

Biology Class 02

23rd May, 2023 at 9:00 AM

A BRIEF REVISION OF THE PREVIOUS CLASS (9:02 AM):

CELL BIOLOGY (9:04 AM):

- **Cell** is the basic **structural** and **functional unit** of all known forms of life.
- Types of organisms on the basis of the number of cells:
- Unicellular (one cell) and Multicellular (More than one cell).
- **Unicellular organisms**: Contain only a single cell which performs all the life processes.
- **Eg**: Amoeba, Euglena, Paramecium etc.
- **Multicellular organism**: Organisms which consist of more than one cell.
- The different cells can be specialized for different functions all of which coordinate to make life possible in an organism.
- **Eg**: Insects, Human beings, Plants, etc.

PROKARYOTE VS EUKARYOTE (9:17 AM):

- **Prokaryotes**:
- They are unicellular organisms that **lack a membrane-bound nucleus and cell organelle**.
- The **genetic material** (DNA) is **circular** and is present in the **nucleoid region**.
- **Examples** are **bacteria**, and **cyanobacteria** (Blue-green algae).
- **Eukaryotes**:
- They can be either **unicellular** or **multicellular**.
- They have a **membrane-bound nucleus** and **cell organelle**.
- The **genetic material** (DNA) is **linear** and is organized in the form of rod-like structures called **chromosomes**.
- **Examples** are **Plants, Animals, Fungi, Amoeba**, etc.

STRUCTURE OF CELL (9:26 AM):

- Draw the diagram.
- **Cell Membrane/Plasma membrane:**
 - It separates the interior of all cells from the outside environment.
 - It is made up of **phospholipids**.
- **Cell Wall:**
 - It is the **structural layer** surrounding the plasma membrane in certain types of cells to provide additional **support** and **protection** to the cells.
 - It is **made up** of **cellulose** in plants, **peptidoglycan** in bacteria, and **chitin** in fungi.
- **Cell Nucleus:**
 - It is the **controlling center of all activity** of the cell.
 - It is generally **spherical** in shape and is located in the center of the cell.
 - It contains the **genetic material** in the form of chromosomes.
- **Cytoplasm:**
 - It consists of all the components of the cell enclosed within the cell membrane other than the nucleus.
- **Protoplasm:**
 - It is the living part of the cell which includes the **nucleus** and **cytoplasm**.
- **Ribosomes:**
 - They are **sites** of **protein synthesis** within the cell.
 - They can be present freely in the cytoplasm or attached to the endoplasmic reticulum.
- **Endoplasmic Reticulum:**
 - They are channels of transport of material between various parts of the cell.
 - They are **two types** that are:
 - **Rough Endoplasmic Reticulum** contains attached ribosomes and is associated with **protein synthesis**.
 - **Smooth Endoplasmic Reticulum** does not contain attached ribosomes and is associated with the **manufacture of fats**.
- **Mitochondria:**
 - It is the site for energy production in cells and thus, it is called the **powerhouse of cells**.
 - It has its **own DNA**.
- **Golgi Bodies:**
 - They package and dispatch material from inside to outside the cells.
- **Lysosomes:**
 - It contains powerful **digestive enzymes** which can digest any foreign material as well as worn-out cell organelle.
 - They can digest the whole damaged cell and thus it is called the **suicide bags** of the cell.
- **Vacuoles:**
 - They are **storage structures** of the cell.
 - They can be present in the form of a **single large structure** in the **plant cell** or **multiple small structures** in the **animal cells**.
- **Plastids:**
 - Plastids contain **pigments of different colors** and are found only in **plant cells**.
 - **They contain their own DNA.**
 - They are of three types that are **chloroplasts** (for the green part), **chromoplasts** (for the colored parts), and **leucoplasts** (white or colorless).

DIFFERENCE BETWEEN ANIMAL CELL AND PLANT CELL (9:57 AM):

Animals cells

Cell membrane only.

There are no plastids.

They have small multiple vacuoles.

It has a central nucleus.

Glycogen is stored in the animal cell.

Plants cells

Cell wall only.

Plastids are present in a plant cell.

Single large vacuole.

It has a peripheral nucleus.

Starch is stored in a plant cell.

KINGDOM CLASSIFICATION (10:16 AM):

- **Monera:** Monera organisms are **prokaryotes**. They are always **unicellular**.
Eg: **Bacteria** and **Cyanobacteria** etc.
- **Protista:** They are **Eukaryotic** and **unicellular**. Eg: **Amoeba, Euglena** etc
- **Fungi:** **Eukaryotic**. It can be both **unicellular** and **multicellular**. Eg: **Mushrooms, Yeast**, etc.
- **Plants:** They are **Eukaryotic** and **multicellular**. Eg: **Algae, Ferns, Roses**, etc.
- **Animals:** **Eukaryotic** and **multicellular**. Eg: **Hydra, Dolphin**, etc.

VIRUS (10:24 AM):

- Viruses have their **own Genetic material- DNA/RNA**, and **Proteins**.
- They however **lack the enzymes** needed for energy production.
- They can grow and replicate only inside the living cells of another organism.
- They can **infect plants, animals**, and even **micro-organisms** like bacteria.
- **Examples of RNA viruses: Coronavirus; DNA Virus- Chicken pox virus.**

DIGESTIVE SYSTEM (10:51 AM):

- **Mouth:**
- In the mouth, we have salivary glands which produce **saliva**, which contains an enzyme- **Amylase**.
- Amylase - Breaks down carbohydrates.
- **Esophagus/Food pipe:**
- No breakdown takes place here.
- It is connecting channel between the mouth and stomach.
- **Stomach:**
- Secretes gastric juice (HCL + Protease enzyme to break down the protein).
- **Small Intestine:**
- Secretes intestinal juice [**Peptidase** (for breaking down carbohydrates) + **Sucrase + Maltase + Lactase** (breaks down proteins)].
- It has a rich blood supply and nutrients are absorbed into the blood.
- **Liver:**
- Produces **bile** which helps in **fat digestion**.
- (Bile - No fat-digesting enzymes).
- **Gall bladder:**
- Stores the bile.
- **Pancreas:**
- Secretes pancreatic juice.
- Pancreatic juice has **Protease** (for breaking down proteins), **Lipase** (for fats), and **Lactase** (for carbohydrates).
- **Large intestine:**
- Contains undigested material and excess water.
- **Water absorption** takes place here.
- Undigested waste comes out of the body in the form of stool.

RESPIRATORY SYSTEM (11:07 AM):

- Respiration is for the production of energy.
- **Two steps:**
- **Gaseous Exchange:**
- Path of air travel: Nasal cavity (nose) - Pharynx - larynx (voice box) - Trachea (supply air to lungs) - Bronchi - Bronchioles- Alveoli(Air sacs, gaseous exchange actually takes place here, it has a rich supply of blood).
- Haemoglobin (Hb) has a very high affinity for Oxygen, Oxygen gets attached to Hb.
- In this attached form, O₂ goes to all the parts of the body.
- **Cellular Respiration:**
- Process of energy production at the level of the cell.
- $\text{Glucose} + \text{O}_2 = \text{CO}_2 + \text{H}_2\text{O} + \text{Water} + \text{Energy}$ (Aerobic respiration).
- Anaerobic respiration occurs in Bacteria, Yeast.
- $\text{Glucose} = \text{Ethanol} + \text{CO}_2 + \text{Energy}$ (Anaerobic respiration, it is also called fermentation).
- If there is insufficient oxygen, then in our body also **anaerobic respiration** takes place.
- This property is limited to **muscle cells** only.
- $\text{Glucose} = \text{Lactic acid} + \text{Energy}$.
- **Muscle cramps** - Due to the production of lactic acid.

CIRCULATORY SYSTEM (11:26 AM):

- Three parts: Blood, Heart, and Blood vessels.
- Blood vessels are of two types:
- **Artery:** Take away blood from the heart, reddish in color, deep-seated, thick-walled, and carries oxygenated blood except the **Pulmonary Artery**.
- **Vein:** Takes blood toward the heart, bluish-green in color, superficial, thin-walled, and carries deoxygenated blood except **Pulmonary Vein**.
- **Heart:**
- Four chambers - Atrium(Right and Left) + Ventricle (Right and Left).
- **Double circulation in the heart:**
- Lungs - Oxygenated blood - Left Auricle - Left Ventricle - Oxygenated blood - Body (except lungs) - Deoxygenated blood - Right Auricle - Right Ventricle - Deoxygenated blood.
- **Pulmonary Vein:** Carry oxygenated blood from the lungs to the heart.
- **Aorta:** Carry oxygenated blood away from the heart and supply it to all parts of the body.

EXCRETORY SYSTEM (11:45 AM):

- Removal of waste + Regulation of water
- **Kidneys** = Removal of waste in the form of urine and regulation of water.
- **Urine** = Urea 2.5%, other waste - 2.5%, and water -95%.
- Kidney is connected to the urinary bladder through ureters.

Homework: NCERTs: Class 7- Chapters 2,6,7; Class 9- Chapters 5.

TOPIC FOR THE NEXT CLASS:Endocrine system, Health, and diseases.