Cell & Cell Theory

toppr

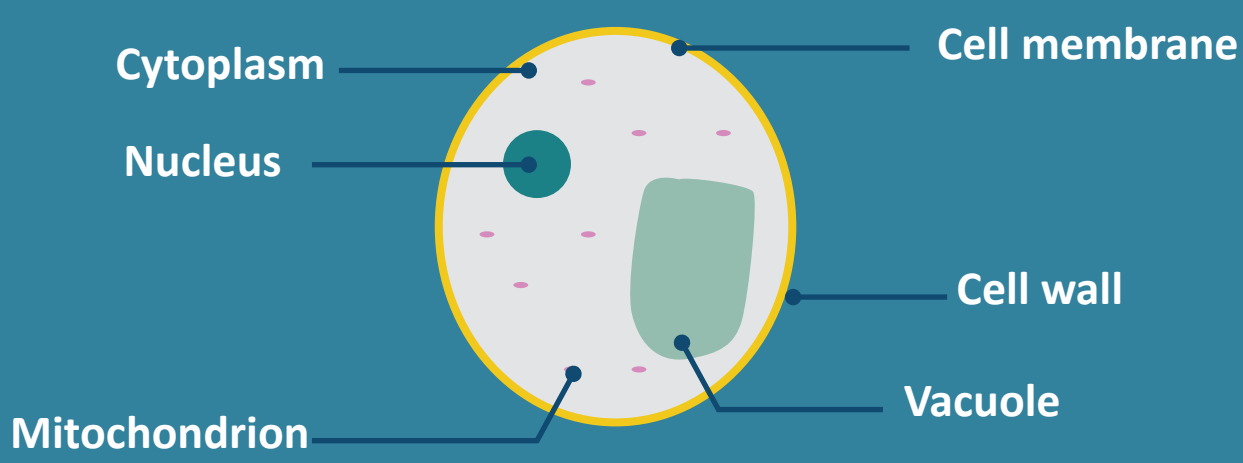
Cell:- The building blocks & basic unit of life

Features of a Cell

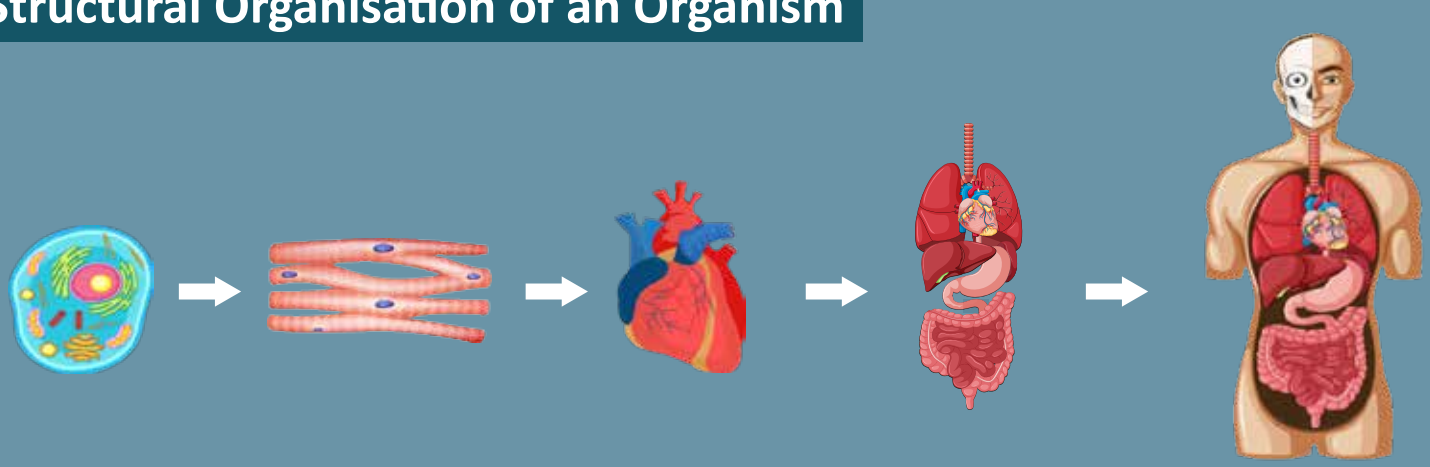
* Smallest biological, structural & functional unit of life
* Organisms may be unicellular or multicellular
* Cells are the building blocks of organisms
* Cells cluster up to form tissues that form organs, organs forms organ system that form an organism

Functions of a Cell

- Nutrition
- Metabolism
- Respiration
- Transportation
- Excretion
- Response to stimuli
- Reproduction



Structural Organisation of an Organism



Cell → Tissue → Organ → Organ System → Organism

Discovery of Cell

Robert Hooke

* Robert Hooke coined the term '**Cells**'
* Observed dead cork cells under microscope

Anton van Leeuwenhoek

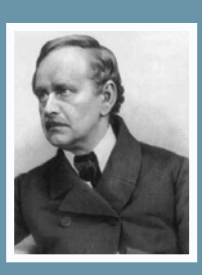
* Live cells were first observed by Anton van Leeuwenhoek

Robert Brown

* Robert Brown discovered nucleus
* It is the driving engine of a cell

Cell Theory

* Matthias Jacob Schleiden stated cells are building blocks of all plants in 1838.



* Theodor Schwann in 1839 stated that cells make up animals.

* This led to 'Cell Theory' that stated cells are the basic unit of all living organisms.

* Rudolf Virchow stated in German '**Omnis cellula e cellula**' which means cells arise from already existing cells.

Cell Theory

* The cell is the basic structural and functional unit of all living organisms.
* All living organisms (plants & animals) are made up of cells.
* All cells arise from pre-existing cells.

Prokaryotic Cell

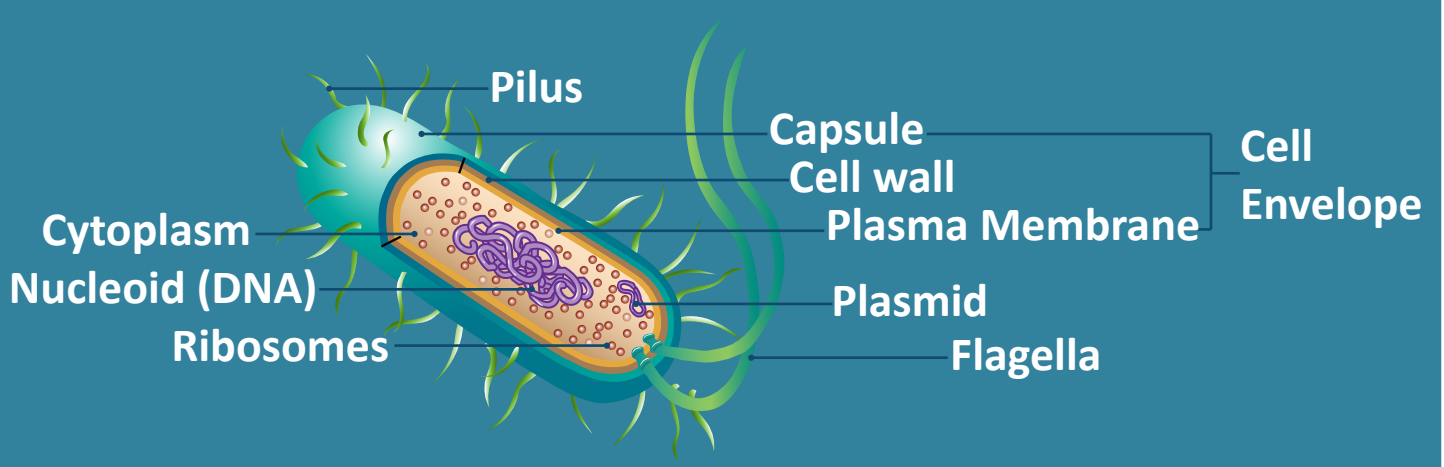
Features of a Prokaryotic cell

* Lack cell membrane & membrane-bound cell organelles
* They are unicellular & multiply rapidly
* Size: 0.2 to 10 µm
  e.g.: Blue-green algae, bacteria and *Mycoplasma*
* Bacteria are found everywhere – water, soil, rock, etc.

Bacterial Shapes

Cocci | Bacilli | Vibrio | Spirillum

Components of a Prokaryotic Cell



Cell Envelope

* Protective covering of a cell
* Consisted of
  → **Capsule**: Made up of macromolecules & may be loose
  → **Cell wall**: Made of peptidoglycan that provides shape & structural support & protects cell from bursting or collapsing
  → **Plasma membrane**: Semi-permeable membrane that prevents leakage & allows material exchange

Inclusion Bodies

* Freely existing bodies that store reserve materials
* Gas storing vacuoles found in cyanobacteria & other photosynthetic bacteria

Ribosomes

* Proteins are made here from mRNA
* 70S ribosome: 30S + 50S subunits
* Occur in groups called polysomes

Chromatophores

* Membrane extensions in cyanobacteria
* Contain photosynthetic pigments inside

Fimbriae

* Short bristle-like structures
* Found in both gram-negative & gram-positive bacteria
* Aid bacterial attachment to surfaces

Cytoplasm

* Semi-fluid structure inside plasma membrane
* Cell parts float in cytoplasm

Mesosomes

* Extension of plasma membrane as tubules or lamella
* **Functions**:
  → Cellular respiration & secretion
  → Increase the surface area of the plasma membrane & enzymatic content
  → Cell wall formation
  → DNA replication and distribution of genetic material to daughter cells

Flagella

* Locomotory organs that extend from cell wall
* 3 parts – Basal body, filament & hook

Nucleoid

* Region containing prokaryotic genetic material
* Lack nuclear membrane
* Some bacteria contain plasmid (circular DNA)

Pili

* Long tubular structures
* Found in gram-negative bacteria
* Allow transfer of genetic material between cells