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Original Research Article

Functions of plant and animal cellular appendages and DNA

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Abstract
Plant cells are the basic unit of life in organisms of the kingdom Plantae. They are eukaryotic cells, which have a true nucleus along with specialized structures called organelles that carry out different functions.
The plant cell wall has a diversity of functions. It provides a structural framework to support plant growth and acts as the first line of defense when the plant encounters pathogens. The cell wall must also retain some flexibility, such that when subjected to developmental, biotic, or abiotic stimuli it can be rapidly remodeled in response. Genes encoding enzymes capable of synthesizing or hydrolyzing components of the plant cell wall show differential expression when subjected to different stresses, suggesting they may facilitate stress tolerance through changes in cell composition wall Abebe et al. 2015. Bacteria are small single-celled organisms that get the nutrients they need from their environment. Sometimes, this environment can be your child or any other living thing. Bacteria are very small and cannot be seen under a microscope. A number of bacteria are good for the body because they help the digestive system to function properly and prevent harmful bacteria from entering the body. Some other bacteria are also used to make drugs and vaccines. A cell wall is defined as the non-living component, covering the outmost layer of a cell. Its composition varies according to the organism and is permeable in nature. The cell wall separates the interior contents of the cell from the exterior environment. It also provides shape, support, and protection to the cell and its organelles. However, this cellular component is present exclusively in eukaryotic plants, fungi, and few prokaryotic organisms. In this paper we concluded that the differences between plant and animal DNA lie in the sequence of bases in the helix. Compounds found in plant cells are absent in animal cells, and DNA base sequences reflect this. Also, the genomic plant DNA is often larger than animal DNA.

Keywords: cell wall, bacteria, cell organism, DNA

INTRODUCTION
The plant cell wall is a complex structure that fulfills a diverse array of functions throughout the plant lifecycle. In addition to maintaining structural integrity by resisting internal hydrostatic pressures, the cell wall provides flexibility to support cell division, a biochemical scaffold that enables differentiation, and a pathological and environmental barrier that defends against stress.

Cell wall
Cell wall functions
The cell wall forms the cell and provides strength and support to the protoplasm within the cell. Although the wall is an external and inactive product of protoplasts, it has special functions and plays an important role in absorbing secretion and transmission.

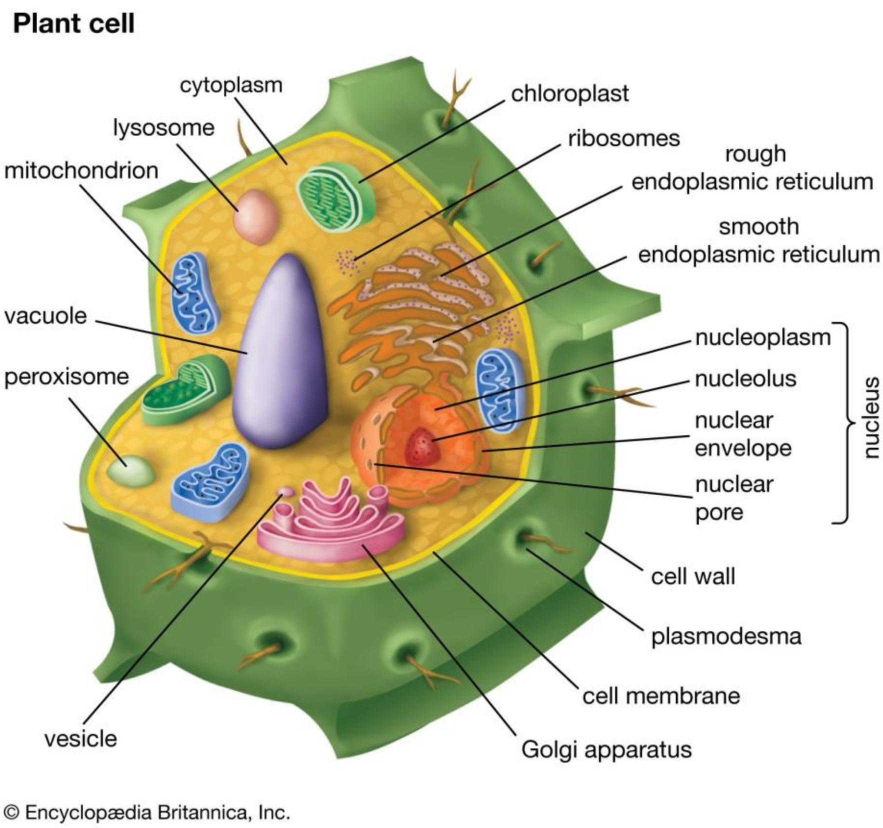


Fig-1: plant cell function and structute

Mechanical properties of wall layers

All cell walls contain two layers, the middle lamella and the primary cell wall, and many cells produce an additional layer, called the secondary wall. The middle lamella serves as a cementing layer between the primary walls of adjacent cells. The primary wall is the cellulose-containing layer laid down by cells that are dividing and growing. To allow for cell wall expansion during growth, primary walls are thinner and less rigid than those of cells that have stopped growing. A fully grown plant cell may retain its primary cell wall (sometimes thickening it), or it may deposit an additional, rigidifying layer of different composition; this is the secondary wall. Secondary cell walls are responsible for most of the plant's mechanical support as well as the mechanical properties prized in wood. In contrast to the permanent stiffness and load-bearing capacity of thick secondary walls, the thin primary walls are capable of serving a structural, supportive role only when the vacuoles within the cell are filled with water to the point that they exert a turgor pressure against the cell wall.

The chemical composition of the wall

Cellulose

Celluloses are large polysaccharide molecules formed by combining n molecules of beta-glucose with azide bonds. The joining of two beta-glucose molecules forms a cellobiose molecule. All 5 molecules of cellobiose form a crystalline cellulose with a cubic spatial arrangement. Cellulose microfibrils are obtained from the crystal assemblage and cellulose microfibrils are obtained from a total of 20 microfibrils.

Hemicellulose

Hemicelluloses are part of the wall material that is chemically formed from the sharing of 5-carbon sugars such as xylans and 6-carbon sugars such as mannose and uronic acids. In most cases, hemicellulose units are made of a spinal axis with a linear structure that is joined at various locations by hydrogen bonds to the cellulose.

Pectins

These substances are similar to hemicelluloses but have a much higher amount of uronic acids. Most of the middle septum of cells is made of calcium pectate.

Proteins

The proteins in the wall are more than the derivatives of the amino acid proline.

Biotic Stress and the Plant Cell Wall

In the co-evolutionary battle ground between plants and microbes over millions of years, plants have evolved a multi-layered defense system in which the cell wall serves multiple purposes. The plant cell wall may serve as preformed or passive structural barrier as well as an induced or active defense barrier. Microbes have to circumvent the cell wall and other preformed barriers to establish the desired pathogenic relationship with host plants. This requires appropriate host recognition strategies and the development of suitable infection structures and/or chemical weapons (Zentmyer, 1961; Turrà et al., 2015). Failure to evolve appropriate strategies to breach the host wall and other preformed structures results in the microbes becoming non-pathogens and non-adapted pathogens

Cell membrane

The cell membrane is the outer covering of the cell that protects the internal organs. This membrane, also known as the plasma membrane, has a number of vital functions And there are types of cells: eukaryotic and prokaryotic Plants, animals, fungi, protozoa, etc. have eukaryotic cells, and prokaryotic cells are found only in bacteria. Eukaryotic cells belong to the main structure, which includes parts such as DNA, ribosome, vesicle (small sac), endoplasmic reticulum (both rough and soft), Golgi apparatus, cytoskeleton, mitochondrial, vacuole, centriole, lysosome, cytoplasm, membrane Plasma and cell wall.

Plant cells have large vacuoles and limited cell walls, but animal cells do not have cell walls, but some may have very small vacuoles. Therefore, in animal cells, the cell membrane is the outer covering Anders et al. 2012.

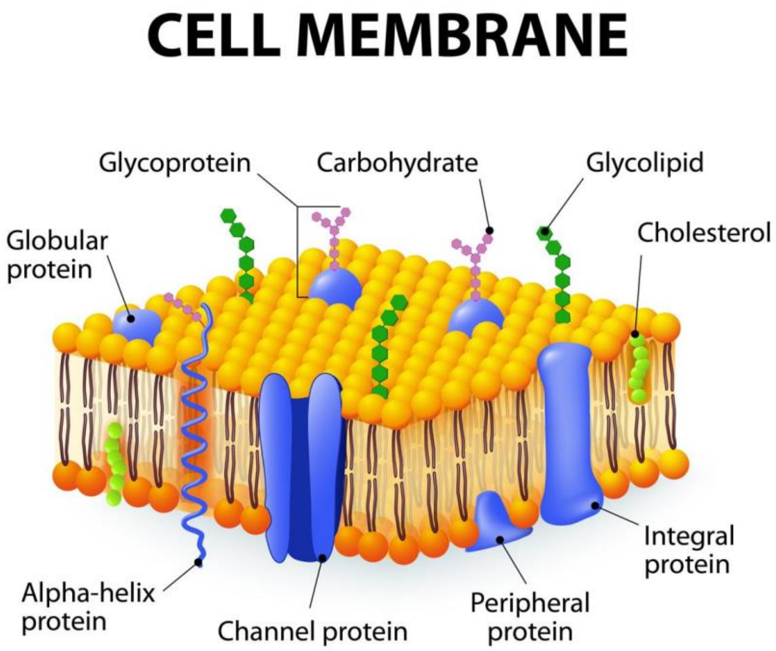


Fig-2: show Cell membrane composition

Vacuole

A vacuole is an organ in a cell that is responsible for storing and holding various solutions or substances. Vacuoles are solutions and compounds in which they are created, stored, or excreted. Compounds in vacuoles include a variety of ions, sugars, amino acids, and organic acids. A vacuole is a chamber that is surrounded by a membrane that prevents the cytosol from being exposed to its contents. Because vacuoles are surrounded by semipermeable membranes, only certain molecules can enter and leave through the vacuole membrane.

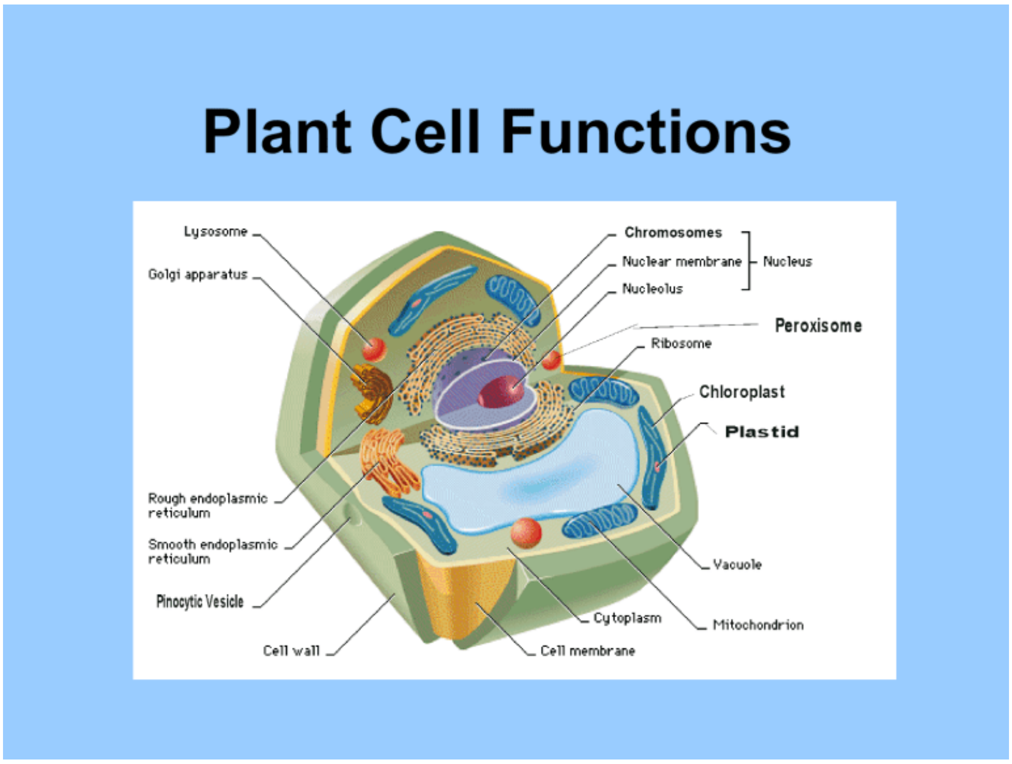


Fig-3: show plant cell function. Aist et al. 1977

Mitochondria

The mitochondrion, in the cell, is an organ that is responsible for cellular respiration and an energy transfer organ that produces chemical energy in food by oxidative phosphorylation in the form of high-energy bonds of ATP phosphate (adenosine). Triphosphate) to be stored. This organelle is present in all aerobic cells except in bacteria whose respiratory enzymes are located in the cytoplasmic membrane. Mitochondria, like chloroplasts, are composed of two inner and outer membranes.

Mitochondria are found in almost all types of human cells that are vital to human survival. In addition to producing energy, mitochondria store calcium for cellular signaling activities, generate heat in the body, and mediate cell growth and programmed cell death (apoptosis).

The number of mitochondria in each cell is very different. In humans, for example, red blood cells contain no mitochondria, while liver cells and muscle cells may contain hundreds or even thousands of mitochondria. The only eukaryotic organism that lacks mitochondria is a species called "Oxymonad Monocercomonoides". Unlike other cellular organs, mitochondria have two distinct membranes and a single genome and are propagated by binary division. These features suggest that mitochondria have a common evolutionary past with prokaryotes (single-celled organisms).

Mitochondrial DNA

Animal	Plant
14-26 kb	150-2500kb
Circular, usually homogeneous among cells	Set of different-sized circles, which arise from processes that interconvert between mother circle & subgenomic circles
No recombination, inheritance maternal	No recombination, inheritance maternal
Mutation rates high at sequence level; substitutions	Rapid evolution in gene order but slower at sequence level (ca x100 slower than in animals)

Fig-4: Differences between animal and plant mitochondrial DNA

Ribosome

Because proteins are synthesized by ribosomes, they are important. Ribosomes are more or less spherical, dense particles than electrons that range in diameter from 40 to about 300 angstroms.

The number of ribosomes in a cell reaches about five hundred thousand. This number varies greatly in different cells as well as in different biological and physiological conditions in a cell

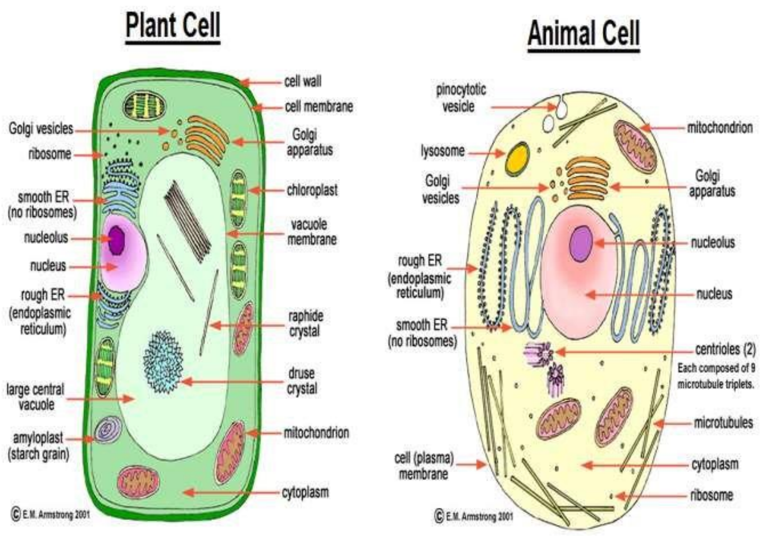


Fig-5: Plant and animal cells have several differences and similarities. For example, animal cells do not have a cell wall or chloroplasts but plant cells do. Animal cells are mostly round and irregular in shape while plant cells have fixed rectangular shapes.

Hastak

The nucleus is the most important structure in the nucleus of eukaryotic cells and the transcription site of ribosomal aranas, the pre-processing of aranas and the construction of a ribosome subunit. The nucleus is a dynamic structure that forms late in the telophase phase around clusters of ribosomal aron gene replicates.

Endoplasmic reticulum (ER) is an organ found in all eukaryotic cells. The endoplasmic reticulum inside each cell is a membrane structure that exists extensively throughout the cell. This organ acts as a site for the modification of proteins, the production of macromolecules and lipids, and the transport of substances throughout the cell. In addition, endoplasmic reticulum is the site for protein translation and folding and the formation of functional protein structures. This organelle is also involved in other processes, including the transport of proteins that are supposed to be part of the cell membrane (e.g., intermembrane receptors, intramembrane receptors), and the transport of proteins that must be secreted or released from the cell. (Such as digestive enzymes).

Golgi device

The Golgi apparatus is an organ in eukaryotic organisms that transports molecules from the endoplasmic reticulum to its destination. The Golgi organ also ultimately alters endoplasmic reticulum products. The Golgi apparatus consists of a set of flat sacs that branch off from the endoplasmic reticulum and extend.

Conclusion

The main functions of the cell wall are **to provide structure, support, and protection for the cell**. The cell wall in plants is composed mainly of cellulose and contains three layers in many plants. The three layers are the middle lamella, primary cell wall, and secondary cell Aditya et al. 2015.

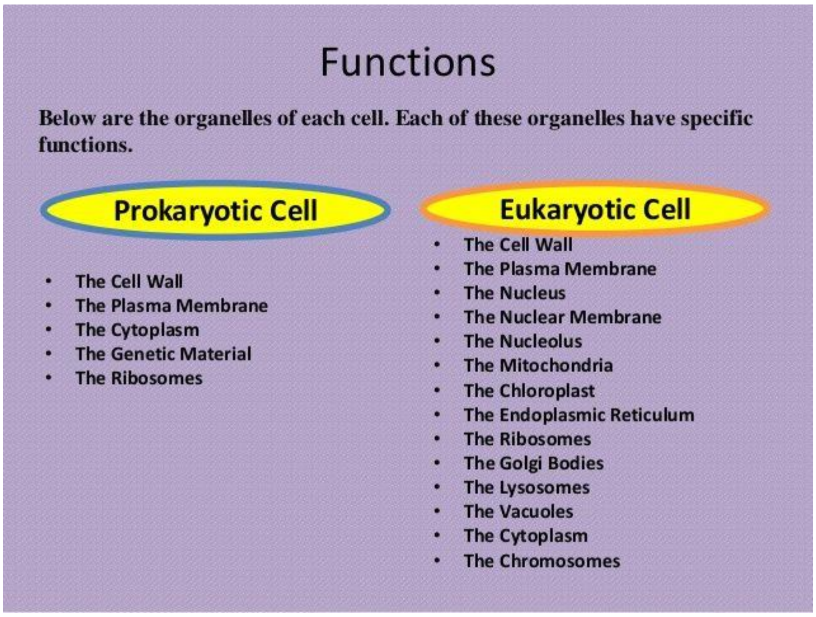
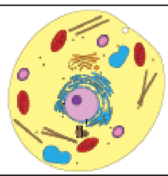


Fig-6: Differences between prokaryotic and eukaryotic cell

Table-1: Animal cell and plant cell differences

Name : ________________

Animal Cell vs Plant Cell

Plant Cell	Animal Cell
	
Plant cell is large and has a fixed rectangular shape.	Animal cell is small and irregular or round in shape.
Cell wall is present.	Cell wall is absent.
The nucleus lies on one side of the cell.	The nucleus lies in the center.
Mitochondria are present in fewer numbers.	Mitochondria are present in large numbers.
Plastids are present.	Plastids are absent.
Centrosomes are absent.	Centrosomes are present.
One large central vacuole is present.	Many small vacuoles are present.

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Research shows that plants and animals may produce some proteins in common. One prominent example is known as Cytochrome C. But because the DNA copying process is imperfect, mistakes accumulate over time, making Cytochrome C slightly different in different creatures. The gene regions that specify the amino acid sequence in human Cytochrome C are more similar to those in another mammal like a rabbit, and less similar to a more evolutionarily distant creature, like a sunflower. The schematic of classifying animals and plants in kingdoms is facing competition. More recently an alternative system has arisen, based on evolutionary and molecular information. Cytochrome c is perhaps the canonical or paradigmatic molecule in this approach.

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