

# Plant cell organelles and their functions essay sample



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All living things are made up of units called cells. A cell, the basic unit of life, is a microscopic structure that forms the basic structural as well as functional unit of living organisms. Cells can be divided into two categories called prokaryotic and eukaryotic cells. Prokaryotic cells are simple cells that lack nucleus and membrane-bound organelles whereas, eukaryotic cells are more complex cells comprising nuclear and cytoplasmic material sheathed by a cell membrane. Plant cells are the cells found in plants comprising sub cellular organelles. Both plants and animals come under eukaryotic cells. Eukaryotic cells have a standard set of features, however, plant and animal cells do have their differences.

A plant cell is actually a large microscopic ‘fully functioning’ city, literally and figuratively, housing miniature structures known as organelles. It is fun to teach about a plant cell diagram and definitions, when your kid is already intrigued with the subject. Trouble is when he really isn’t and would rather be doing anything else in the world than study biology. Yet, learning and teaching plant cell diagrams to children can actually be fun. You can use plant cell diagram for kids to make miniature models and the project will be fun as well as help your child to learn. Kids love making and building things. So a plant cell diagram model set up on a sheet of thermocol, using interesting things to make up the internal organelles should really excite your child. Before you do that though, brush up your own knowledge from this article. This work will show a well Labeled annotated Plant Cell diagram and the Functions of the various organelles of the plant cell. I used to enjoy drawing labeled plant cell diagrams in my biology class (incidentally my favorite subject), but if learning about this is something your child is not

keen on, you can use this article to teach him/her. Though learning about the labeled plant cell diagram and functions can get a little tedious, there are ways to make it a fun experience for a child.

Objective of this study

To generally analyze every single organelle and their functions in a plant cell and also examine the similarities and differences between the plant and animal cell.

Well labeled Diagram of the plant Cell

## CHAPTER 2

### Functions of Various Organelles Of The Plant Cell

Let us begin with taking each internal organelle found in the plant cell diagram and highlighting its function and purpose within the plant cell. The most important things to note are the differences that make a plant cell so different from an animal cell. A typical plant cell is distinguished from a typical animal cell as it contains things like the cell wall, vacuoles, chloroplasts and plasmodesmata, that the animal cells do not contain.

However, they lack centrioles and intermediate filaments which are present in animal cells. Here's a look at a plant cell diagram with definitions of all the internal structures. Amyloplast

This is a plant cell organelle, that stores starch and is not found in all plant cells. It is usually found only in plants that are starchy in nature, like tubers and some fruits. These plastids are non-pigmented organelles that synthesize starch granules to convert into sugar, when the plant requires

energy. Adenosine Triphosphate

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Alternately referred to as the ATP, this is a high energy molecule that stores up energy. ATP is produced by the plant cell in the cristae of the mitochondria and chloroplasts and supports the important function of energy transfer within the plant cells. This multifunctional nucleotide provides the energy for cellular processes like biosynthetic reactions and cell division.

**Cell Membrane** This is a thin wall that is found on the inside of the cell wall. It is a layer made up of protein, fats and cellular fiber, which provides the plant cell organelles with support and structure. Also known as the plasma membrane or plasmalemma, the cell membrane is the semi-permeable biological separation, between the cell insides and the cell outsides.

#### Cell Wall

This is the thin and rigid outer cover that lies above the cell membrane and surrounds the entire plant cell. This cell wall bonds with other plant cell walls and forms the structure of the plant that we know of. Made up of cellulose fiber, the cell wall is tough and acts as a filtering mechanism for the plant cell. Its most important function is to maintain internal plant cell pressure and prevent over-expansion when water enters the cell.

**Centrosome**

Also known as the microtubule organizing center, the centrosome is 'centriole free' structure that has radiating tubules originating from a dense center. Found near the nucleus of the plant cell, the centrosomes produce the microtubules that regulate the cell-cycle progression. When the plant cell divides (mitosis), the centrosome also divides into two parts that move in the opposite directions.

**Chlorophyll**

If you draw a colored plant cell diagram, you will have to make a green colored molecular structure within, to show chlorophyll. Chlorophyll is a molecule that carries on the process of photosynthesis. This is the process of producing sugar and oxygen using light energy, water and carbon dioxide. This usually green organelle is magnesium based and is found in many different molecular structures. Chloroplast

This is usually the elongated or disc shaped photosynthesis site that contains the chlorophyll. Also a part of the ' plastids' group, chloroplasts are similar to mitochondria, but are only found in plants and protista. Chloroplasts have their own DNAs and are protected by the surrounding two lipid-bilayer membranes. Chromatin

Chromatin is a combination of DNA and protein that is highly complex in nature and is central to the makeup of the chromosomes. Found inside the nuclei of eukaryotic cells, the chromatin plays important roles to pack DNA into smaller volumes (to fit in the cell), control DNA replications and allow mitosis and meiosis. Cristae

Cristae are the finger-like projections that form the folded inner membranes of the mitochondria. ATP is generated in the walls of the cristae and they also help in cellular respiration. Made up of proteins, ATP synthase and various cytochromes, the cristae increase the surface area of the plant cell, on which the various reactions can actually take place. Cytoplasm

The cytoplasm is essentially the jelly-like substance outside the plant cell nucleus. This is where all the plant cell organelles are situated and it is the substance that is entirely encircled by the cell wall. The contents of the <https://assignbuster.com/plant-cell-organelles-and-their-functions-essay-sample/>

nucleus are called the nucleoplasm and are not part of the cytoplasm, but all the other plant cell organelles are indeed a part of it. Druse Crystal

It's a granular type of crystal found in plant vacuoles. It is composed of calcium oxalate and is considered to deter herbivory. Golgi Body

Also known as the golgi apparatus or the golgi complex, the golgi bodies are flat, layered sac-like organelles, that are located near the nucleus. These bodies do the important work of packing proteins and carbohydrates into membrane-bound vesicles. These vesicles are then exported from the cell.

Mitochondrion

A mitochondrion is a round or rod-shaped organelle with a double layered membrane. The inner membrane is double folded and forms projections known as the cristae. The mitochondrion performs the essential task of converting energy stored in glucose form into ATP. Nuclear Envelope It's an enclosure that surrounds nucleus and its contents. Unlike cell membrane which has pores and spaces for RNA and proteins to pass through, it keeps the chromatin and nucleolus inside the nucleus. Nucleolus It is the most prominent structure in the nucleus wherein ribosomes are made.

Nucleus

This is spherical body that contains various organelles like the nucleolus (where ribosomal RNA is produced) and surrounded by a nuclear membrane. The nucleus is the control room that controls various cell functions by controlling the protein synthesis of the plant cell. The nucleus contains DNA within the chromosomes. Peroxisomes These are membrane bound packets

of oxidative enzymes that convert fatty acids into sugar and assist chloroplasts in photo-respiration. Plasmodesmata

### Ribosome

These are the sites that see protein synthesis and are basically nothing but small cell organelles made up of RNA-rich cytoplasmic granules. These molecules make proteins out of amino acids. The word 'ribosome' is derived from the name 'ribonucleic acid' that is biologically very important for the plant cell. Rough Endoplasmic Reticulum

Also known as rough ER, this is a vast interconnected system of membranes, infolded tubular structures and convoluted sacs that are found in the cell's cytoplasm. This is a network that is covered with ribosomes and these are what give it a rough appearance. These networks transport materials through the cell and produce proteins in sacs known as cisternae. These are in turn sent to the golgi bodies and deposited into the cell membrane.

### Smooth Endoplasmic Reticulum

Also known as smooth ER, this is the same thing as the rough ERs, but with the main difference that they are smooth. They bud off from the rough ERs and also transport materials within the cell. The ER channels, known as the ER lumen, are used to transport proteins and lipids to the golgi bodies and the membranes. Stroma

These are parts of the plant cell chloroplasts and are located between the grana within their inner cell membranes. A stroma is essentially the fluid matrix that surrounds the thylakoids. Thylakoid Disks These are chlorophyll containing disk shaped membrane structures found inside the chloroplasts. <https://assignbuster.com/plant-cell-organelles-and-their-functions-essay-sample/>

Chloroplasts are actually made up of a stack of thylakoid disks that aid in the process of photosynthesis. The stack of thylakoid disks in the chloroplasts are known as grana (singular granum).

**Vacuole** These are large fluid-filled, membrane-bound spaces within the plant cell. They help in maintaining the cell shape and most plant cells have just one, single vacuole that represents up to 90 percent of the total plant cell. They contain ions, sugar, secondary metabolites and enzymes. A vacuole is surrounded by a membrane called the tonoplast.

**Lysosome**

Lysosomes, usually found in animal cells are very rare in plant cells.

Lysosomes comprise digestive enzymes known as 'hydrolytic enzymes', that are essential for intracellular digestion. These enzymes of plant cells can be detected in the vacuole.

There are many other small structures found within the plant cell like the intercellular air spaces (gap between two plant cells) and the peroxisome (has a crystalline core and helps in removing hydrogen from substrates), but I will conclude my 'plant cell diagram' article here.

## CHAPTER 3

### 3. 1Plant Cell Vs. Animal Cell

In this article, we will do a comparative study of a plant cell and animal cell, so as to have a better understanding of the similarities as well as the differences between these two types of cells. The bodies of both plants and animals are made up of cells. Although the basic structure and most of the features are the same, there are many points of differences between the <https://assignbuster.com/plant-cell-organelles-and-their-functions-essay-sample/>



two. The primary differences between both cells arise because of the fact that plants have to produce their own food by photosynthesis. Another important distinguishing factor is that plants have to support their own weight, which animals do by means of their skeleton. To perform these two important functions, plant cells and animal cells produce different kinds of organelles, that create a variation between the two types of cells.

### 3. 2Plant Cell Vs Animal Cell Similarities

#### Cell Type

Both plant and animal cells are eukaryotic in nature, having a well-defined membrane-bound nucleus. Nucleus

It is present in both. The nucleus carries most of the genetic material in the chromosomes, which carry the genetic information in the form of DNA (deoxyribonucleic acid). Cell Membrane

It is a semi-permeable or selectively-permeable membrane that encloses the contents of a cell, allowing only selected molecules to enter the cell and blocking the others. Mitochondria

They act as the powerhouse of the cell, converting food into energy. Animal cells have more number of mitochondria, as they are the only source of energy. They also contain a small amount of DNA. Endoplasmic Reticulum (ER)

These membrane-bound organelles consist of a series of sac-like structures that help in the production of proteins and lipids, and transport to the Golgi apparatus. Rough ER helps in transporting proteins and smooth ER aids in the production of lipid. Ribosomes

They act as sites, where proteins synthesizing from amino acids takes place. Some ribosomes are attached to the endoplasmic reticulum, while others float freely in the cytoplasm. Golgi Bodies/Apparatus

It is a flattened sac-like structure which receives and processes proteins from the endoplasmic reticulum, and transports them to various locations within the cell or sends them out of the cell.

### 3. 3Plant Cell Vs. Animal Cell Differences

#### Shape & Size

A plant cell is usually larger and rectangular in shape, whereas an animal cell is spherical in shape. Cell Wall

A plant cell has a cell wall as well as a plasma membrane. The cell wall guards and maintains the cell shape and provides rigidity to the cell. It is made up of cellulose and hemicellulose. Animal cells do not have cell walls. The plasma membrane serves as the outer boundary to the animal cell.

#### Chloroplast

Plant cells contain chloroplast, hence, can prepare their own food. They act as the site of photosynthesis, using sunlight, carbon dioxide, and water to prepare carbohydrate molecules. Animal cells do not have chloroplast.

#### Vacuole

A plant cell usually has a single large and prominent vacuole, which is a bladder-like structure containing water and other solutes, thus serving as a storehouse of the cell. Animal cells may or may not contain one or many smaller vacuoles. Centrioles

These organelles are absent in plant cells. In animal cells, centrioles assist in the movement of chromosomes during the cell division process. Lysosomes

An animal cell contains lysosomes in its cytoplasm. Lysosomes contain a number of enzymes that help in the digestion or breakdown of substances in the animal cell. Plant cells do not have lysosomes. Amino Acids

In a plant cell, all types of amino acids are synthesized. An animal cell can synthesize only a few types of amino acids on its own.

### Cell Division

The formation of a cell plate takes place during cell division of a plant cell. In animal cells, the division takes place by means of a constriction at the center of the cell.

## CHAPTER 4

### Summary and Conclusion

The cells are the basic units of life that work together to perform life sustaining functions in both animal and plant worlds. Plant cells are eukaryotic cells having thick and rigid cell walls. Eukaryotic cells are cells that contain complex structures enclosed within membranes called nucleus or nucleus envelop, within which the genetic material is present. These cells are present in almost Plant cells differ from animal cells in that they have three different structures known as cell wall, vacuoles and plastids. However, they lack centrioles and intermediate filaments which are present in animal cells.