

PRO & EUKARYOTIC CELL

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INTRODUCTION : →

In 1957, Dougherty first proposed the adjective, Prokaryotic and Eukaryotic to describe cell. The prokaryotic cells are small, relatively simple in str. having only a single membrane - the cell membrane - the cell membrane, which is usually surrounded by a rigid cell wall. There is no nucleus and no membranous organelles like the mitochondria or endoplasmic reticulum. There is a single chromosome, a single, a single molecule of double helix DNA densely coiled to form a nuclear zone. Reproduction by asexual division. The bacterium *E. scherichia coli* is a typical example of prokaryotic cell.

The Eukaryotic cells are much larger and complex in structure they are 1000 to 10,000 times as larger as prokaryotic cells. They have membrane bound nucleus containing several chromosomal & another membrane like mitochondria & E.R.

COMPARISON BETWEEN PRO. AND EUKARYOTIC CELLS :-

Many organelles bound in Eukaryotic cells are absent in Prokaryotic cells. Some common st. and difference between them are as follows

1) IN PLASMA MEMBRANE :-

(a) IN PROKARYOTES : →

- 1) → Cytoplasm delimited by a thin membrane of lipid and protein molecule called P.M. (surrounded)
- 2) → The PM of Bacteria contains oxidative or respiratory functions which are usually done by mitochondria of Eukaryotic cell.

→ Bacterial PM may differentiate to form other structures.

1) → PM of bacterium *Thiovulum magnum* ^{may} sink deep into the cytoplasm to form multilayered called desmosomes. + wt

2) → In some bacteria the PM giving out certain invagination convoluted membranes called mesosomes in the cytoplasm. + wt

3) → The mesosomes have various functions viz. Respiratory, Secretory and they receive the transforming DNA molecules from the bacterial cell during conjugation.

[Q] IN EUKARYOTIC CELL :-

1) → The semipermeable barrier between the internal and external environment of cell is called the P.M.

2) → It is found to contain many pores through which exchange of molecules may occur.

3) → It is formed by unit membrane of lipid and protein like an Prokaryotic cell.

4) → The membranes also contain small amount (2-10%) of carbohydrates in the form of glycolipids.

5) → Membrane contain specific receptors for external stimuli.

6) → The cell membrane shows many ^{invagination} invaginations which go into the cell even encircle the nucleus.

7) → Current concept of membrane sl. are bonded on the fluid mosaic model (Singer & Nelson 1972)

[Q] CELL WALL :-

(A) IN PROKARYOTIC CELL :-

1) → Cell wall of Prokaryotic cells are rather complicated and markedly different from those in Eukaryotic cells.

2) → Bacteria are roughly divided into gram positive & gram negative cells based on the differential by staining by Cystal violet reagent.

3) → The cell wall of gram positive bacteria contain

Glycocalyx and murein (they also contain RNA)

- 4) → The cell wall of gram negative bacteria contains similar network but have in addition an outer layer of lipids complexed to protein and polysaccharides.
- 5) → The cell wall of gram negative bacteria are so thin and appear like unit membrane.
- 6) → The bacterial cell wall besides containing carbohydrates, lipids, proteins, phosphorus contain inorganic salts, contain amino acids, diaminopimelic acid and a derivative of glucose-muramic acid.
- 7) → In blue green algae outer covering of cell wall include an outermost gelatinous layer.
- 8) → Outside to cell wall of most bacteria occurs a slimy capsule which composed largely of Polysaccharides.
- 9) → PPLO (The Pleuropneumonia like organism) lack cell wall and mesosomes.

[b] IN EUKARYOTIC CELL :-

- 1) → In eukaryotic cell, cell wall is found only in plant.
- 2) → The cell wall is semirigid laminated external & non-living of the cell.
- 3) → The cell wall is secreted by the cell itself & primarily it contains a complex polysaccharides, carbohydrate the cellulose.
- 4) → The cell wall provides protection and support of PM & cytoplasm.
- 5) → The cell wall of some plant cell has some canal or pit like minute apparatus by which the cell remains connected to adjacent cells. These canal of cell wall are known as 'Plasmodesmata'.
- 6) → In mature plant, cell wall is composed of three parts - Middle lamella, Primary walls & sec. wall.

7 → The middle lamellae is composed of pectine polymers. The primary wall consists of cellulose, hemicellulose and pectine as well as lignin. The sec. wall contains mostly cellulose & smaller amounts of hemicellulose and lignine.

8 → A. large number of opening called pit occurs in sec wall.

9 → The generalized animal cell has no rigid cell wall however it has a cell coat and external to PM of most cells is a multicomponent system consisting of binding proteins, glyco-lipids, glyco-proteins, enzymes, hormone receptor site.

[3] RIBOSOME : →

[a] IN PROKARYOTIC CELL : →

1 → In prokaryotic cells ribosome are grouped in clusters 10-200 nm in diameter.

