

SBI 3U: LEAVES AND PHOTOSYNTHESIS

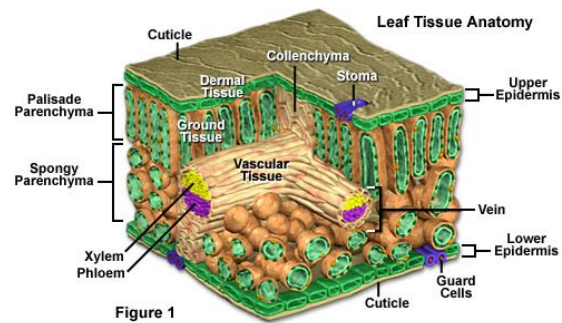
STRUCTURE AND FUNCTION

Function

- Photosynthesis
 - Uses carbon dioxide
 - Produces oxygen and glucose

Structure

- Designed to capture maximum light and minimize water loss



LEAF TISSUES

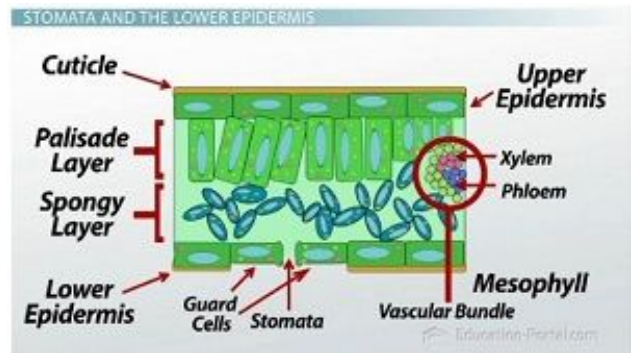
The leaf is composed of 3 main tissues:

1. dermal tissue
2. ground tissue
3. vascular tissue

DERMAL TISSUES

The **epidermis**:

- outer protective layer of polygonal cells
- helps defend against injury and invasion by foreign organisms
- secretes a waxy substance that forms a coating, the **cuticle**, on the surface of the leaf.
 - The cuticle is unique to terrestrial plants and allows them to retain water



STOMATA AND GUARD CELLS

On the lower epidermis of the leaf there are microscopic pores known as **stomata**.

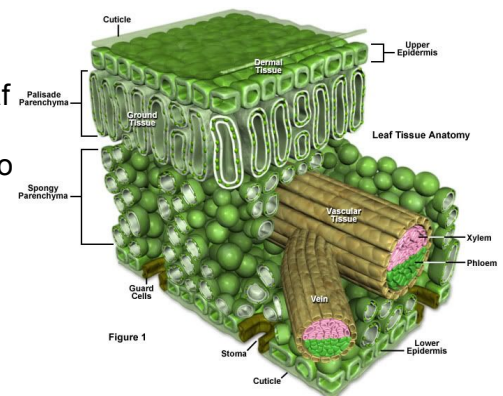
Each stoma is a small opening between a pair of specialized cells known as **guard cells**.

OPENING AND CLOSING STOMATA

- guard cells open and close the stomata to regulate gas exchange and transpiration
- when there is high solute, water moves into the guard cells, they swell and open stomata
- low solute, water moves out, close
- influenced by various environmental factors.
 - ie. when the weather is hot and dry, the guard cells of plants will close the stomata in order to reduce evaporation from the leaf

VASCULAR TISSUES

- To transport the products and reactants of photosynthesis, a leaf must be connected to the overall vascular structure of the plant. The xylem and phloem present in the stem of a plant divide into two branches to supply the leaves with materials.
- These xylem and phloem are what make up the veins seen in leaves.
- The vascular components extend throughout the **mesophyll** so



that the xylem and phloem are brought into close proximity with the tissues that carry out photosynthesis

GROUND TISSUES

The ground tissue is found in the mesophyll of a leaf.

- mid-section of a leaf between upper and lower epidermal layers
- predominant cells are **parenchyma** cells
 - contain chloroplasts, sites of photosynthesis.

The mesophyll is divided into two different regions:

1. upper section (**palisade parenchyma**) has elongated columnar parenchyma cells that contain three to five times more chloroplasts than the...
2. **spongy parenchyma cells** are irregularly shaped, allowing gases to circulate through the air spaces between them to the palisade parenchyma.