CELL

CONTENTS

THE CELL

Cell is the functional & structural unit of life as all the metabolic activity takes place in a cell.

The study of structure & composition of cell is known as cytology.

HISTORY

Robert Hooke used a primitive compound microscope to examine thin slices of cork from the bark of an oak tree.
He observed the hollow box like structure similar to honey comb for which he coined the term 'cell'.

◈ Unicellular Organisms :

- In these organisms, all the function like nutrition, respiration, excretion & reproduction are carried out by the single cell.
  Example → Amoeba.

◈ Multicellular Organisms :

- Organisms which are made up of a few to billions of cells.
  Example → Plants & Animals.

◈ Shape of Cell :

- The Cells of animals & plants may be oval, spherical, cuboidal, columnar, polygonal or spindle-like. Neuron is the longest cell in animal body.

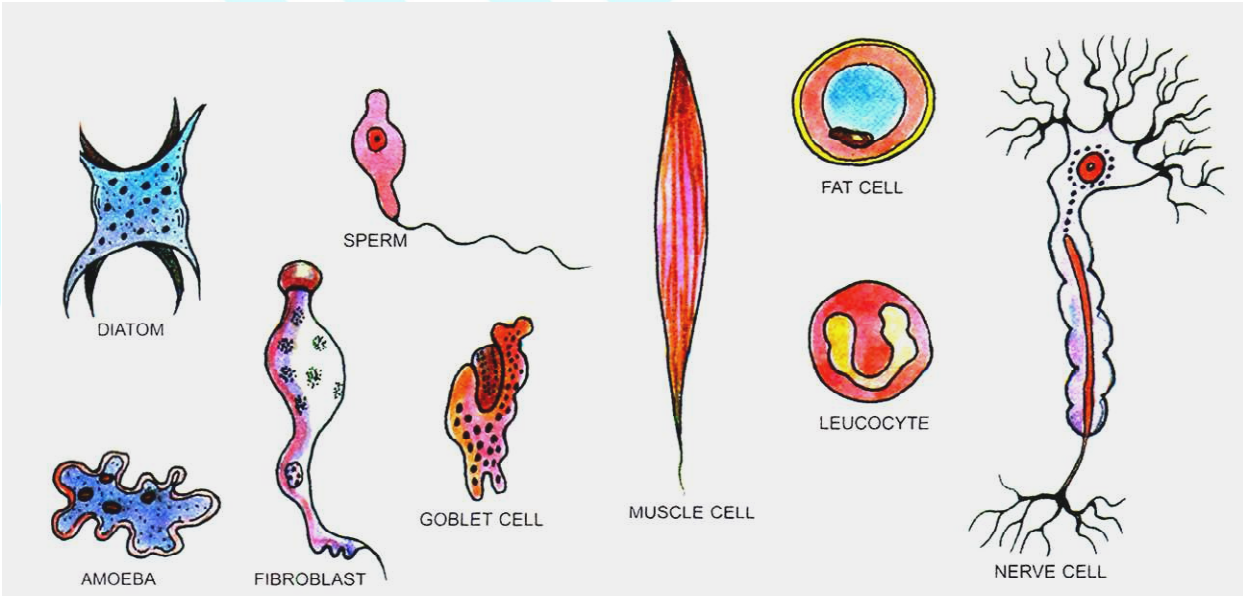

Figure : VARIOUS TYPES OF CELLS SHOWING DIFFERENT SHAPES

◈ Size of Cell :

- The cell of animal & plants show variation in their size.
  For example - The largest living cell is egg of an ostrich which is about 170 mm in diameter. The smallest cell is PPLO which is 1μ small.

➢ STRUCTURE OF CELL

◈ Cell Membrane :

- Cell membrane is also called the **plasma membrane**. In an animal cell, it is the outermost layer, where as in a plant cell, it is protected by the cell wall. It is a living structure and controls the entry and exist of some substances in and out of the cell. It also protects the internal components of the cell. It gives shape to the cell.

◈ Cell Wall :

- In addition to the cell membrane, plant cells have an outer thick layer called **cell wall**. It is non-living and it mainly composed of **cellulose**. It is protective in function and mainly determines the shape of the cell. It is absent in animal cells.

◈ Cytoplasm :

- It is a transparent , jelly-like living substance which fills the interior of an animal and plant cell. It is present between the cell membrane and the nucleus. It contains a number of minute living structures known as the **cell organelles** and many non-living substances known as **cell inclusions**.

◈ Nucleus :

- Nucleus is the most important part of a cell. It is usually spherical or oval in shape. It controls all the vital functions of the cell. It is made up of the **nuclear membrane, nuceloplasm, nucleolus** and chromosomes. The **nuclear membrane** surrounds the nucleus and separates it from the cytoplasm. It is permeable and controls the passage of materials through and from the nucleus.
- The **nucleoplasm** or **nuclear sap** makes up the body of the nucleus. It is deser than the cytoplasm.
- The **nucleolus** is a spherical body in the nucleus. It is composed of the nucleoprotein **RNA** (ribonucleic acid). It is responsible for protein synthesis.
- Nucleus also contains thread-like structures called **chromosomes**, which are composed of nucleoprotein **DNA** (deoxyribonucleic acid). The hereditary units of chromosomes are the **genes**. They are responsible for the transmission of characters from the prarents to the offspring.
- Those organisms which do not have well defined nucleus and nuclear membrane are called **prokaryotes**. For example, bacteria, and some blue green algae.
- Those organisms which have well organized nucleus with the nuclear membrane are called **eukaryotes.** For example man, elephant, onion and cheek cells.

➢ CELL ORGANELLES

These are active, living, permanent small structure present in cytoplasm & concerned with cell function.

◈ Vacuoles :

- The central part of most plant cells is occupied by a large vacuole. It is a sac like structure filled with fluid. Food, wastes pigments and other substances are dissolved in the fluid. Some plant cells have a number of large vacuoles.
  Vaculoes are not so common in animal cells.
- When they occur, they are much smaller in size.

◈ Plastids :

- These organelles are not present in animal cells. **Chloroplasts** (a type of plastid) contain the green pigment chlorophyll and are responsible for photosynthesis. Only green parts of plants have chloroplasts.
- There are two other types of plastids called chromoplasts and leucoplasts. **Chromoplasts** contain pigments which give fruits and flowers their colours. **Leucoplasts** store food and are found in the storage organs of plants.

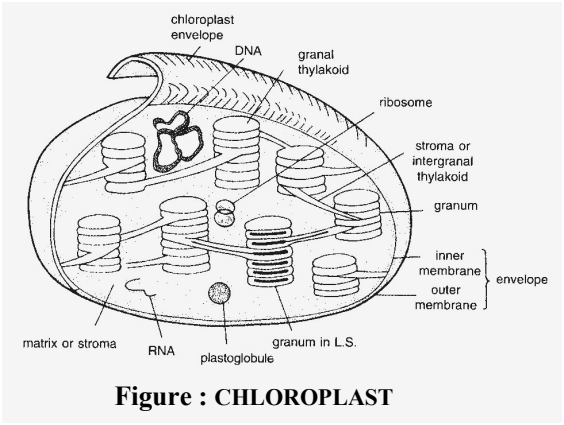

Figure : CHLOROPLAST

◈ Endoplasmic reticulum (ER) :

- The endoplasmic reticulum is a network of tube-like structures running through the cytoplasm. If ribosomes are attached to it, the reticulm is rough, otherwise it is smooth.
- Function - It gives internal support to the colloidal matrix (cytoplasm).
- Rough endoplamic reticulum (RER) is associated with the synthesis of proteins.

◈ Ribosomes :

- Ribosomes are extremely Small, round bodies found either in the state in the cytoplasm or attached to the surface of the ER. They are composed of ribonucleoprotein (ribonucleic acid and protein).
- Functions - The main function of ribosomes is to act as a platform or work place for the synthesis of proteins.

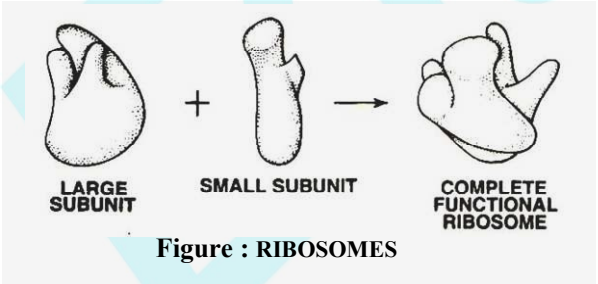

Figure : RIBOSOMES

◈ Mitochondria :

- Mitochondria are small, rod-shaped organelles found in large numbers. Each mitochondria is bounded by two membranes-outer and inner. The outer membrane is smooth and the inner membrane is pushed inwards at intervals forming crests called cristae. The cristae lie in a ground substane called matrix. Mitochondria process enzymes necessary for the oxidation of carbohydrates. This process releases energy in the form of ATP. This is why mitochondria are known as the powerhouses of the cell. Mitochondria have their own DNA and ribosomes. They can synthesize their own proteins.
- Function- Mitochondria provide energy for the vital activities of living cells.

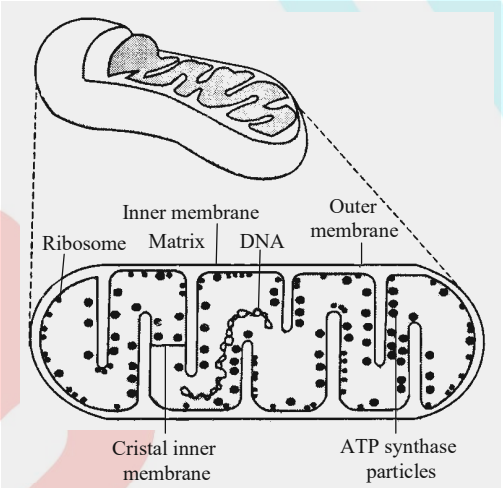

Figure : MITOCHONDRIA

◈ Golgi Body :

- These are small, hollow, plate-like or cup-shaped bodies found in animal cells. They synthesise, store and secrete enzymes and proteins. The Golgi apparatus in plants is known as **dictyosome**.

◈ Lysosome :

- They are present in animal cells only. They contain enzymes for cellular digestion. If they burst, the cell may get damaged or destroyged. Hence, they are called the **suicidal bags** of the cell.

◈ Centrosome :

- It is a star-like structure found mostly in animal cells. It consists of **cenrioles**. It helps in cell division.