

In The Name Of Allah

Biological Sciences

Cell Structure And Function (2018 (3d))

1- Definition:

- Cells are the smallest living units of structure and function of all living things.
- The word cell is derived from the Latin word cellula which means a little room.
- The cell was derived by Robert Hooke in 1665.

Structure And Functions:

2- Common Things in all cells:

(i) Cell Membrane

• All cells have cell membrane which separates the inside from its environment.

• It is composed of four different types of molecules

(i) Phospholipids

(ii) Cholesterol

(iii) Proteins

(iv) Carbohydrates

ii) Cytoplasm:

- Which is jelly like fluid.
- The living content of the protoplasm between plasma membrane and nucleus is cytoplasm. These living content collectively form protoplasm.

(iii) DNA:

- Which is cell's genetic codes that determine all the characteristics of a living thing.

3- Broad Categories of Cell:

Cells have two categories are given below.

i) Eukaryotic Cells:

- They have organelles which includes the nucleus and other special parts.
- They are more advanced complex cells such as those found in plant and animal cells.

ii) Prokaryotic Cell:

- They don't have a nucleus and membrane enclosed organelles.
- They do have genetic material but it's not contain within a nucleus.
- They are always one called or unicellular organisms such as bacteria.

4- Organelles:

- It means little organ.
- They are special parts of cells that have unique jobs to perform.
- Each types of organelle has a definite structure and a specific role in the function of the cell.

5- Nucleus:

- The nucleus contain DNA or genetic material.

⇒ DNA

- DNA dictates what the cell is going to do and how its going to do it.

Chromatin:

- Chromatin the tangled spread out form of DNA found inside the nuclear membrane.
- When a cell is ready to divide DNA condenses into structures known as chromosomes.

⇒ Nucleolus:

- The nucleus also contain a nucleolus which is a structure where ribosomes are made.
- After ribosomes leaves the nucleus, they will

have the important job of "synthesizing" or making proteins.

- Outside the nucleus the ribosomes and the rest of the organelles float around in cytoplasm, which is jelly-like substance.

Cytoplasm:

Ribosomes may wander freely within the cytoplasm or attach to the endoplasmic reticulum, sometimes abbreviated ER

(i) ER

- * There are two types as:

(a) Rough ER

(b) Smooth ER

Rough ER

Smooth ER

- It has ribosomes attached to it

- It doesn't have ribosomes attached to it

- * The ER is a membrane enclosed passageway for transporting from materials such as proteins, synthesized by ribosomes.

(a) Protein:

- Protein and other materials emerge from

the ER in small vesicles.

Golgi Apparatus (Golgi Body):

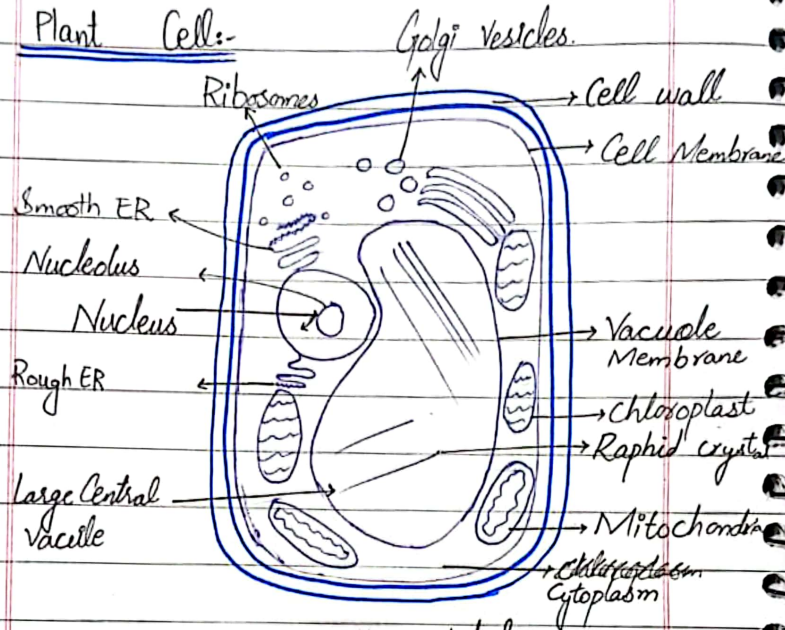
- They receive them.
- As proteins move through the Golgi body they're customized into forms that the cell can use.
- The Golgi body does this by folding the proteins into usable shapes, or adding other material on them such as lipid or carbohydrates.

6- Vacuoles:

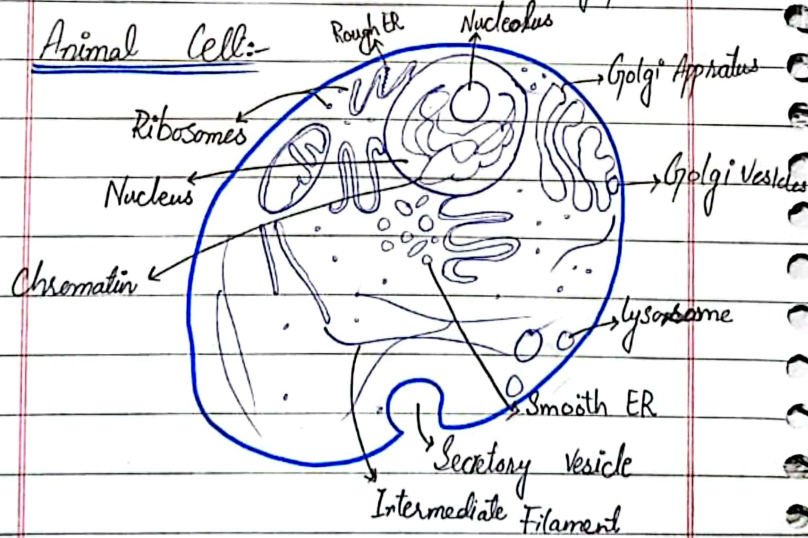
- Vacuoles are sac-like structures that store different materials.

Plant Cell

Plant Cell:-



Animal Cell:-



<u>Plant Cell</u>	<u>Animal Cell</u>
(i) Cell Membrane:	
<ul style="list-style-type: none"> • It is the semi-permeable membrane that is present within the cell wall. • It is composed of a thin layer of protein and fat. 	<ul style="list-style-type: none"> • It is selectively permeable and allows only certain molecules to pass through. • It is a double-layered membrane made up of phospholipids that surrounds the entire cell.
(ii) Cell Wall:	
<ul style="list-style-type: none"> • It is a rigid layer which is composed of cellulose, pectin and hemicellulose. • It is located outside the cell membrane. 	<ul style="list-style-type: none"> • Animal cells never have a cell wall.
(iii) Nucleus:	
<ul style="list-style-type: none"> • The nucleus is a membrane-bound structure that is present only in eukaryotic cells. 	<ul style="list-style-type: none"> • The nucleus contain the genetic material DNA located in the nucleolus region of the nucleus.

- The vital function of a nucleus is to store DNA or hereditary information required for cell division and growth.

(i) Nucleolus:

- It manufactures cell protein-producing structures and ribosomes.

(ii) Ribosomes:

- They are the smallest membrane-bound organelles which comprise RNA and protein.
- They are the sites for protein synthesis hence also referred to as the protein factories of the cell.

- The nucleus is separated from the rest of the cell by a nuclear membrane. It also regulates the growth and division of cells.

- Ribosomes are found freely in the cytoplasm of the cell or attached to the membranes of ER.
- They help in the synthesis of protein.

Common Things in Both cells.

(v) Endoplasmic Membrane:

- It consists of a network of membranous sacs called cisternae that branches off from the nuclear membrane.

- It is of two types.

Rough Endoplasmic Reticulum,

Smooth Endoplasmic Reticulum.

- It helps in transporting proteins synthesised by the ribosomes.

(vi) Golgi Apparatus:

- They are found in all eukaryotic cells, which are involved in distributing synthesised macromolecules to various parts of the cell.

- Golgi Apparatus receives proteins from endoplasmic reticulum, and package (synthesised by ribosomes) them into vesicles.

(vi) Mitochondria:

- They are the double-membraned organelles found in the cytoplasm of all eukaryotic cells.
- They provide energy by breaking down carbohydrate and sugar molecules, hence they are also called powerhouses of cells.
- These are also known as powerhouses of cells because they produce energy.
- It consists of an outer membrane and an inner membrane. The inner membrane is divided into folds called crista.
- They help in the regulation of cell metabolism.

(vii) Lysosome:

- Lysosome are called suicidal bags as they hold digestive enzymes in an enclosed membrane.
- They known as suicidal bags because they poses hydrolytic enzymes to digest protein, lipid, carbohydrates and nucleic acid.

(vii) Chloroplast:

- They are heterogenous, coloured plastid which is responsible for pigment synthesis and for storage in photosynthetic eukaryotic organisms.
- It have red, orange, and yellow coloured pigments which provide colour to all rip fruits and flowers.

(viii) Plastids:

- These are double-membraned structure and are found only in plant cell.
- These are of three types:
 - (a) Chloroplast that contains chlorophyll and is involved in photosynthesis.
 - (b) Chromoplast that contains chlorophyll a pigment called carotene that provide the plants red, yellow or orange colours.
 - (c) Leucoplast that are colourless and store oil, fat, carbohydrates

Conclusion:

- Eukaryotic cell: Plant and Animal cells with a nucleus and membrane-enclosed organelles.

- Prokaryotic Cell: Unicellular organisms without a nucleus or membrane-enclosed organelles.
- All cells have a cell membrane, cytoplasm and genetic material.
- Both plant and animal cells have mitochondria.