The Plant Cell Essay, Research Paper

Cell Wall

Size: Around 1?

Basic Function:

\* Hold the shape of the cell.

\* Strengthen the cell.

Covering the cell membrane of the plant cell, there is the cell wall. The cell wall is composed of two

layers of rigid, hard cellulose embedded in compounds like pectin and lignin. Pores in the cell wall allow

molecules to pass through. The cell wall has two parts. The primary cell wall is formed during the growth

of the cell. After the cell has stopped growing, a secondary cell wall forms. This secondary wall is made of

lignin and cellulose, woven together tightly, to prevent further growth and to form and strong protective

barrier.

Cytoplasm

Size: Unmeasurable

Basic Function:

\* Helps dissolve waste products

\* Creates a “medium” for vesicles to travel through

\* Aids in cell metabolism

\* Serves as a home for the cytoskeleton.

The cytoplasm is the jelly-like material that makes up much of the cell. It is 80% water and usually clear

in color. It also contains many salts. The liquid portion is referred to as cytosol. In fact, “cytoplasm” means

“cell substance.” The cytoplasm is also the home of the cytoskeleton, a network of

cytoplasmic filaments that are responsible for the movement of the cell. The cytoplasm is constantly

moving and churning due to cytoplasmic streaming.

Golgi Apparatus

Size: Between 2 and 3?

Basic Function:

\* Serves as “processing center” for cell.

\* Packages and processes new proteins.

\* Prepares proteins for secretion or storage.

The Golgi Apparatus is a series of stacked membranes in the cytoplasm that packages proteins for

secretion or storage in vesicles. Inside the membranes are sacs of fluid or gel-like substances. The Golgi

Apparatus takes proteins in transport sacs from the endoplasmic reticulum and sends it through a series of

these membranes. The proteins are then “modified”‘ as they pass from membrane to membrane. After the

vesicle of proteins has finished its trip through the Golgi Apparatus, it buds off the organelle in a Golgi sac,

ready to be stored or transported to other parts of the body.

Cell Membrane

Size: 7 to 8 NM (nanometers)

Basic Function:

\* Controls what enters and exits the cell.

\* Separates cell from outer environment.

On the outside of all cells, there is a layer of protein and lipid (fat) called the cell membrane or the

plasma membrane. This membrane is found in ALL cells. The membrane is selectively permeable, meaning

it allows some molecules to enter and some not to. The membrane allows molecules in through two forms

of transport, active and passive. Passive transport consists of simple diffusion through the pores in the

membrane or carrier molecules. Active transport consists of endocytosis, exocytosis, and the sodium-

potassium pump. The membrane also protects the cell from the outside environment, keeping the cytoplasm

and its organelles in, and all of the stuff outside out.

Mitochondria

Size: 2 to 3 ?m

Basic Function:

\* Serves as “respiration” center” for cell.

\* Makes energy for the cell.

Floating inside the cytoplasm are a series of fairly large organelles called Mitochondria. These

organelles, the size of some bacteria, serve as the cell’s respiration centers, the place where energy for the

cell is produced. Since the Mitochondria serves as a center for energy production, there are varying

numbers of mitochondria in different cells. Muscles have many mitochondria due to the amount of energy

they need, but skin cells have very few. The mitochondria (singular: mitochondrion) have two membranes.

The outer membrane protects the organelle, and the inner membrane is folded into a series cristae or long

folds.

Endoplasmic Reticulum

Size: Highly variable

Basic Function:

\* Serves as “transportation system” for cell.

\* Moves proteins and vesicles around cell.

The Rough Endoplasmic Reticulum (or ER) serves as a home for the ribosomes of a cell and as a

“highway” for the cell’s proteins to be transported on. Being close to the ribosomes allows for the quick

transfer of proteins from them to the rest of the cell. This “highway” is composed of interconnected

membranes and vesicles. The process of transporting these newly created proteins is critical to the cell, and

is required for furthur survival. The ER is very closely associated with the Golgi Apparatus.

Vacuole

Size: Varies from 10+? to quite small.

Basic Function:

\* Serves as large storage centers for cell.

\* Hold water and many nutrients

Inside the cell, surrounded by the cytoplasm, is the vacuole. In a plant, the vacuole acts as an extremely

large storage area, and serves as a “control” for the turgor pressure in the cell. The vacuoles that perform

the latter are called contracile vacuoles. They take on excess water and then squeeze it out of the cell to

prevent cytolysis. The other task of the vacuole is also very important. It stores enzymes and toxic wastes

that cannot be stored anywhere else in the cell. Usually, there is only one vacuole per plant cell, and it can

take up to nearly 90% of the cell’s total volume.