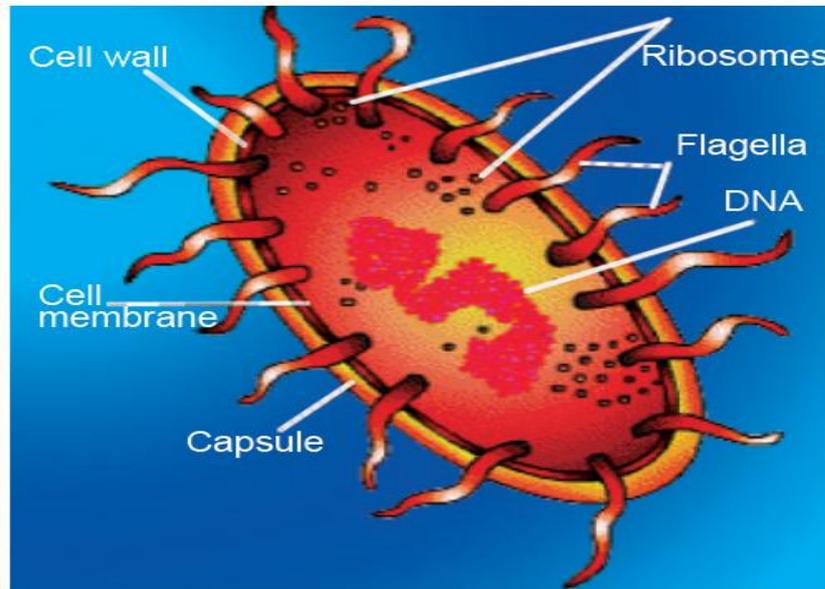


The basic structural and functional unit of an organism

The basic structural and functional unit of an organism is called cell. Cells are like bricks that are assembled to make a building. Similarly, cells are assembled to make the body of every organism. This is why cell are called the basic structural and functional unit of an organism.



A Prokaryotic cell (Bacteria)

Discovery of cell:

Robert Hooke in 1665 observed slices of cork (a part of the bark of a tree) under a simple magnifying device. He Robert Hooke observed under a microscope there are many partitioned boxes or compartments like a honeycomb. Hooke coined the term 'cell' for each box.

A hen's egg can be seen easily. Is it a cell or a group of cells?

It is a single cell. A white blood cell (WBC) in human blood is another example of a single cell.

How do scientists observe and study the living cells?

Scientists used microscopes which magnify objects. Stains (dyes) are used to colour parts of the cell to study the detailed structure.

Kinds of organism: Organisms which are made up of a single cell are called unicellular where as Organisms made up of more than one cell is called multicellular.

Cell Theory : Cell Theory was elaborated by a German botanist Schleiden and Zoologist Schwann

The Cell Theory states that:

1) All organisms are made up of one or more cells and the products of those cells.

- 2) All cells carry out life activities (require energy, grow, have a limited size).
- 3) New cells arise only from other living cells by the process of cell division.

Tissue: The group of cells that are similar in structure and functions is called tissue. like nervous tissue in animal and Vascular tissue in plant.

Cells have different shape of Cells according to function they perform in body:

Generally, cells are round, spherical or elongated (red blood) . Some cells are long and pointed at both ends. They exhibit spindle shape (muscle cells) . Cells sometimes are quite long. Some are branched like the nerve cell or a neuron. Guard cell in leaves are kidney shaped. White blood cells change their shape and move like amoeba.

Which part of the cell gives it shape?

Cell membrane provides shape to the cells of plants and animals. Cell wall is an additional covering over the cell membrane in plant cells. It gives shape and rigidity to cells.

The size of cells in living organisms may vary . The smallest cell is 0.1 to 0.5 micrometre in bacteria.

The largest cell measuring 170 mm ×130 mm, is the egg of an ostrich. Nerve cell is the longest cell and blood cells are the smallest cell in our body

Cell Structure

Protoplasm: The entire content of a living cell is known as protoplasm. It includes the cytoplasm and the nucleus. Protoplasm is called the living substance of the cell.

Plasma membrane: The cytoplasm and nucleus are enclosed within the cell membrane together called the plasma membrane.

Cell membrane: The outer boundary of the cell is the cell membrane. It is composed of proteins and carbohydrates.

Functions of Cell membrane: The cell membrane gives shape to the cell. The cell membrane separates cells from one another and also the cell from the surrounding medium. The cell membrane is porous and allows the movement of substances or materials both inward and outward. This is why it is called selectively permeable membrane.

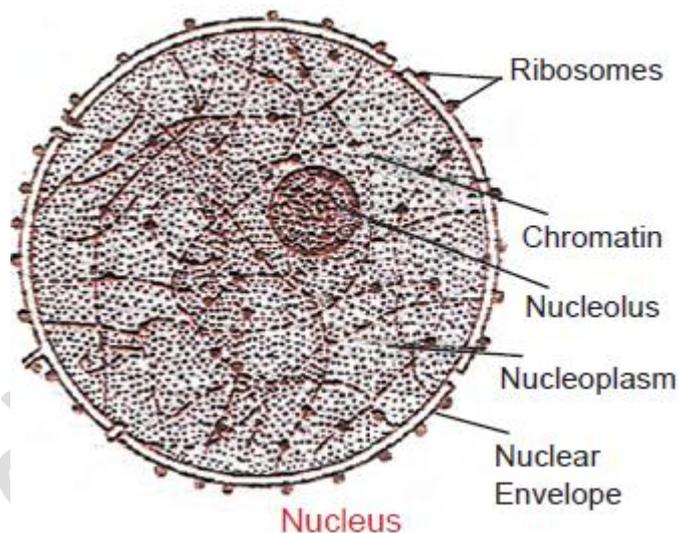
Cell wall: There is also another thick additional covering of animal cell called the cell wall. This is because plant cell need protection against variations in temperature, high wind speed, atmospheric moisture, etc.

Cytoplasm: The jelly-like substance (composed of 90% water) present between the cell membrane and the nucleus is called cytoplasm. Various other components which help in function of cell called organelles are present within the cytoplasm.

Nucleus: There is a dense round spherical body in the centre of a cell is called the nucleus. It was discovered by Robert brown in 1831.

The nuclear envelop is perforated by nuclear pores which allows the movement of certain materials in and out of the nucleus.

Nucleus is covered with a covering called nuclear membrane. This membrane is porous and allows the movement of materials between the cytoplasm and the inside of the nucleus. Nucleus is called control centre of the cell as it control all activity within the cell.



Functions of Nucleus:

1. Nucleus controls all the metabolic activities of the cell.
2. It controls the inheritance of characters from parents to off springs.
3. It controls cell division.

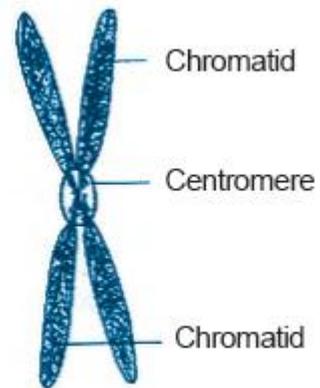
Nucleoplasm :The dense fluid like substance present inside the nucleus i is called Nucleoplasm.

Nucleolus : There is a dense round spherical body in the centre of Nucleus is called the nucleolus which contains RNA.

Chromosomes are condensed form of the fine thread like structure called chromatin material (thread) which are seen only cell undergoing cell division. The chromatin thread are made up of DNA which organize into gene.

Chromosomes are called hereditary vehicle

This is because they contain gene which have information for the development of child characteristics and transfer of characters from the parents to the offspring.



Structure of chromosome

Prokaryotic and eukaryotic cells:

The cells having nuclear material without nuclear membrane are termed prokaryotic cells. The organisms with these kinds of cells are called prokaryotes. Examples are bacteria and blue green algae. Cell having well organized nucleus with a nuclear membrane are called eukaryotic cells onion cells and cheek cells. All organisms other than bacteria and blue green algae are called eukaryotes.

Differences between Prokaryotic cell and Eukaryotic cell

Sl. No.	Prokaryotic Cell	Eukaryotic Cell
1.	It is generally smaller (1-10 microns) in size	It is comparatively larger (5-100 microns) in size.
2.	It lacks a well organized nucleus as its nuclear material is not surrounded by a nuclear membrane.	It contains a well organized nucleus as its nuclear material is surrounded by a nuclear membrane.
3.	It has a single chromosome	It has more than one chromosome.
4.	Nucleolus is absent	Nucleolus is present
5.	It lacks membrane bound cell organelles	It possesses membrane bound cell organelles
6.	Cell division occurs by fission or budding. Mitotic and meiotic divisions are absent	Cell division takes place by mitosis and meiosis.
7.	Ribosomes are smaller	Ribosomes are larger

Cell organelles are as follows:

Vacuoles are fluid– filled sacs bound by a single membrane called tonoplast.

Generally large vacuoles are common in plant cells but much smaller in animal cells. Vacuoles help in storing soluble food and waste.

Functions of Vacuoles are

1. Vacuoles store and concentrate mineral salts as well as nutrients.
2. They maintain proper osmotic pressure in the cell for its turgidity.

Endoplasmic Reticulum (ER) : ER is a complex network of membranes that divides the cytoplasm into channels which help on transportation of substance with in cell.

Endoplasmic Reticulum (ER) are of two types:

Channels with a smooth surface are called smooth endoplasmic reticulum. They secrete lipids

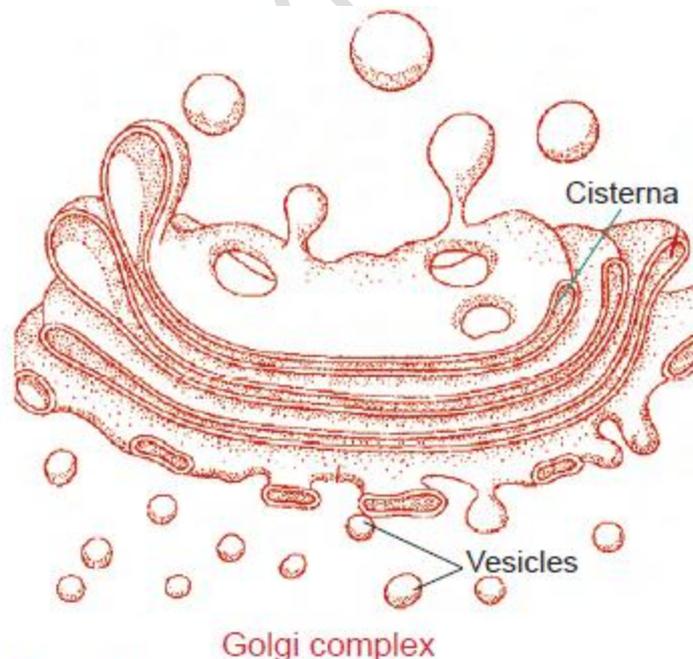
Channels with spherical bodies (ribosome) attached are known as rough endoplasmic reticulum. It involved in protein synthesis.

Ribosomes:

Ribosomes are small particles which are found individually in the cytoplasm and also line the membranes of the rough endoplasmic reticulum. They are made of RNA (ribonucleic acid) and protein and are manufactured in the nucleus. Ribosomes help in production of protein.

Golgi bodies:

Golgi bodies are stacks of flattened membranous stacks .The Golgi body temporarily stores protein and responsible for the concentration, storage and secretion of substance with in cell.

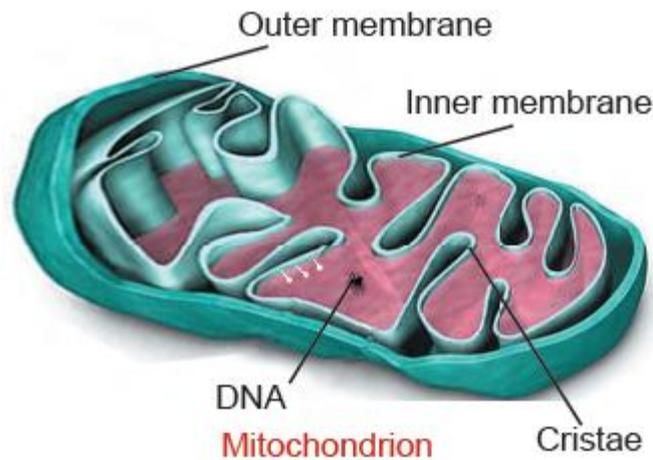


Functions of Golgi apparatus

1. Golgi apparatus is involved in the formation of Lysosomes.
2. It is also responsible for the synthesis of cell wall and cell membrane.

The mitochondria

The mitochondria are round "tube-like" organelles which produce energy from the food during respiration. This is why it is called powerhouse of cell.



Structure of the mitochondria:

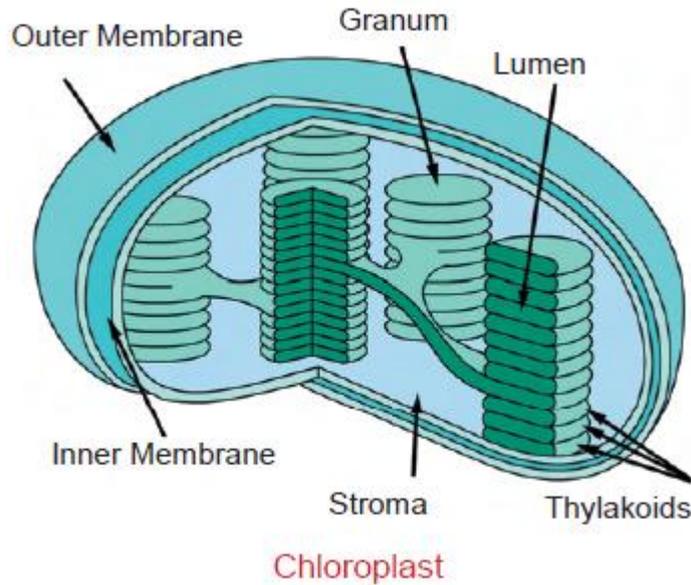
The mitochondria contain proteins and lipids. Each mitochondrion is bound by two membranes – an outer continuous membrane and an inner membrane thrown into folds called cristae. These cristae divide the inner chamber incompletely. The inner chamber is filled with homogenous dense material called the matrix.

Plastids and its type:

Plastids are disc or oval shaped organelles which occur only in plant cells.

Plastids are of three types. They are Leucoplasts, Chromoplasts and Chloroplasts.

1. Leucoplasts: These are colourless plastids which store food in the form of starch, lipids and proteins
2. Chromoplasts: These are yellow or reddish in colour due to the presence of pigments other than chlorophyll. Chromoplasts provide colour to many flowers and fruits.
3. Chloroplasts: These are green coloured plastids which possess the photosynthetic pigment chlorophyll which is present in leaves



Lysosomes

These are small membrane bound vesicles which contain powerful digestive enzymes and help in auto digestion of cell. Digestive enzymes are produced by the joint activity of Endoplasmic reticulum and Golgi apparatus.

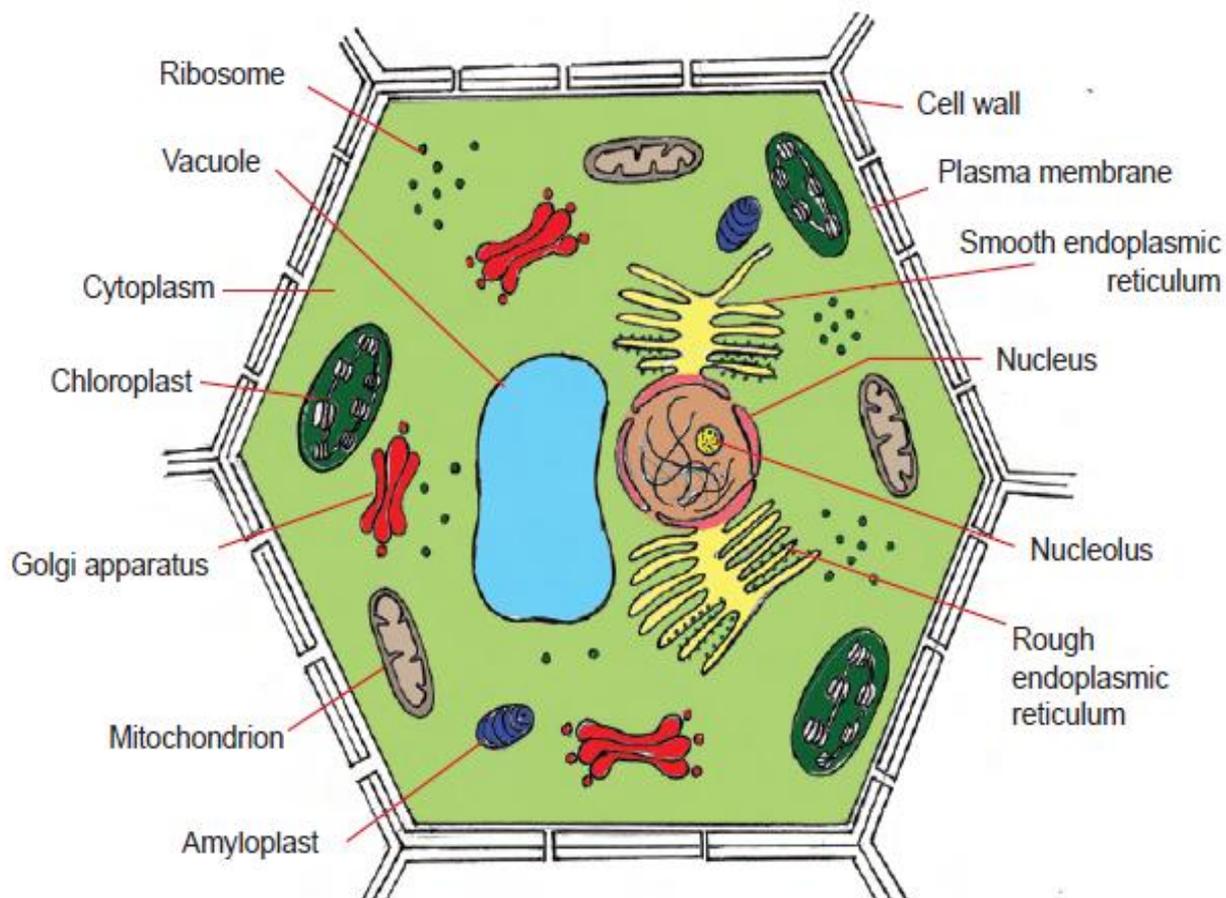
Lysosomes are called 'suicide bags'.

If the membrane of Lysosomes gets ruptured, the digestive enzymes of Lysosomes would digest the entire cellular structure causing death of the cell. So Lysosomes are called 'suicide bags'.

Centrosome: Centrosome is present in animal cells and in certain lower plants. It is absent in prokaryotic cells and in higher plant cells. It is located in the cytoplasm, just outside the nucleus. It contains a pair of small, hollow granules called Centrioles.

Functions of Centrosome: Centrioles play an important role in the formation of spindle fibers during cell division.

The structure of typical plants cell



Ultra structure of a Plant cell

Educational Websites:

<http://www.jsuniltutorial.weebly.com>

<http://cbseadda.blogspot.in>

<http://cbsepathshala.blogspot.com/>

<http://physicsadda.blogspot.in/>

<http://chemistryadda.blogspot.com/>

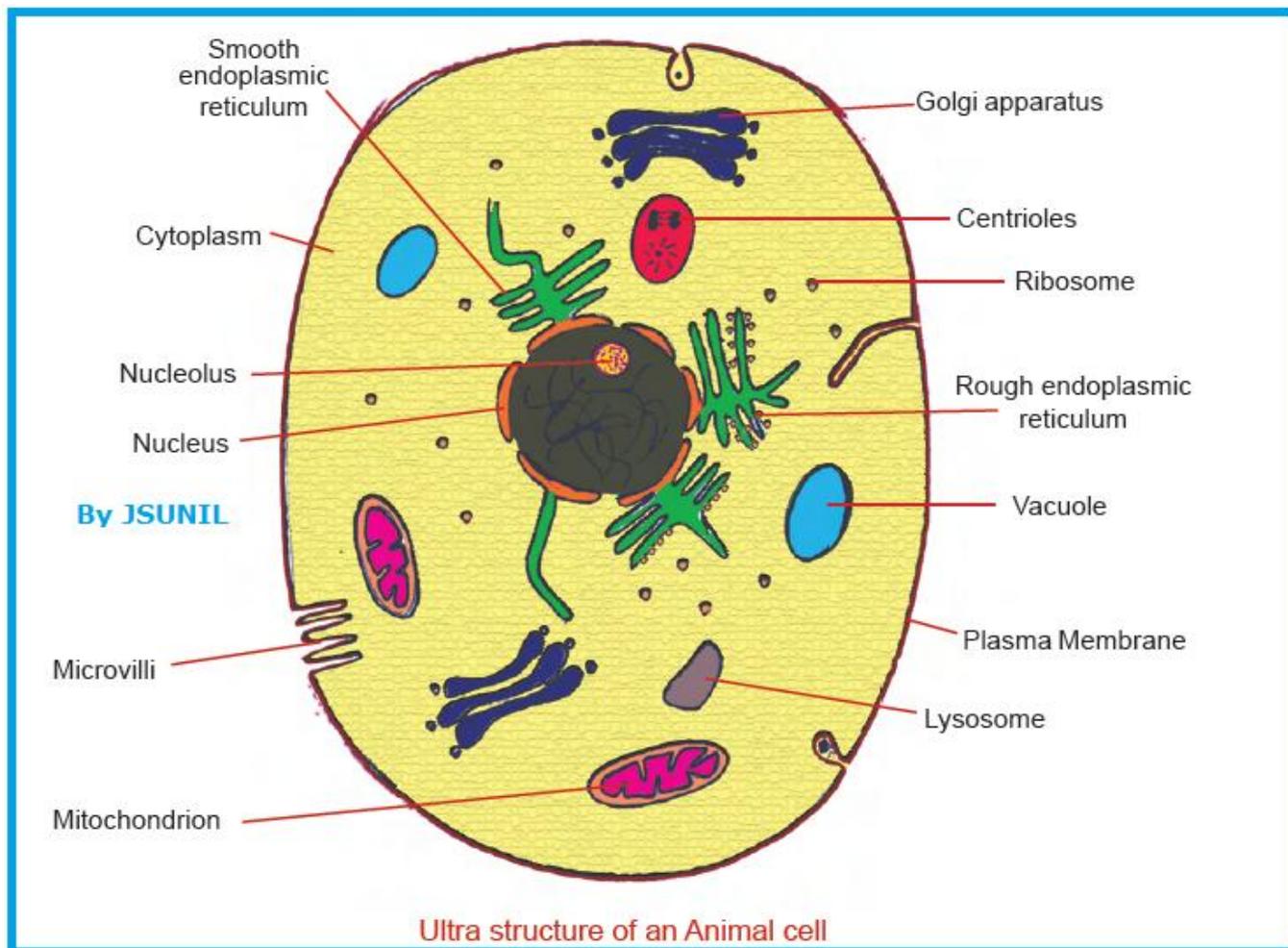
<http://cbsemathstudy.blogspot.in/>

<http://www.sciencecentral.com>

<http://www.botany.org>

<http://www.khanacademy.org>

The structure of typical animal cell



A study of the diagrams of Plant cell and Animal cell shows the following differences

A study of the diagrams of Plant cell and Animal cell shows the following differences		
Sl. No.	Plant cell	Animal cell
1.	Plant cell has an outer rigid cell wall which is made up of cellulose.	Animal cell lacks a cell wall.
2.	Plant cell is larger than animal cell	Animal cell is comparatively smaller in size.
3.	Plant cell has large vacuoles which occupy more space in the cell.	Animal cell usually lacks vacuoles. Even if they are present, they occur in minute sizes.
4.	Centrosome is present only in the cells of some lower plants	All the animal cells have centrosomes.
5.	. Lysosomes are found only in the eukaryotic plant cells.	Lysosomes are found in all animal cells.
6.	Plant cell contains plastids	Plastids are absent
7.	Mostly, starch is the storage material.	Glycogen is the storage material.