**Plant Biology Unit 1 Study Guide**

Standard: Students will be able to convey an understanding of how matter cycles in plant cells to maintain stable internal conditions and how special structures perform particular functions.

1. Define Osmosis:

The diffusion of water through a selectively permeable membrane and/or the movement of water from high concentration to low concentration

1. Define Parenchyma:

The least specialized type of cell. Stores water, has large central vacuole. Cell wall made of cellulose which is fairly thin and uniform.

1. Define Collenchyma:

Smaller than parenchyma. Cell wall made of cellulose. Cell wall is not uniform. It is thicker around the edges.

1. Define Sclerenchyma:

The strongest of the three cell types we have learned about. They are dead at maturity and are mainly composed of a thick cell wall and an outer secondary cell wall. Cell wall contains both cellulose and lignin which is responsible for making them stronger. There are two types of sclerenchyma: fibers, and sclereids.

1. Explain the xylems structure and role in plants.

Structure: long hollow tubes of mainly dead cells. Runs from the roots to the top of the plant. Contains both sclerenchyma (the part that looked like long fibers under the microscope), parenchyma (the bubbly looking cells near the fibers under the microscope), and other elements that are outside the scope of this unit.

Role: moves water from the roots to the top of the plant.

1. Explain transpiration, where it occurs, and its role in water movement in plants.

Transpiration is the evaporation of water from the stomata in the leaves that drives the movement of water in plants. This process is responsible for the majority of water movement in plants because it creates a gradient, forcing water to move toward areas with less water. The drier the air around the plant, the greater the driving force is for water to move through the plant and the faster the transpiration rate.

1. For each beaker, fill in the missing percentages of water, draw an arrow showing which direction the water would move, and label the beaker as hyper, hypo, or isotonic.



98%

70%

90%

90%

90%

90%

Isotonic Hypotonic Hypertonic

1. What makes young stems and leaf petioles stiff enough to stand upright or hold a leaf towards light?

Primarily turgor pressure. Turgor pressure describes the pressure that is put on the cell wall from the cell being full of water and the cell membrane expanding outward. Think of the example of the bicycle tire. Also, the xylem adds some sturdiness to the stem and the epidermis acts as a protective outer layer, but they cannot account for the fact that plants can stand upright even though they do not have bones.

1. Explain why don’t plant cells don’t burst when they are placed in pure water.

They have a cell wall that keeps them from bursting

1. What is structurally different between the cells that make up the epidermis and the cells that make up the core of the celery petiole?

Epidermis has waxy outer layer that protect the plant from transpiration—therefor they also allow less water in and are more resistant to osmosis compared to the cells that make up the core of the petiole. Just below the waxy layer of the epidermis lies mainly collenchyma cells which are closely packed and have stronger cell walls compared to the cells in the inner part of the petiole.

1. What is happening when a plant wilts?

Plants wilt because of water loss. When water moves out of the cells the vacuole shrinks and subsequently the cell shrinks. The cell membrane begins to pull away from the cell wall. Turgor pressure is lost. The cells become ‘droopy’. This can happen from being placed in a hypertonic solution, which would of course cause water to move out of the cells… Or simply from losing water through the stomata and not having it be replaced through the roots i.e. when you forget to water your plants.