

D. CELL ULTRA STRUCTURE (CELL ORGANELLES):

1. ENDOPLASMIC RETICULUM

Endoplasmic reticulum refers to a vast network of membrane enclosed tubules, vesicles and sacs in the cytoplasm. It is found in differentiated cells only.

Structure:

Endoplasmic reticulum appears as a double membrane with variable spaces. It forms a continuous system and is attached to the nuclear envelope on one side and cell membrane on the other. It is of two types viz. rough and smooth. The endoplasmic reticulum carrying ribosomes has granular surface and is therefore called rough endoplasmic reticulum, while the ribosome free region has smooth surface and is hence called smooth endoplasmic reticulum.

Functions:

1. Rough endoplasmic reticulum is associated with the synthesis of proteins.
2. Smooth endoplasmic reticulum is associated with synthesis of lipids and glycogen.
3. It acts as an inter-cellular transport system for various substances.
4. It contains many enzymes which perform various synthetic and metabolic activities..
5. It provides a passage for mRNA from nucleus to the cytoplasm.
6. It is involved in the formation of the new nuclear membrane after each nuclear division.

2. GOLGI COMPLEX

They are cellular organelles which consist of a series of concentric double membranes. They are located either near nuclear membrane or cell periphery. They arise from rough endoplasmic reticulum.

Sub-microscopic spaces or sacs are enclosed by the double membranes and are known as cisternae. Each golgi complex has 3 to 12 inter-connected cisternae which are composed of lipo-proteins.

Functions:

1. Packaging of food materials such as proteins, lipids and phospholipids for transport to other cells.
2. It plays a role in the formation of the plasma membrane.
3. It is involved in the formation of the cell wall of plant cells.

Question:

1. Draw a neatly labeled diagram of the Golgi complex.

3. LYSOSOMES:

- It originates from Golgibody.
- It is rich in hydrolyticenzymes.
- Its main function is digestion.

4. VACUOLE:

- Membrane bound space found in thecytoplasm.
- It contains water, sap, excretory product and some othermaterials.
- It is maintaining the internal pressure and avoids cells fromcollapsing.

5. MITOCHONDRIA

Mitochondria are rod shaped cytoplasmic organelles, which are the main sites of cellular respiration. Hence, they are often referred to as “**Power house**” of the cell.

Structure:

Each mitochondrion is enclosed by two concentric unit membranes comprising of an outer membrane and an inner membrane. The space between the two membranes is known as perimitochondrial space. The membranes are lipo-proteinaceous in nature. The inner membrane has a series of infoldings known as cristae. The inner space enclosed by cristae is filled by a relatively dense material known as matrix. The matrix contains several copies of round or circular DNA molecules.

Functions:

1. They are the sites of cell respiration. Oxidation of carbohydrates, lipids and proteins occurs in the mitochondria.
2. They contain some amount of DNA and are thus associated with cytoplasmic inheritance.

Problem:

1. Draw a neatly labelled diagram of a mitochondrion.

6. CHLOROPLAST

Chloroplasts contain green pigment chlorophyll and are sites of photosynthesis in plants. They are usually spherical, oval or disc shaped.

Structure:

Two concentric lipo-proteinaceous membranes enclose each chloroplast. The outer membrane is permeable, while the inner one is impermeable. The space between the two membranes is known as periplastidial space. The space inside the inner membrane is known as stroma. It contains enzymes related to dark reaction of photosynthesis. Chloroplasts contain some amount of DNA which is present in the stroma. In higher plants, the stroma contains small cylindrical structures called grana. Each granum contains 5 to 25 thylakoids placed one above the other. The grana are

inter-connected by fine tubules known as stroma lamella. Light reaction of photosynthesis takes place in the grana.

Functions:

1. To carry out the process of photosynthesis.
2. They contain some amount of DNA and are thus associated with cytoplasmic inheritance.

Question:

1. Draw a neatly labeled diagram of a chloroplast.

7. PEROXISOME:

- It is a lipid bilayer membrane and helps in glyoxylate metabolism.

8. SPHAEROSOME:

- A small organelle plant cell bounded by a single membrane.
- It helps in synthesis and storage of food.

9. NUCLEUS

Nucleus is called the “**controlling centre**” of a cell. It is usually of spherical or oval shape and is generally larger in active cells than in resting cells.

Structure:

A nucleus consists of three main parts viz. nuclear envelope, nucleolus and chromatin.

Nuclear envelope constitutes outer boundary of the nucleus and appears as a double layered membrane composed of lipo-proteins. The space between the outer and inner membrane is known as perinuclear space and is about 200 angstroms wide. The envelope has many small apertures known as nuclear pores which provide direct connection between nucleus and cytoplasm.

Nucleolus is a spherical, colloidal body found in the nucleus. It is associated with a specific region of a particular nucleolar organizing chromosome. It disappears during prophase of mitosis and meiosis and reappears during telophase.

Chromatin refers to DNA + Proteins such as histones. It is a basic unit of chromosomes and contains genes which play an important role in the inheritance of characters from the parents to offspring.

Functions:

1. To regulate growth and reproduction of cells.

Question:

1. Draw a neatly labeled diagram of a plant cell nucleus.

10. RIBOSOME

Ribosome's are spheroid structures occurring either freely in the cytoplasm or remain attached to the membranes of the endoplasmic reticulum. They are known as universal components of all biological organisms.

Each ribosome is composed of two subunits. One subunit is large in size and is dome shaped, while the other subunit is small in size and is placed under the larger sub unit, thus forming a cap like structure. In higher organisms, the large subunit is of 60s type and the smaller sub unit is of 40s type. The major components of ribosomes are RNA and proteins. There is no lipid content in ribosome.

Functions:

1. To carry out synthesis of proteins with the help of mRNA.

Question:

1. Draw a neatly labeled diagram of a plant ribosome.