Cell: The Unit of Life

(1) **Cytology:** (G.k. kyios = cell ; logas = study) is the branch of biology which comprises the study of cell structure and function.

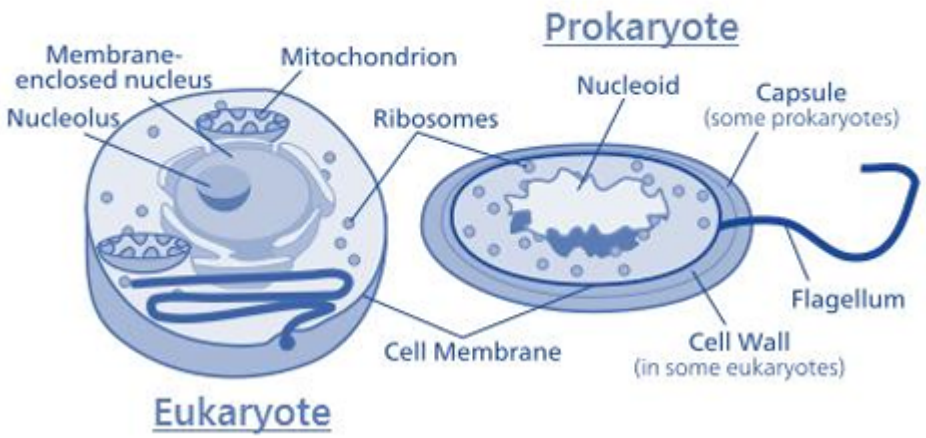
(2) Cell is the structural and functional unit of all living beings.

(3) There are two types of cells: plant cell and animal cell.

Plant cell	Animal cell
Cell wall present.	Cell wall absent.
Nucleus usually lies near periphery due to vacuole.	Nucleus present near the centre.
Centrosome is usually absent from higher plant cells, except lower motile cells.	Usually centrosome is present that helps in formation of spindle fibres.
Plastids are present, except fungi.	Plastids are absent.
Mitochondria is generally spherical or oval in shape.	Generally tubular in shape.
Single large central vacuole is present.	Many vacuoles occur, which are smaller in size.
Number of mitochondria from 200 – 2000.	Number of mitochondria is approximately 1600 – 16000 in liver cells.
Cytoplasm during cell division usually divides by cell plate method.	Cytoplasm divides by furrowing or cleavage method.
Plant cells are capable of forming all the amino acids coenzymes and vitamins.	Animal cells cannot form all the amino acids, coenzymes and vitamins.
There is no contractile vacuole.	Contractile vacuole may occur to pump excess water.
Sodium chloride is toxic to plant cells.	Tissue fluid containing sodium chloride bathes the animal cells.
Plant cells are generally well over 100 micrometer long.	Generally much smaller than 100 micrometer
Spindle formed during cell division is anastral.	Spindle formed during cell division are amphiastral.
Lysosomes present in less number.	Lysosomes present in more number.
Chromosomes are larger in size.	Chromosomes are smaller in size.

Prokaryotic cell	Eukaryotic cell
It is a single membrane system.	It is a double membrane system.
Cell wall surrounds the plasma membrane.	Cell wall surrounds the plasma membrane in some protists, most fungi and all plant cell. Animal cell lack it.
Cell wall composed of peptidoglycans. Strengthening material is mureir.	It is composed of polysaccharide. Strengthening material is chitin in fungi & cellulose in others plants.
Cell membrane bears respiratory enzymes.	It lacks respiratory enzymes.
Cytoplasm lacks cell organelles e.g., Mitochondria, ER, Golgi body etc.	Cytoplasm contains various cell organelles.
Ribosomes are 70 S type.	Ribosomes are 80 S type.
There are no streaming movements of cytoplasm.	Cytoplasm show streaming movements.
Endocytosis and exocytosis do not occur.	Endocytosis and exocytosis occur in animal cells.
Mitotic spindle is not formed in cell division.	Mitotic spindle is formed in cell division.
The mRNA does not need processing.	The mRNA needs processing.
Nuclear material is not enclosed by nuclear envelope and lies directly in cytoplasm. It is called nucleoid.	It is enveloped by nuclear envelope. Nucleus is distinct from cytoplasm.
DNA is circular and not associated with histone proteins.	Nuclear DNA is linear and associated with histone proteins extranuclear DNA is circular and protein free.
Replication of DNA occurs continuously throughout cell cycle.	Replication of DNA occurs during S- Phase of cell cycle only.
These have small size (0.5 to 10 micrometer) and have much less DNA.	These are relatively large (10 – 15 micrometer) and have much more DNA.
Sexual reproduction absent but parasexuality present.	Sexual reproduction is present.
Plasmids and pili occur in many prokaryotes **Example – E. coli**	There are no plasmids and pili in eukaryotic cells Example – Spirogyra, Chlorella
Cell division mostly amitotic.	Cell division is typically mitotic.
Plasma invaginates and from finger like process. Mesosome which take part in respiration	Absent

(4) Difference between Prokaryotic and eukaryotic cells



(5) Difference between primary cell wall and secondary cell wall

Primary cell wall	Secondary cell wall
Primary wall is laid inner to middle lamella	Secondary wall is laid inner to primary wall.
It is formed in a growing cell.	It is formed when the cells have stopped growing.
It is capable of extension.	Extensibility is absent except in collenchyma cells.
It is single layered.	It is three or more layered.
Cellulose content is comparatively low (5 – 20%).	Cellulose content is comparatively high (20 – 90%).
Cellulose microfibrils are shorter, wavy and loosely arranged.	They are longer, closely arranged straight and parallel.
Protein content up to 5%.	Protein content up to 1%.
Hemicellulose content is high up to 50%.	It is 25% of the total.
Lipid content up to 5 – 10%.	Lipid is absent.
Primary wall is comparatively thin 1 – 5 micrometer	It is comparatively thick 5 – 10 micrometer

(6) Difference between **extrinsic protein** and **intrinsic protein**

Extrinsic Protein	Intrinsic Protein
These are associated with surface only.	These lie throughout phospholipid matrix and project on both surfaces, also called transmembrane or tunnel protein.
They form about 30% of the total membrane protein.	They form about 70% of total membrane proteins.
Example – Spectrin in red blood cells & ATPase in mitochondria.	Example – Rhodopsin in retinal rod cells.

Cell Wall

(1) Discovery: It was first discovered by Robert Hooke in 1665.

(2) Cell wall is the outer most, rigid, protective, non living and supportive layer found in all the plant ells, bacteria, cyanobacteria and some protists.

(3) It is not found in animal cells.

Plasma Memberane

(1) Definition: Every living cell is externally covered by a thin transparent electron microscopic, elastic regenerative and selective permeable membrane called plasma membrane.

Protoplasm

(1) Definition: Protoplasm is a complex, granular, elastic, viscous and colourless substance. It is selectively or differentially permeable.

(2) It is considered as “Polyphasic colloidal system”.

Cytoplasm

The substance occurs around the nucleus and inside the plasma...