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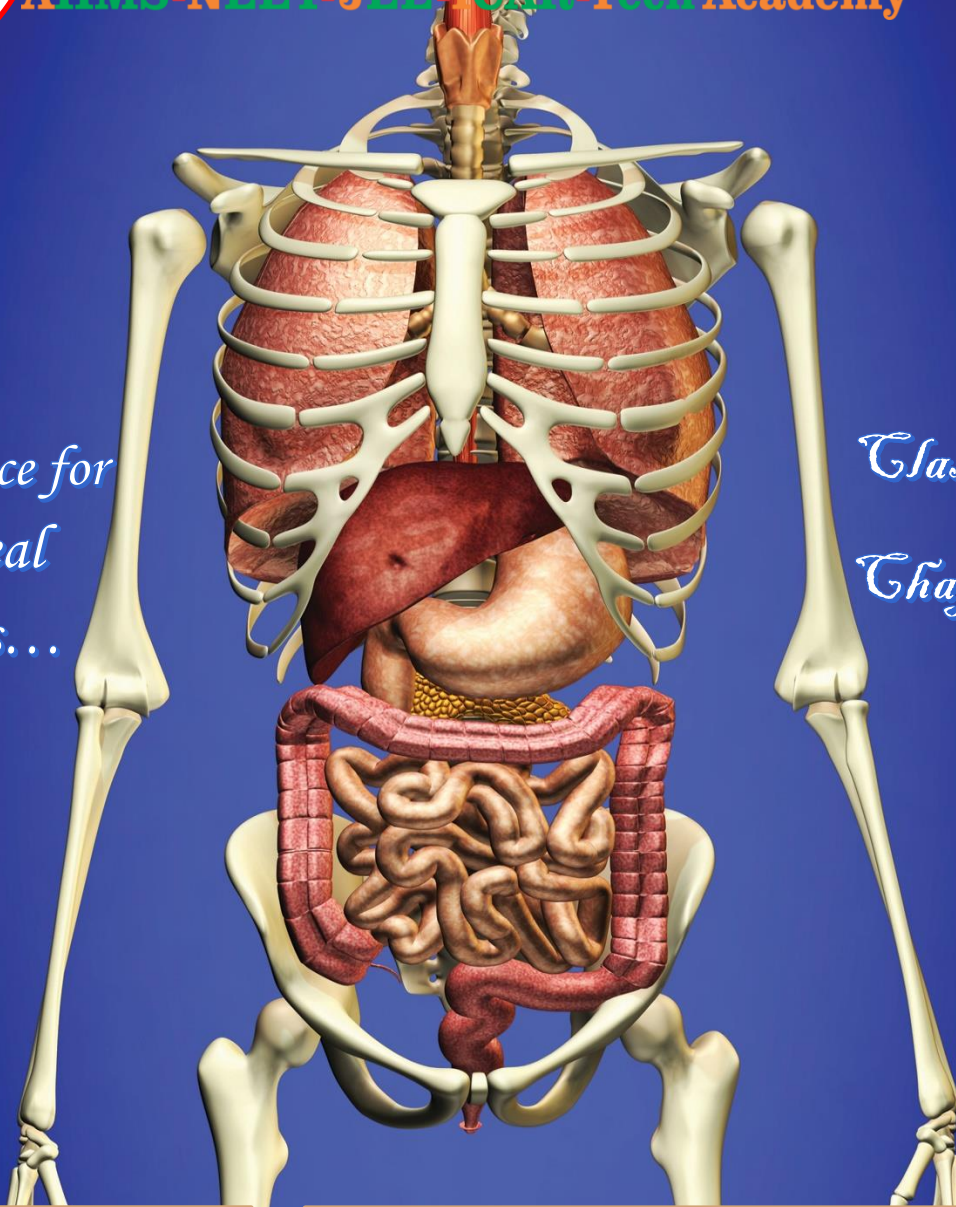
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Nutrition in Plants & Animals – Life Processes

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Topics:

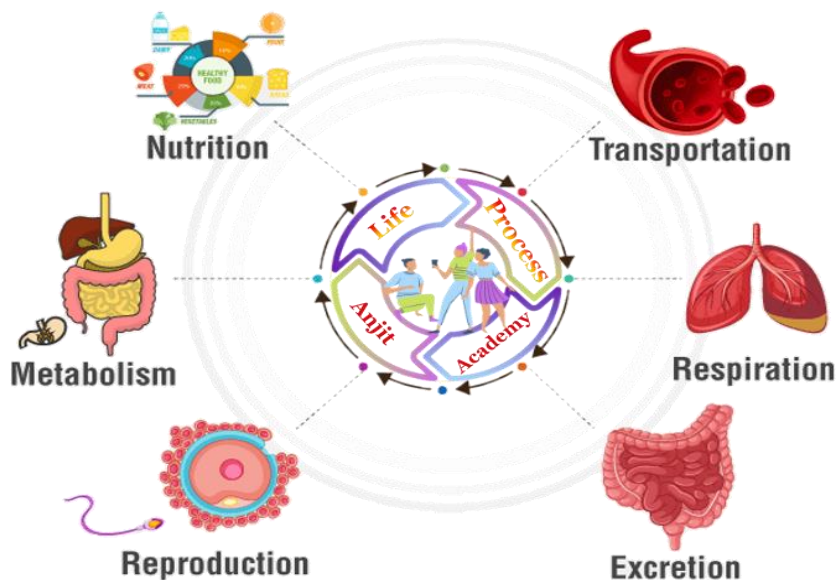
- ✚ Introduction
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01. Introduction: In this chapter, we will learn about the details of these processes occurring in plants, animals and human beings.

✚ **Life:** Earth happens to be the only known planet having a life. There are beings who live, die and become part of nature again.

✚ **Life Process:**

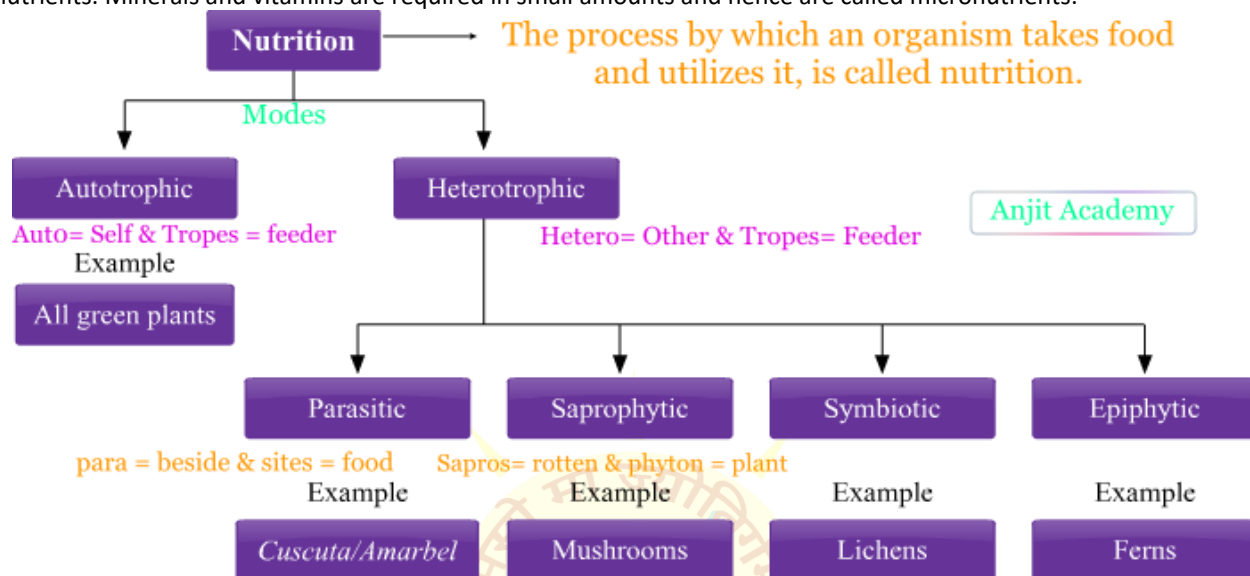


- ✓ The maintenance of living organisms is essential even if they are moving, resting or even sleeping.
- ✓ The processes which together perform the function of maintenance of 'life' are called as life processes.
- ✓ Nutrition, respiration, circulation, and excretion are examples of essential life processes.
- ✓ These processes are essential for all living organisms including plants and animals.

02. Nutrition:

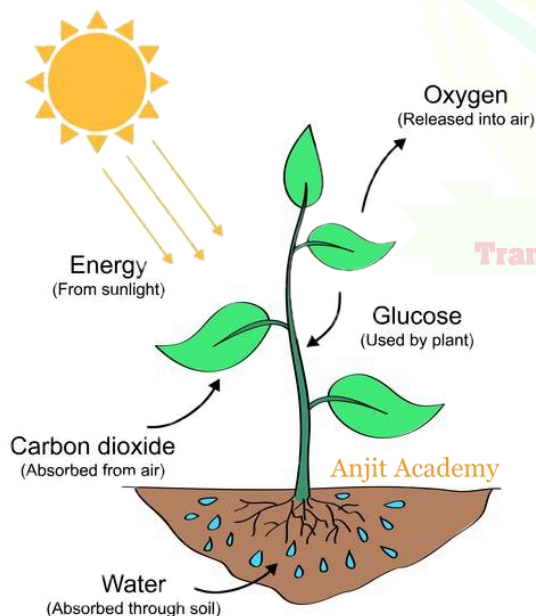
Need for Nutrition: Organisms need the energy to perform various activities. The energy is supplied by the nutrients. Organisms need various raw materials for growth and repair. These raw materials are provided by nutrients.

Nutrients: Materials which provide nutrition to organisms are called nutrients. Carbohydrates, proteins and fats are the main nutrients and are called macronutrients. Minerals and vitamins are required in small amounts and hence are called micronutrients.



03. Autotrophic Nutrition –

If an organism can nourish itself by **making its own food** using sunlight or chemicals such mode of nutrition is called as autotrophic nutrition.



The organisms which carry out autotrophic nutrition are called autotrophs (green plants).

Autotrophic nutrition is fulfilled by the process, by which autotrophs intake CO₂ and H₂O, and convert these into carbohydrates in the presence of chlorophyll, sunlight is called photosynthesis.

Photosynthesis: The process by which green plants prepare food is called photosynthesis.

- ✓ During this process, the solar energy is converted into chemical energy and carbohydrates are formed.
- ✓ Green leaves are the main site of photosynthesis.

✓ The green portion of the plant contains a pigment chloroplast, chlorophyll (green pigment).

The whole process of photosynthesis can be shown by the following equation:



Raw Materials for Photosynthesis:

- Sunlight
- Chlorophyll: Sunlight absorbed by chloroplast
- CO₂: Enters through stomata, and oxygen (O₂) is released as a byproduct through stomata on the leaf.
- Water: Water + dissolved minerals like nitrogen, phosphorous etc., are taken up by the roots from the soil.

How do raw materials for photosynthesis become available to the plant?

- Water comes from the soil, through the xylem tissue in roots and stems.
- Carbon dioxide comes in the leaves through stomata.

Site of Photosynthesis: Chloroplast in the leaf. Chloroplast contains chlorophyll (green pigment)

Main Events of Photosynthesis:

- ✓ Absorption of light energy by chlorophyll.
- ✓ Conversion of light energy into chemical energy + splitting (breaking) of water into hydrogen and oxygen.
- ✓ Reduction of CO₂ to carbohydrates.
- ✓ Sunlight activates chlorophyll, which leads to splitting of the water molecule.
- ✓ The hydrogen, released by the splitting of a water molecule is utilized for the reduction of carbon dioxide to produce carbohydrates.
- ✓ Oxygen is the by-product of photosynthesis.
- ✓ Carbohydrate is subsequently converted into starch and is stored in leaves and other storage parts.
- ✓ The splitting of water molecules is a part of the light reaction.

04. Stomata –

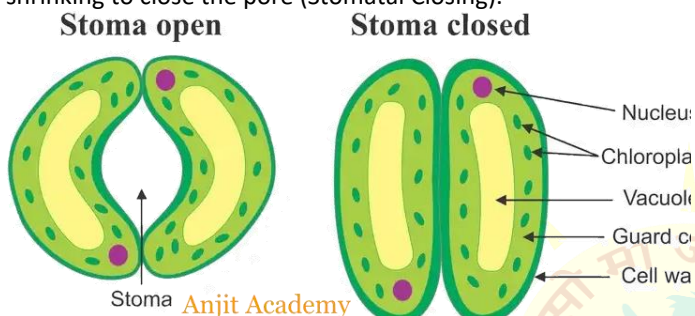
Stomata: These are tiny pores present in the epidermis of leaf or stem through which gaseous exchange and transpiration occur.

Functions of stomata

- ✚ Exchange of gases, O_2 and CO_2 .
- ✚ Loses a large amount of water (water vapour) during transpiration.

Opening and closing of stomatal pores:

- ✓ The opening and closing of stomatal pores are controlled by the turgidity of guard cells.
- ✓ When guard cells uptake water from surrounding cells, they swell to become a turgid body, which enlarges the pore in between (Stomatal Opening).
- ✓ While, when water is released, they become flaccid shrinking to close the pore (Stomatal Closing).



06. Heterotrophic Nutrition –

The mode of nutrition in which an organism takes food from another organism is called heterotrophic nutrition. Organisms, other than green plants and blue-green algae follow the heterotrophic mode of nutrition. Heterotrophic nutrition can be further divided into three types, viz. saprophytic nutrition, holozoic nutrition, and parasitic.

✚ Saprophytic Nutrition:

- Some organisms feed on dead and decaying organic matter. This mode of nutrition is called saprophytic nutrition.
- The food is partially digested outside the body and then it is absorbed. Ex- Fungi

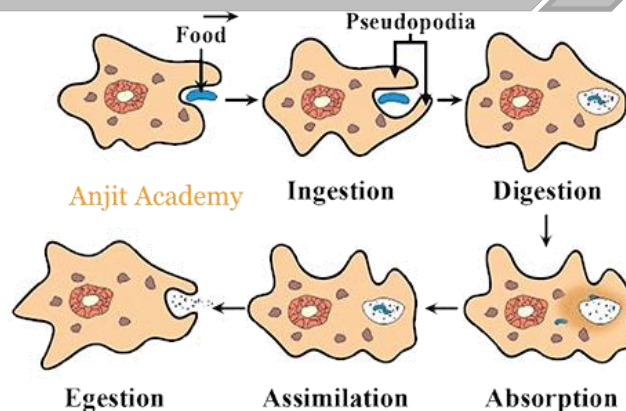
✚ Holozoic Nutrition: Some organisms feed at the expense of another organism and in turn cause harm. This is called the parasitic mode of nutrition.

- These live on the body or in the body of a host organism and derive the nutrients directly from the body of the host.
- Ex- Leech is an ectoparasite while Ascaris is an endoparasite. Cuscuta is a parasitic plant.

✚ Parasitic Nutrition: The organism which lives inside or outside another organism (host) and derives nutrition from it is known as parasites and this type of mode of nutrition is called parasitic nutrition. For example Cuscuta, tick etc.

6. Nutrition in Amoeba

- ✓ Amoeba is a unicellular animal which follows the holozoic mode of nutrition.
- ✓ In holozoic nutrition, the digestion of food follows after the ingestion of food. Thus, digestion takes place inside the body of the organism.
- ✓ Holozoic nutrition happens in five steps, viz. ingestion, digestion, absorption, assimilation and egestion.



Steps of Holozoic Nutrition:

- ✚ **Ingestion:** The process of taking in the food is called ingestion.
- ✚ **Digestion:** The process of breaking complex food substances into simple molecules is called digestion. Simple molecules, thus obtained, can be absorbed by the body.
- ✚ **Absorption:** The process of absorption of digested food is called absorption.
- ✚ **Assimilation:** The process of utilization of digested food, for energy and for growth and repair is called assimilation.
- ✚ **Egestion:** The process of removing undigested food from the body is called egestion.

Amoeba is a unicellular animal which follows the holozoic mode of nutrition. The cell membrane of amoeba keeps on protruding into pseudopodia. Amoeba surrounds a food particle with pseudopodia and makes a food vacuole. The food vacuole contains food particle and water. Digestive enzymes are secreted in the food vacuole and digestion takes place. After that, digested food is absorbed from the food vacuole. Finally, the food vacuole moves near the cell membrane and undigested food is expelled out.

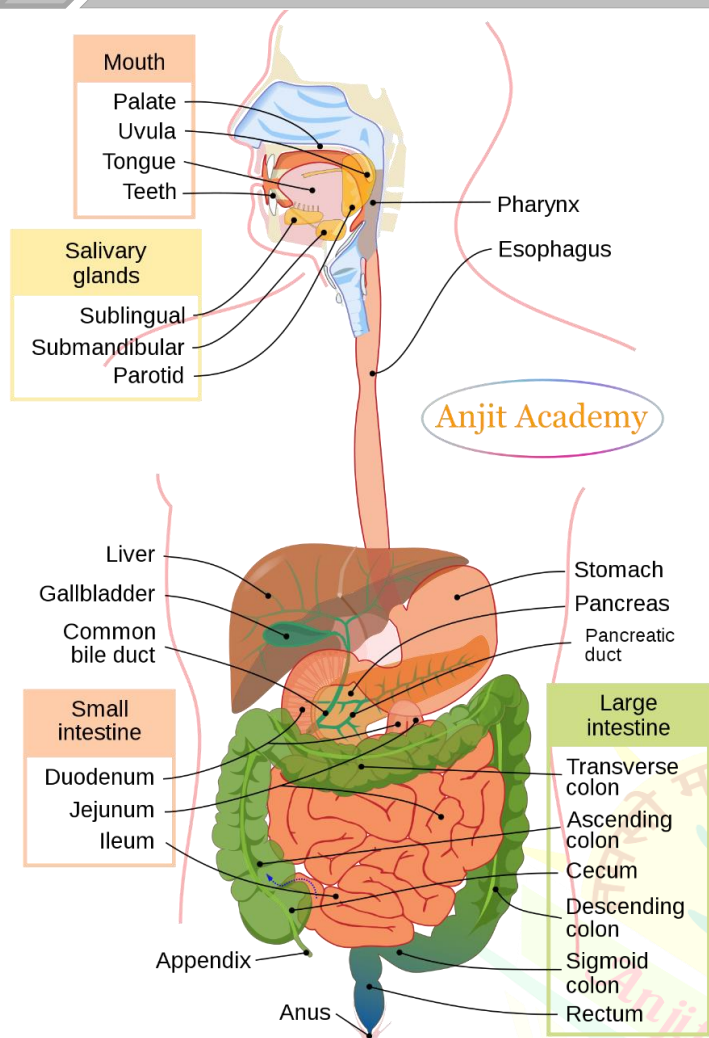
7. Nutrition in Human Beings –

- ✚ Humans are omnivores, they can eat plant-based food as well as animal-based food.
- ✚ Being more complex, humans have a very complicated nutrition system.
- ✚ The digestive system has an alimentary canal and associated digestive glands, which together function to nourish the body.
- ✚ There are five stages in human nutrition; Ingestion, Digestion, Absorption, Assimilation and Egestion.
- ✚ Four stages i.e. ingestion, digestion, absorption and egestion take place in the alimentary canal while assimilation of food takes place in the whole body.

Structure of the Human Digestive System:

The human digestive system comprises of the alimentary canal and associated digestive glands.

- ✚ **Alimentary Canal:** It comprises of mouth, oesophagus, stomach, small intestine and large intestine.
- ✚ **Associated Glands:** Main associated glands are
 - ✚ Salivary gland
 - ✚ Gastric Glands
 - ✚ Liver
 - ✚ Pancreas

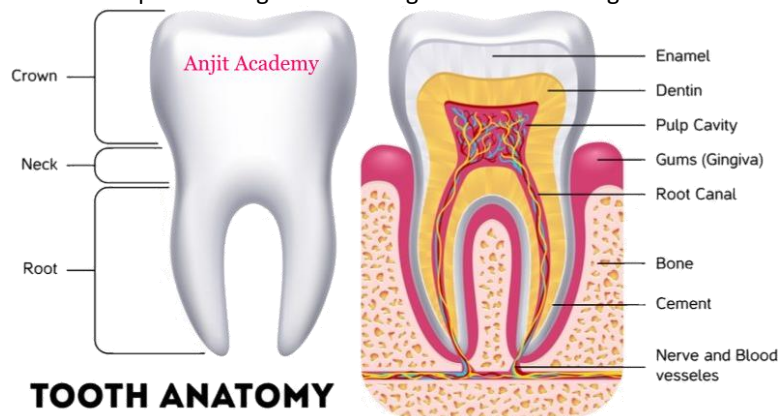


Permanent teeth: The second set of 32 larger teeth, when a child is 6-7 years old and comes by replacing milk teeth.

Enamel: A white, strong, shining, protective material covering on teeth.

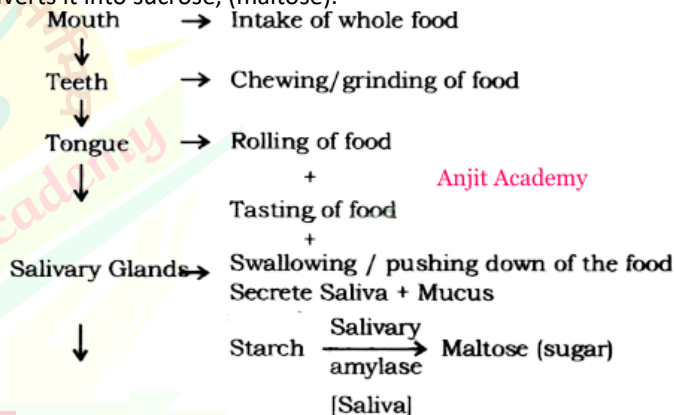
Tongue: A muscular organ attached to the floor of the buccal cavity which helps in tasting and mixing the food with saliva for digestion.

Helps in tasting food + rolling food + swallowing food.



TOOTH ANATOMY

Salivary glands secrete saliva: Saliva makes the food slippery which makes it easy to swallow the food. Saliva also contains the enzyme salivary amylase or ptyalin. Salivary amylase digests starch and converts it into sucrose, (maltose).



Oesophagus: Taking food from mouth to stomach by Peristaltic movement.

Peristaltic movement: Rhythmic contraction of muscles of the lining of the alimentary canal to push the food forward.

Stomach

- Stomach is a bag-like organ. Highly muscular walls of the stomach help in churning the food.
- The walls of the stomach secrete hydrochloric acid. Hydrochloric acid kills the germs which may be present in food.
- Moreover, it makes the medium inside the stomach as acidic. The acidic medium is necessary for gastric enzymes to work.
- The enzyme pepsin, secreted in the stomach, does partial digestion of protein.
- The mucus, secreted by the walls of the stomach saves the inner lining of the stomach from getting damaged from hydrochloric acid.

1. Alimentary Canal:

- ✓ The alimentary canal in humans is a long tube of varying diameter.
- ✓ It starts with the mouth and ends with the anus.
- ✓ Oesophagus, stomach, small intestine and large intestine are the parts of the alimentary canal.

Mouth-

- It is the opening of the alimentary canal and helps in the ingestion of food.
- The buccal cavity which is present behind the mouth is also commonly referred to as the mouth.
- The buccal cavity has teeth and a tongue.
- The set of teeth helps in the mastication of food.
- The tongue has taste buds on it and thus helps in tasting the food.
- The salivary glands open also in the buccal cavity and pour saliva which initiates the process of digestion.

Teeth-

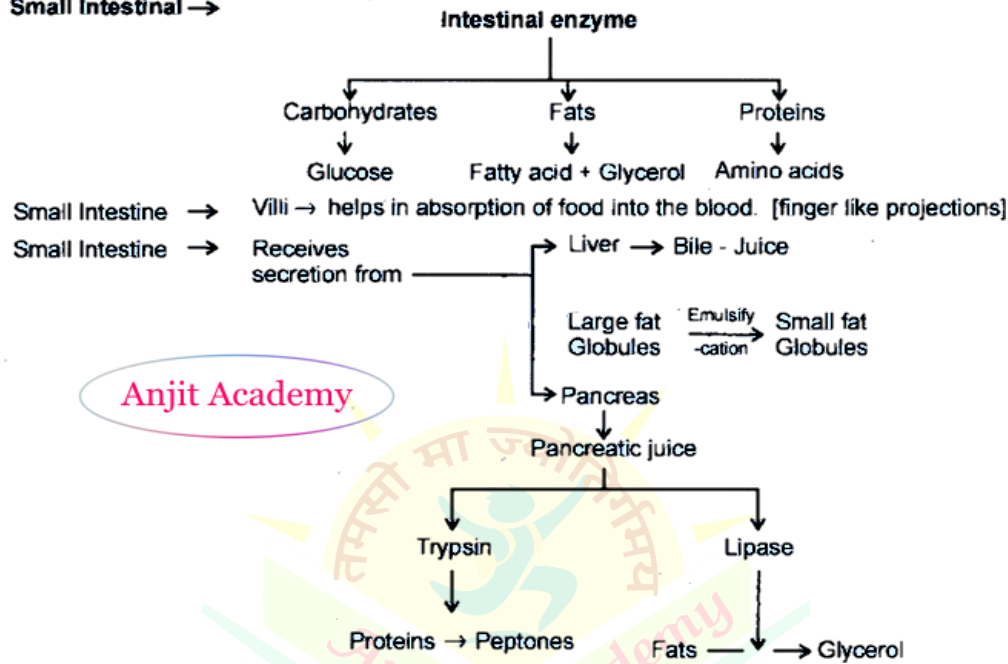
- Teeth are the hard structures present in the buccal cavity.
- They help us to cut, shear and masticate the food we eat.
- The vertical section of a tooth shows four layers enamel, dentine, cement and dental pulp.
- Enamel is the outermost, shiny, highly mineralized and the hardest part of the human body.

Milk teeth: The first set of 20 small teeth when the baby is 6-7 months old.

Small Intestine: It is a highly coiled tube-like structure. The small intestine is longer than the large intestine but its lumen is smaller

Small Intestinal →

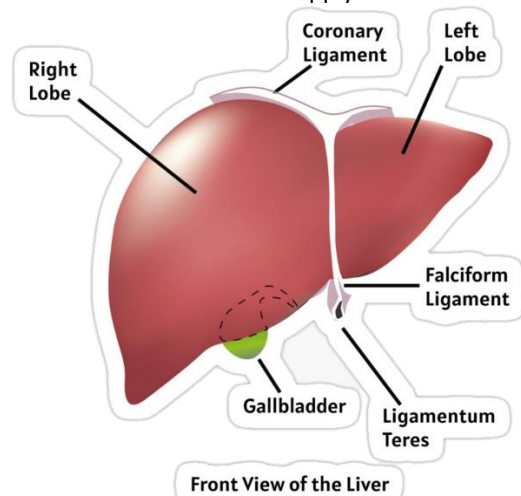
than that of the large intestine. The small intestine is divided into three parts, like duodenum, jejunum and ileum.



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Liver: Liver is the largest organ in the human body. The liver manufactures bile, which gets stored in the gall bladder. From the gall bladder, bile is released as and when required.

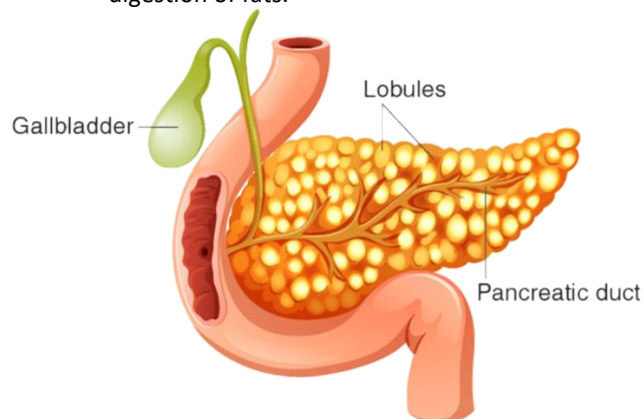
- ✓ The liver is the largest and major digestive gland of humans
- ✓ Liver, in humans, is located in the upper right-hand portion of the abdomen.
- ✓ This organ is dark reddish-brown in color due to an extensive blood supply.



Pancreas: Pancreas is situated below the stomach. It secretes pancreatic juice which contains many digestive enzymes.

- ✓ The pancreas is a long, flat gland present behind the stomach in humans.

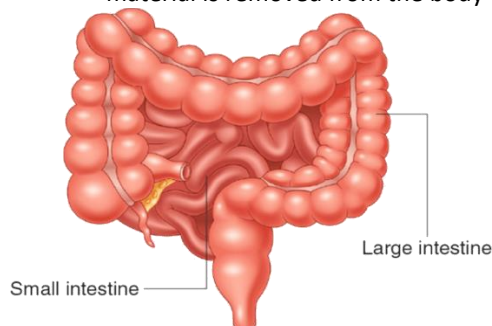
- ✓ It is one of the major digestive glands and is of mixed nature i.e. endocrine as well as exocrine.
- ✓ As an endocrine organ, it secretes two hormones called insulin and glucagon which maintain the blood sugar level.
- ✓ As an exocrine gland, it secretes pancreatic juice which is nothing but a mixture of many digestive enzymes.
- ✓ The digestive enzymes secreted by the pancreas include trypsin and chymotrypsin and proteases which digest proteins.
- ✓ It also includes amylase which digests the starch content of the food.
- ✓ Pancreatic lipases are the pancreatic enzymes that help in digestion of fats.



Bile and pancreatic juice go to the duodenum through a hepatopancreatic duct. Bile breaks down fat into smaller particles. This process is called emulsification of fat.

Large Intestine:

- Large intestine is smaller than the small intestine.
- Undigested food goes into the large intestine.
- Some water and salt are absorbed by the walls of the large intestine. After that, the undigested food goes to the rectum, from where it is expelled out through the anus.
- Large Intestine absorb excess of water. The rest of the material is removed from the body via the anus. (Egestion).

**Respiration –**

Respiration: The process by which a living being utilizes the food to get energy, is called respiration. Respiration is an oxidation reaction in which carbohydrate is oxidized to produce energy. Mitochondria is the site of respiration and the energy released is stored in the form of ATP (adenosine triphosphate). ATP is stored in mitochondria and is released as per need.

Steps of respiration:

- Breaking down of glucose into pyruvate: This step happens in the cytoplasm. Glucose molecule is broken down into pyruvic acid. Glucose molecule is composed of 6 carbon atoms, while pyruvic acid is composed of 3 carbon atoms.
- Fate of Pyruvic Acid: Further breaking down of pyruvic acid takes place in mitochondria and the molecules formed depend on the type of respiration in a particular organism. Respiration is of two types, viz. aerobic respiration and anaerobic respiration.
- Respiration involves
 - Gaseous exchange: Intake of oxygen from the atmosphere and release of $\text{CO}_2 \rightarrow$ Breathing.

- Breakdown of simple food in order to release energy inside the cell $\rightarrow$ Cellular respiration

Types of Respiration –

- Aerobic respiration:** This type of respiration happens in the presence of oxygen. Pyruvic acid is converted into carbon dioxide. Energy is released and water molecule is also formed at the end of this process.
- Anaerobic respiration:** This type of respiration happens in the absence of oxygen. Pyruvic acid is either converted into ethyl alcohol or lactic acid. Ethyl alcohol is usually formed in case of anaerobic respiration in microbes, like yeast or bacteria. Lactic acid is formed in some microbes as well as in the muscle cells.
 - Glucose (6 carbon molecule) $\rightarrow$ Pyruvate (3 carbon molecules) + Energy
 - Pyruvate (In muscles, lack of O_2) $\rightarrow$ Lactic Acid + Energy
 - Pyruvate (In mitochondria; the presence of O_2) $\rightarrow$ Carbon dioxide + Water + Energy

Aerobic Respiration	Anaerobic Respiration
Takes place in the presence of oxygen.	Takes place in the absence of oxygen.
Occurs in mitochondria.	Occurs in cytoplasm.
End products are CO_2 and H_2O .	End products are alcohol or lactic acid.
More amount of energy is released.	Less amount of energy is released.

HOT: Pain in leg muscles while running:

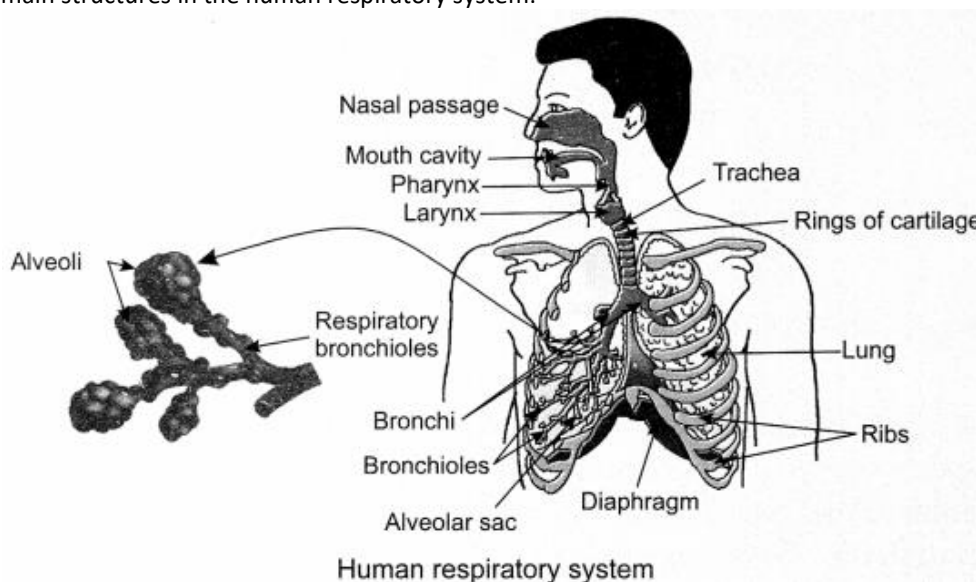
- ✓ When someone runs too fast, he may experience throbbing pain in the leg muscles. This happens because of anaerobic respiration taking place in the muscles.
- ✓ During running, the energy demand from the muscle cells increases. This is compensated by anaerobic respiration and lactic acid is formed in the process.
- ✓ The deposition of lactic acid causes pain in the leg muscles. The pain subsides after taking rest for some time.

Terrestrial organisms: Use atmospheric oxygen for respiration.

Aquatic organisms: Use dissolve oxygen for respiration.

Human Respiratory System –

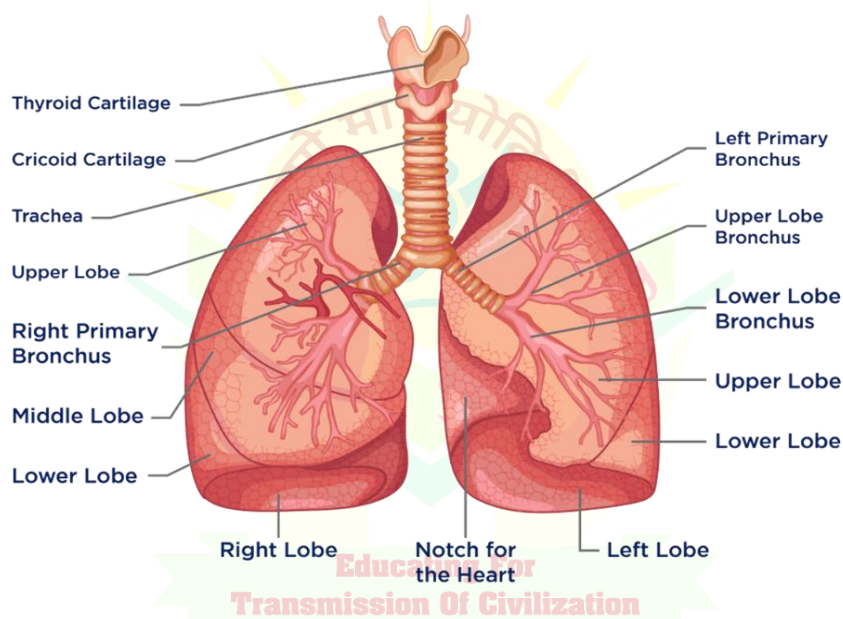
The human respiratory system is composed of a pair of lungs. These are attached to a system of tubes which open on the outside through the nostrils. Following are the main structures in the human respiratory system:



- ✚ **Nostrils:** There are two nostrils which converge to form a nasal passage. The inner lining of the nostrils is lined by hair and remains wet due to mucus secretion. The mucus and the hair help in filtering the dust particles out from inhaled air. Further, air is warmed up when it enters the nasal passage.
- ✚ **Pharynx:** It is a tube-like structure which continues after the nasal passage.
- ✚ **Larynx:** This part comes after the pharynx. This is also called voice box.
- ✚ **Trachea:** This is composed of rings of cartilage. Cartilaginous rings prevent the collapse of trachea in the absence of air.
- ✚ **Bronchi:** A pair of bronchi comes out from the trachea, with one bronchus going to each lung.
- ✚ **Bronchioles:** A bronchus divides into branches and sub-branches inside the lung.
- ✚ **Alveoli:** These are air sacs at the end of bronchioles. The alveolus is composed of a very thin membrane and is the place where blood capillaries open. This is alveolus, where the oxygen mixes with the blood and carbon dioxide exits from the blood. The exchange of gases, in alveoli, takes place due to the pressure differential.

HOT: Why Do We Need Lungs?

- ✚ In unicellular organisms like an amoeba exchange of gases takes place through a general body surface by osmosis.
- ✚ In lower animals like an earthworm, the gaseous exchange takes place through their moist skin.
- ✚ The requirement for oxygen is sufficiently met in these ways.
- ✚ But as the animal starts becoming more and more complex, for example, humans, the requirement of oxygen cannot be met alone by diffusion.
- ✚ Moreover, diffusion will not be able to supply oxygen to the deep-seated cells.
- ✚ This difficulty has led to the evolution of a more complex mechanism of gaseous exchange and that is the development of lungs.
- ✚ The alveoli present in the lungs provide a large surface area required for the necessary gas exchange.



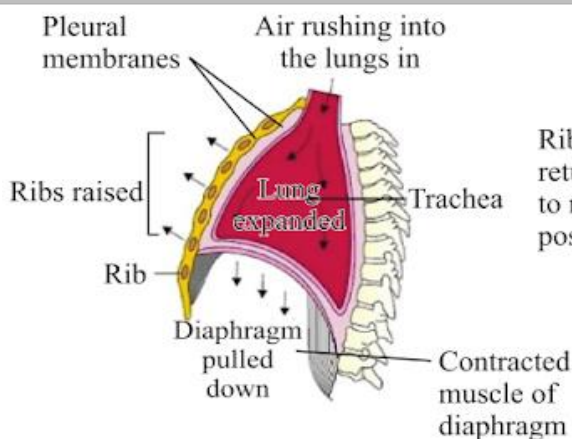
HOT: ATP-

- It is the energy currency of the cell.
- ATP stands for Adenosine Tri-Phosphate.
- This molecule is created as a result reactions like photosynthesis, respiration etc.
- The three phosphate bonds present in the molecule are high-energy bonds and when they are broken, a large amount of energy is released.
- Such released energy is then used for other metabolic reactions.

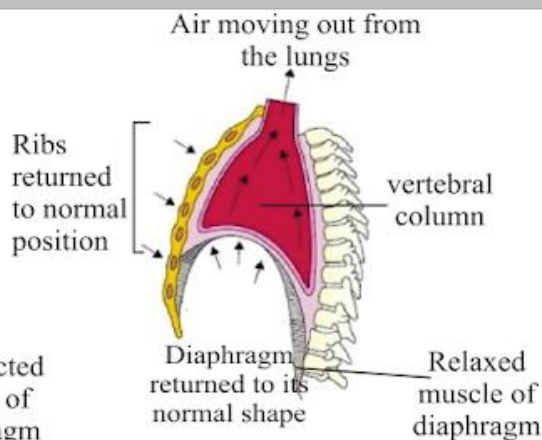
Breathing Mechanism:

- ✓ The breathing mechanism of lungs is controlled by the diaphragm and the intercostal muscles.
- ✓ The diaphragm is a membrane which separates the thoracic chamber from the abdominal cavity.
- ✓ When the diaphragm moves down, the lungs expand and the air is inhaled.
- ✓ When the diaphragm moves up, the lungs contract and air are exhaled.

Inhalation	Exhalation
During inhalation the thoracic cavity (chest cavity) expands.	Thoracic cavity contracts.
Ribs lift up.	Ribs move downwards.
Diaphragm become flat in shape.	Diaphragm becomes dome shaped.
Volume of lungs increases and air enters the lungs.	Volume of lungs decreases and air exits from the lungs.



(a) Inhalation



(b) Exhalation

✂ Transportation –

Circulatory system of human being, transportation in plants. Human beings like other multicellular organism need a regular supply of foods, oxygen etc. This function is performed by a circulatory system or transport system.

01. Transportation in Human Beings: The circulatory system is responsible for transport of various substances in human beings. It is composed of the heart, arteries, veins and blood capillaries. Blood plays the role of the-

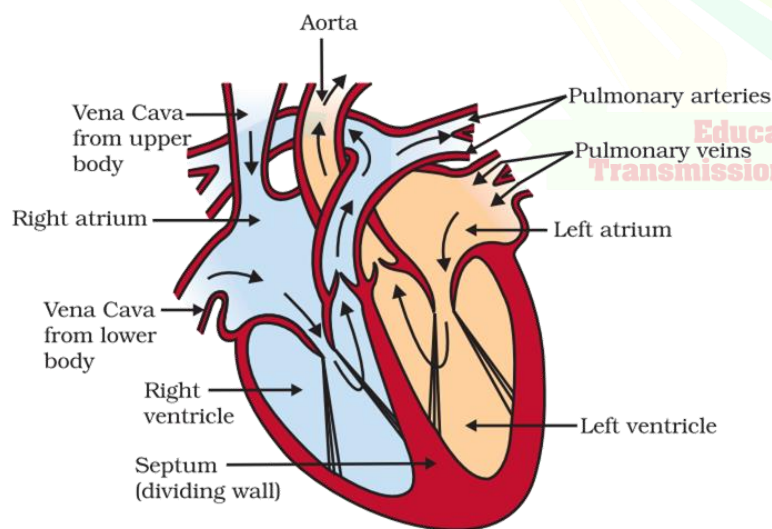
1. Heart: Heart is a muscular organ, which is composed of cardiac muscles.

It is so small that, it can fit inside an adult's wrist. The heart is a pumping organ which pumps the blood.

The human heart is composed of four chambers, viz. right atrium, right ventricle, left ventricle and left atrium.

Systole: Contraction of cardiac muscles is called systole.

Diastole: Relaxation of cardiac muscles is called diastole.



Types of Blood Vessels : There are two types of blood vessels

2. Arteries:

These are thick-walled blood vessels which carry oxygenated blood from the heart to different organs.

Pulmonary arteries are exceptions because they carry deoxygenated blood from the heart to lungs, where oxygenation of blood takes place.

3. Veins:

These are thin-walled blood vessels which carry deoxygenated blood from different organs to the heart, pulmonary veins are

exceptions because they carry oxygenated blood from lungs to the heart.

Valves are present in veins to prevent back flow of blood.

Arteries	Veins
Carry oxygenated blood from heart to body parts except pulmonary artery.	Carry deoxygenated blood from body parts to heart except pulmonary vein.
Also called distributing vessel.	Also called collecting vessel.
Thick and elastic.	Thin and less elastic.
Deep-seated. (far from the skin)	Superficial (near to the skin) as compared to arteries.
Blood flows under high pressure.	Blood flows under low pressure.

4. Capillaries: These are the blood vessels which have single-celled walls.

Blood: Blood is a connective tissue which plays the role of the carrier for various substances in the body.

Blood is composed of 1. Plasma 2. Blood cells 3. Platelets.

Blood plasma: Blood plasma is a pale coloured liquid which is mostly composed of water. Blood plasma forms the matrix of blood.

Blood cells: There are two types of blood cells, viz. Red Blood Cells (RBCs) and White Blood Cells (WBCs).

(a) **Red Blood Corpuscles (RBCs):** These are of red colour because of the presence of haemoglobin which is a pigment. Haemoglobin readily combines with oxygen and carbon dioxide. The transport of oxygen happens through haemoglobin. Some part of carbon dioxide is also transported through haemoglobin.

(b) **White Blood Corpuscles (WBCs):** These are of pale white colour. They play important role in the immunity.

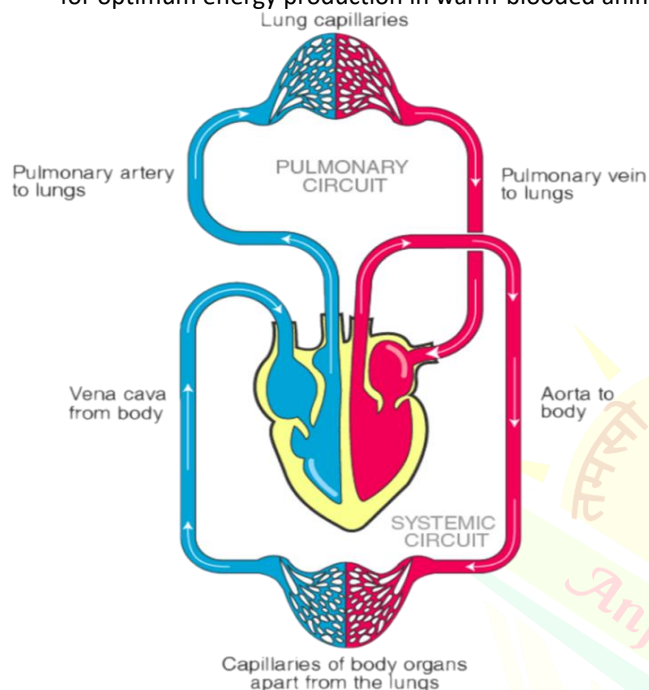
Platelets: Platelets are responsible for blood coagulation. Blood coagulation is a defense mechanism which prevents excess loss of blood, in case of an injury.

Lymph:

- Lymph is similar to blood but RBCs are absent in lymph.
- Lymph is formed from the fluid which leaks from blood capillaries and goes to the intercellular space in the tissues. This fluid is collected through lymph vessels and finally return to the blood capillaries.
- Lymph also plays an important role in the immune system.
- Lymph yellowish fluids escape from the blood capillaries into the intercellular spaces contain less proteins than blood.
- Lymph flows from the tissues to the heart assisting in transportation and destroying germs.

Double circulation:

- ✓ In the human heart, blood passes through the heart twice in one cardiac cycle. This type of circulation is called double circulation.
- ✓ One complete heartbeat in which all the chambers of the heart contract and relax once is called cardiac cycle. The heart beats about 72 times per minute in a normal adult.
- ✓ In one cardiac cycle, the heart pumps out 70 mL blood and thus, about 4900 mL blood in a minute.
- ✓ Double circulation ensures complete segregation of oxygenated and deoxygenated blood which is necessary for optimum energy production in warm-blooded animals.



02. Transportation in plants: Plants have specialized vascular tissues for transportation of substances. There are two types of vascular tissues in plants.

- ✚ **Xylem:** Xylem is responsible for transportation of water and minerals. It is composed of tracheids, xylem vessels, xylem parenchyma and xylem fibre. Tracheids and xylem vessels are the conducting elements. The xylem makes a continuous tube in plants which runs from roots to stem and right up to the veins of leaves.
 - Carry water and minerals from the leaves to the other part of the plant.
- ✚ **Phloem:** Phloem is responsible for transportation of food. Phloem is composed of sieve tubes, companion cells, phloem parenchyma and bast fibers. Sieve tubes are the conducting elements in phloem.
 - Carries product of photosynthesis from roots to other part of the plant.

Functions:

- ✓ Absorption and upward movement of water and minerals by creating pull.
- ✓ Helps in temperature regulation in plant.

Xylem	Phloem
Carries water & minerals from the roots to other parts of the plant.	Carries product of photosynthesis from leaves to the other parts of the plant.
No energy is used.	Energy is used from ATP.

the plant is called Translocation.

03. Excretion –

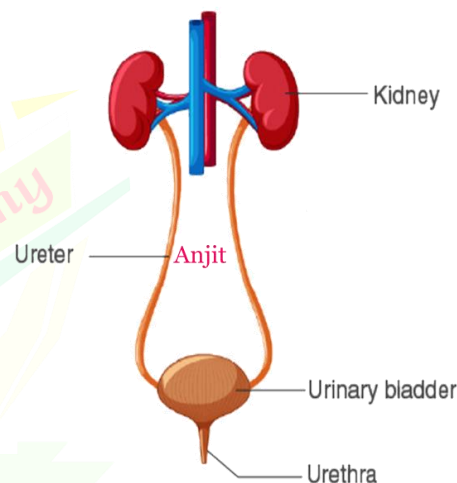
- ✓ Human excretory system, excretion in plants.
- 1. **Excretion in human beings:**
 - Removal of harmful waste from the body is called excretion.
 - Many wastes are produced during various metabolic activities.
 - These need to be removed in time because their accumulation in the body can be harmful and even lethal for an organism.

Human Excretory System:

- The human excretory system is composed of a pair of kidneys.
- A tube, called ureter, comes out of each kidney and goes to the urinary bladder.
- Urine is collected in the urinary bladder, from where it is expelled out through urethra as and when required.

Excretory system of human beings includes :

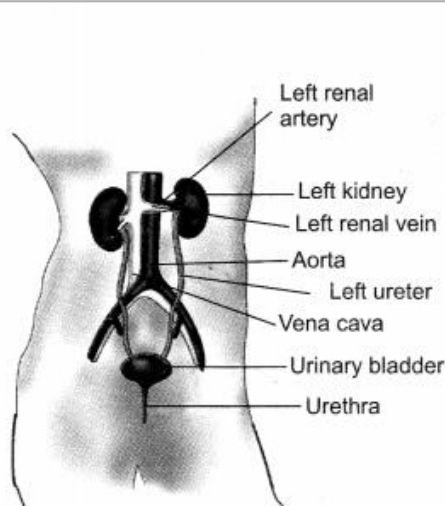
- ✚ A pair of kidneys.
- ✚ A urinary bladder.
- ✚ A pair of the ureter.
- ✚ A urethra.

**Kidney:**

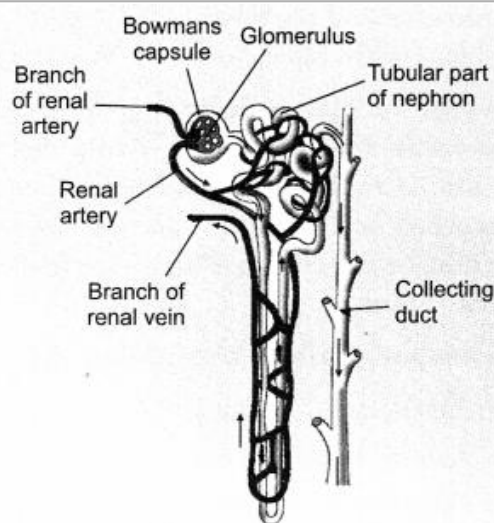
- ✓ Kidney is a bean-shaped organ which lies near the vertebral column in the abdominal cavity.
- ✓ The kidney is composed of many filtering units, called nephrons.
- ✓ Nephron is called the functional unit of kidney.

Nephron:

- It is composed of a tangled mess of tubes and a filtering part, called glomerulus.
- The glomerulus is a network of blood capillaries to which renal artery is attached.
- The artery which takes blood to the glomerulus is called afferent arteriole and the one receiving blood from the glomerulus is called efferent arteriole.
- The glomerulus is enclosed in a capsule like portion, called Bowman's capsule. The Bowman's capsule extends into a fine tube which is highly coiled.
- Tubes from various nephrons converge into collecting duct, which finally goes to the ureter.



Excretory system in human beings



Structure of a nephron

Urine formation in the kidney:

- ★ **Urine:** A yellowish liquid which contains water and urea.

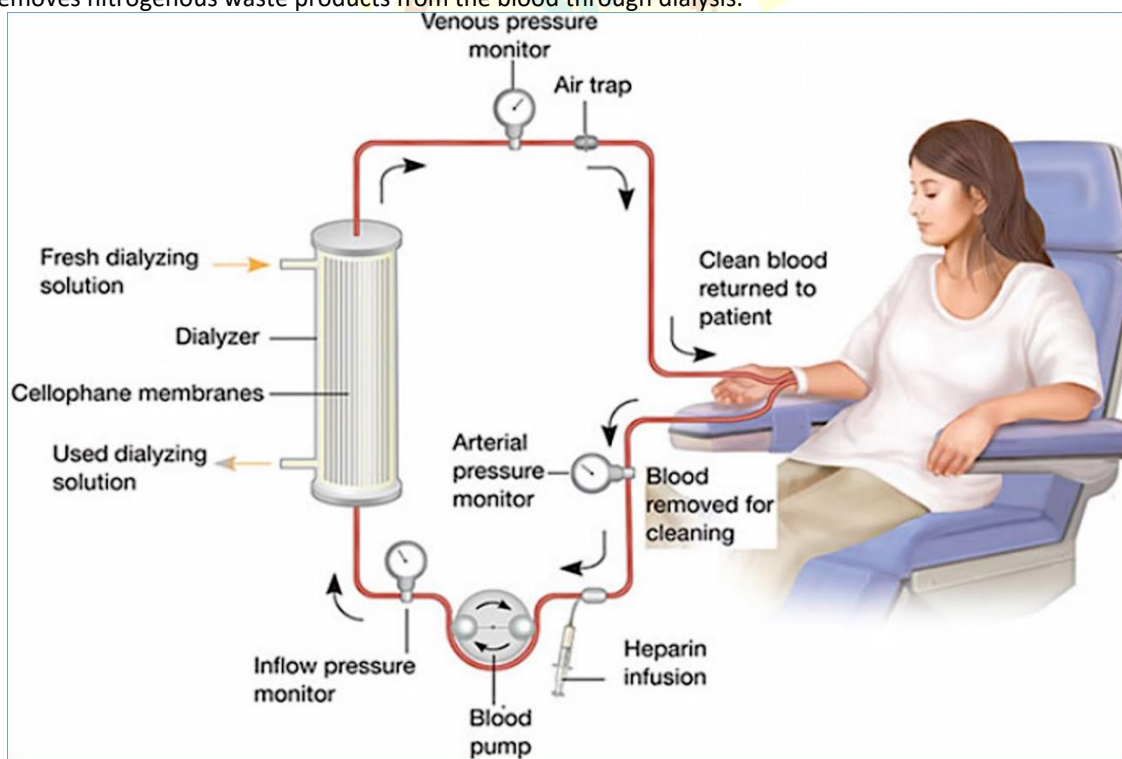
The urine formation involves three steps:

- **Glomerular filtration:** Nitrogenous wastes, glucose, water, amino acid filter from the blood into bowman's capsule of the nephron.
- **Tubular reabsorption:** Now, useful substances from the filtrate are reabsorbed back by capillaries surrounding the nephron.
- **Secretion:** Extra water, salts are secreted into the tubule which opens up into the collecting duct and then into the ureter.

The purpose of making urine is to filter out waste product from the blood i.e., urea which is produced in the liver.

Haemodialysis: The process of purifying blood by an artificial kidney. It is meant for kidney failure patient.

It removes nitrogenous waste products from the blood through dialysis.



02. Excretion in Plants: Other wastes may be stored in leaves, bark etc. which fall off from the plant.

- ✓ Plants excrete some waste into the soil around them.
- ✓ Gums, resin → In old xylem
- ✓ Some metabolic wastes in the form of crystals of calcium oxalates in the leaves of colocasia and stem of Zamikand.
- ★ **Excretion:** It is the process of removing waste products from the body.
- ★ **Excretory products of plants:** CO₂, O₂, water vapour, peel of bark, fruits, leaves, gum, raisin, etc.

Nutrition in Plants and Animals:

Nutrition: Process of obtaining and utilizing of food is known as nutrition.

Mode of nutrition:

- ✚ Autotrophic Nutrition (All green plants)
- ✚ Heterotrophic Nutrition (Animals, Man, Non-green plants)
 - Saprotrophic nutrition
 - Parasitic nutrition
 - Holozoic nutrition

Autotrophs: It is a mode of nutrition in which organisms can make their own food from simple raw material. Example, all green plants.

Heterotrophs: It is a mode of nutrition in which organisms cannot prepare their food on their own and depend on others. Example, animals.

Saprotrophic Nutrition: It is the process by which the organism feeds on dead and decaying matter. Example, Rhizopus, Mucor, yeast.

Photosynthesis: It is the process by which green plants prepare their own food.

Raw materials for photosynthesis:

- Water and Minerals: These are absorbed by the roots from the soil.
- Carbon dioxide: Carbon dioxide enters the leaves through tiny pores called stomata.
- Sunlight: Energy from the sun is called solar energy.
- Chlorophyll: Chlorophyll pigment helps leaves to capture solar energy.

Products of Photosynthesis: Carbohydrate-glucose- It is converted to starch.

Symbiotic relationship: Two organisms live in a close association and develop a relationship that is beneficial to both this is called a symbiotic relationship.

Example: Lichen is a living partnership between a fungus and an alga. Fungus absorbs water and provides shelter and alga prepare food by photosynthesis

Insectivores: Plants feed on insects for their nitrogen requirements.

Holozoic nutrition: It means feeding on solid food. Organism takes complex organic food into the body. Example, man, amoeba, dog, etc.

- ✚ **Herbivores:** Animals which feed on plants only. Example, deer, cow.
- ✚ **Carnivores:** Animals which feed on flesh or meat. Example, tiger.
- ✚ **Omnivores:** Animals which feed on both plant and flesh. Example, man, dog.

Steps of Holozoic nutrition:

- Ingestion: Taking food into the mouth.
- Digestion: Break down of large insoluble food into small water-soluble molecules by enzymes.
- Absorption: Digested food absorbed through the intestinal wall into the blood.

- Assimilation: Absorbed food is taken by body cells for releasing energy, growth and repair.
- Egestion: Eliminating undigested food from the body.

Short Answer Type Questions

1. What is the mode of nutrition in fungi?
2. How does amoeba engulf its food?
3. In which kind of respiration is more energy released?
4. Name the parts of the digestive system of a grasshopper.
5. What is the scientific name of touch me not plant?
6. Why are cramps caused in our muscles during sudden activity?
7. Name two organisms that obtain food through parasitic nutritive strategy.
8. Where does digestion of fat take place in our body?
9. State the difference between the broad-leaved plants and the Narrow-leaved plants on the basis of the stomata?
10. How the plants take up nitrogen from the soil and the atmosphere?
11. What are chloroplasts & where are they found in the leaves?
12. Name the tissue which transports water and minerals in a plant.
13. Leakage of blood from vessels reduces the efficiency of pumping system. How is leakage prevented?
14. What is the role of acid in our stomach?
15. What is translocation in plants?
16. Name the intermediate and the end products of glucose breakdown in aerobic respiration.
17. Mention the site of complete digestion of carbohydrates, proteins and fats in humans.
18. Name two enzymes present in pancreatic juice.
19. When we breathe out, the air passage does not collapse. Why?
20. Ventricles have thicker muscular walls than atria. Give reason.
21. Define Parasite.

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