29/3/25

Ch-2

The Cell

Notes:-

Cell:- Structural and functional of life.

Discovery of Microscope -

1 - Antony van Leeuwenhoek - Simple microscope, 1 - biconvex lens, 200 times the object

2 - Robert Hooke - Compound microscope, 2 - biconvex lens, magnificance - 2000 times.

* Robert Hooke viewed cork tissues of bark of a tree saw empty box like structure - cell.

Cell Theory - Given by 3 scientists :-

Germ Theory
- Matthias Schleiden: 1838 → Structure of all plants is made of cell.
- Theodor Schwann: 1839 → All plants and animals are made of cells.
- Rudolf Virchow: 1858 → New cell rises from a pre-existing cell.

Main points of Cell Theory :-

(i) Cell is the unit of structure of all living organisms.
(ii) Cell is the functional unit of all the living organisms.
(iii) All new cell rises from the pre-existing cell.

Smallest cell - Bacteria - (0.3 - 0.5) um
Largest cell - Egg of ostrich (Yolk part)
Longest cell - Nerve cell.

~~Why cells are microscopic.~~

Structural unit of cell :- Every cell has three basic structure :- (i) Cell Membrane. (ii) Cytoplasm. (iii) Nucleus.

Date Page 2

Ex:- Mytoplastia

Cell Organelles :- Most parts of a cell have a definite shape, a definite structure and a definite function. Most parts are called Organelles.

	Organs	Organelles
(i)	It is a multicellular structure made up of tissues	It is a part of cell.
(ii)	It does a definite function for multicellular body.	It does a definite function for cell.

Cell Membrane	Cell wall
• Is a thin electric membrane which surrounds the cell cytoplasm.	Is a thick rigid wall surrounding cell membrane in plant cell.
• Found in plant & animals cell.	Found in plant cell.
• Made up of lipoproteins (living)	Made of cellulose (Dead).
• Made up of semipermeable in nature.	Fully permeable.

Cytoplasm - (i) Colourless, transparent, watery fluid.
(ii) Always in a state of motion.

Protoplasm :- (i) Living matter present inside a cell.
(ii) Includes nuclear and cytoplasm.

Nucleus :- Spherical body travel found nearly in the centre of a cell.
Animal cell - In centre.

Plant cell - At periphery.

Nucleus has - network of long, thin, thread like structure called chromatin fibres.

Dividing cell - Chromatin fibres condense to form chromosomes. → Made up of DNA (Deoxyribonucleic acid)

Chromatin Fibres	Chromosomes
• The DNA of a non-dividing cell is present in the form of chromatin fibres.	The chromatin fibres condense become short and thick in a dividing cell.
• These are long, thin like structure.	Are thick, flatened thread like cell.

Function of Chromosomes: (i) Transfers the genes from the parents to off-spring (babies).

Genes - Specific DNA units (molecules) present over chromosomes. Control hereditary characters of an organism.

Nucleolus :- Spherical, dense, body present inside the nucleus.
- Involved in protein synthesis.
- Formation of RNA - Ribo- Nucleic acid, Ribose.

~~Prokaryotic cell - The nuclear material~~
Prokaryotic cell :- The cell in which nuclear material (i.e. nucleus, nucleose) scattered in the (cell) cytoplasm and not

covered by a nuclear membrane.
Eg. - Bacteria, Cynobacteria (blue-green).

Eukaryotic cell :- The (cell) in which nuclear material is surrounded by double layered nuclear membrane.
E.g - All plant cells.

Endoplasmic Reticulum :- (er/ER) :- It is an irregular network of double membranes over the entire cytoplasm in a cell.
- It appears rough when small granules called ribosomes are attached to it and appears smooth without them.
Endoplasmic Reticulum :- Has two types which are Rough ER (RER) and Smooth ER (SER).
- Forms the supporting framework also serves as a pathway for the distribution of the materials from one part of the cell to the another.

Ribosomes (The sites of protein synthesis) :- Small granules either scattered freely in the cytoplasm or attached to the membranes of the endoplasmic reticulum. These are the "factories" for the synthesis of proteins.

Mitochondria (Power house of the cell) :- This are also called "The cell's energy producers". These are minute double-walled bags with their inner walls produced into finger-like processes projecting inwards (called cristae). Mitochondria are called "power house of the cell" because they store ATP (Adenosine Triphosphate).

Golgi apparatus (The delivery system of the cell):- The golgi apparatus which are supposed to be originated from endoplasmic reticulum. The golgi complex consists of many small groups of hollow tubular structures with membranous walls called cisternae. In plants are more specifically known as dictyosomes. Both golgi complexes and dictyosomes are concerned with the secretions of the cell including enzymes, hormones, etc.

Lysosomes (The intracellular digestive centres):- Small vesicles of different shapes containing some digestive enzymes.
- Digest the stored food.
- Many damaged cells are rapidly destroyed or dissolved by their own lysosomes hence these are also called the 'suicide bags'.

Centrosome and centrioles:- A centrosome is found only in an animal cell. During cell division spindle fibres develop from the centrosome. The centrosome contains two centrioles which are short bundles of microfilaments.

Plastids:- Plastids are found only in plant cells. These are special organelles in different shapes - oval, spherical and disc-shaped.
Depending upon the colour they impart, plastids are classified as leucoplasts, chromoplasts and chloroplasts.

(a) Leucoplasts:- Leuco means 'white'. Are colourless plastids. They have no pigment. They store starch. Cells of a potato have loads of leucoplasts in them.

(b) Chromoplasts (chromo: 'colour'):- These are the variously

coloured plastids - yellow, orange and red.
- Mostly are present in petals of flowers and plants. Yellow because of xanthophyll and orange red because of carotene.
- Anthocyanids are not associated with plastids; instead they remain dissolved in cell sap of vacuoles and give red, purple and blue colours to different plant parts.

Non-living substances or cell inclusions

(i) Granules:- These are the many small particles in the cytoplasm and such particles are believed to contain food materials such as starch, glycogen and fats.

(ii) Vacuoles:- Filled with water and various substances in solution. In plant cells the vacuoles are usually quite large and the (animal) liquid which they contain is called cell sap. Membranes surrounding a vacuole called tonoplast.

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