

Learn the key concepts of Science topic - Cell, Tissue and Structural Organization in Animals

Hello our dear learners, we will be discussing about Cell, Tissue and Structural Organization in Animals. So let's cover this topic. Firstly know about the basic and fundamental unit of life i.e. cell.

## Cell

Cell is fundamental structural and functional unit of life. Cell was discovered in 1665 by Robert Hooke. He discovered cork cell with the help of microscope. Anton Van Leeuwenhoek first saw and described living cell.

## Cell Theory

In 1838, Matthias Schleiden, a German botanist and in 1839, Theodor Schwann, a British zoologist, composed cell theory. Cell theory as understood today is:

1. all organisms are composed of cells and products of cells.
2. All cells arise from preexisting cell.

## Two types of cells

Prokaryotes	Eukaryotes
1. Nucleus is absent	1. Nucleus is present with nuclear membrane
2. Membrane bound organelle are absent	2. Membrane bound organelle are present
3. Complexity is much simpler	3. More complex in nature and structure
4. Cell structure is unicellular	4. Cell structure is mostly multicellular, some unicellular
5. Smaller in size	5. Larger in size
6. Genetic material is in circular form	6. Genetic material is in linear form
7. Examples- Bacteria and archaebacteria	7. Examples- protista, fungi, plants, animals

## Organelles of Prokaryotic cells

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### Cell Envelope and Modifications:

Cell envelope of prokaryotic cells have 3 layers:

1. Glycocalyx- tough layer called capsule.
2. Cell wall- It determines shape and structure. It provides support and prevents cells from bursting.
3. Plasma membrane- Semipermeable in nature.

### Ribosomes:

- 15-20 nm in size
- 2 subunit - 50S and 30S together form 70S
- prokaryotic ribosomes
- Several ribosomes attach to single mRNA form polysome or polyribosome
- Ribosomes are site of protein synthesis.

### Inclusion bodies:

- Reserve materials in cytoplasm are stored in inclusion bodies, Membrane-less.
- Eg- Phosphate granules, cyanophycin granules and glycogen granules.

## Organelles of Eukaryotic cells

**Cell Membrane:** Cell membrane is the boundary of the cell. It forms the outer limiting membrane of the animal cell. It is composed of lipid bilayer, protein and carbohydrate.

- **Lipid bilayer-** consist of phosphoglyceride. Arranged in membrane with polar i.e. hydrophilic part outside and nonpolar i.e. hydrophobic part outside.
- **Protein-** two types of protein are integral Or peripheral. Peripherals lie on the surface while integrals are completely or partially buried in the membrane.
- **Carbohydrates-** present on the cell surface help in cell recognition and adhesion.

### Cell Wall:

- Non-living rigid structure
- Form outer covering of cell membrane in plants and fungi
- It is made up of cellulose, hemicellulose, pectins and proteins
- Function of cell wall is to protect cell from mechanical damage and infection.

**Endoplasmic Reticulum:** It is part of endomembrane system. It is continuous with nuclear membrane and divide intracellular space in two compartment luminal and extra luminal. Two type of ER are:

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RER	SER
1. Rough endoplasmic reticulum	1. Smooth endoplasmic reticulum
2. Ribosomes present on surface	2. Ribosomes absent
3. Help in protein synthesis and secretion	3. Help in lipid synthesis

### Golgi Apparatus:

- Discovered by camillo golgi
- Consist of flat or disc shape sac or cisternae
- Arranged near nucleus has 2 surface cis and trans
- Function is to package the material
- Help in glycoprotein and glycolipids synthesis

### Lysosome:

- Part of endomembrane system
- Formed by packaging from golgi body
- Contain hydrolytic enzyme which work at acidic pH, Digest carbohydrate, protein, nucleic acid etc.

### Vacuoles:

Membrane bound space contain water, sap, excretory profit

### Mitochondria:

- Double membrane bound organelle.
- Known as power house of cell, Produce energy in form of ATP.
- membrane divide lumen in two compartments i.e. outer and inner.
- Inner compartment is called Matrix and it contains single circular DNA with 70S ribosomes for protein synthesis.
- Mitochondria divide by fission.

### Chloroplast:

- Found in all plant cell and Euglenoids.
- Chloroplast contain chlorophyll.
- Chromoplast contain carotenoids.
- Leucoplast are colourless and store nutrients.

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## Nucleus:

- Discovered by Robert Brown in 1831.
- Nucleus is a double membrane organelle with perinuclear space between two membrane.
- Matrix of the nucleus is called nucleoplasm and it contains a spherical nucleolus.
- Nucleus stores all the genetic information of a cell.

# Tissue

## Animal tissue:

Group of similar cells along with intercellular substances performing specific functions are known as tissue. Animal tissue is broadly classified in 4 categories:

**1. Epithelial tissue:** This tissue has a free surface which faces either body fluid or the outside environment.

Simple epithelium	Compound epithelium
Composed of single layer of cell form lining of body cavity	It is multilayered and help in providing protection against stress
Eg. ducts and tubes	Eg. Dry surface of skin, moist surface of buccal cavity

**2. Connective tissue:** This tissue provides support and linking to other tissue. Eg. Cartilage, bone, blood and adipose. There are 3 types of connective tissue:

**A) Loose connective tissue:** cell and fibres loosely arranged in semi- fluid ground substance. Mainly present beneath skin  
Eg. Areolar and adipose tissue.

**B) Dense connective tissue:** fibres and cells are densely arranged. This can be divided into two by arrangement of fibre. Dense regular tissue in which fibres are arranged in rows. Eg. Tendon and Ligament. Dense irregular tissue in which fibres are oriented differently Eg. Skin.

# Specialized Connective tissue

Eg. Cartilage, bone and blood etc.

**1. Neural tissue:**

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- Neurons are the unit of neural tissue.
- Rest of the neural system consists of neuroglia. It helps in protection and support of the system.
- Function of neural tissue is to give response in different conditions of the body.

## 2. Muscle Tissue:

Muscle tissue is formed of myofibrils. There are 3 types of muscle in human body:

	<b>Skeletal muscle</b>	<b>Smooth muscle</b>	<b>Cardiac muscle</b>
Location	Attached to bone	Present in viscera organ	Heart
Appearance	Striated	Non-striated	Striated
Nerve supply	Voluntary	Involuntary	Involuntary
Nuclei	Multinucleate	Uninucleate	Uninucleate

Cells arrange in tissues, tissues in organs and organs in the organ system. Hence all the complex body functions are carried out by this arrangement.

I hope you learned well. Study hard and stay tuned for more.