

The Cell

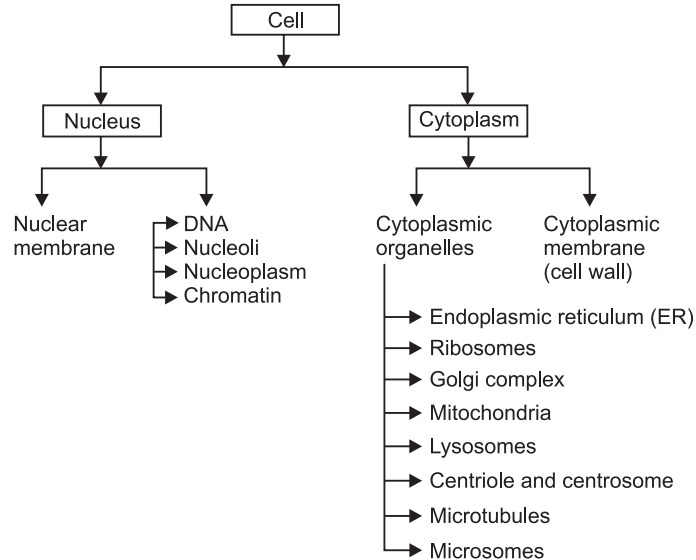
1 Define cell. Enlist different components/parts of cell. OR
Enlist different cellular components. (W.22)

Cell

The cell is the smallest, basic, living, structural and functional unit of the body.

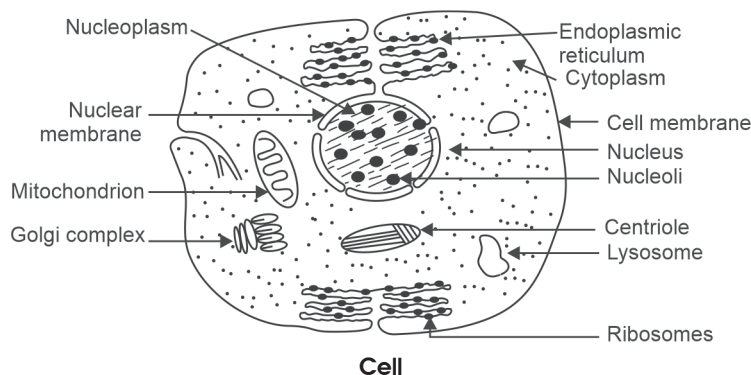
Different Components/Parts of Cell

Major intracellular organs/organelles are as follows.



2 Sketch and label a diagram of cell. (S.22, W.22,23)

Diagram of Cell



3 Write a short note on 1. Nucleus, 2. Endoplasmic reticulum, 3. Golgi complex, 4. Mitochondria, 5. Lysosomes, 6. Cell wall.

1. Nucleus

It is a spherical and largest part of the cell. It contains nuclear membrane, nucleoplasm, nucleoli and genetic material DNA. Nuclear membrane is continuous with endoplasmic reticulum.

Functions

- (i) It controls all cellular activities.
- (ii) It contains DNA, RNA and proteins.
- (iii) RNA helps in protein synthesis.
- (iv) DNA helps in production of chromosomes.

2. Endoplasmic Reticulum (ER)

It is a network of membrane continuous with cell membrane and nuclear membrane. It is of two types.

- (a) **Rough-surfaced ER:** Ribosomes are present at the outer border of the membrane.
- (b) **Smooth-surfaced ER:** Smooth-surfaced ER does not possess ribosomes at the outer border of the membrane.

Functions

- (i) It provides a surface area for a number of chemical reactions.
- (ii) It helps in synthesis of steroids, proteins, etc.
- (iii) It provides a pathway for transporting various chemical substances.
- (iv) It helps to concentrate the products of synthetic activities of the cell.

3. Golgi Complex/Golgi Apparatus

It consists of 4 to 8 flattened bag-like channels stacked upon each other with expanded areas at the ends. The structure looks like a network of fine threads or irregular granular material, hence called Golgi complex. It is located near the nucleus.

Functions

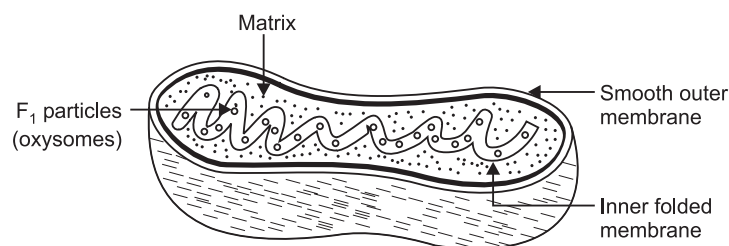
- (i) It helps in packaging of secretory proteins.
- (ii) It helps in synthesis of carbohydrates.
- (iii) It helps in intracellular sorting of proteins.

4. Mitochondria

(S.23)

Mitochondria are small intracellular organelles and are also known as powerhouse of cell or storehouse of energy.

It is bound by inner folded and outer smooth-surfaced membrane. Inner membrane has many cristae and is covered with F_1 particles.



Mitochondria

Functions

- (i) It is the main site of synthesis and storage of ATP.
- (ii) It is the site for citric acid cycle, β -oxidation and urea cycle, ETS, etc.
- (iii) It contains special DNA and is self-replicative.
- (iv) It performs the main function of conversion and transfer of cellular energy.

Physiology of Mitochondria

When nutrients and oxygen come in contact with oxidative enzymes present in the mitochondria, they combine to form CO_2 , water and liberated energy is utilised to synthesize ATP. The ATP then diffuses throughout the cells and releases its stored energy for performing cellular functions.

5. Lysosomes (Digestive Apparatus of Cell/Suicide Packets)

Lysosomes are described as a separate cytoplasmic organelles. These are membranous vesicles containing powerful digestive enzymes which are capable of breaking down many kinds of molecules.

Functions

- (i) It helps in intracellular digestion.
- (ii) Autolysis
- (iii) Phagocytosis
- (iv) Systematic growth and death can be managed by lysosomal activity.

6. Cell Membrane/Cytoplasmic Membrane/Plasma Membrane/Cell Wall

It is a membrane which covers and protects the cell and surrounds the cytoplasm. It separates the cells from each other and external environment.

The cell wall is composed of proteins, phospholipids, carbohydrates, minerals, etc.

Functions

- (i) It covers and protects the cell and organelles.
- (ii) It gives shape to the cell.
- (iii) It is involved in the transport of molecules in and out of the cells.
- (iv) It forms channels of endoplasmic reticulum (ER).
- (v) It forms boundaries to the cytoplasm.
- (vi) It can act as a physiological sieve (semipermeable membrane).
- (vii) It helps in intracellular adhesion and communication.

4 Explain physiology of cell wall.

Physiology of Cell Wall

The cell wall forms the boundary of the cell, inside which various organelles and protoplasm are present. The cell wall is mainly composed of proteins, carbohydrates, phospholipids, minerals, etc. The cell wall is a semipermeable membrane which acts as a sieve through which certain substances are allowed to enter the cell while some other substances are allowed to move outside the cell in the form of excreta.

The substances pass through semipermeable membrane and it depends upon their:

- (i) Particle size
- (ii) Concentration
- (iii) Lipid solubility
- (iv) Electrical charges
- (v) Presence of carrier molecules.

5 Why lysosomes are known as 'suicide bags'/suicide packets/digestive apparatus of the cell?

- ☞ • Lysosomes are membranous vesicles containing powerful digestive enzymes which are capable of breakdown of many kinds of molecules.
- Lysosomes are known as suicide bags of cell because they contain lytic enzymes capable of digesting cells and unwanted materials when lysosomes burst, the lytic enzymes within it spill all over the cell, rupturing the cell membrane or cell wall and inducing the death of cell. This is also known as autolysis.

6 Why mitochondria are called powerhouse/storehouse of cell (energy coin/storehouse of energy)? (S.24)

- ☞ • Mitochondria are tiny organelles present inside the cell.
- They are involved in release of energy from food. This is known as cellular respiration.
- They generate energy rich molecules ATP from cellular respiration which are later used for other processes.
- The energy is stored in the form of ATP.
- It is the main site for citric acid cycle, β -oxidation, urea cycle, ETS, etc. where, ATP is generated.

Hence, mitochondria are called the powerhouse of the cell.

7 What are various stages of cell reproduction or cell division?

☞ **Stages of Cell Reproduction**

1. Prophase
2. Metaphase
3. Anaphase
4. Telophase

OBJECTIVE QUESTIONS WITH ANSWERS IN BOLD LETTERS

1. **Cell** is the basic living structural and functional unit of the body.
2. **Lysosomes** organelle of the cell is concerned with autolysis.

3. **Mitochondria** are called the storehouse/powerhouse/energy coin of the cell.
4. Mitochondria are the storehouses or powerhouse of **ATP**.
5. **Lysosomes** are cell organelles called a suicidal bag.
6. **Albert von Kölliker** observed the 'mitochondria' first.
7. ATP is formed in **mitochondria**.
8. The most important function of endoplasmic reticulum is **protein synthesis**.
9. The major role of Golgi bodies is **glycosidation**.
10. **Mitochondria** are a site for citric acid, beta-oxidation, urea cycle and ETS, etc.
11. **Nucleus** controls all cellular activities.
12. Nucleoli are rich in **DNA, RNA and proteins**.
13. The rupture/breakdown of cell membrane or cell wall and inducing death of the cell is known as **autolysis**.
14. The study of human body cells is termed **cytology**.
15. The term "suicidal bags" is used for **lysosomes**.
16. The function of protein sorting, lipid sorting and secretion is performed by **Golgi complex**.
17. **Endoplasmic reticulum** is the centre of protein synthesis.
18. The network of endoplasmic reticulum is present in the **cytoplasm**.
19. Nucleus is the centre of **gene control**.
20. The **cell wall** is an outer covering of the cell.