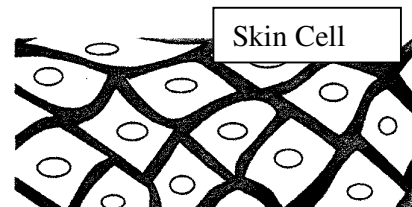
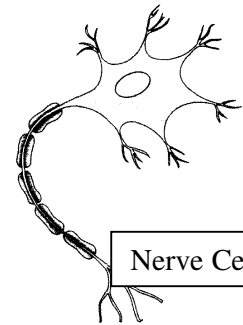


8th – CELL STRUCTURE



- The cells are known as building blocks or basic structural unit of life. As the blocks can be joined in many ways to make the building of different shapes and sizes. In the same way all , living organisms are made differently of different shapes, sizes and by different number of cells.
- The cells were discovered by **Robert Hooke**, English scientist in 1665 with his home made crude microscope he examined a thin slice of cork and observed that it had comb like structure. He called these thick walled room like structure cells.
- In 1674, with improved microscope, Anton von Leeuwenhoek discovered small components within the cell.
- **Variation in Number:** bodies of organisms may consist of one or many cells. Organisms whose body consists of a single cell are called unicellular organisms. Examples of unicellular organisms are Amoeba, Paramecium, Euglena, and bacteria.
- Thus, in a unicellular organism, a single cell performs vital activities like feeding, movement, respiration, and reproduction. Organisms whose body consists of many cells are called multicellular organisms. Most plants and animals (including human beings) are multicellular organisms.
- **Variation in Shape:** cells exist in different shapes. They can be disc-shaped, polygonal, rectangular, branched, or an irregular. The shape of a cell depends on the specific function it performs.
- **Variation in Size:** most cells are microscopic and cannot be seen with the naked eye. Cell size may vary from a micrometre (a millionth of a metre) to a few centimetres. The smallest cells are bacteria, which generally range in size from 0.1 to 0.5 micrometre.
- The largest cell is the egg of an ostrich, which is 170 millimetre in diameter. Human nerve cells are believed to be the longest cells.
- **Boiled EGG:** there are two clear portions in a hens egg. The yellow part and a white part surrounding it. The white part is called albumin while the yellow part is yolk.
- In an unboiled egg, the albumin is a jelly like transparent liquid. The yolk looks like a thicker yellow jelly.
- **Structure of a CELL:** A cell has both living and non-living parts. The living parts of the cell that have a definite shape, structure, and function are called organelles. The main parts of a generalized cell are cell membrane, cytoplasm, and nucleus.
- **Cell membrane:** It is the outer covering of a cell. It is a porous membrane through which selected substances can enter or leave the cell. The cell membrane is also called plasma membrane.
- Functions



8th – CELL STRUCTURE



1. Plasma membrane is porous and allows entry and exit of only selected substances. It also prevents the movement of some other substances across it. Thus, it is called **selectively permeable membrane**.
 2. It provides an outer boundary to the cell and separates cell from one another and also from the surrounding medium. It also protects the cell from injury.
 3. In addition, the plant cell and bacterial cell have an outer wall surrounding the cell membrane. This wall is called cell wall. The cell wall in plant cells provides protection against temperature variations, high wind speed and atmospheric moisture.
- **Cytoplasm:** It is a jelly-like fluid that fills up the part of the cell between the cell membrane and the nucleus. Several organelles are embedded in the cytoplasm. All the chemical reactions of cell occur in the cytoplasm. There are many small cytoplasmic bodies suspended in the cytoplasm. These are mitochondria, golgi bodies, ribosomes, endoplasmic reticulum, etc. These are called cell organelles.
 - **Nucleus** It is considered to be the brain of the cell. Nucleus is surrounded by a membrane called the nuclear membrane and is filled with a semi-solid substance called the nucleoplasm. It is the most important component of the living cell. Nucleus is a large and spherical structure present in all cells. After staining, it can be easily seen with the help of a microscope. In animal cells, nucleus lies at the centre of the cell whereas in plant cells, it is present at the periphery of the cell due to presence of a large vacuole. The nucleus consists of the following four parts:
 - (a) **Nuclear membrane** : Nucleus is separated from the cytoplasm by a membrane called nuclear membrane. This membrane is also porous and allows the movement of certain selected materials between the cytoplasm and the nucleus.
 - (b) **Nucleoplasm:** The dense fluid present in the nucleus is called nucleoplasm.
 - (c) **Nucleolus** : It is a small spherical body present inside the nucleus. It is rich in **RNA(Ribo nucleic acid)**.
 - (d) **Chromosomes** : Some fine, thread like structures, composed of **deoxy-ribonucleic acid (DNA)** are suspended in the nucleoplasm. These are called chromatin fibres. In the dividing nucleus, these chromatin fibres condense and form chromosomes. Due to this, chromosomes are only visible in dividing cells. These chromosomes carry genes. **Genes** are responsible for passing genetic characteristics from the parents offspring. A child receives one copy of each gene from the mother and another copy of same gene from the father.

Functions

- (i) The nucleus controls all the metabolic activities of the cell.
- (ii) It is responsible for passing genetic characteristics from the parents to the offspring. If a person has brown eyes, his son/daughter may also have brown eyes. If a woman has curly hair, her son/daughter may also have curly hair. However, different combinations of genes from parents may result in different characteristics.

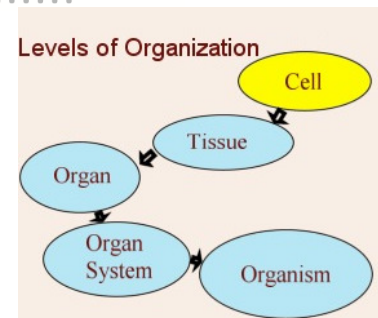
- Different cytoplasmic organelles are:

8th – CELL STRUCTURE



- **Golgi apparatus (or Golgi body)** It is made up of tubules (long tube-like structures), vesicles (small vessels), and vacuoles and is responsible for the secretion of chemical substances like enzymes, hormones, and proteins.
- **Vacuole:** It is a fluid-filled space enclosed in a membrane. Vacuoles store excess water, useful minerals, pigments, and many other substances.
- **Lysosome:** they contain chemical substances called enzymes that are capable of digesting cells and a variety of intra- and extra-cellular materials [intra, internal (inside); extra, external (outside)]. In times of emergency, lysosomes burst and destroy the cell. Hence, they are also called suicide bags of the cell.
- **Endoplasmic reticulum:** It is a network of tubules and channels and is involved in the synthesis, storage, and transport of cell products.
- **Ribosomes** These are small granular structures scattered in the cytoplasm that act as sites of protein synthesis.
- **Centrosomes** This structure is present only in animal cells. The main function of centrosomes is to initiate and regulate cell division.
- **Plastids** These are present only in plant cells. Plastids contain certain pigments that have a specific role to play in the functioning of the plant. Depending on the pigment colour, plastids are of three kinds: chloroplasts, chromoplasts, and leucoplasts.
 1. Chloroplasts contain the green pigment chlorophyll, which helps plants in making food.
 2. Chromoplasts contain non-green pigments that give colour to flowers and fruits.
 3. Leucoplasts are colourless and store food in the form of carbohydrates, fats, and proteins.
- **Mitochondria** (singular mitochondrion) These are tiny spherical or rod-shaped bodies. They act as sites of energy production and are, therefore, called the powerhouses of the cell.
- **Levels of Organisation:** In unicellular organisms, like Amoeba a single cell performs all the functions.
- Whereas in Multicellular organisms have cells that are specialized to perform specific function. As group of cell performing a specialized function forms a **tissue** for example nervous tissue. A group of tissues performing a specific function forms an **organ**, for example, kidney. A number of such organs work together to form an **organ system**, for example, digestive system.

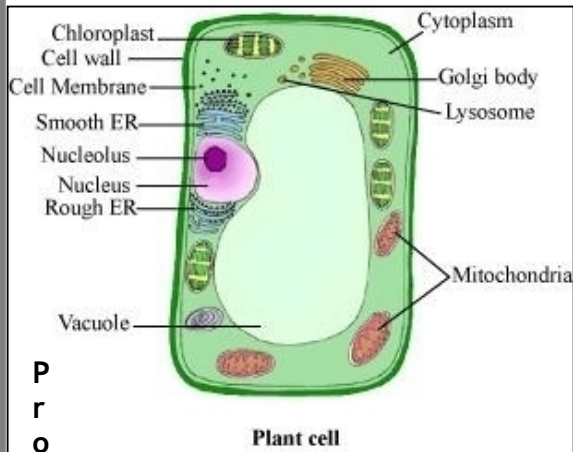
Comparison between Plant Cell and Animal Cell:



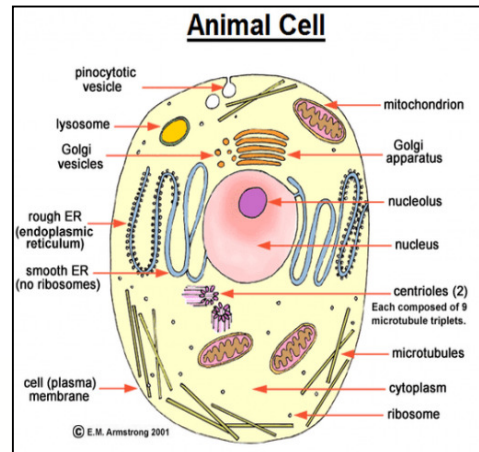
8th – CELL STRUCTURE



Plant Cell	Animal Cell
• Cell wall is present	• Cell wall is absent
• Cytoplasm is not as dense as in animal cell	• Cytoplasm is dense
• Large vacuole is present	• Vacuoles are generally absent. If present, they are small in size.
• Plastids are usually present	• Plastids are absent
• Centrosome is absent	• Centrosome is present



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Prokaryotic and Eukaryotic Cells:

- Cells that lack a well-defined nucleus surrounded by a nuclear membrane are called **prokaryotic cells**. Organisms that have such cells are called prokaryotes (pro, primitive; karyon, nucleus). Examples of prokaryotes are bacteria and blue-green algae.
- Cells that have a well-defined nucleus are called **eukaryotic cells**. Organisms that have such cells are called eukaryotes (eu, true; karyon, nucleus). All organisms apart from bacteria, blue-green algae, and viruses are eukaryotes.
- Cell Division and Growth:** The food that we eat leads to an increase in the size of cells. After reaching a certain size, a cell divides into two by a process known as cell division. Increase in the number of cells in the body as a result of cell division is responsible for growth in organisms.
- Cell division also replaces the dead or damaged cells with new ones and is, thus, responsible for healing wounds.
- Growth occurs because of cell division, not because of an increase in the size of cells. Most cells only grow till a certain point, after which they start dividing.

