CELL : THE UNIT OF LIFE

PROKARYOTIC CELLS

PROKARYOTIC CELLS

- The prokaryotic cells are represented by bacteria, blue-green algae, mycoplasma or PPLO (Pleuro Pneumonia Like Organisms). They are generally smaller and multiply more rapidly than the eukaryotic cells.
- The organisation of the prokaryotic cell is fundamentally similar even though prokaryotes exhibit a wide variety of shapes and functions.

Prokaryotic cell –

Cell that bears naked genetic material i.e. nucleus is without envelop is known as prokaryotic cell. This group is represented by Bacteria, Blue Green Algae (Cyanobacteria), Mycoplasma. **They may vary greatly in shape and size. The four basic shapes of bacteria are**

(a) bacillus (rod like)
(b) coccus (spherical)
(c) vibrio (comma shaped)
(d) spirillum (spiral)

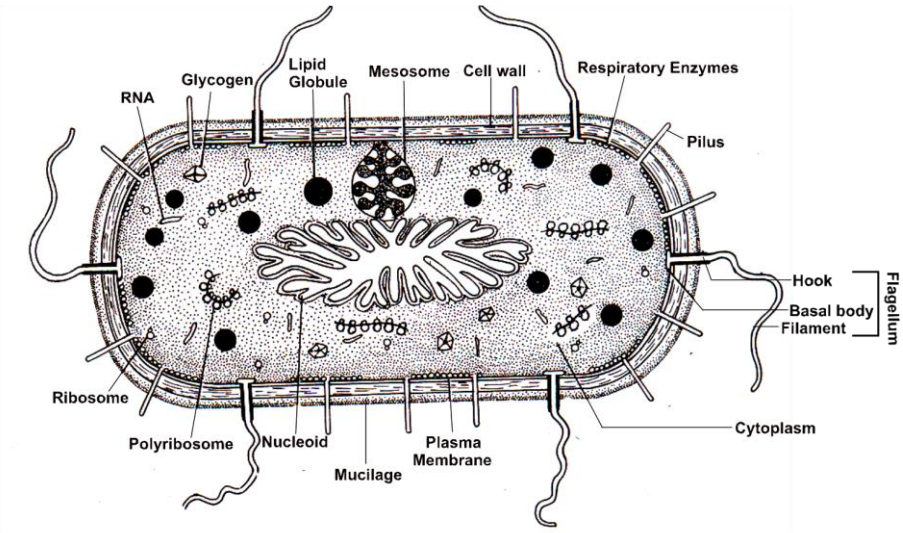

fig:- Ultrastructure of Prokaryotic cell

Structure of prokaryotic cell:

1. Like eukaryotic cells, they are different in shape and size but smaller than eukaryotes and divide rapidly.
2. Naked genetic material is called **genophore / Nucleoid**.
3. **Genomic DNA** is circular and naked (without histone protein) and termed as single chromosome.
4. Beside genomic DNA, small circular DNA is also present in many bacteria called **plasmid** which make them **antibiotic resistant, regulates some phenotypes and also responsible for bacterial transformation.**
5. Most prokaryotic cells mainly the bacterial cell has envelope consists of three layers, which are tightly bound **outer glycocalyx, middle cell wall and innermost cell membrane.**
6. Although each layer of the envelope performs distinct function, they act together as a single protective unit.
7. If these envelopes are stained by Gram stain then they are called Gram positive bacteria while other those don't have are called Gram negative bacteria.
8. Glycocalyx, a polysaccharide envelope forms either loose sheath **slime layer** or thick and tough structure **capsule**.
9. **Cell wall usually consists of peptidogylan, absent in mycoplasma.**
10. The cell wall determines the shape of the cell and provides a strong structural support to prevent the bacterium from bursting or collapsing.
11. **Cell membrane consists of lipoprotein. It is common structure between prokaryotic cell and Eukaryotic cell.**
12. The cell membrane is selectively permeable in nature and interacts with the outside world.
13. **Essential infoldings of Plasma membrane towards cytoplasm are called Mesosomes. They can be in form of the Vesicles Tubules and Lamellae.**

    These help in:

    (a) Cell wall formation (b) DNA replication and distribution to daughter cells (c) Respiration (analogous to mitochondria) (d) secretion of processes (to increase the surface area of the plasma membrane and enzymatic content).
14. **In cyanobacteria, there are other membranous extensions into the cytoplasm called chromatophores that contain pigments (analogous to chloroplast).**

15. **Cell wall form some filamentous extensions called flagellum.** It consists of **filament**, **hook** and **basal body** and helps in locomotion.
16. Besides flagella**, Pili and Fimbriae are also surface structures of the bacteria but do not play a role in motility.** The **pili** are elongated tubular structures made of a special protein pilin. **The fimbriae are small bristle like fibres sprouting out of the cell that provides attachment to substratum or host tissue.**
17. **In prokaryotes, ribosomes are associated with the plasma membrane of the cell. They are about 15 nm by 20 nm in size.**
18. **70S type of ribosomes are found in prokaryotic cells. Its two subunits are 50S and 30S. Several ribosomes are joined with mRNA to form polysome or polyribosome for efficient conduction of protein synthesis.**
19. **Reserved food materials are stored in cytoplasm in the form of non-living inclusion bodies.**

(NEET-2017)

20. **Inclusion bodies are not bound by any membrane system and lie free in the cytoplasm.**
21. **Gas vacuoles are found in blue green algae (Cyanobacteria), purple sulphur bacteria and green sulphur bacteria.**

Differences between Plant and Animal Cells			
S.No.	**Plant Cell**	**S.No.**	**Animal Cell**
1	A plant cell has rigid wall on the outside.	**1**	A cell wall is absent.
2	Plastids are found in plant cells	**2**	Plastids are usually absent.
3	A mature cell has a large central vacuole.	**3**	An animal cell may have many small vacuoles.
4	Nucleus lies on one side in the peripheral cytoplasm due to central vacuole.	**4**	Nucleus usually lies in the centre.
5	Centrioles are usually absent.	**5**	Centrioles are found in animal cells.

6	Spindle apparatus formed during nuclear division is anastral.	6	Spindle is amphiastral.
7	Golgi apparatus consists of number of distinct and unconnected units called dictyosomes.	7	Golgi apparatus is either localised or diffused and consists of a well connected single complex.
8	Reserve food is generally starch and fat.	8	Reserve food is usually glycogen and fat.
9	Adjacent cells may be connected through plasmodesmata.	9	Adjacent cells are connected through a number of cell junctions.
10	Cytokinesis occurs by cell plate.	10	Cytokinesis takes place by cleavage.