Chloroplast versus mitochondria

These two organelles are opposite to each other, one traps the solar energy by photosynthesis, the other releases the energy by breaking the complex molecule by respiration.

Similarities: 1. Both contain their own DNA as well as their own RNA. Thus, they can self-duplicate to produce more of their own kind without the help of nucleus.

2. Both are termed as semi-autonomous only because they are incapable of independent existence outside the cytoplasm for a long time. Since most of their proteins are synthesised with the help of the nuclear DNA.

Endoplasmic Reticulum, Golgi Body and Ribosomes

The Endoplasmic reticulum (ER) and Golgi body are single membrane bound structures. The membrane has the same structure (lipid-protein) as the plasma membrane but ribosomes do not have membranes. Ribosomes are involved in synthesis of proteins in the cell. Golgi bodies in secreting and the ER in transporting and storing the products. These three organelles operate together.The ribosomes present in the ER.

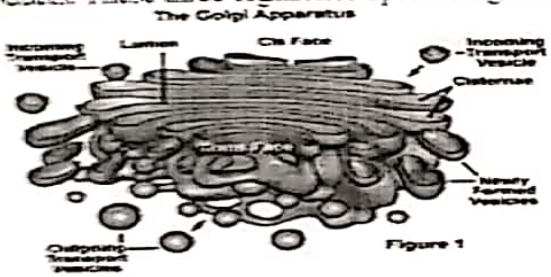


Figure 1

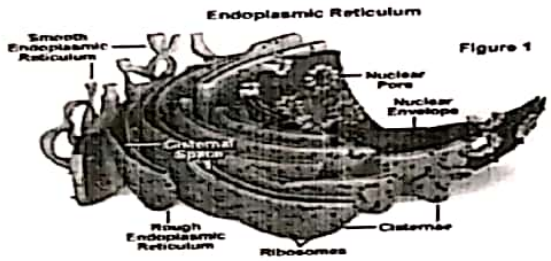


Figure 1

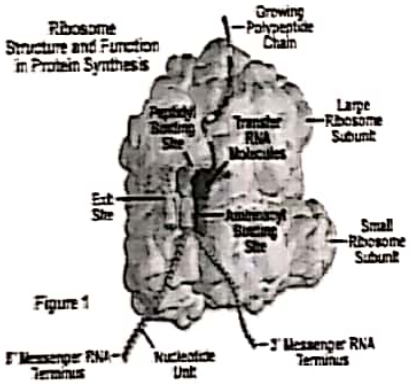


Figure 1

The microbodies

These are small sac-like structures bounded by the single membranes. These are of different kinds e.g. lysosomes, peroxisomes and glyoxysomes.

1. Lysosomes

Lysosomes are present in all animal cells and some non-green plant cells. They perform intracellular digestion.

The main features of lysosomes are :

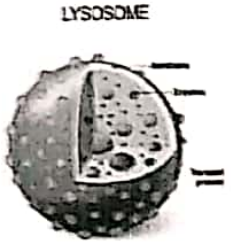
(i) Membranous sacs budded off from Golgi body.

(ii) May be in hundreds in a single cell.

(iii) Contain several enzymes.

(iv) Materials to be acted upon by enzymes enter the lysosomes.

(v) Lysosomes are called "suicidal bags" as enzymes contained in them can digest the cell's own material when damaged or dead.

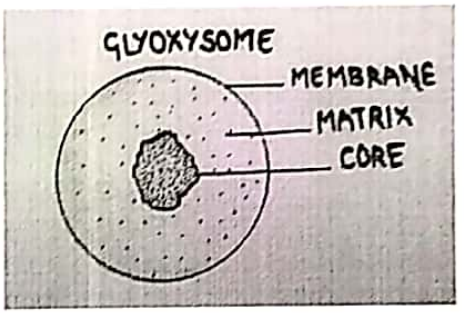


2. Peroxisomes

Found both in plant and animal cells. Found in the green leaves of higher plants. They participate in oxidation of substrates resulting in the formation of hydrogen peroxide.
They often contain a central core of crystalline material called nucleoid composed of urate oxidase crystals.
These bodies are mostly spherical and about the size of mitochondria and lysosomes.
They are usually closely associated with ER.
They are involved in photorespiration in plant cells.
They bring about fat metabolism in cells.

3. Glyoxysomes

The microbodies present in plant cells and morphologically similar to peroxisomes.
Found in the cell of yeast and certain fungi and oil rich seeds in plants.
Functionally they contain enzymes of fatty acid metabolism involved in the conversion of lipids to carbohydrates during germination.



Cilia and flagella

(i) Some unicellular organisms like *Paramecium* swim in water with the help of cilia and flagella.
(ii) In multicellular organisms some living tissues have cilia.
(iii) Cilia beat like tiny oars or pedals and flagella bring about whiplash like movement.
(iv) Both are made up of contractile protein tubulin in the form of microtubules.

Centriole

It is present in all the animal cells, located just outside the nucleus. It is cylindrical, 0.5 m in length and without a membrane. It has 9 sets of peripheral triplet tubules. It has its own DNA and RNA.
Function : Centrioles are involved in cell division.

Basal bodies

These are structures similar to centrioles. They have the same nine sets of triplet organization as in the centrioles. The cilia and flagella appear to arise from the basal bodies.

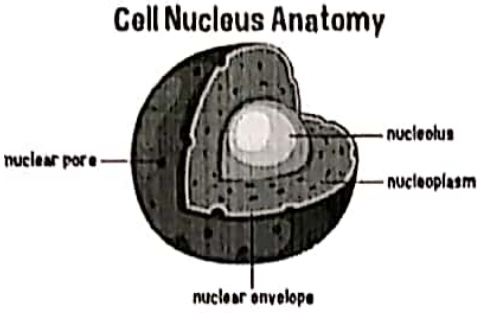
3. NUCLEUS

General structure of the nucleus :
(i) It is the largest organelle seen clearly when the cell is not dividing.
(ii) It is mostly spherical, WBC have lobed nuclei.
(iii) It is mostly one in each cell.
(v) Double layered nuclear membrane having fine nuclear pores encloses nucleoplasm which contains chromatin network and a nucleolus.

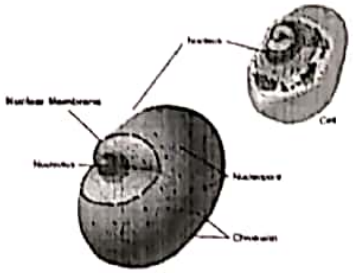
Functions

Maintains the cell in a working order.
Co-ordinates the activities of other cell organelles.

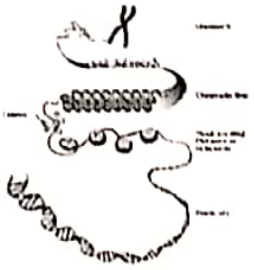
Takes care of repair work.
Participates directly in cell division. This division is called mitotic cell division.
The parts of a nucleus are :



1. Nuclear membrane
Double layered membrane is interrupted by large number of nuclear pores.
Membrane is made up of lipids and proteins and has ribosomes attached on the outer membrane which make the outer membrane rough.
The pores allow the transport of large molecules in and out of nucleus.



2. Chromatin
Within the nuclear membrane there is jelly like substance rich in proteins.
The number of chromosomes is fixed in an organism. During mitotic cell division chromosomes divide in a manner that the daughter cells receive identical amounts of hereditary matter.



3 Nucleolus
Membraneless, spheroidal bodies present in all eukaryotic cells except in sperms and in some algae.
Their number varies from one to few.
It has DNA, RNA and proteins. Store house for RNA and proteins.
Regulates the synthetic activity of the nucleus.
Nucleus and cytoplasm are interdependent, and this process is equal to nucleo-cytopalsmic interaction.