EXERCISE QUESTIONS

CHAPTER - 8 CELL: THE UNIT OF LIFE

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.

Ans - (a) Robert brown discovered the cell.

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

Ans - (c) pre-existing cells

8.3 Match the following

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

Ans - a – (ii);
b – (iii);
c – (i).

8.4 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.

Ans - (c) In prokaryotes, there are no membrane-bound organelles

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

Ans - A prokaryotic cell's membranous structure known as a mesosome is created when the plasma membrane is extended within the cell in the form of vesicles, tubules, and lamellae. As they carry out aerobic cellular respiration in prokaryotes, mesosomes are equivalent to mitochondria in eukaryotes. It facilitates DNA replication and genetic material transfer to daughter cells. Mesosomes are also important for respiration, increasing the plasma membrane's surface area and enzyme content, and forming cell walls.

8.6 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?

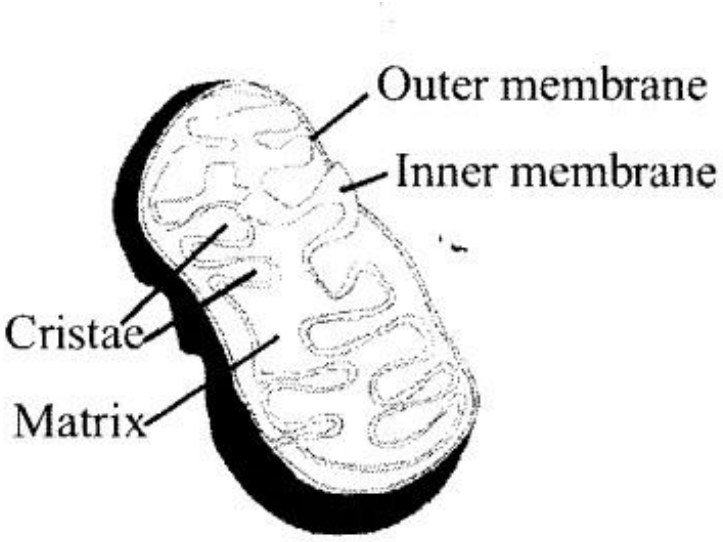
Ans - By simply diffusing along the concentration gradient, or from higher concentration to lower concentration, neutral solutes can pass through the membrane. Also possible is the movement of water from higher to lower concentrations through this membrane. Osmosis is the name for the diffusion-based movement of water. Polar molecules need a carrier protein of the membrane to help them cross the membrane because they cannot pass through the non-polar lipid bilayer.

A small number of ions or molecules are transported across the membrane against the gradient of their concentration, or from concentrations that are lower to higher. It is known as active transport and is an energy-dependent mechanism that makes use of ATP. example: Na'/K* Pump

8.7 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.

Ans -Mitochondria: Organelles bound by a double membrane include mitochondria and chloroplasts. Mitochondria are cylindrical or sausage-shaped cell organelles that are made up of an exterior and an inner membrane. The outer membrane serves as the continuous limiting barrier of the organelle, while the interior compartment is known as the matrix and contains DNA, RNA, ribosomes, Krebs cycle enzymes, etc. The cristae, or folds that the inner membrane forms, enhance the surface area.

On the inner mitochondrial membrane, oxysomes are visible. Since mitochondria contain their own DNA and ribosomes, they are semiautonomous organelles.



Mitochondria

What mitochondria do:

• Aerobic respiration depends on mitochondria.

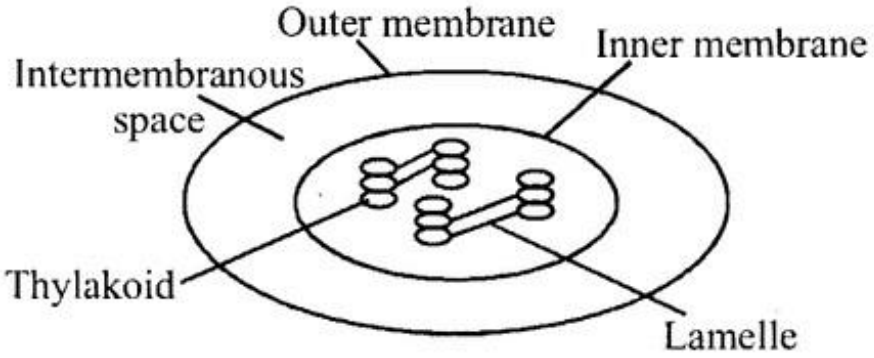
• Intermediates for the synthesis of crucial biomolecules including chlorophyll, cytochrome, steroids, etc. are provided by mitochondria.

:The concentration of calcium ions in a cell is controlled by mitochondria.

:The production of fatty acids is carried out by enzymes found in the mitochondrial matrix.

• Numerous amino acids can be produced here.

Chloroplast: These disc-shaped, green plastids are present in all living things. The term "stroma" refers to the area that the chloroplast's inner membrane restricts. The thylakoids, which are organised flattened membrane sacs, are present in stroma. Grana, which are stacks of thylakoids, are arranged. DNA, RNA, ribosomes, and enzymes are found in the chloroplast's matrix. Another semiautonomous organelle is the chloroplast.



Chloroplast

Functions of the chloroplast :

(i)The chloroplast's primary job is to capture solar energy and use photosynthesis to transform it into chemical energy for food.

(ii) Starch storage

(iii)Chromoplasts are transformed into chromoplasts in fruits and flowers

8.8 What are the characteristics of prokaryotic cells?

Ans - Mycoplasma, blue-green algae, bacteria, and PPLO are the prokaryotic cells (Pleuro Pneumonia-like organisms). Compared to eukaryotic cells, they typically have a smaller size and reproduce more quickly. Their size and shape might vary substantially. Bacillus (rod-like), Coccus (spherical), Vibrio (comma-shaped), and Spirillum are the four primary forms of bacteria (spiral).

Even while prokaryotes come in a vast range of shapes and functions, their basic organisational structure remains the same. A cell wall encloses the cell membrane in all prokaryotes. The cytoplasm is the fluid matrix that makes up each cell. There isn't a distinct nucleus. The lack of a nuclear membrane leaves the genetic material essentially bare.

Many bacteria have tiny DNA circles outside of their genomic DNA, which is the single chromosome or DNA circle. These smaller DNA circles are known as plasmids, and the plasmid DNA endows antibiotics with particular distinctive characteristics. Inclusions are something special that prokaryotes have.

Prokaryotes are distinguished by a specific, specialised type of the cell membrane known as the mesosome. Essentially, they are infoldings of the cell membrane.

8.9 Multicellular organisms have division of labour. Explain.

Ans - The diversification of certain components or pieces to execute distinct activities for better efficiency and higher survival is known as the division of labour. Millions of cells are frequently found in multicellular organisms. Each tissue, organ, or organ system is made up of a collection of different cells, each of which is specialised to carry out a certain function.

A multicellular organism cannot have nourishment from the outside coming into any of its cells. The organism needs a method for obtaining, digesting, and distributing food. Consequently, a digestive system and a transportation system are also necessary. The process of reproduction is taken up by some bodily cells. Others help with the maintenance and replacement of damaged or worn-out components. A multicellular creature also needs an ideal interior environment for cells to function well. Consequently, multicellular organisms develop

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

Ans - All living things are made up of tiny, discrete compartments or structures called cells, which are referred to as the basic unit of life. The 'building blocks' of life are these cells.

1. Since the cells carry out all living functions, including metabolism, response, and reproduction, they are actually regarded as the fundamental unit of life.

2. Only the cells of the organism carry out respiration, nourishment, and energy release.

3. Due to individual cell reproduction, even plants and animals reproduce.

4. Cells divide and grow, leading to growth.
Every aspect of an amoeba's life is carried out within the confines of a single cell.

5. The only distinction between them and unicellular creatures is that multicellular organisms have bodies formed of many cells.

6. The cells in these species organise themselves into tissues rather than acting independently. Each tissue is tailored to carry out particular tasks. The various tissues are then arranged into tissues.

7. Each tissue is tailored to carry out particular tasks. Then, various tissues are arranged into organs that carry out particular activities.

8. Organ systems are ultimately formed by the organisation of various organs. Now it should be abundantly evident that cells are the only components of tissues, organs, and organ systems.

9. The organisms' tissues, organs, and organ systems function because the cells do.

10. The cells are the fundamental component of life since they are the structural and functional unit of living things.

8.11 What are nuclear pores? State their function.

Ans - The nucleus is bound from the outside and separated from the cytoplasm by the nuclear envelope. It is made up of two membranes, the outer one of which is joined to the endoplasmic reticulum. The merging of its two membranes results in tiny nuclear pores, which are found in several locations along the nuclear envelope.

These Nuclear pores are the channels that allow RNA and protein molecules to travel back and forth from the nucleus to the cytoplasm.

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

Ans - Lysosomes and vacuoles are endomembrane system organelles that work in close synchronisation with one another while being specialised for distinct tasks. As they contain hydrolytic digestive enzymes, lysosomes aid in food digestion by breaking down old and dead cells.

They also participate in cell division. Contrarily, vacuoles in amoeba (contractile vacuole) aid in excretion and osmoregulation or give prokaryotes buoyancy and mechanical strength (air vacuoles).

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

Ans - (i) Nucleus: The nucleus is the primary cell organelle that is double membrane bound and houses all of the genetic material needed to control cellular metabolism and transmit genetic material.

The nucleus is divided into the following four components:

(a) Nuclear envelope: The nucleus is surrounded by a twofold membrane-bound envelope that divides it from the cytoplasm.

(b) Nucleoplasm: This transparent, non-staining fluid substance found in the nucleus contains metal ions, enzymes (DNA/RNA polymerases), and nucleotides, which are the building blocks for the creation of RNA and DNA.
Nucleolus and chromatin make up the nuclear matrix, or nucleoplasm.

(c) Nucleolus: A nucleolus is a naked, circular, somewhat asymmetrical structure that is affixed to the chromatin at a particular location. It is a location for ribosomal RNA synthesis in action.

(d) Chromatin: It can become discoloured by some common basic dyes. The hereditary DNA protein fibrillar complex is what is known to be present. The nucleoplasm contains a variety of chromatin fibres.

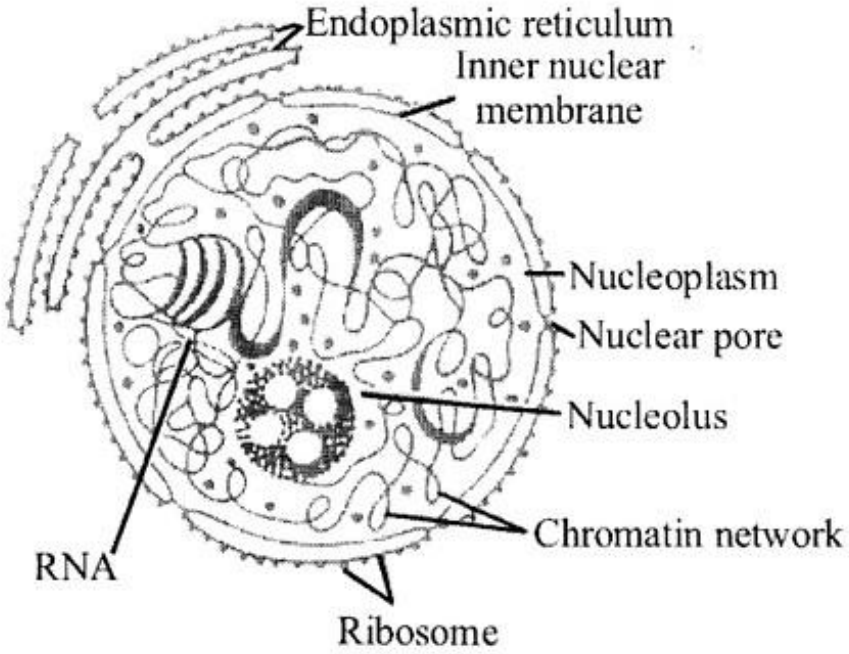


Fig. Nucleus

(ii) Centrosome:

1. Each centriole is revealed to be made up of nine sets of tubular structures arranged in a circular pattern under the electron microscope.

2. These groups are all triplets made up of three microtubules. The diameter of each microtubule is around 250A. The matrix contains the triplets.

3. The triplet sets sometimes seem to be connected to one another by fine strands.

4. Delicate strands that link the triplet sets to one another, creating the impression of a cartwheel, may also be seen radiating from the cylinder's central core.

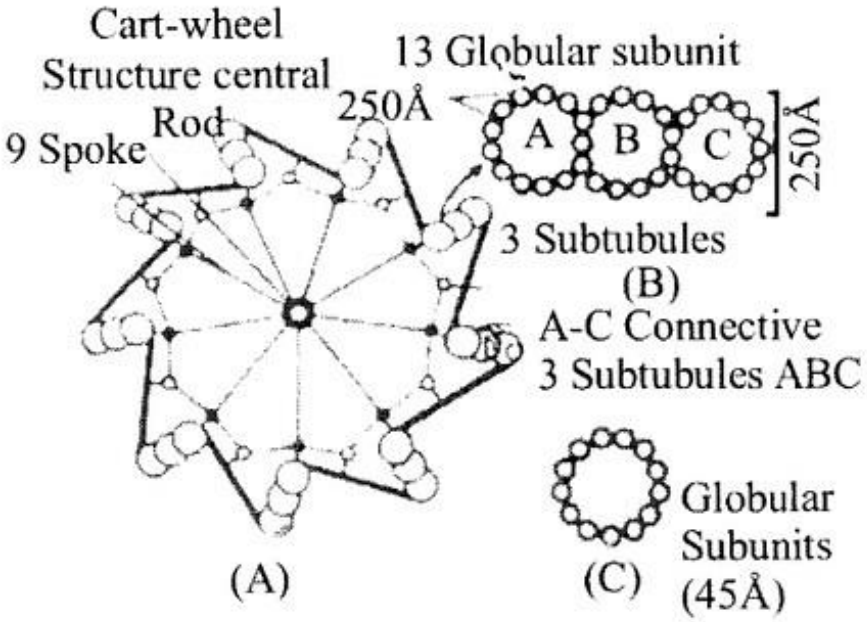


Fig. Centrosome

8.14 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.

Ans -

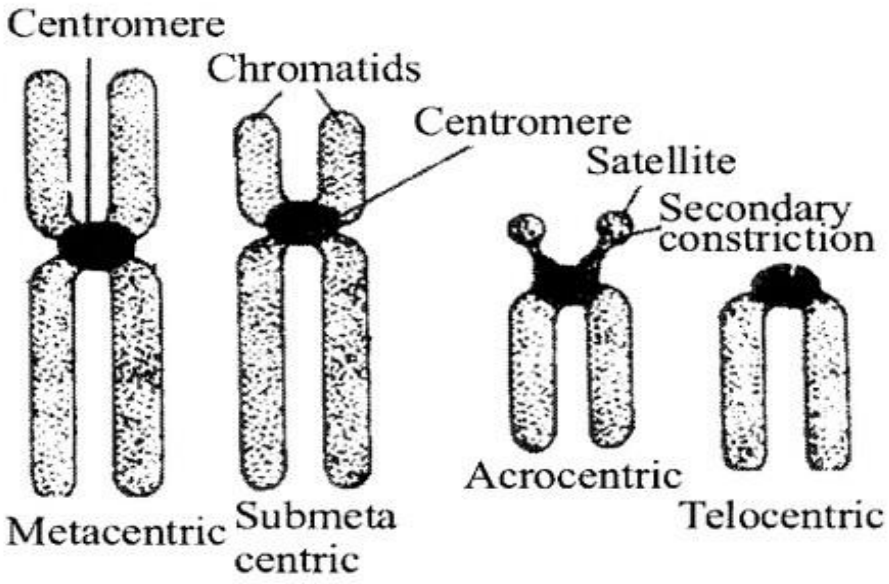


Fig. : Types of chromosomes

A chromosome is made up of two identical halves called chromatids that are kept together at a centromere. The major constriction is another name for the centromere. The kinetochore, a disc-shaped structure, is located on its side. According to where the centromere is located on the chromosome, there are four different types of chromosomes.

(i) Metacentric chromosome: This chromosome has a centromere in the centre and two nearly equal-length arms.

(ii) Submetacentric chromosome: One arm is somewhat shorter than the other because the centromere is a little off from the midway point.

(iii)Acrocentric chromosome: One arm is incredibly short and the other is incredibly long, with the centromere located close to the end.
The centromere is located at the terminal of the telocentric chromosome

(iv). Humans do not have these chromosomes.