THE STRUCTURE OF CELLS

History of cells:

Robert hook an English scientist, observed a thin slice of cork under the microscopy in 1665 and he described the small space by wall and named them **cells** and this come from Latino word ***cella*** and mean small room, but he did not know structure of the cells and he thought that the cells were empty because the microscope had low magnification and he was unable to see compounds of the cells.

Anton van Leeuwenhoek 1675 was the first person to observe living cells that he used high magnificent microscopy that could magnify the object 270x.Later, Robert Brown discovery of nucleus of the cells.

Theory of cells

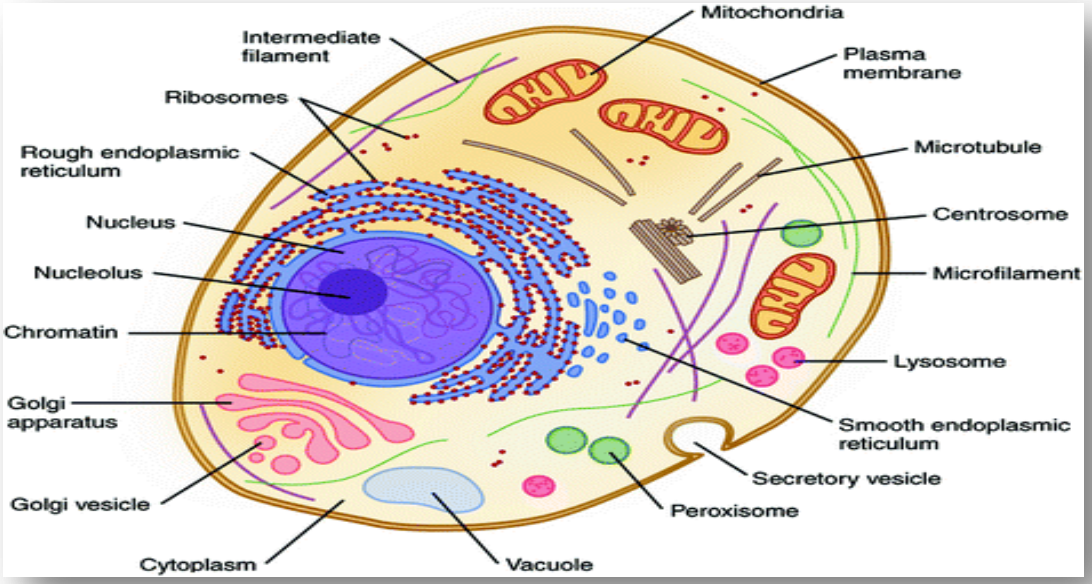
- **Matthias and Schleiden (1838)** conducted that all plants composed of cells.
- **Theodore Schwann (1839)** find out that all the animals composed from cells.
- **Rudolf Virchow (1855**) Determined that all the cells come from other cells.

The principles of cells theory

1. All living organisms are made up of cell and their products.
2. The cells are functional and structural unit of organism.
3. New cells are formed by divided of pre- existing cells.
4. Energy flow (metabolism and biochemistry) occurs within cells.
5. Cells contain DNA which is found specifically in the chromosome and RNAfound in the cell nucleus and cytoplasm.
6. All cells are basically the same in chemical composition in organisms ofsimilar species.

Definition of cell:

It is smaller structural and functional unit of life, in other word cells make up livingthings and carry out the activities that keep a living thing alive.



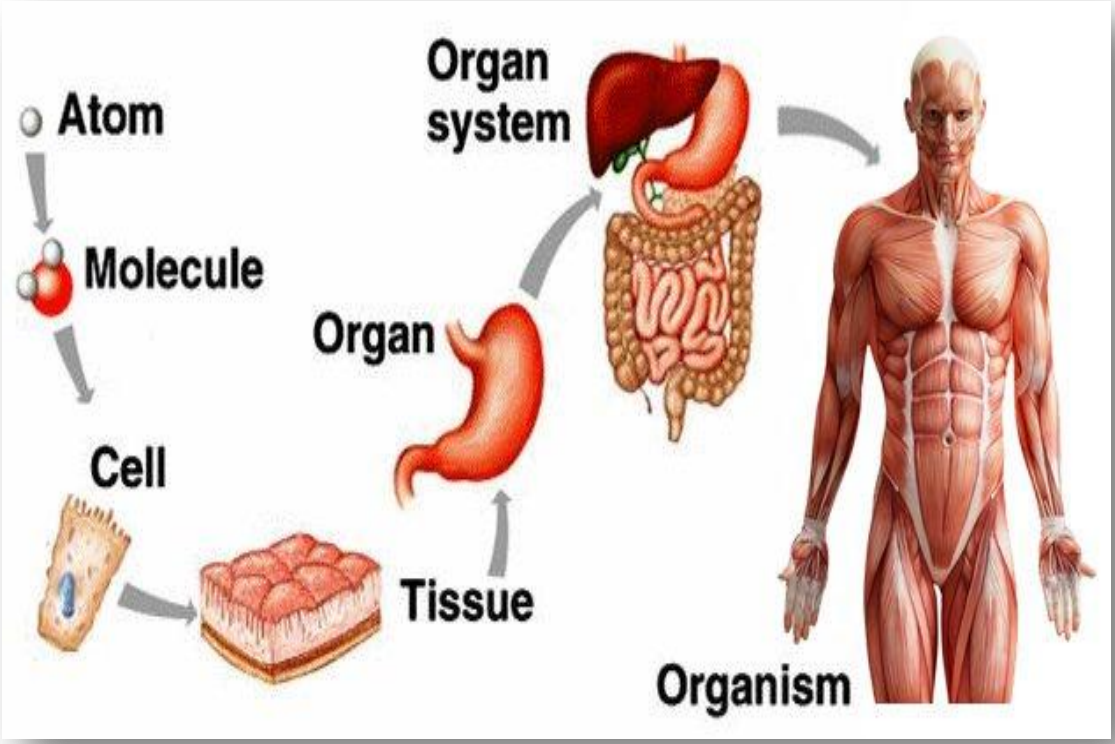
Organization and structure of the cells

All the cells are different in size and shape, but all cells have the same characteristic features. Cells have three major parts, nucleus, cytoplasm, and cell membrane.

The nucleus is separated from cytoplasm by nuclear membrane, and cytoplasm is separated from surrounding fluid by cells membrane also called plasma membrane, but the plant cells have additional things such as cell wall, Vacuoles, and chloroplast.

The cell is the smallest functioning part in the body. A group of the cells working together is called **Tissue**, and a collection of tissues for performing a specific function is called **organ**.

Multiple organs which are connected together are referred to as an **organ system**. Examples of organs include the heart, lungs, liver, kidneys, intestines, and stomach. Examples of organ systems include the respiratory system, circulatory system, reproductive system, and digestive system.



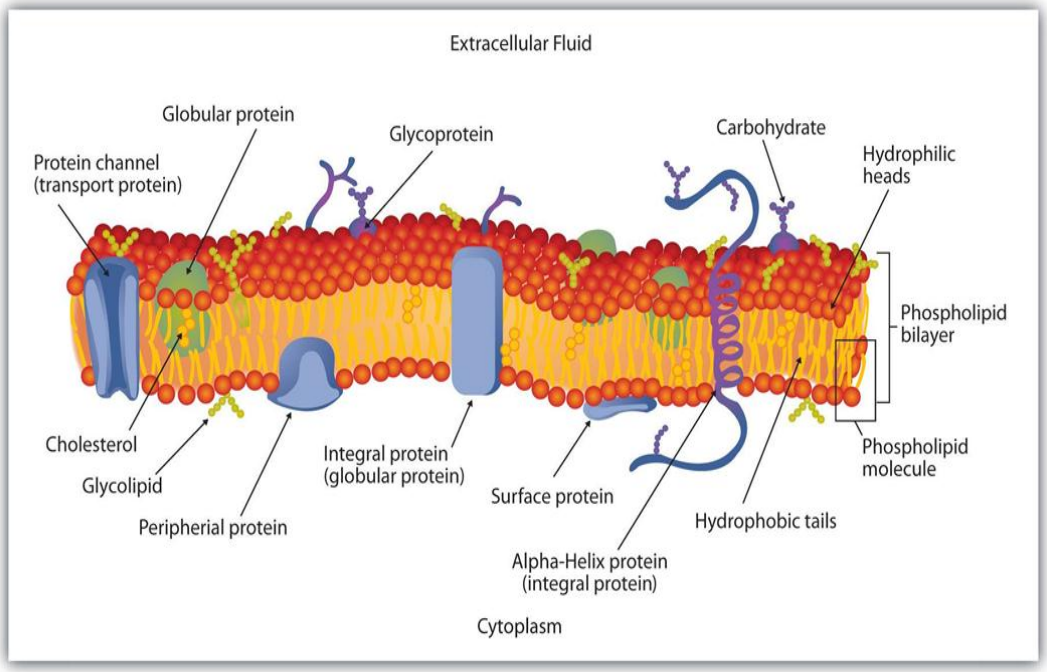
1. Cell membrane:

Cell membrane is called also plasma membrane. It is a thin membrane that surrounded every living thing. The cell membrane separates the material outside the cell (extracellular), from the material inside the cell, (intracellular). Therefore, has two functions:

- **First: to be a barrier keeping the constituents of the cell inside.**
- **Second: to be a gate allowing transport nutrient into cells and movement of waste products out of cell.**

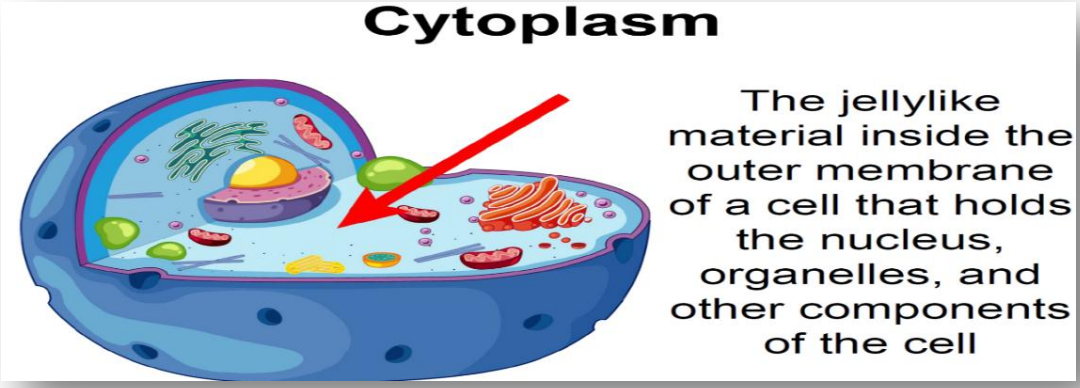
Cell membrane composed from three parts:

1. **Phospholipids:** cell membrane is a double layer of phospholipid molecules.
2. **Cholesterol**: Is another lipid composed of four fused carbon rings, found alongside phospholipids in the core of the membrane.
3. **Proteins**: Proteins in the cell membrane provide structural support, form channels for passage of materials, act as receptor sites, function as carrier molecules, and provide identification markers.



2. Cytoplasm:

Cytoplasm is the material within eukaryotic cells, enclosed by the cell membrane. The main compound of cytoplasm are the cytosol, organelles, and cytoplasm inclusions. One of the major functions of cytoplasm is to enable cells to maintain their characteristics, which enables the cells to hold their shape and size.



Other functions of cytoplasm:

1. **Cytoplasm is jelly-like fluid, composed of salt and water, and embeds all of the parts of thecells and organelles.**
2. **Cytoplasm is home for many activities of the cell as it contains molecules, enzymes that are responsible for breakdown of the waste.**
3. **Cytoplasm also assists in metabolic activities.**
4. **Cytoplasm provides shape of the cell. It fills up the cells thus enabling the organelles to remain in their position.**
5. **The cells, without cytoplasm, would deflate and substances will not transfer easily from one to the other organelle.**
6. **Cytosol or cytoplasmic matrix, is a part of the cytoplasm, the cytosol has no organelles. Its fill up the cell section, which does not hold the organelles.**

Protoplasm: **is the whole cellular content of a living cell that include the cytoplasm, nucleus and all other living components of the cell together make up the protoplasm of a cell.**

Protoplasm= cytoplasm+ nucleus+ other living components.