NCERT Solutions for Class-XI Biology

Chapter-8

1. Which of the following is not correct?
(a) Robert Brown discovered the cell.
(b) Schleiden and Schwann formulated the cell theory.
(c) Virchow explained that cells are formed from pre-existing cells.
(d) A unicellular organism carries out its life activities within a single cell.

1. (a) Robert Hooke discovered the celland Robert Brown discovered nucleus in the cell.

2. New cells generate from
(a) bacterial fermentation
(b) regeneration of old cells
(c) pre-existing cells
(d) abiotic materials

2. (c) According to the biogenic theory, new cells can only arise from pre-existing cells. Only complete cells, in favourable conditions, can give rise to new cells.

3. Match the following

(a) Cristae	(i) Flat membranous sacs in stroma
(b) Cisternae	(ii) Infoldings in mitochondria
(c) Thylakoids	(iii) Disc-shaped sacs in Golgi apparatus

3.

(a) Cristae	(ii) Infoldings in mitochondria
(b) Cisternae	(iii) Disc-shaped sacs in Golgi apparatus
(c) Thylakoids	(i) Flat membranous sacs in stroma

4. Which of the following is correct:
(a) Cells of all living organisms have a nucleus.
(b) Both animal and plant cells have a well defined cell wall.
(c) In prokaryotes, there are no membrane bound organelles.
(d) Cells are formed de novo from abiotic materials.

4. (c) Membrane-bound organelles are organelles surrounded by a double membrane. Nucleus, mitochondria, chloroplasts, etc., are examples of such organelles. These cell organelles are absent from prokaryotes.

5. What is a mesosome in a prokaryotic cell? Mention the functions that it performs.

5. Mesosome is a membranous structure in prokaryotic cell, which is formed by the extensions of the plasma membrane into the cell in form of vesicles, tubules and lamellae. Mesosomes are equal to mitochondria in eukaryotes, as they perform aerobic cellular respiration in prokaryotes. It helps in DNA replication and distribution of

genetic material to daughter cells. Mesosomes also help in respiration, increase the surface area of the plasma membrane and enzymatic content and cell wall formation.

6. How do neutral solutes move across the plasma membrane? Can the polar molecules also move across it in the same way? If not, then how are these transported across the membrane?

6. Plasma membrane is the outermost covering of the cell that separates it from the environment. It regulates the movement of substances into the cell and out from it. It allows the entry of only some substances and prevents the movement of other materials. Hence, the membrane is selectively-permeable.

Movement of neutral solutes across the cell membrane – Neutral molecules move across the plasma membrane by simple passive diffusion. Diffusion is the movement of molecules from a region of higher concentration to a region of lower concentration.

Movement of polar molecules across the cell membrane – The cell membrane is made up of a phospholipid bilayer and proteins. The movement of polar molecules across the non-polar lipid bilayer requires carrier-proteins. Carrier-proteins are integral protein particles having certain affinity for specific solutes. As a result, they facilitate the transport of molecules across the membrane.

7. Name two cell-organelles that are double membrane bound. What are the characteristics of these two organelles? State their functions and draw labelled diagrams of both.

7. Mitochondria and chloroplast are double membrane bound organelles. Mitochondria: Mitochondria are cylindrical or sausage shaped cell organelles and contains two membranes, outer and inner. The inner compartment is called the matrix containing DNA, RNA, ribosomes, enzymes of Krebs cycle etc and outer membrane forms the continuous limiting boundary of the organelle. Inner membrane forms number of infoldings called the cristae which increases the surface area. Oxysomes are present on inner mitochondrial membrane. Mitochondria are semiautonomous organelles, i.e., have their own DNA and ribosomes.

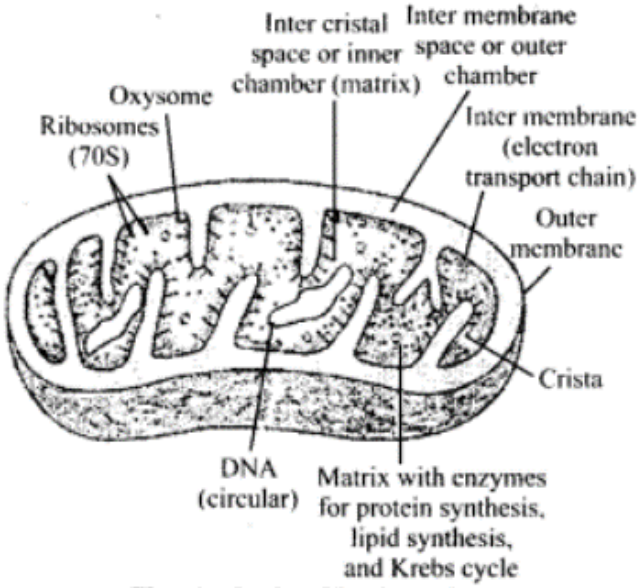


Fig.: A mitochondrion in section.

Functions of mitochondria:

- Mitochondria are essential for aerobic respiration.
- Mitochondria provide intermediates for synthesis of important biomolecules such as chlorophyll, cytochrome, steroids etc.
- Mitochondria regulate the calcium ion concentration in the cell.
- Mitochondrial matrix contains enzymes for the synthesis of fatty acids.
- Synthesis of many amino acids takes place here

Chloroplast: They are green coloured plastids which are disc shaped. The space limited by inner membrane of chloroplast is called as stroma. Stroma has organised flattened membranous sacs called the thylakoids. Thylakoids are arranged in stacks called grana. Matrix of a chloroplast contains DNA, RNA, ribosomes and enzymes. Chloroplast is also a semiautonomous organelle.

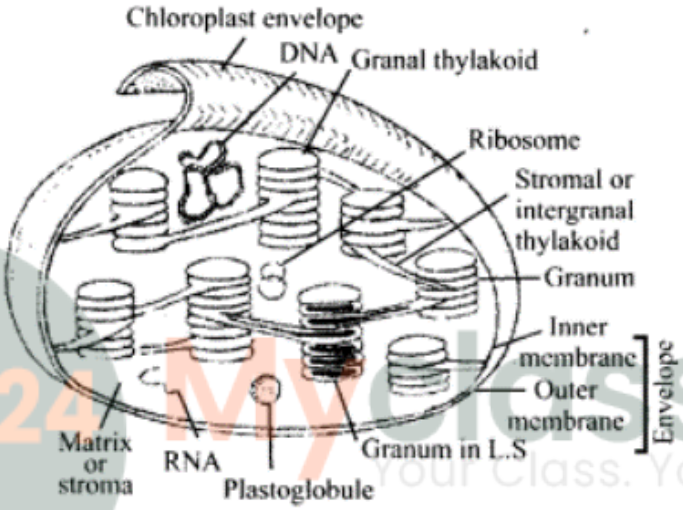


Fig.: 3-dimensional structure of a chloroplast.

Functions of chloroplast:

- Photosynthesis is performed by chloroplast.
- Chloroplast stores starch grains.
- Maintains balance of C02 concentration in the air.
- Keeps oxygen balance constant in atmosphere by liberating 02 into the atmosphere, used during respiration and combustion.

8. What are the characteristics of prokaryotic cells?

8. Prokaryotic cell is a unicellular organism lacking membrane-bound organelles.

The characteristics of prokaryotic cells are as follows:

- Most of them are unicellular.
- They are generally small in size. The size of a prokaryotic cell varies from 0.5 – 5 µm.
- The nuclear region of a prokaryotic cell is poorly-defined because of the absence of a nuclear membrane. Hence, a prokaryotic cell lacks a true nucleus.
- The genetic materials of prokaryotic cells are naked. They contain single, circular chromosomes. In addition to the genomic DNA, they have a small, circular plasmid DNA.
- They have specialised membranous structures called mesosomes. Mesosomes are formed by the invagination of the cell membrane. These extensions help in the synthesis of the

cell wall, replication of DNA. They also help in the equal distribution of chromosomes into the daughter cells.

- Membrane-bound cell organelles such as mitochondria, plastids, and endoplasmic reticulum are absent from a prokaryotic cell.
- Most prokaryotic cells contain a three-layered structure – outermost glycocalyx, middle cell wall, and the innermost plasma membrane. This structure acts as a protective unit.

Examples of prokaryotic cells include blue green algae, bacteria, etc.

9. Multicellular organisms have division of labour. Explain.

9. Division of labour is differentiation of certain components or parts to perform different functions for increased efficiency and higher survival. Multicellular organisms often possess millions of cells. Various cells are grouped together to form specific tissue, organ or organ system, with each specialised to perform particular function. Every cell of a multicellular organism cannot obtain food from outside. The organism requires a system for obtaining food, its digestion and distribution. Therefore, a digestive system and system of transport are also required. Certain cells of the body take over the function of reproduction. Others take part in repair and replacement of worn out or injured portions. For optimum functioning of cells, a multicellular organism also requires an internal favourable environment. Therefore, multicellular organisms come to have division of labour.

10. Cell is the basic unit of life. Discuss in brief.

10. Cells are the basic units of life capable of doing all the required biochemical processes that a normal cell has to do in order to live. The basic needs for the survival of all living organisms are the same. All living organisms need to respire, digest food for obtaining energy, and get rid of metabolic wastes. Cells are capable of performing all the metabolic functions of the body. Hence, cells are called the functional units of life.

11. What are nuclear pores? State their function.

11. Nuclear envelope bounds the nucleus from outside and separates it from cytoplasm. It consists of two membranes, with outer membrane continuous with endoplasmic reticulum. The nuclear envelope is interrupted by minute nuclear pores, at a number of places, which are produced by the fusion of its two membranes. These nuclear pores are the passages through which movement of RNA and protein molecules takes place in both directions between the nucleus and the cytoplasm.

12. Both lysosomes and vacuoles are endomembrane structures, yet they differ in terms of their functions. Comment.

12. Lysosomes are membrane-bound vesicular structures holding a variety of enzymes such as lipases, proteases, and carbohydrases. The purpose of lysosomes is to digest worn out cells. They are involved in the intracellular digestion of foreign food particles and microbes. Sometimes, they also act as suicidal bags. They are involved in the self digestion of cells. They are a kind of waste disposal systems of a cell. On the other hand, vacuoles are storage sacs found in cells. They might store the waste products of

cells. In unicellular organisms, the food vacuole contains the consumed food particles. It also plays a role in expelling excess water and some wastes from the cell.

13. Describe the structure of the following with the help of labelled diagrams.
(i) Nucleus (ii) Centrosome

13. **(i) Nucleus:**

Nucleus is double membrane bound principle cell organelle which contains all genetic information for controlling cellular metabolism and transmission of genetic information.

Nucleus is differentiated into following four parts:

(a) Nuclear envelope: It is a double membrane bound envelope that surround the nucleus and separates the latter from the cytoplasm.

(b) Nucleoplasm: Itis clear, non-staining, fluid material present in the nucleus, which contains raw materials (nucleotides), enzymes (DNA/RNA polymerases) and metal ions for the synthesis of RNAs and DNA. The nuclear matrix or the nucleoplasm is composed of nucleolus and chromatin.

(c) Nucleolus: It is a naked, round and slightly irregular structure, which is attached to the chromatin at a specific region. It is a site for active ribosomal RNA synthesis.

(d) Chromatin : It has the ability to get stained with certain basic dyes. It is known to be the hereditary DNA protein fibrillar complex. The chromatin fibres are distributed throughout the nucleoplasm.

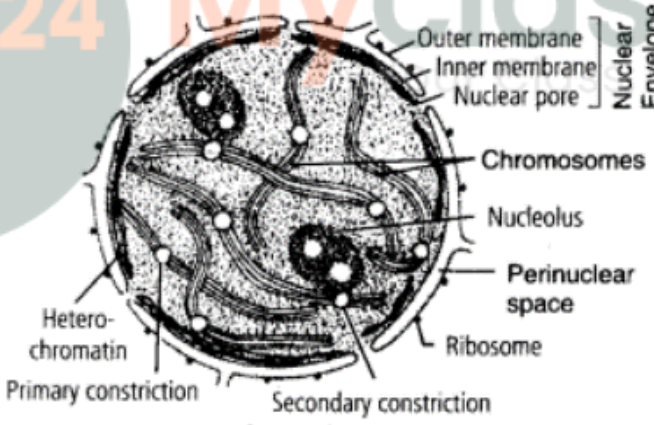


Fig : Nucleus

(ii) Centrosome: Centrosome is an organelle usually containing two cylindrical structures called centrioles. They are surrounded by amorphous pericentriolar materials. Both the centrioles in a centrosome lie perpendicular to each other. They are made up of nine evenly spaced peripheral fibrils of tubulin protein. Each of the peripheral fibril is a triplet. The adjacent triplets are also linked. The hub of centriole is connected with tubules of the peripheral triplets by radial spokes made of protein.

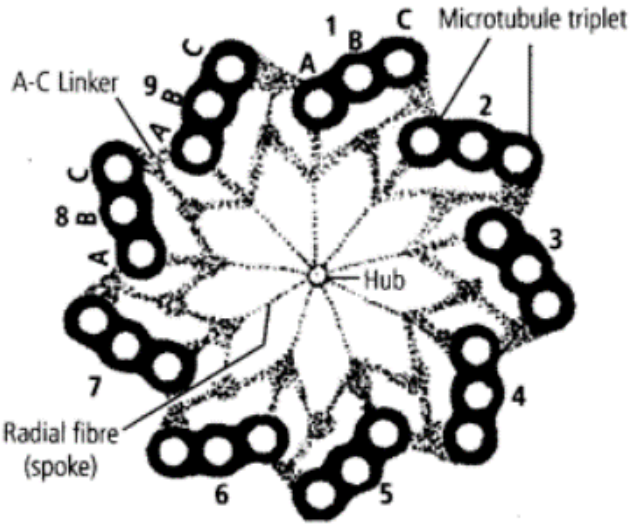


Fig : T. S. of centriole

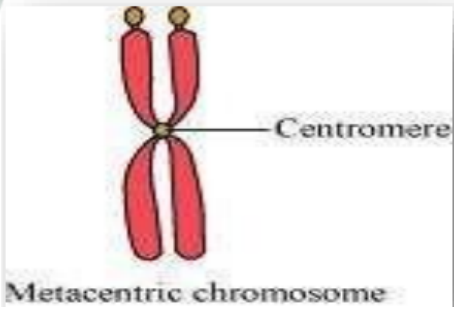
14. What is a centromere? How does the position of centromere form the basis of classification of chromosomes. Support your answer with a diagram showing the position of centromere on different types of chromosomes.

14. Centromere is a constriction present on the chromosomes where the chromatids are held together.

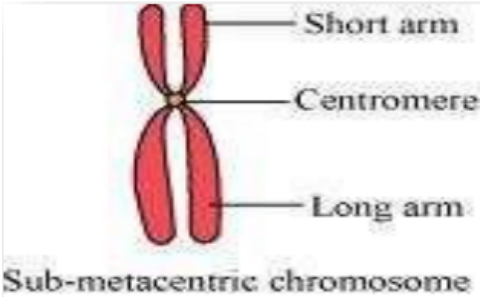
Chromosomes are divided into four types based on the position of the centromere.

(i) Metacentric chromosome

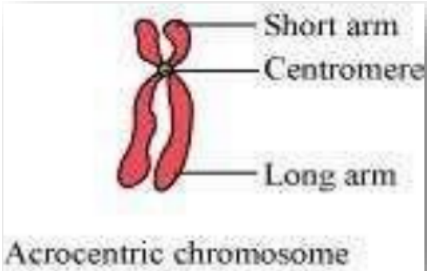
The chromosomes in which the centromere is present in the middle and divides the chromosome into two equal arms is known as a metacentric chromosome.



(ii) Sub-metacentric chromosome The chromosome in which the centromere is slightly away from the middle region is known as a sub-metacentric chromosome. In this, one arm is slightly longer than the other.

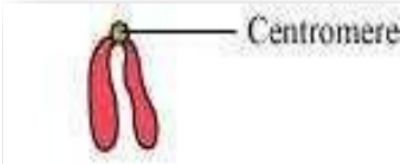


(iii) Acrocentric chromosome The chromosome in which the centromere is located close to one of the terminal ends is known as an acrocentric chromosome. In this, one arm is extremely long and the other is extremely short.



Acrocentric chromosome

(iv) Telocentric chromosome The chromosome in which the centromere is located at one of the terminal ends is known as a telocentric chromosome.



Telocentric chromosome

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