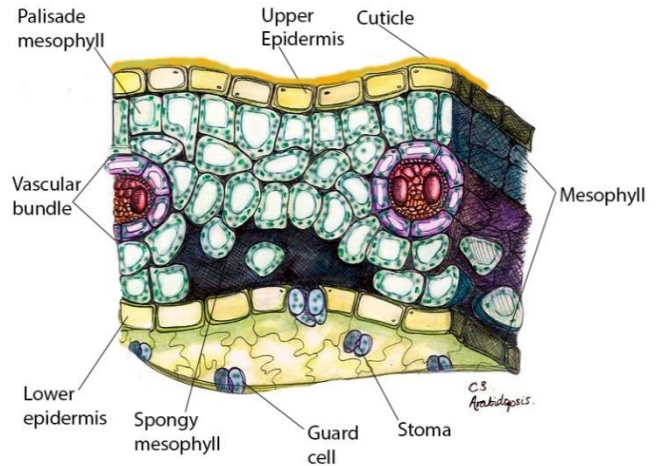


## Photosynthesis: Leaf Structure

The Kingdom Plantae exhibits a great amount of diversity. For the purposes of this activity, examining leaf structure, we will be looking at leaves from a group called dicotyledons or dicots which are a sub-division of the angiosperms or flowering plants. Dicots include many plants with which you are familiar like tomatoes, broccoli, tulips, oak trees, roses, apples and pears.

Dicot leaves have an upper and lower epidermis. The epidermal layers protect the inner layers of cells from pathogens and the environment. Most cells in the epidermal layers do not contain chloroplasts. The upper epidermis may also be coated with a waxy layer called the cuticle. The cuticle minimizes water loss. The lower epidermis contains special cells called guard cells. These cells contain chloroplasts. During the day when photosynthesis is occurring in the guard cells, they swell and bow open allowing gases to enter and exit the spaces within the leaf.



The mesophyll is located between the upper and lower epidermis. A row or rows of cells can be found immediately under the upper epidermis. This is called the palisade mesophyll. These cells are packed tightly together in a regular arrangement. Beneath the palisade mesophyll is the spongy mesophyll in which the cells are more loosely arranged and more broadly spaced. Large air spaces are found in this region of the mesophyll.

Image by Ninghui Shi

([https://commons.wikimedia.org/wiki/File:Cross\\_section\\_of\\_Arabidopsis\\_thaliana,\\_a\\_C3\\_plant..jpg](https://commons.wikimedia.org/wiki/File:Cross_section_of_Arabidopsis_thaliana,_a_C3_plant..jpg)) edited by S. Finazzo

Vascular bundles are scattered throughout the mesophyll. The vascular tissues of the plant, xylem and phloem, are located within the vascular bundle. Xylem transports water and minerals from the roots to the rest of the plant. Phloem transports sugars from the leaves to the growing regions of the plant, fruits, flowers and roots.

## Materials

### Microscope

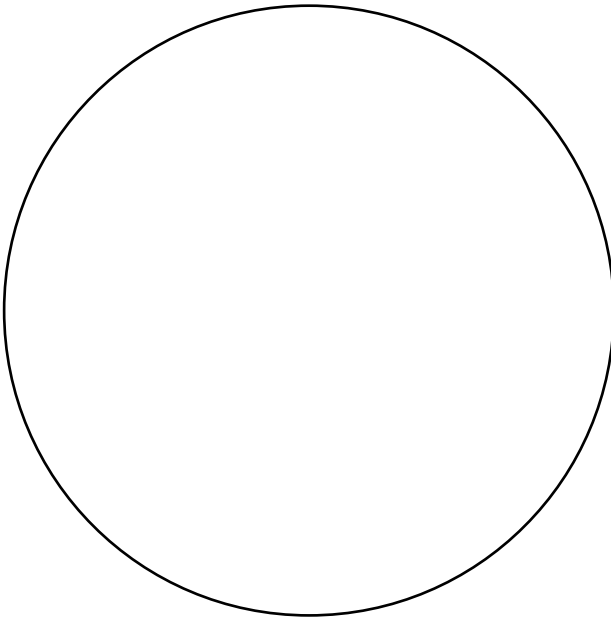
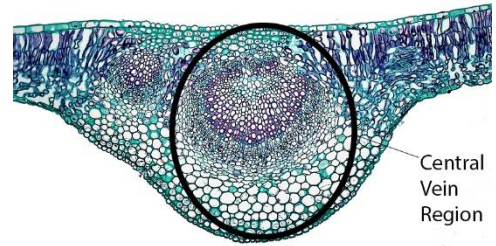
Prepared slide of syringa or another dicot

## Procedure

1. Acquire a slide from the supply table.
2. Place the slide on the microscope.
3. Position the slide over the light source. Rotate the 4X objective over the stage. Focus the microscope. Adjust the light. You may initially focus on the central vein of the leaf but then

move the slide to the side of the vein before increasing magnification. The mesophyll is not well developed around the central vein.

4. Increase magnification to 100 X. Focus the microscope.
5. Draw what you see in the circle below. Label the following structures stoma, guard cells, upper epidermis, lower epidermis, palisade mesophyll, spongy mesophyll and vascular bundle.



Organism \_\_\_\_\_

Magnification \_\_\_\_\_

1. What is the function of the stoma?
2. Which cells in the leaf perform photosynthesis?