

# Cell : The Unit of Life



## TRY YOURSELF

## ANSWERS

1. A cell is the structural and functional unit of an organism. It is the smallest unit capable of independent existence and performing essential functions of life.
  2. The two objections to cell theory are :
    - (i) Bacteria and cyanobacteria do not have nucleus and also lack membrane bound organelles.
    - (ii) Viruses are considered to be organisms, though they are acellular and do not have cellular machinery.
  3. Surface area to volume ratio =  $96/32 = 3:1$
  4. Smaller cells are metabolically more active than a larger cell due to higher nucleocytoplasmic ratio and higher surface area volume ratio. Hence, they function better than a larger cells.
  5. Number of fimbriae are 300-400 per cell. They help in attaching the bacteria to solid surfaces or host tissues.
  6. Gas vacuoles protect the bacteria from harmful radiations. They also constitute buoyancy regulation mechanism for their proper positioning in water during daytime for photosynthesis.
  7. Ribosomes
  8. The proteins that occur inside the membrane are called integral or intrinsic proteins. The intrinsic proteins pass into the lipid bilayer to different depths and establish hydrophobic bonds with lipid molecules. Some of the integral proteins run throughout the lipid bilayer and are called tunnel proteins which form channels for passage of water and water soluble substances.
  9. According to the fluid mosaic model of membrane, there is no uniform deposition of proteins and lipids, rather there is a mosaic of two. Lipid molecules are present in viscous bilayer and protein molecules occur at places both inside and on outer side of lipid bilayer. Lipid bilayer is quasifluid and membrane protein may shift laterally and thus provide flexibility.
  10. SER is smooth endoplasmic reticulum that has smooth membrane which do not bear ribosomes. It is found in cells engaged in the synthesis and storage of glycogen, fat and sterols. It is also commonly found in leucocytes.
- RER is rough endoplasmic reticulum that has rough membrane due to ribosomes attached to their outer surface. RER is engaged in synthesis of proteins and enzymes.
11. Endomembrane system is grouping of organelles which function in close coordination with one another. It consists of endoplasmic reticulum, Golgi complex, lysosomes and vacuoles.
  12. Polymorphism is existence of more than one morphological form. Depending upon morphology and function, four types of lysosomes are primary lysosomes, secondary lysosomes, residual bodies and autophagic vacuoles.
  13. The number of mitochondria varies from one to several in different cells depending upon cellular activities. Cells of dormant seeds have very few mitochondria while germinating seeds have several mitochondria.
  14. Unlike most other organelles, chloroplasts and mitochondria have small circular chromosomes known as extranuclear DNA. Chloroplast DNA contains genes that are involved with aspects of photosynthesis and other chloroplast activities. It is thought that both chloroplasts and mitochondria are descended from free-living cyanobacteria, which could explain why they possess DNA that is distinct from the rest of the cell.
  15. Photosynthesis occurs in the thylakoids of the chloroplast. Thylakoids contain chlorophyll and carotenoids, which are all pigment molecules that can capture light energy and turn it into chemical energy.
  16. Microtubules also make up parts of cilia and flagella, the organelles that help a cell in movement.
  17. Microfilaments are the thinnest of the cytoskeleton structures and are made of two thin actin chains that are twisted around one another. Microtubules are the thickest of the cytoskeleton structures and are most commonly made of filaments which are polymers of alpha and beta tubulin.
  18. Chromatin is uncondensed part of nucleoprotein complex, which is observable in the interphase nucleus. It is active in controlling metabolism and other activities of the cell.

**19.** The number of cilia per cell is usually very large about 300-14000 per cell whereas flagella are only about 1-4 per cell.

**20.** Based on the position of centromere, chromosomes are of 4 types: (i) Metacentric: Centromeres lies in the centre of the chromosome. They are V-shaped and two arms are equal in length. (ii) Sub-metacentric: Chromosomes have arms of unequal length as the centromere lies near the centre. They

are J-shaped or L-shaped. (iii) Acrocentric: Centromeres lie near one end and have a small arm beyond centromere and (iv) Telocentric: The chromosomes have centromeres located on one end on a rod like chromosomes.

**21.** Lampbrush chromosomes occur in diplotene stage of animal oocytes, spermatocytes and in giant nucleus of unicellular alga *Acetabularia*.

**22.** Sub-metacentric chromosome.

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