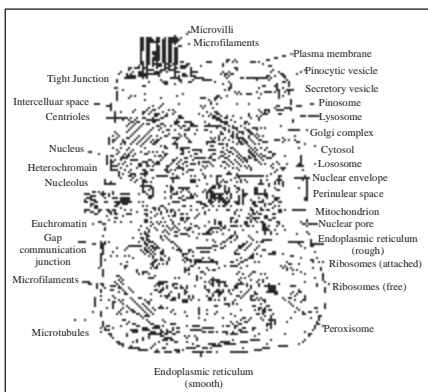


CHAPTER - 1

CELL

WHAT IS CELL?

All living organisms on earth are divided in pieces called cells. Cells are small compartments that hold all of the biological equipments necessary to keep organisms. Cells carry out all the basic functions of life: growth, metabolism and reproduction. There are some organisms like amoeba consists of a single cell. This single cell increase in size and when it attains a certain size, it divides into two separates individuals. In case of multi cellular organisms, the cell also divides into two parts, but the two parts remaining joined this process is repeated crore of times so that body mass is built up. In this process some cells become specialized to perform specific functions but other retains their capacity for cell division throughout life.



Cell membranes : It is like a plastic bag with some tiny holes that bag holds all of the cell pieces and fluids inside the cell and keeps foreign particles outside the cell. The holes are there to let some things move in and out of the cell. Compounds called **proteins** and **phospholipids** make up most of the cell membrane. The phospholipids make the basic bag. The proteins are found around the holes and help move molecules in and out of the cell. Substances like CO_2 and O_2 can move across the cell membranes by a process called **diffusion**. Diffusion is a process of movements of substance from a region of high concentration to a region where its concentration is low. Water also obeys the law of diffusion. The movement of water molecules is called **osmosis**.

Cytoplasm : It is the fluid that fills a cell. Scientists used to call the fluid proto plasm. cytoplasm contain many specialized cell called organ cells. Each of these organ cells performs a specific function for the cell.

Cell organelles : Organelles are living part of the cell have definite shape, structure and functions. To keep their function different from each other these organelles use membranes bound little structure with in them selves. Some of the important organelles are :

- (a) **Endoplasmic reticulum :** It is a network of **tubular** membranes connected at one end to the nucleus and on the other to the plasma membranes. Endoplasmic reticular (ER) are two types: rough endoplasmic reticular (RER) and Smooth endoplasmic reticulum (SER).

Functions of ER:

- 8 It forms the supporting skeleton frame work of the cell.
- 8 It provides a pathway for distribution of nuclear material.
- 8 It provides surface for various enzymatic reactions.

- (b) **Ribosomes :** it synthesis protein, and ER sent these protein in various part of the cell. Where as SER helps in the manufacture of fats.

Functions of these proteins and fats :

- 8 Protein and fat (lipid) help in building the cell membranes. This process is known as **membranes biogenesis**.

WHO GAVE THE CELL THEORY?

The term cell was coined by **Robert Hooke** in 1665. In 1838 **matthias schleiden**, German botanist proposed the idea that all plants consists of cells. In 1839, The Eodor Schwann a German zoologist asserted that all plant and animals are made up of cells. This finding forms the basis of cell theory.

COMPONENTS OF CELL?

In the living organisms there are two types of cellular organizations. If we look at very simple organisms like bacteria and blue-green algae, We will discover cells that have no defined nucleus, these are **prokaryotes cells**. The cells which have definite nucleus are known as **eukaryote**. But the things which both have in common is that there are compartments surrounded by some type of membranes. These are called **cell membranes**.



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- 8 Chromosomes are usually found in pairs.
- 8 Human Beings probably have 46 chromosomes (23 pairs).
- 8 Peas only have 12, a dog has 78 chromosomes.
- 8 The number of chromosomes is not related to the intelligence or complexity of the creature.

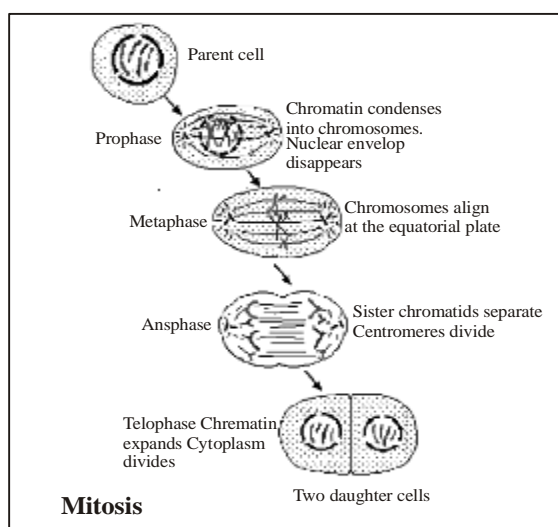
(d) **Nucleolus:** It is a dense spherical granule contained within the nucleus, its size is related to the synthetic activity of the cell. Neurons cell have a comparatively larger nucleate than those cell have no synthetic activity. The nucleolus stores proteins.

CELL DIVISION

Organisms grow and reduce through **cell division**. Plants continue to grow by cell division all their lives. But in most animals cells divide more slowly once the body taken shape. There are two methods of replication **mitosis** and **meiosis**.

(a) **Mitosis:** The main theme of this replication is that mitosis is the simple duplication of a cell and all of its parts. It duplicates its DNA and the two new cells (daughter cells) have the same pieces and generic code. Beyond the idea that two identical cells are created, there are five steps in this process. You should remember the term PMATI. It breaks down to :

1. Prophase
2. Metaphase
3. Anaphase
4. Telophase
5. Interphase.



The phases:

(i) **Prophase:** a cell gets the idea that it is time to

divide. First it has to get everything ready. Cell need -to duplicate DNA, get certain pieces in the right position (centrioles) and generally prepare the cell for the process of mitotic division.

(ii) **Metaphase:** The DNA lines up along a central axis and then DNA condensed into chromosomes.

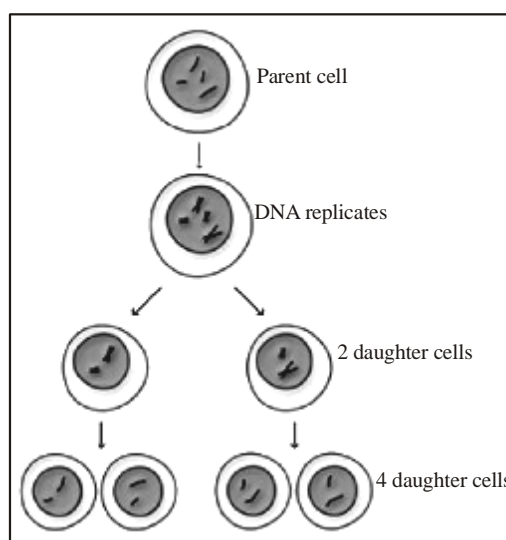
(iii) **Anaphase:** Here the separation begins. Half of the chromosomes are pulled to one side of the cell half to go the other way.

(iv) **Telophase:** Now the division is finishing up. We have now two separate cells each with half of the original DNA.

(v) **Interphase:** This is the normal state of the cell.

(b) **Meiosis:** It's for sexual reproduction. The main theme of meiosis is that there are two cell division. Mitosis has one division and meiosis has two divisions in this process four cells are created where there was originally one.

Meiosis happens when its time to reproduce an organisms. The steps of meiosis are very simple. When we break it down its just two PMATI's in a row. The interphase that happens between the two proce-sses is very short and the DNA is not duplicated. Meiosis is the great process that shuffles the cell's gene-sis around. Instead of creating two new cells with equal number of chromosomes (like mitosis).



The cell does a second divi-sion soon after the first. This second divi-sion divides the number of chromo-somes in half. Scien-tists call, this process as **meiosis I and II**, but its just two PMATI's.

8 **Meiosis I:** This is basically live PMATI of a regular mitosis. Pairs of chromosomes are lined up at the centre of the cell and then pulled to



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Golgi complex	present	Present but absent in mature RBC
Nucleus	present	present
Granules.	present	present

8 Nucleus is absent in mature mammalian red blood cells and sieve tubes in the phloem tissue of vascular tube.

	<i>Plant Cell</i>	<i>Animal Cell</i>
1.	Nucleus elliptical in shape.	1. Nucleus rounded in shape
2.	Mitochondria fewer.	2. Mitochondria numerous.
3.	Plant cells do not burst if placed in hypotonic solution.	3. Animal cells usually burst if placed in hypotonic solution.
4.	Centrioles absent except in lower plants.	4. Centrioles present.
5.	Spindle formed during cell division is anastral type.	5. Spindle formed during cell division is of amphiastral type.
6.	Golgi body has distyosomes.	6. Golgi apparatus consists of a single complex.
7.	Lysosomes rare.	7. Lysosomes present in animal cells.
8.	Glyoxysomes present.	8. Glyoxysomes absent.
9.	Crystals of inorganic substances occur inside.	9. Crystals do not occur.
10.	Adjacent cells connected through plasmodesmata by middle lamella.	10. Adjacent cells connected by a number of junctions.
11.	Cytokinesis by cell plate.	11. Cytokinesis by cleavage.

Dissimilarities :

<i>Cell part</i>	<i>Plant</i>	<i>Animals</i>
Cell wall	present	absent
Lysosomes	absent	present
Centrioles	absent	present
Plastids	present	absent
vacuoles	present	absent



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