

Chapter 1: The fundamental unit of life.

- 1) In 1665, Robert Hooke first discovered and named the cells.
- 2) Cell is the structural and functional unit of all living organisms.
- 3) Organisms may be unicellular or multicellular. A single cell constitutes the unicellular organism whereas many cells coordinately function in case of multicellular organism.
- 4) The size, shape and volume of the cell are related to the specific function that they perform.
- 5) A cell generally shows plasma membrane, nucleus and cytoplasm
- 6) Plasma membrane is a thin, selectively permeable membrane, covering the cell and is made up of lipids and proteins.
- 7) Functions of plasma membrane :
 - i) It separates the contents of a cell from its outside environment.
 - ii) It regulates the flow of substances to and from the cell through diffusion, facilitated diffusion, active transport and endocytosis.
- 8) Osmosis is diffusion of water through a selectively permeable membrane.
- 9) A cell placed in different solutions:
 - i. hypotonic solution : A cell placed in it will gain water.
 - ii. hypertonic solution: A cell placed in it will lose water: Also known as plasmolysis.
 - iii. isotonic solution: A cell placed in it will neither gain nor lose water

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10) Cells of Plants, fungi & bacteria: Contain both plasma membrane & cell wall.

Cell wall is rigid, non-living & outer most covering, composed mainly of cellulose.

11) When placed in hypertonic solution, a living plant cell shows plasmolysis

12) Cell wall provides mechanical strength to the cell. It permits the cell to withstand huge changes in the surrounding medium.

13) Nucleus is an important, spherical, usually centrally located constituent of the cell and is bounded by double layered nuclear envelope.

14) The nucleus of a dividing cell shows rod-shaped chromosomes, made up of DNA and proteins. In a non-dividing cell, the chromosomes elongate and take the form of thread-like chromatin.

15) DNA molecules are responsible for transmitting hereditary information from one generation to the next.

16) Nucleus controls all metabolic activities of the cell.

17) Depending on the presence or absence of nucleus, cells may be prokaryotic or eukaryotic.

i) Prokaryotic cells lack a well-defined nucleus and instead show nucleoid, an undefined nuclear region containing the genetic material.

ii) Eukaryotic cells possess a proper nucleus with nuclear membrane.

18) Cytoplasm is the fluid content of the cell, occurring between nucleus and

plasma membrane. It stores several vital chemicals and is the site of certain important metabolic pathways.

19) Several specialized cell organelles are present in the cytoplasm. These organelles perform different kinds of metabolic activities and are kept separate from each other.

20) The various cell organelles include endoplasmic reticulum, Golgi apparatus, lysosomes, mitochondria, plastids, vacuoles and centrosome.

21) Endoplasmic reticulum (ER) is an extensive, interconnected, membranebound network of tubes and sheets.

22) Ribosomes are attached to the surface of Rough Endoplasmic Reticulum (RER) and are absent in Smooth Endoplasmic Reticulum (SER)

23) Functions of ER :

- i) It synthesizes important proteins (RER) and lipids (SER).
- ii) It provides a pathway for intracellular transport of materials.
- iii) SER of liver cells is important for detoxification.

24) Golgi apparatus is a network of stacked, flattened, membrane bound sacs and vesicles.

25) Golgi apparatus carries out the storage, modification and packaging of substances manufactured in the cell and is also involved in lysosome formation.

26) The spherical, sac-like lysosomes contain powerful digestive enzymes and form the waste disposal system of the cell. They are also known as 'suicide bags'.

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27) Mitochondria and plastids are each covered by 2 membranes and possess their own DNA and ribosomes.

28) Mitochondria are the 'powerhouses of the cell', providing energy for various metabolic activities.

29) Chromoplasts and leucoplasts are the 2 types of plastids present in plant cells.

30) Chloroplasts are chromoplasts containing chlorophyll and carry out photosynthesis in plants.

31) Leucoplasts store starch, oil and protein granules.

32) The large central vacuole of mature plant cells provides turgidity to the cell and also stores important substances.

33) In unicellular organisms, vacuoles play important roles in nutrition and osmoregulation.

34) Ribosomes are sites of protein synthesis.

35) Centrosome is found only in animal cells and consists of 2 centrioles. Centrosome helps in cell division.

37) The membrane-bound cell organelles are absent in prokaryotic cells.

38) Differences between plant cell and animal cell.

	Plant cell	Animal cell
1	Plant cells are generally large in size.	Animal cells are smaller than plant cells.
2	Plant cells possess plastids.	Animal cells lack plastids.
3	Cell wall is present	Cell wall is absent.
4	Mature plant cells possess a large, central and permanent vacuole.	Animal cells possess many small and temporary vacuoles.
5	Centrosome and centrioles are absent in plant cells.	Centrosome and centrioles are present in animal cells.

39) The basic structural organization of the cell helps it to perform important functions like respiration, nutrition, excretion and protein synthesis.

Definitions

- 1) Cell - An autonomous self-replicating structure that forms the structural, functional and biological unit of all living organisms.
- 2) Prokaryotic cell – A cell characterized by the absence of a distinct, membrane-bound nucleus or membrane-bound organelles, and by DNA that is not organized into chromosomes.
- 2) Nucleoid – An undefined nuclear region of the prokaryotic cell, containing the genetic material (nucleic acids).
- 3) Eukaryotic cell – A cell containing a membrane-bounded nucleus and membrane-bounded organelles.
- 4) Unicellular organism – Organism having only one cell.
- 5) Multicellular organism - Organism consisting of more than one cell, wherein the differentiated cells perform specialized functions in the organism.
- 6) Diffusion – The spontaneous movement of a substance from a region of its higher concentration to a region of its lower concentration.

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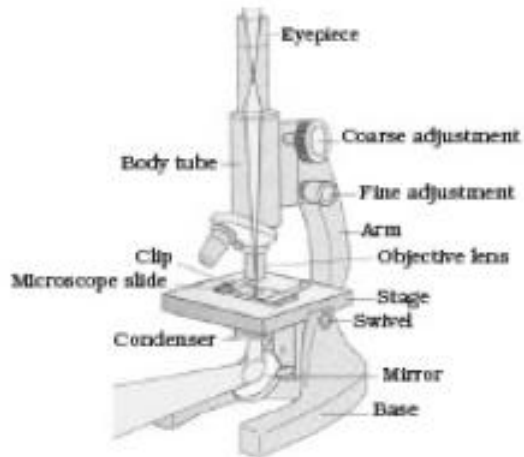
- 7) Osmosis – The movement of water through a semi-permeable membrane from a region of high water concentration to a region of low water concentration.
- 8) Hypertonic solution - A solution that has a higher solute concentration than the one to which it is compared (eg - some kind of cell).
- 9) Hypotonic solution - A solution that has a lower solute concentration than the one to which it is compared (eg - some kind of cell).
- 10) Isotonic solution - A solution that has the same tonicity as another solution with which it is compared.
- 11) Plasmolysis - Shrinkage or contraction of the protoplasm away from the wall of a living plant or bacterial cell, caused by loss of water through osmosis.
- 12) Cell organelle – A specialized subunit within a cell that has a specific function, and is usually separately enclosed within its own membrane.
- 13) Genes - A hereditary unit consisting of a sequence of DNA that occupies a specific location on a chromosome and determines a particular characteristic in an organism.
- 14) Membrane biogenesis – The process of synthesizing the biological membranes.
- 15) Plasma membrane – The thin, selectively permeable membrane composed of lipids and proteins which surrounds an entire cell and regulates the flow of substances to and from the cell.
- 16) Cell wall – The rigid, non-living, outer covering of certain cells (like plant and bacteria), composed mainly of cellulose and providing the cell with structural support and protection.
- 17) Cytoplasm - The jellylike material of a cell that is enclosed within the plasma membrane, except the nucleus and contains the cell organelles.

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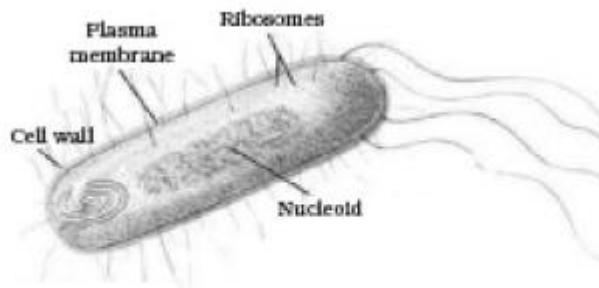
18) Chloroplasts – The plastids containing chlorophyll which are capable of carrying out photosynthesis in plants.

Top diagrams

Compound

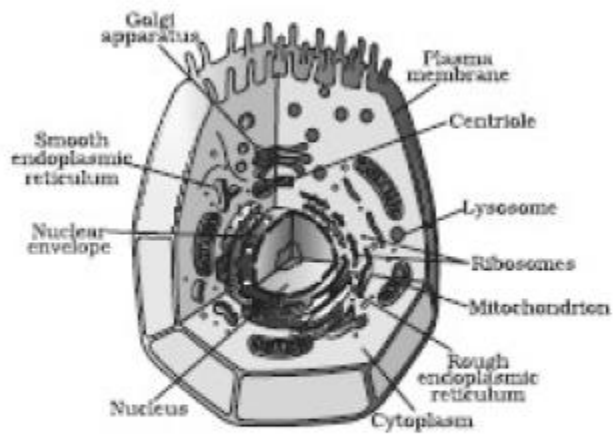


Compound microscope

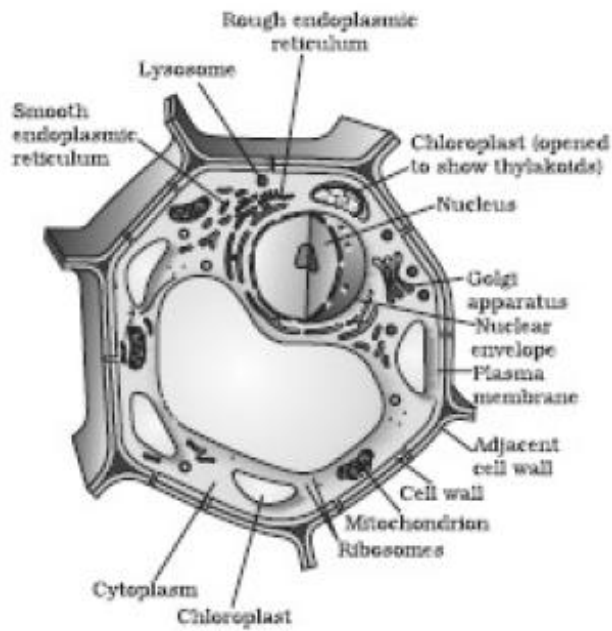


Prokaryotic cell

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Animal cell



Plant cell

The nucleus

