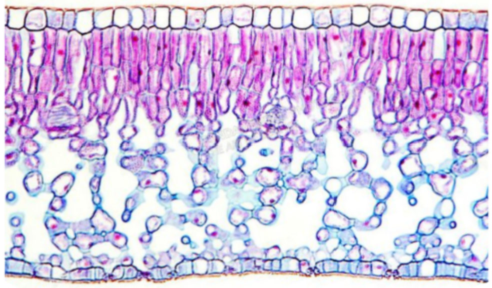


DIRECTIONS:

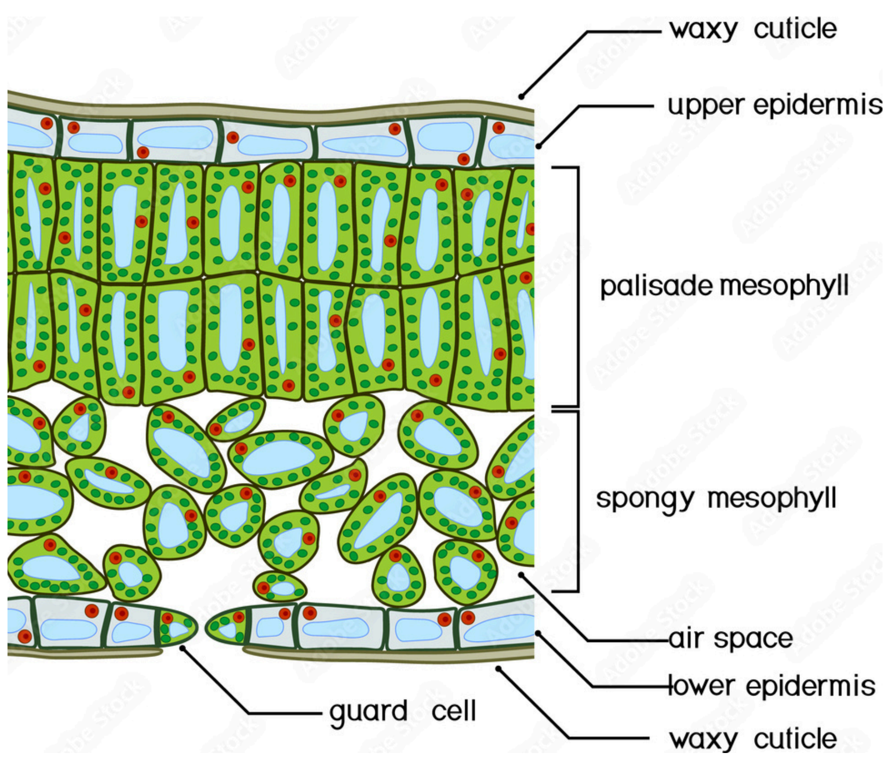
1. Use low power and orient the slide so that a ribbon-like section appears horizontally across the field. This is what you should see at low power (40X).



2. Switch to high power (400X). You should see something like this:



3. Using the diagram below as a guide, observe the **upper epidermis**, noting that the cells are closely packed and have a waxy covering, the **cuticle**, on the outside. Next, examine the **mesophyll**, the bulk of the cells between the upper and lower epidermis. The mesophyll consists of two major tissues, the **palisade mesophyll** and the **spongy mesophyll**. Note how tightly the cells are packed in the upper tissue, the palisade. The abundance of chloroplasts in these cells indicates that a major function of these cells is photosynthesis. The spongy layer consists of irregular cells with an abundance of **air spaces**. This permits a more rapid exchange of oxygen, carbon dioxide, and water vapor by these cells. These exchange processes are important during photosynthesis. Lastly, locate the **lower epidermis**. Note that its cells, and those of the upper epidermis, do not normally contain chloroplasts. Locate the two sausage-shaped **guard cells** and the small pore or **stoma** between them. Changes in the water content and thus shape of the guard cells result in opening and closing of the stoma.

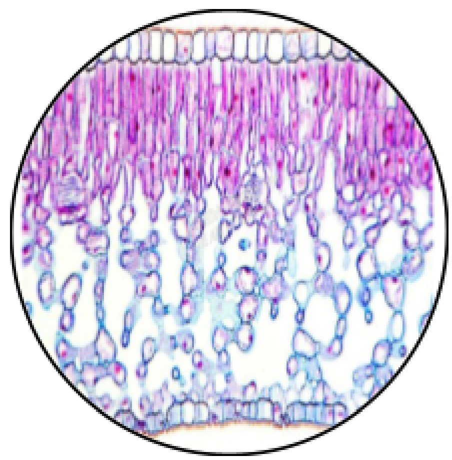


4. **Take a picture of the leaf cross section at 400X.** *Be sure your picture includes at least one stomata!*

SOFTWARE SKILLS

Google Slides	MS Powerpoint	Canva
How to circle crop	How to circle crop	How to circle crop
How to add an image border	How to add an image border	How to add an image border
How to add a line	How to add a line	How to add a line
How to add text box	How to add text box	How to add text box

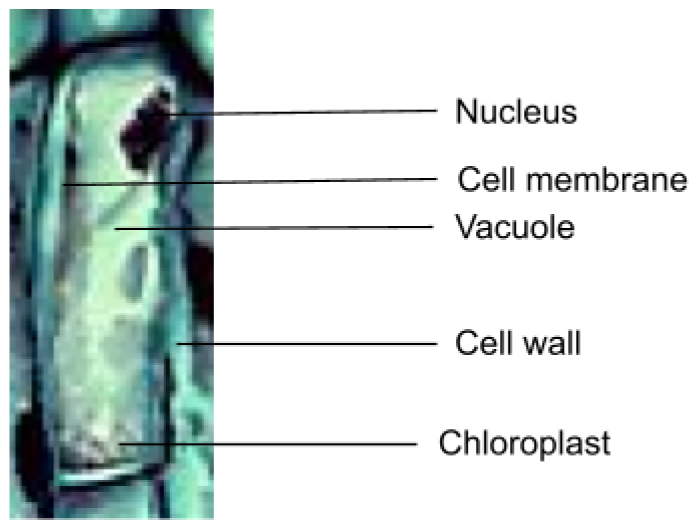
ANALYSIS PART A:



1. Create a slide in a presentation software (Slides, Powerpoint or Canva).
2. Paste your picture of the leaf cross section as viewed at 400X.
3. Orient the photo so the top of the leaf (palisade mesophyll) is up and the bottom of the leaf (spongy mesophyll) is down.
4. Crop the photo into a circle, with the circle edge roughly encircling the field of view diameter.
5. Add a thin black border to your image.
6. Scale the image so it is in the middle of the page; filling about half of the available space.
7. Above the image, add a textbook for a title. The title should be centered and larger than other text. The title should always include the scientific name (which is italicized or underlined, capitalized *Genus* and lowercase *species*). The title should state what the photo depicts and what magnification power it was viewed (for example, phrased as: "…photographed as seen through 400X magnification").
8. Insert a scale bar underneath your photo. The line should be the length of the field of view.
9. Add a textbox underneath the scale bar to label the diameter of the 400X field of view. Be sure you have the correct number of digits and the unit.
10. Add lines and textboxes to create labels that form a vertical list. Label the following structures:
    - cuticle
    - upper epidermis
    - palisade mesophyll
    - spongy mesophyll
    - air space
    - lower epidermis
    - guard cell
    - stoma
11. Add a second slide to add the FUNCTION of each of the structures labeled on the image.
12. Submit your slide into Canvas.

ANALYSIS PART B:

1. On an unlined, white piece of paper, **draw a single palisade mesophyll** cell as seen in the image of your 400X field of view. Draw the cell so it is in the middle of the page; filling about half of the available space.
2. Add a title above the drawing. The title should be centered and larger than other text. The title should always include the scientific name (which is italicized or underlined, capitalized *Genus* and lowercase *species*). The title should state what the drawing depicts and what magnification power it was viewed (for example, phrased as: "…drawn as seen through 400X magnification").
3. Using a ruler, add a scale bar underneath your drawing. The line should be the length of the bottom edge of the cell.
4. Given the size of the field of view on high power, estimate the size of the single cell you have drawn. Label the scale bar with the estimated size of the cell. Be sure you have the correct number of digits and the unit.
5. Using a ruler, add lines to create labels that form a vertical list. Label the following structures:
    a. Cell wall (outermost edge of the cell)
    b. Cell membrane (inside of the cell wall, may or may not be distinguishable)
    c. Nucleus (stains dark)
    d. Vacuole (any empty space within the cell)
    e. Chloroplast (tiny little dots, probably a bit blurry. Usually pushed towards the edge of the cell).



6. Calculate how many times life size your drawing is compared to an actual plant cell.

Use a ruler and measure the length of the scale line added next to your drawing.

$$\text{Drawing Magnification} = \frac{\text{Measured size of drawing}}{\text{Size of specimen}}$$

Since you are calculating magnification from an estimate, you must round your answer to one significant digit.

The life size of the sample, often estimated by figuring out how much of a known field of view the sample takes up.

7. Submit your drawing to your teacher.