

Chapter 8 : Cell : The Unit of Life

Biology Notes | Class 11

Nucleus
Control center
of the cell



Chloroplast
Site of photosynthesis



Mitochondrion
Powerhouse
of the cell



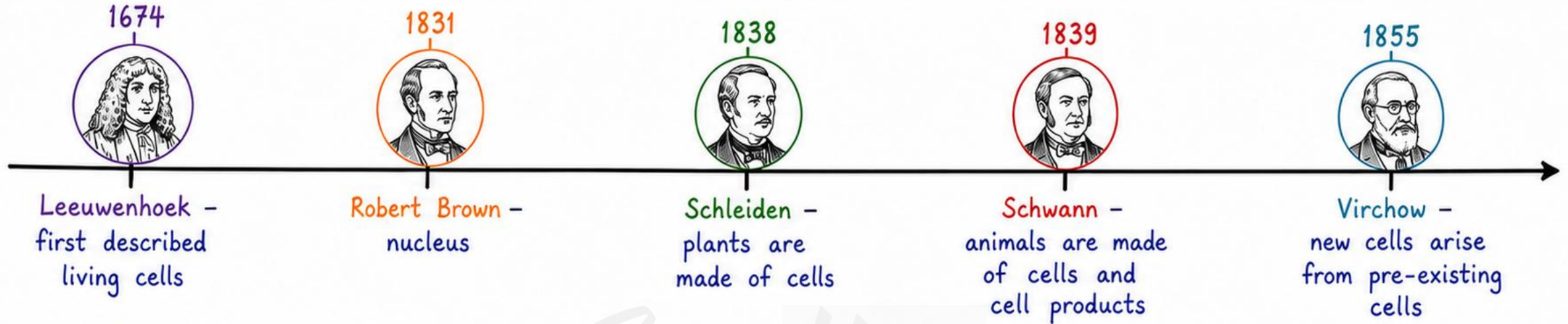
Large Vacuole
Stores water
and nutrients



Endoplasmic
Reticulum
Transport and
protein synthesis

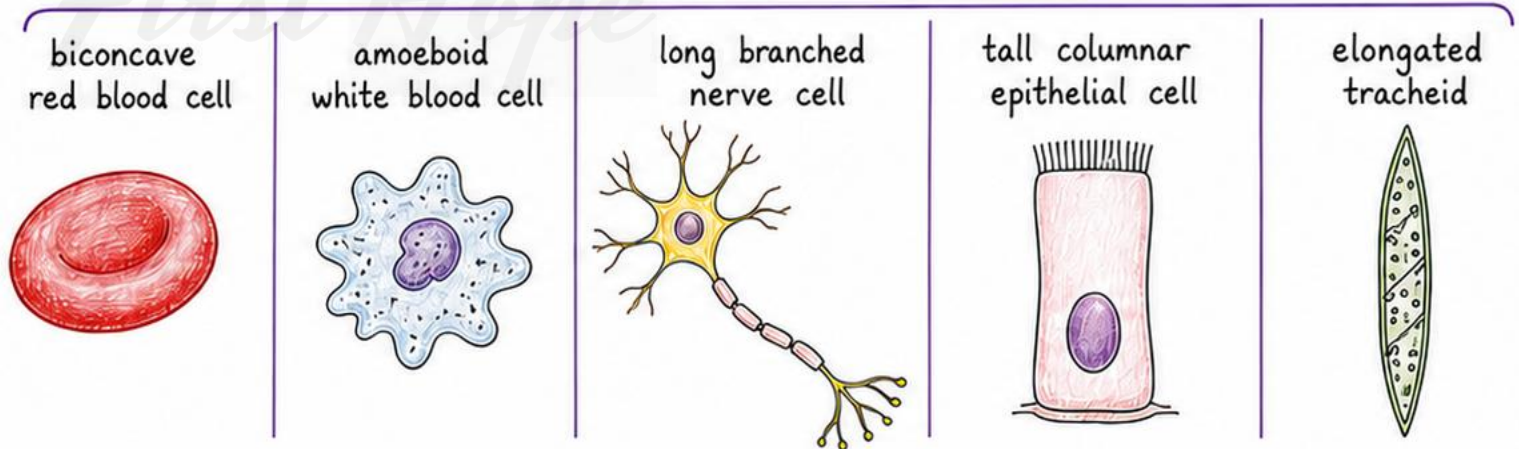


CELL THEORY & DIVERSE CELL FORMS



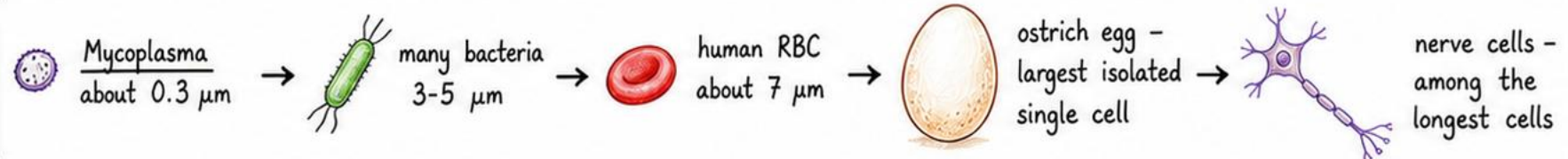
- CELL = fundamental structural and functional unit of all living organisms.
- UNICELLULAR: one cell performs all essential life functions and can exist independently.
- MULTICELLULAR: many specialised cells cooperate.

FORM FITS FUNCTION



MODERN CELL THEORY

1. All living organisms are composed of cells and products of cells.
2. All cells arise from pre-existing cells.



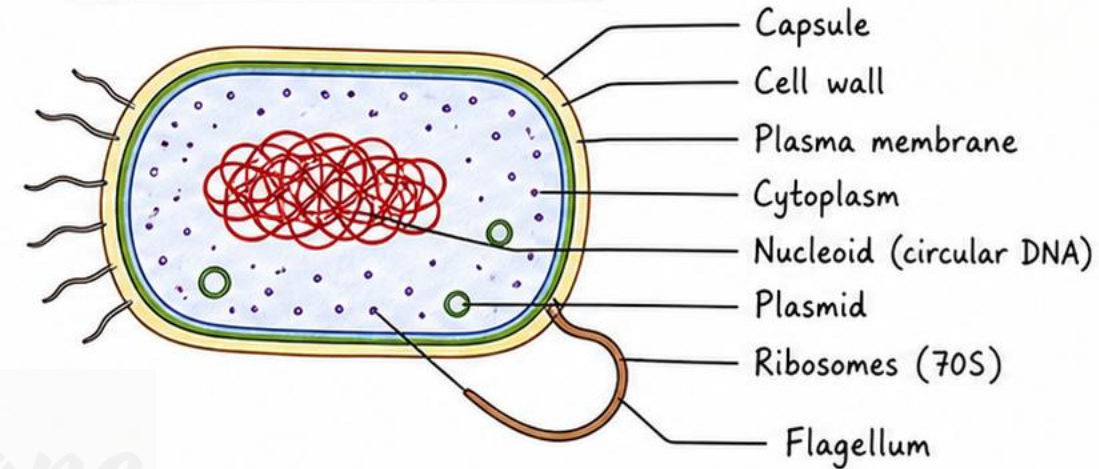
PROKARYOTIC & EUKARYOTIC CELL ORGANISATION

PLASMA MEMBRANE + CYTOPLASM + DNA + RIBOSOMES

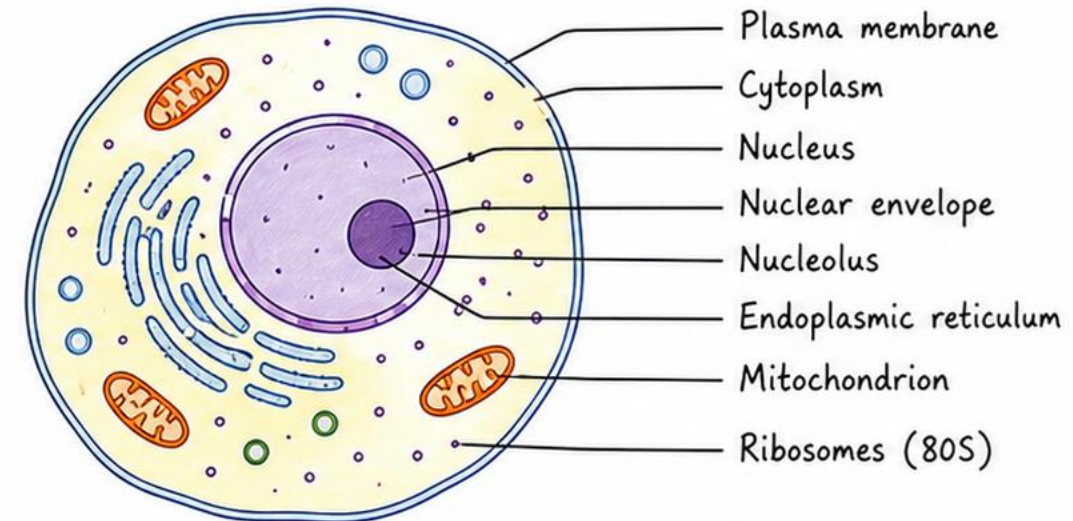
Feature	Prokaryotic Cell	Eukaryotic Cell
Nuclear organisation	no membrane-bound nucleus	nucleus enclosed by nuclear envelope
DNA organisation	mainly circular genomic DNA in nucleoid; plasmids may occur	DNA organised into chromosomes
Membrane-bound organelles	absent	present
Ribosome type	70S	80S in cytoplasm
Usual size	generally smaller	generally larger
Examples	bacteria, cyanobacteria, mycoplasmas	protists, fungi, plants, animals

CYTOPLASM is the main arena of cellular reactions.

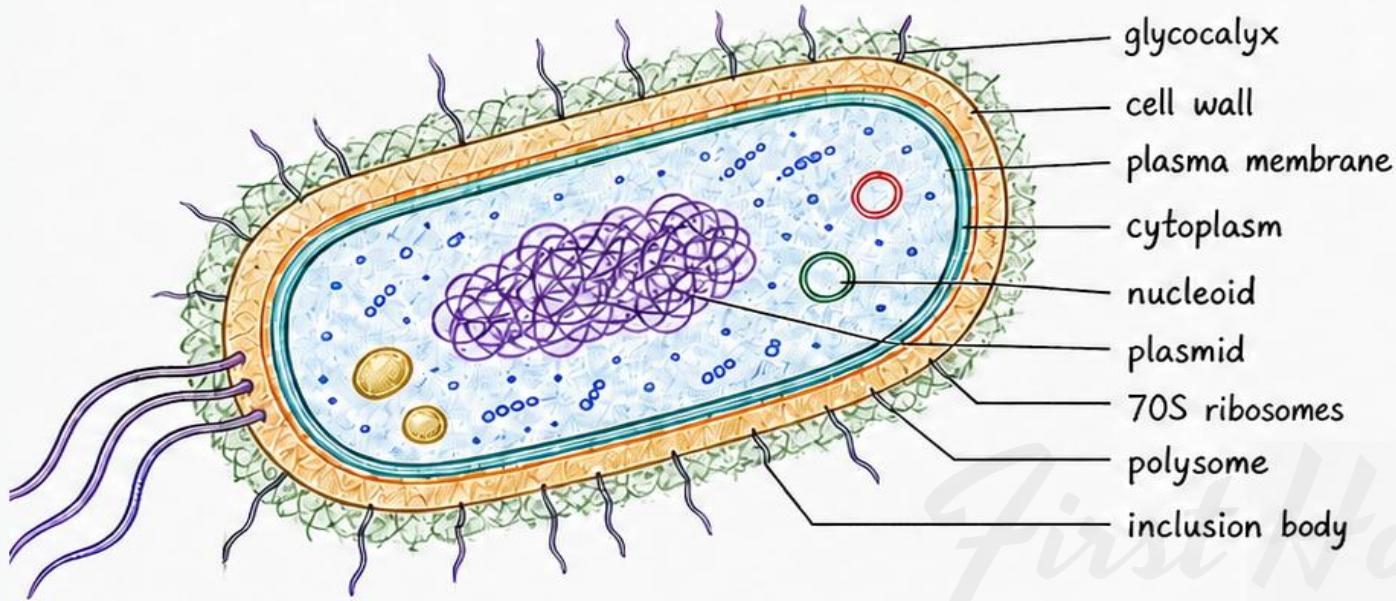
Typical Bacterium 1-2 μm



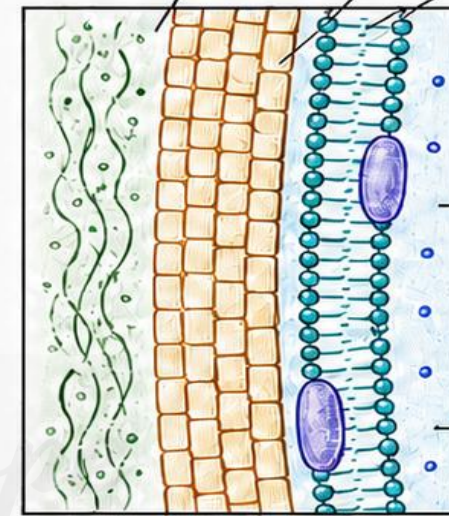
Typical Eukaryotic Cell 10-20 μm



PROKARYOTIC CELL PLAN & CELL ENVELOPE



CELL ENVELOPE (OUTSIDE TO INSIDE) GLYCOCALYX → CELL WALL → PLASMA MEMBRANE



Glycocalyx:

- loose = SLIME LAYER
- thick and tough = CAPSULE

Cell wall:

shape, support and protection against bursting/collapse.
Mycoplasma lacks a cell wall.

Plasma membrane:
selectively permeable.

Nucleoid:

main circular genomic DNA, no nuclear membrane.

Plasmids:

small extra circular DNA, may carry traits such as antibiotic resistance.

Ribosomes:

50S + 30S → 70S protein synthesis.
POLYSOME = several ribosomes translating one mRNA.

Inclusion bodies:

non-membrane-bound storage reserves.



glycogen/phosphate granule
gas vacuole

COCCUS - spherical



BACILLUS - rod



VIBRIO - comma



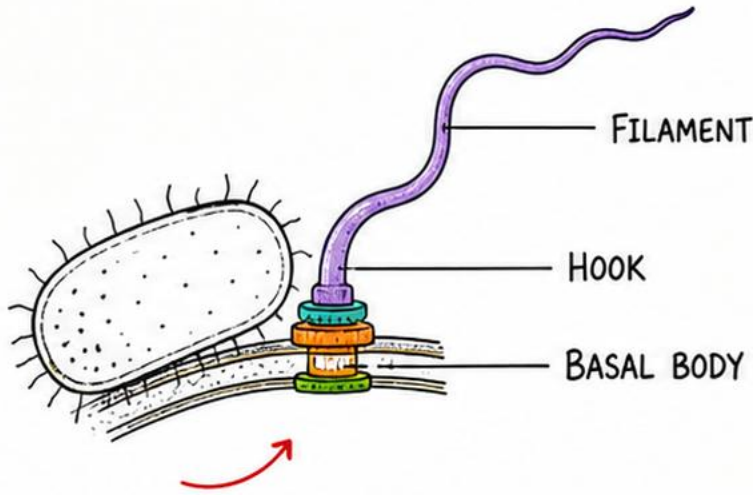
SPIRILLUM - spiral



Gram-positive bacteria retain Gram stain;
Gram-negative bacteria do not.

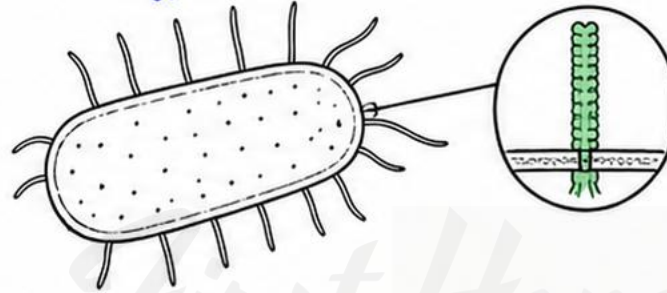
BACTERIAL SURFACE STRUCTURES & MEMBRANE SPECIALISATIONS

1. BACTERIAL FLAGELLUM - motility

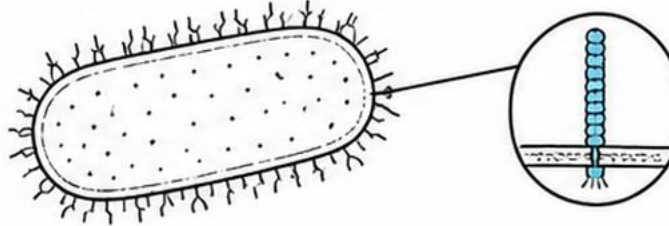


- Motile bacteria vary in flagellar number/arrangement.
 - Monotrichous (one polar)
 - Lophotrichous (tuft at one pole)
 - Amphitrichous (one at each pole)
 - Peritrichous (all around the cell)
- Non-motile bacteria lack functional flagella.

2. **PILI**: elongated tubular protein structures; may mediate attachment/conjugation depending on type.

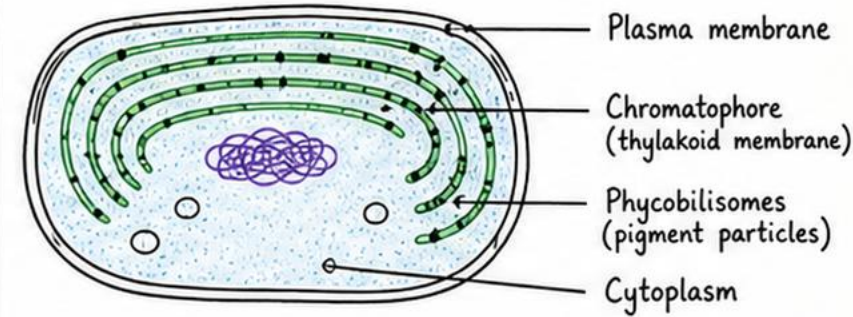


FIMBRIAE: short bristle-like fibres; commonly aid attachment to surfaces or host tissue.



Neither is the locomotory flagellum.

3. **CHROMATOPHORES**: pigment-bearing internal membrane systems in some photosynthetic prokaryotes such as cyanobacteria.



CORRECTION CARD

CLASSICAL MESOSOME - historical term.

Large vesicular, tubular or lamellar folds seen after conventional chemical fixation are generally preparation artifacts, not universal bacterial organelles.

Do not assign them DNA-replication or respiratory functions.

Some bacteria can possess genuine specialised membrane invaginations, but these are not the classic universal mesosome.

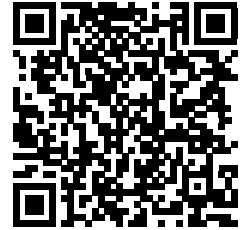


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