

Topic: Ultra Structure of Plant cell
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Ultra Structure of Plant cell

Plants are unique among the eukaryotes, organisms whose cells have membrane-enclosed nuclei and organelles, because they can manufacture their own food. Chlorophyll, which gives plants their green color, enables them to use sunlight to convert water and carbon dioxide into sugars and carbohydrates, chemicals the cell uses for fuel.

All plants are made up of cells. The cell plays a fundamental role in the understanding of botany. It also helps in the understanding of chemistry. Cell is the simplest organization in the hierarchy of biological organization. It exhibits the properties of life. Some organisms are single celled. Most of the organisms are multicellular.

The body of a plant is composed of many kinds of specialized cells. There is division of labour among the cells. Different cells perform different functions. It produces higher level of organization. These organizations are tissue and organ level.

The Ultrastructure of plant cells is studied by cell fractionation technique and electron microscope. Cell fractionation is a special technique in which cells are homogenized in

ultra-centrifuge.

The plants cells are placed in acidic solution for removing cell wall before centrifugation. Cell fractionation technique breaks the plasma membrane and separate different organelles in different layers. Each layer is removed and studied under electron microscope.

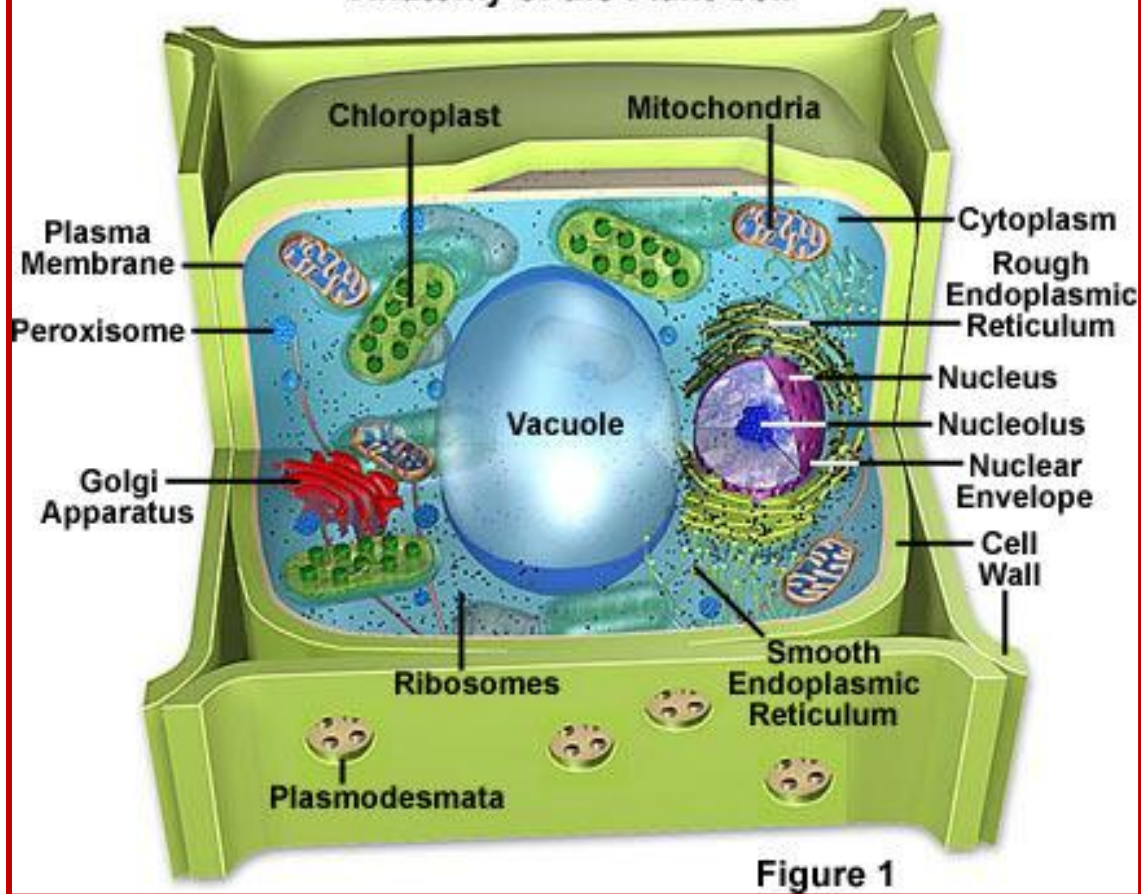
Components of Plant cell

Cell Wall - Like their prokaryotic ancestors, plant cells have a rigid wall surrounding the plasma membrane. It is a far more complex structure, however, and serves a variety of functions, from protecting the cell to regulating the life cycle of the plant organism.

Chloroplasts - The most important characteristic of plants is their ability to photosynthesize, in effect, to make their own food by converting light energy into chemical energy. This process is carried out in specialized organelles called chloroplasts.

Endoplasmic Reticulum - The endoplasmic reticulum is a network of sacs that manufactures, processes, and transports chemical compounds for use inside and outside

Anatomy of the Plant Cell



of the cell. It is connected to the double-layered nuclear envelope, providing a pipeline between the nucleus and the cytoplasm. In plants, the endoplasmic reticulum also connects between cells via the plasmodesmata.

Golgi Apparatus - The Golgi apparatus is the distribution and shipping department for the cell's chemical products. It modifies proteins and fats built in the endoplasmic reticulum and prepares them for export as outside of the cell.

Microfilaments - Microfilaments are solid rods made of globular proteins called actin. These filaments are primarily structural in function and are an important component of the cytoskeleton.

Microtubules - These straight, hollow cylinders are found throughout the cytoplasm of all eukaryotic cells (prokaryotes don't have them) and carry out a variety of functions, ranging from transport to structural support.

Mitochondria - Mitochondria are oblong shaped organelles found in the cytoplasm of all eukaryotic cells. In plant cells, they break down carbohydrate and sugar molecules to

provide energy, particularly when light isn't available for the chloroplasts to produce energy.

Nucleus - The nucleus is a highly specialized organelle that serves as the information processing and administrative center of the cell. This organelle has two major functions: it stores the cell's hereditary material, or DNA, and it coordinates the cell's activities, which include growth, intermediary metabolism, protein synthesis, and reproduction (cell division).

Peroxisomes - Microbodies are a diverse group of organelles that are found in the cytoplasm, roughly spherical and bound by a single membrane. There are several types of microbodies but peroxisomes are the most common.

Plasmodesmata - Plasmodesmata are small tubes that connect plant cells to each other, providing living bridges between cells.

Plasma Membrane - All living cells have a plasma membrane that encloses their contents. In prokaryotes and plants, the membrane is the inner layer of protection surrounded by a

rigid cell wall. These membranes also regulate the passage of molecules in and out of the cells.

Ribosomes - All living cells contain ribosomes, tiny organelles composed of approximately 60 percent RNA and 40 percent protein. In eukaryotes, ribosomes are made of four strands of RNA. In prokaryotes, they consist of three strands of RNA.

Vacuole - Each plant cell has a large, single vacuole that stores compounds, helps in plant growth, and plays an important structural role for the plant.

Leaf Tissue Organization - The plant body is divided into several organs: roots, stems, and leaves. The leaves are the primary photosynthetic organs of plants, serving as key sites where energy from light is converted into chemical energy. Similar to the other organs of a plant, a leaf is comprised of three basic tissue systems, including the dermal, vascular, and ground tissue systems. These three motifs are continuous throughout an entire plant, but their properties vary significantly based upon the organ type in which they are located.