Holy Faith Presentation School

ASSIGNMENT

CLASS: 9th

SUBJECT: BIOLOGY

SESSION: 2024-2025.

"Unit :- 2nd".

UNIT-2nd

Chapter no:- 1 The Fundamental units of life.

Remaining half.

Non Textual Ouestions

<u>Cell organelles</u>: - Small membrane bounded structures embedded in the cytoplasm are known as cell organelles.

1. Endoplasm reticulum: - It was discovered and named so by Porter. Endoplasmic reticulum is an interconnected system of membrane lined channels that runs through the cytoplasm. At places it is connected with the plasma membrane or plasma lemma as well as with the nuclear envelope.

Endoplasmic reticulum is quite extensive in metabolically active cells. e. g. Pancreas and liver, simple in storage cells e. g. adipose cells, reduced in spermatocytes and absent in eggs, mature erythrocytes, embryonic cells. E. R is of two main types.

Rough E. R: - This type has ribosomes on the surface. It is well developed in cells actively engaged in protein synthesis. The Rough E.R is more stable than the smooth E. R. In pancreatic exocrine cells only granular E. R is found. In liver cells, the RER is distributed through the cytoplasm in the form of groups.

Smooth E. R: - The smooth Endoplasmic reticulum membranes are not covered with ribosomes. It is characteristic of cells in which synthesis of non - protein substances like phospholipids, glycolipids and steroid hormone takes place e. g. Adipose tissue cells, Adrenocortical cells and interstitial cells of testis. SER is usually tubular and cisternae are rare.

Functions:-

1. Mechanical support:-E. R contributes to the mechanical support of the cytoplasm.

2. **Transport:** - The E. R acts as an intracellular transport system of various substances. Watson (1959) has suggested that exchange between the nucleus and the cytoplasm takes place through nuclear opening which communicates with the E R.

3. Detoxification: - E. R helps in detoxification of many endogenous and exogenous compounds.

4. Storage: - E. R helps in temporary storage of materials e.g. lipids.

5. Lipid synthesis: - The S E R is concerned with synthesis of lipids e. g. Triglyceride.

6. **Protein synthesis:** - The E. R is the site of secretion of secretory proteins, proteins are synthesized on the ribosomes and enter the E. R cisternae through channels in the membrane .The proteins leave E. R and enter the Golgi complex for reprocessing.

7. Synthesis of nuclear membrane:-E. R is the source of nuclear membrane at the time of cell division.

<u>Ribosomes</u>: - Ribosomes are sub microscopical dense granules about 150 to 250 Angstrom in diameter and have been seen by Plade in 1995 under electron microscope. They are the sites of protein synthesis. Chemically, the ribosome is composed of RNA and proteins, almost in equal proportion.

Location: - Ribosomes are present.

- 1. Attached to RER.
- 2. In the cytoplasm, either singly (monosomes) or in groups called polysomes or polyribosomes.
- 3. In the mitochondria.
- 4. In the chloroplast.

Functions :- Ribosomes help in protein synthesis inside the cell. Hence, they are called protein factories of the cell. At the time of protein synthesis, ribosomes are attached to RNA and form a structure called polyribosome, which is the site of protein synthesis.

Golgi complex :- The Golgi complex first discovered by Camillo Golgi, consists of a system of membrane bound vesicles arranged approximately parallel to each other in stacks called cisterns. These membrane often have connections with the membranes of ER and therefore constitute another portion of a complex cellular membrane system. The material synthesized near the ER is packed and dispatched to various targets inside and outside the cell through the Golgi complex .Its functions include the storage, modification and Page **3** of **9**

packaging of products in vesicles. In some cases, complex sugars may be made from simple sugars in the Golgi complex. The Golgi complex is involved in the formation of lysosomes.

Functions :-

1. Cell plate formation :- In plant cells during the division, the Golgi bodies secrete materials (cellulose, pectin) for the cell plate formation which is then transformed in the cell wall.

2. Cell membrane proliferation :-For the growth of plasma membrane, the proteins are secreted by Golgi complex in the membrane bound by vesicles.

3.Lysosome Formation :- The primary lysosomes are formed from Golgi cisternae.

4. Acrosome Formation :- The Acrosome is found in the sperm cells of most animals. It assists in the fertilization of ovum. The Acrosome is formed by a single large Golgi body present in the sperm cell.

Lysosomes: - Lysosomes are small spherical vesicles covered by a single membrane which contains digestive enzymes for the intracellular digestion and waste disposal. Because of their function in intracellular digestion, lysosomes are called digestive bags. The digestive (Hydrolytic) enzymes contained in lysosomes are synthesized by RER. In damaged cell, lysosomes burst to release enzymes for digestion of cellular compounds, because of their ability to kill and digest cellular components, lysosomes are called suicide bags.

Function: - 1. They help in intracellular digestion of food particles.

2. They help in removing dead and worn out cellular organelles by digesting them.

3. They help in the destruction of foreign particles (bacteria and viruses) so they provide protection to the body.

<u>Mitochondria</u>: - are rod shaped or sausage shaped cell organelles of aerobic Eukaryotes which take part in part of aerobic respiration called Krebs cycle. Mammalian RBCs are devoid of them. Mitochondria are commonly known as "Power house of the cell" because they contain enzymes necessary for the total oxidation of food and for release of high

amount of energy in the form ATP for synthesis of new chemical compounds and for mechanical work. ATP is also known as energy currency of the cell.

Each mitochondrion is bounded by two membranes. The outer membrane is smooth and porous where as inner membrane is folded inwards to form cristae. Cristae increase the surface area for ATP generating chemical reactions. Mitochondria enclose a matrix having DNA, ribosomes and enzymes. Enzymes take part in respiration. DNA and ribosomes make the mitochondria "semi - autonomous "as they are able to manufacture some of their proteins and enzymes.

Functions: - 1. Mitochondria help in the transport of ATP, they collect at sites where energy requirement is high.

2. Due to the presence of RNA, DNA and ribosomes, proteins can be manufactured in mitochondria.

3. Some of the enzymes have been located in mitochondria, which helps in the synthesis of lipids, fatty acids and glycerol.

<u>Plastids :-</u> Plastids are small bodies found free in the cytoplasm of most plant cells. They are absent in Bacteria , Fungi, Cynobacteria. There are three types of Plastids.

- 1. Chloroplast:- The green Plastids are called chloroplasts. They are meant for photosynthesis as they contain chlorophyll. They are generally elliptical, bounded by a double membrane. Inside is a matrix called stroma concerned with dark reaction. The lamellae may occur in the form of Thylakoids while stacks of Thylakoids form Grana.
- 2. Chromoplasts :- They contain carotenoid pigments. They are red to yellow in colour and much more variable in shape. They impart specific colours (other than green) to various plant tissues, fruits and flowers. They are most abundant in the petals of flower and attract the insects for cross pollination.
- Leucoplasts :- Plastids without pigments are called Leucoplasts. They are found in embryonic and sexual cells, and in the region of the plant not receiving light. Leucoplasts helps in storage of starch, oil and proteins.

Functions :- 1. Decomposition of water and liberation of oxygen to purify atmosphere.

- 2. Chloroplast stroma contains enzymes for conversion of carbon dioxide into carbohydrates.
- 3. Some lipids and proteins are also synthesized by them.
- 4. The lamellae are represented as the sites of enzyme activities associated with the conversion of light energy into chemical energy.

<u>Vacuole</u>: The term vacuole is derived from "vaccus" which means empty. It is a membrane bound sac with little or no internal structure. It usually contains water and many dissolved substances. It's membrane is called Tonoplast. The fluid present inside the vacuole is called sap. It contains H2o, minerals, salts, sugar, amino acids etc. There are three types of vacuoles depending upon what they store.

- 1.Food vacuole.
- 2. Gas vacuole.
- 3. Contractile vacuole.

Functions :-

- 1. Osmosis regulation and excretion.
- 2. Storage.
- 3. Maintains turgidity and rigidity.
- 4. It act as a dump house of waste products in plant cells.

"The fundamental units of life".

Remaining Textual Questions.

Q10. Why are Lysosomes known as suicide bags?

Ans: Lysosomes are a waste disposal unit of the cell. These break up foreign materials (food, bacteria etc.) and even old organelles into smaller pieces with the help of powerful digestive enzymes they contain. When the cell gets damaged due to some metabolic disturbances, lysosomes may burst and the enzymes digest their own cells. Therefore lysosomes are known as suicide bags.

Q11. Where are proteins synthesized inside the cell?

Ans: Proteins are synthesized by ribosomes which are attached to the rough E.R. (Endoplasmic reticulum).

Q12. Make a comparison and write down ways in which plant cells are different from animal cells.

 Larger in size. Enclosed by a tough cell wall and plasma membrane. Centrosome is absent. Plastids present. Vacuoles are large and centrally located. Clearly defined Golgi apparatus is scattered and are called dictyosomes. Dalar care againt in the formation of specific process. Smaller in size. Enclosed by plasma membrane only. Centrosome is present. Plastids absent. Plastids absent. Vacuoles are large and centrally located. Clearly defined Golgi apparatus is scattered and are called dictyosomes. Dalar care againt in the formation of specific process. 	Plant cell.	Animal cell.
• Polar caps assist in the formation of spindle at the time of cell division. of cell division.	 Lancen. Larger in size. Enclosed by a tough cell wall and plasma membrane. Centrosome is absent. Plastids present. Vacuoles are large and centrally located. Clearly defined Golgi apparatus is scattered and are called dictyosomes. Polar caps assist in the formation of spindle at the time of cell division. 	 Smaller in size. Enclosed by plasma membrane only. Centrosome is present. Plastids absent. Vacuoles are small and scattered. Clearly defined Golgi apparatus is present near the nucleus. Centrosome is responsible for the formation of spindle at the time of cell division.

Q13. How is a Prokaryotic cell different from a Eukaryotic cell?

<u>Prokaryotic cells</u> .	Eukaryotic cells.
• Generally smaller in size.	• Generally larger in size.
• Nuclear material is not surrounded by a	• A nucleus with nuclear
nuclear membrane.	membrane is present.
• A chromosome is represented by a	• Generally more than one
large single DNA.	Chromosome is present which are
• Membrane bound organelles are absent.	made up of DNA and proteins.
• Cell division is not by mitosis.	Membrane bound organelles are
	present.
	• Cell divides by mitosis and
	meiosis.

Q14.What would happen if the plasma membrane ruptures or breaks down?

Ans: The plasma membrane is a selectively permeable membrane which forms the boundaries of the cell and maintains the internal structure and composition of the cell.

If it ruptures or breaks down then:

- There will be no control on exit or entrance of substances leading to loss of useful substances from the cell or even some harmful materials may move into the cell.
- Due to disruption of boundaries, the internal and external environment of the cell will be same, so there will be no proper diffusion or osmosis.
- The cell will lose its shape. The metabolism of the cell may be so affected that the cell may even die.

Q15. What would happen to the life of a cell if there was no Golgi apparatus?

Ans: Golgi apparatus package and dispatches material synthesized in endo- plasmic reticulum.

So, if there was no Golgi apparatus then.

a) The packaging and dispatching of various proteins within and outside the cell will be affected.

b) Complex sugar, from simple sugar will not be synthesized in some cases.

c) The storage and modification of various products will be affected.

d) Formation of lysosomes will be affected. This will cause accumulation of worn out and dead cell organelles inside the cell. The digestive enzymes which were enclosed in

lysosomes will remain free in the cytoplasm, which may kill other cell contents and may lead to the death of cell.

Q16. Which organelle is known as the power house of the cell? Why?

Ans: Mitochondrion is known as the power house of the cell. This is called so because mitochondrion contains oxidative enzymes which breakdown the food during cellular respiration and release energy. This energy is in the form of ATP molecules and is used for various life activities by the cell.

Q17.Where do the lipids and proteins constituting the cell membrane get synthesized?

Ans: **<u>lipids:</u>** These are synthesized in smooth Endoplasmic Reticulum.

Proteins: These are synthesized in ribosomes, attached to the Rough Endoplasmic reticulum.