CHAPTER

8

CELL: THE UNIT OF LIFE

CLASS 11TH

NCERT EXERCISE AND SOLUTIONS - BIOLOGY

Q. 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.

ANSWER:-

(a) Robert Brown discovered the cell.
This is incorrect because Robert Brown is credited with discovering the nucleus within the cell, not the cell itself.

Q. 2. **New cells generate from**

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

ANSWER:-

(c) pre-existing cells.

Q. 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**

ANSWER:-

(a) – (ii)
(b) – (iii)
(c) – (i)

Q. 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.

ANSWER:-

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

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

ANSWER:-

A mesosome is a distinctive membranous structure created by extensions of the plasma membrane into the cell. When it is connected to the nucleoid, it is referred to as a septal mesosome, while if it is detached from the nucleoid, it is called a lateral mesosome.

The functions of mesosomes include:

- Assisting in cell wall formation
- Aiding in DNA replication and its distribution to daughter cells
- Contributing to respiration and secretion by increasing the surface area of the plasma membrane and enhancing enzymatic content

Q. 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?**

ANSWER:-

Neutral solutes are lipid-soluble, allowing them to pass through the lipid bilayer. In contrast, polar molecules cannot cross the plasma membrane in the same manner as neutral solutes. They need specific hydrophilic regions for their movement. These molecules are transported through three types of mechanisms: ion channels, permeases, and active transport that uses ATP.

Q. 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.**

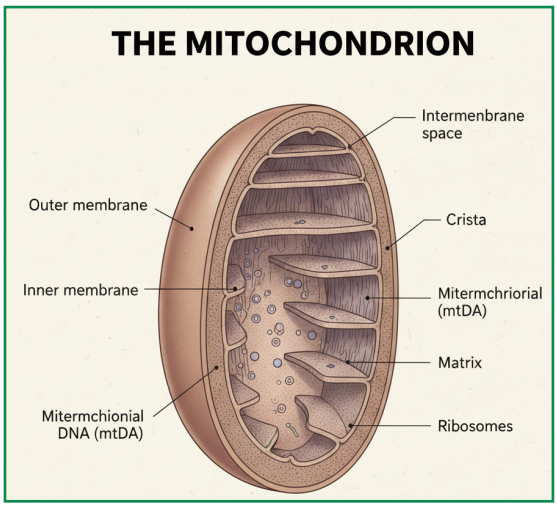
ANSWER:-

Two organelles that have double membranes are: i) Mitochondria and ii) Chloroplasts.

Characteristics of Mitochondria:

Mitochondria are double membrane-bound structures, with the outer and inner membranes creating two distinct aqueous compartments: the outer compartment and the inner compartment.

Mitochondria are semi-autonomous due to the presence of their own DNA. They are the site of aerobic respiration.



Characteristics of Chloroplasts:

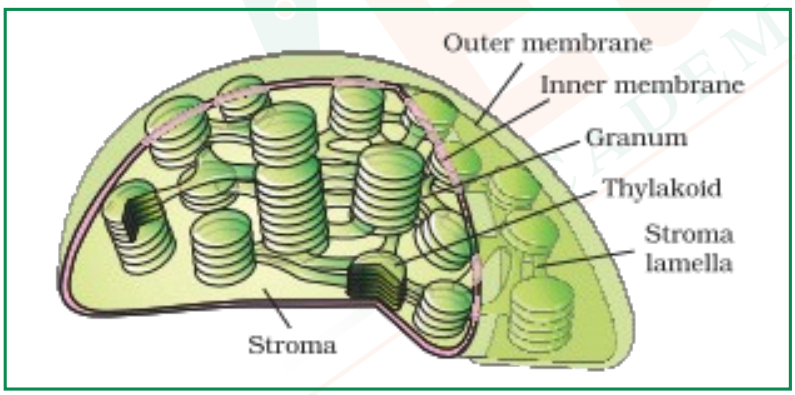
Chloroplasts are found in plants and euglenoids, with various shapes in lower plants and a disc shape in higher plants.

They contain specific pigments that give color to plant leaves.

Chloroplasts have their own DNA.

The pigments present in chloroplasts capture sunlight, aiding in photosynthesis.

The chloroplast contains membrane-bound, flattened sacs called thylakoids within its matrix. In some areas, thylakoids are stacked and referred to as grana.



Q. 8. What are the characteristics of prokaryotic cells?

ANSWER:-

The characteristics of prokaryotic cells are as follows:

- There is no nuclear membrane, and the genetic material is not enclosed in an envelope. The DNA is coiled in the cytoplasm and is called a genophore or nucleoid.
- They lack membrane-bound organelles and a membrane-bound nucleus.
- The cell lumen is filled with cytoplasm.
- The DNA in prokaryotic cells is located in the nucleoid region.
- The prokaryotic cell wall serves as a protective layer and helps maintain the cell's shape.
- Ribosomes are the only cytoplasmic organelles present in prokaryotic cells.

Q. 9. Multicellular organisms have division of labour. Explain.

ANSWER:-

Cells are organized into tissues, which then form organs and organ systems. A cell is an independent structure capable of performing functions on its own. However, the division of labour is necessary to ensure the efficient execution of various tasks, leading to enhanced efficiency and better chances of survival.

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

ANSWER:-

Each plant and animal are composed of organ systems, which in turn are made up of organs. Organs are formed by tissues, and tissues consist of groups of cells. As cells are independent structures capable of performing functions on their own, they are considered the fundamental unit of life.

Q. 11. What are nuclear pores? State their function.

ANSWER:-

The nuclear membrane is punctuated with small openings known as nuclear pores, which are formed by the fusion of two membranes. These pores are simple perforations in the nuclear envelope.

Functions:

- Maintains the shape of the nucleus
- Helps preserve the stability of genetic material by protecting it from degradation in the cytoplasm
- Facilitates the movement of RNA and protein molecules between the nucleus and cytoplasm in both directions

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

ANSWER:-

The endomembrane system is an intracellular network responsible for transporting materials within the cell via vesicles. Key components of this system include the vacuoles, plasma membrane, endoplasmic reticulum, lysosomes, and Golgi apparatus. Lysosomes, which are membrane-bound organelles, release digestive enzymes to break down damaged cells, earning them the nickname "suicidal bags." Vacuoles, on the other hand, help maintain cell shape and store substances such as food, water, and waste products.

Q. 13. Describe the structure of the following with the help of labelled diagrams.

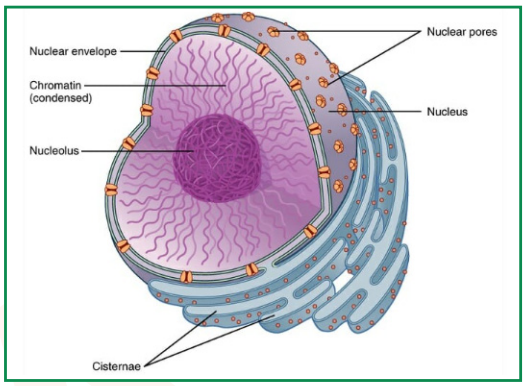
(i) Nucleus

(ii) Centrosome

ANSWER:-

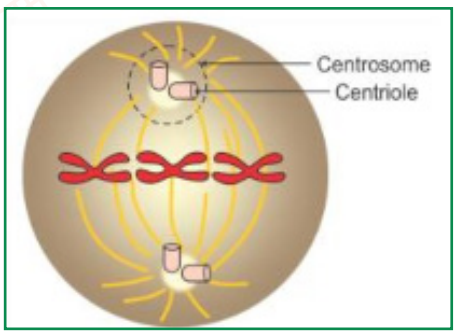
(i) Nucleus

The nucleus is a spherical or oval structure surrounded by a double membrane, housing the genetic material. It consists of five components: the nuclear envelope, nuclear matrix, nucleoplasm, nucleolus, and chromatin.



- **Nuclear envelope:** The nucleus is enclosed by a double membrane known as the nuclear envelope, which contains small pores. These pores act as channels, regulating the movement of substances in and out of the nucleus. The outer membrane is connected to the endoplasmic reticulum and contains ribosomes.
- **Nucleoplasm:** This fluid-filled substance within the nucleus contains enzymes, nucleosides, proteins, and other elements vital for the functioning of genetic material. It also houses the chromatin fibers and nucleolus.
- **Chromatin:** Found inside the nucleus, chromatin consists of fine thread-like structures made of DNA, histones (a type of protein), RNA, and non-histone proteins. During cell division, these chromatin fibers condense to form chromosomes.
- **Nucleolus:** Attached to the chromatin, the nucleolus is a round, irregularly shaped structure that is responsible for producing ribosomal subunits and synthesizing proteins.

(ii) Centrosome



It is made up of two cylindrical structures called centrioles, which are arranged perpendicularly to each other in a cartwheel pattern. These centrioles are surrounded by an amorphous pericentriolar material. Each centriole consists of nine evenly spaced peripheral fibrils made of tubulin protein, with each fibril forming a triplet, and adjacent triplets are linked together. At the center of the centriole is a proteinaceous hub, which is connected to the triplets by radial spokes. Centrioles play a crucial role in cell division by organizing the spindle fibers and astral rays.

Q. 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.

ANSWER:-

The primary constriction in a chromosome is called the centromere, which holds the two chromatids together.

Chromosomes can be classified into four types based on the position of the centromere:

- **Metacentric chromosomes** have the centromere at the center, resulting in two equal arms.
- **Submetacentric chromosomes** have the centromere slightly off-center, producing one shorter arm and one longer arm.
- **Acrocentric chromosomes** have the centromere near one end, leading to one very short arm and one very long arm.
- **Telocentric chromosomes** have the centromere located at the terminal end.