CBSE Class 10 Science Chapter 6 Life Processes Notes

Humans require vital life processes such as respiration, blood circulation, reproduction etc for survival. Explore important life processes to sustain life by referring to Class 10 notes provided right here at BYJU'S. Notes provided are complete and concise for students to refer to for examinations.

Topics Covered in Chapter 6 Life Processes:

Introduction to Chapter:

- All living things perform certain life processes such as growth, excretion, circulation, respiration etc
- All the processes like respiration, digestion which together keep the living entities alive and performing the tasks of maintaining the body are called life processes

What Is Life Process?

The basic essential activities performed by an organism to sustain life on earth is called as Life Process. There are seven important life processes which are common to all plants, birds, and

animals, which includes: Growth, Movement, Respiration, Transportation, Excretion, Reproduction, and Nutrition.

Criteria For Life process

Growth– It is generally defined as an increase in the size, the number of cells, tissues and the whole organism. Growth is mainly classified into Primary and Secondary growth

Movement– All living organisms including animals and plants have the ability to move. Usually, animals move in search of food, shelter and to protect themselves from danger. Plants cannot move like animals, but they show some movements response to an environmental stimulus.

Respiration– All living organisms including animals and plants respire as they need energy to grow, move and repair the cells. Aerobic and Anaerobic are two types of respiration.

Excretion– It is the process of removing or eliminating metabolic waste from a body. Like animals and humans, plant do excretes during photosynthesis and transpiration process.

Reproduction- It is the biological process of giving birth to their young ones. There are two types of reproduction- Sexual and asexual reproduction. Every living organism in this planet earth reproduces for the continuity of the generations.

Nutrition– It is the process of taking in food and converting it into energy, which is used for growth and development. There are two types of nutrition – Autotrophic and Heterotrophic mode of nutrition.

Modes Of Nutrition

- **Nutrition In Plants**
  - Plants are autotrophs
  - They prepare their own food
- **Nutrition In Animals**
  - Animals are heterotrophs
  - They depend on plants or others

Autotrophic Nutrition

- It is a kind of nutrition in which inorganic materials like CO_2, water etc are utilized to prepare organic food by the process of photosynthesis. Example - Green plants
- The organisms which carry out autotrophic nutrition are called autotrophs (green plants)
- Autotrophs use simple inorganic material and convert it into complex high energy molecules(carbohydrates)
- Autotrophic nutrition is fulfilled by the process by which autotrophs take in CO_2 and H_2O and convert these into carbohydrates in the presence of chlorophyll, sunlight is called Photosynthesis.

Equation for photosynthesis:

$6CO_2 + 12H_2O \rightarrow C_6H_{12}O_6 + 6\ O_2 + 6\ H_2O$ (In the presence of sunlight and chlorophyll)

Raw materials for Photosynthesis

- Sunlight: It is an inorganic material
- Chlorophyll: Sunlight is absorbed by chlorophyll
- CO_2: Enters through stomata and oxygen is released as a by-product through stomata on leaf
- Water: water + dissolved minerals like nitrogen, phosphorus etc are taken up the roots of the soil

Site Of Photosynthesis
Some cells contain green pigments which are cell organelles called chloroplasts which contain chlorophyll.

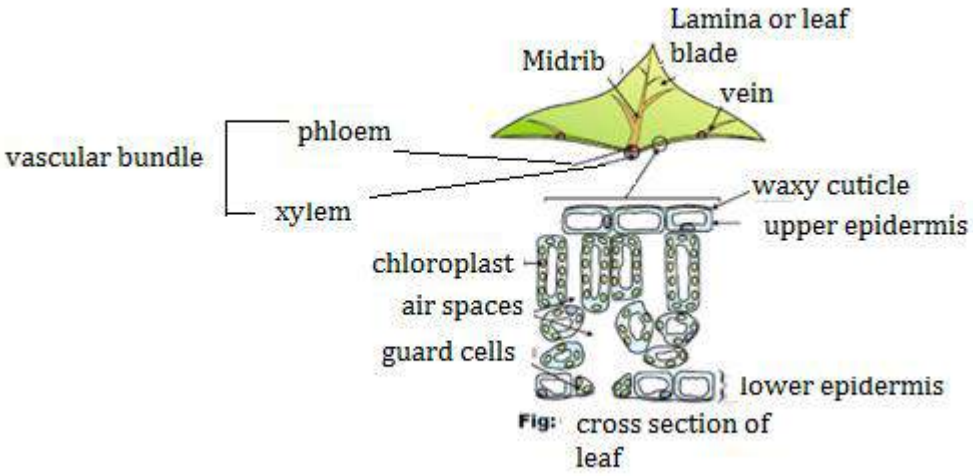


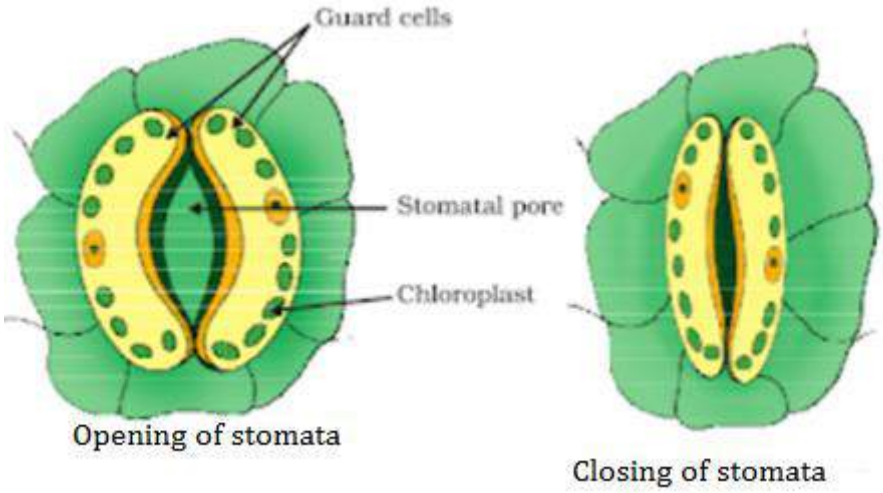
Fig: cross section of leaf

Main Events Of Photosynthesis

- Absorption of light energy by photosynthesis
- Conversion of light energy into chemical energy + splitting (breaking) of water into hydrogen and oxygen
- Reduction of carbon dioxide to carbohydrates

Stomata

Stomata are the tiny pores present on the surface of the leaves



Functions of Stomata

- Exchange of gases O_2/CO_2
- Loses a large amount of water (water vapour) during transpiration

Heterotrophic Nutrition

- Kind of nutrition in which organisms do not possess the ability to synthesize their own food. They depend on autotrophs for their food supply directly or indirectly. Example - Animals, Fungi

  Different modes under this category are as follows:
- Holozoic Nutrition: Animals take in solid food and breakdown inside the body. Example - Amoeba, animals
- Saprophytic Nutrition: Organisms feed on dead, decaying matter. Example - Fungi
- Parasitic Nutrition: Parasites live inside or outside other organisms (host) and derive nutrition from it. Example - Cuscuta (plant parasites), Ticks etc

How do Organisms obtain their food?

- Unicellular/Single-celled organisms - Food is taken up through the entire surface. Example - Amoeba, Paramecium

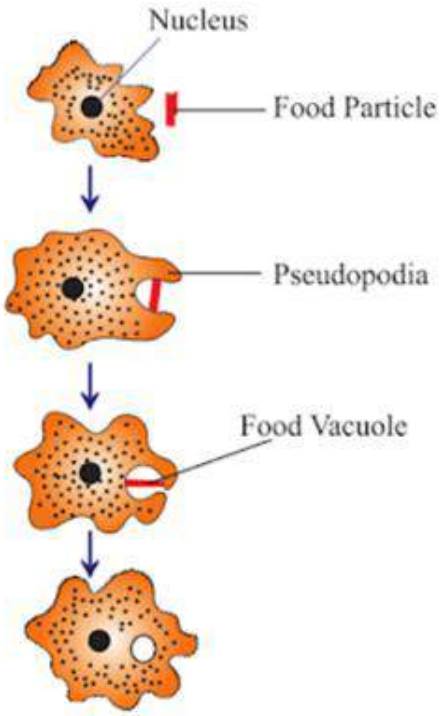
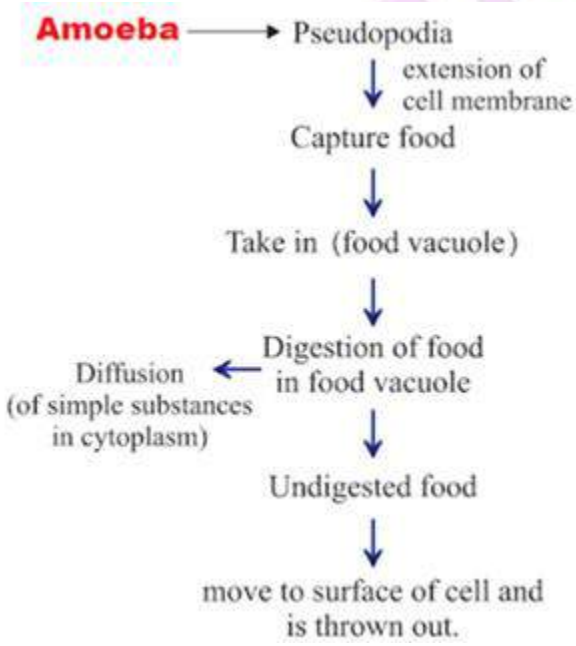


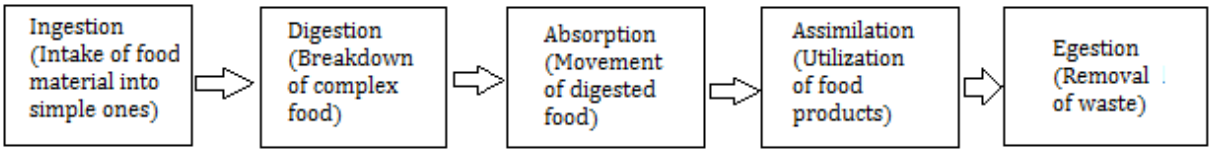
Fig: Nutrition in Amoeba

Process of intake of food by Ameoba:



Nutrition

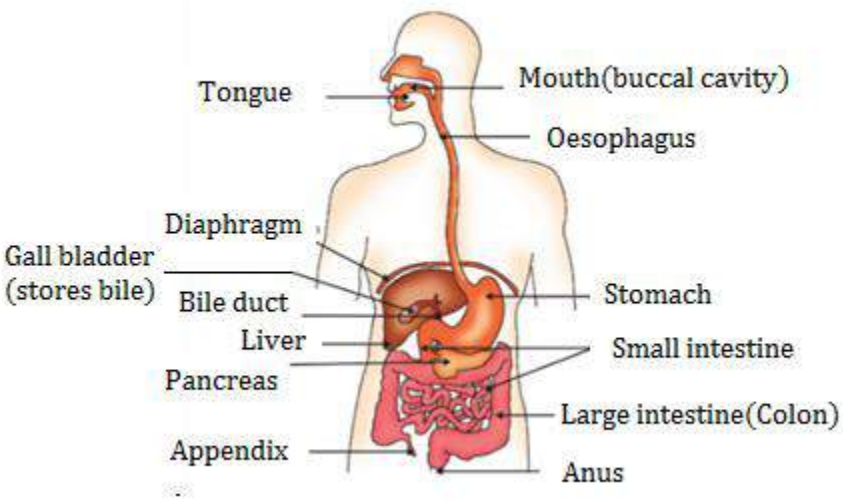
Different organisms utilize different nutritional processes as it depends upon the source of carbon from where the food is taken.



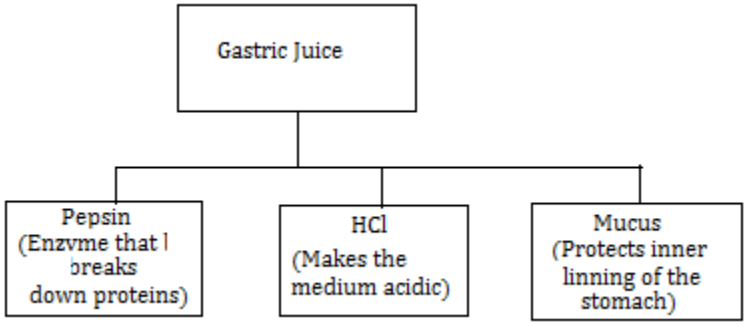
Nutrition In Human Beings

The alimentary canal is basically a long tube extending from the mouth to the anus. Various regions are specialized to perform different functions

Human Digestive System



- Mouth - intake of whole food
- Teeth - Chewing/grinding of food
- Tongue - Rolling of food + tasting of food + swallowing/pushing down the food
- Salivary glands - secrete saliva + mucus (it is a sticky, gelatinous material that lines your lungs, throat, mouth, nose and sinuses) + starch is converted into glucose by saliva (Salivary amylase)
- Oesophagus - Taking food from mouth to stomach by peristaltic movements (contraction and expansion of muscles of the oesophagus)
- Stomach - Gastric glands present in the stomach secrete gastric juice



- Small intestine - it is the site of the complete digestion of carbohydrates, proteins and fats
    - Walls of small intestine secrete intestinal enzyme which converts carbohydrates into glucose, fats in fatty acid + glycerol and proteins into amino acids
    - It has villi (finger projection) which help in the absorption of food into blood
    - It receives the secretions of the liver and pancreas
- The food is acidic which is made alkaline for the pancreatic enzymes to act. The pancreas secretes pancreatic juice which contains enzymes like trypsin for digesting proteins and lipase for breaking down emulsified fats
- Fats are present in the intestine in the form of large globules which makes it difficult for enzymes to act on them. Bile salts break them down into smaller globules which increases the efficiency of enzyme action
- Large intestine - it absorbs excess water and the rest of the material is eliminated from the body via the anus

Respiration In Human beings

Respiration involves:

- Gaseous exchange (Breathing) - Intake of oxygen from the atmosphere and release of carbon dioxide
- Cellular respiration - the breakdown of simple food in order to release energy inside the cell

Breakdown of Glucose by various Pathways:

- The first step is the breakdown of glucose (a six-carbon molecule) into a three-carbon molecule called pyruvate which takes place in the cytoplasm
- The pyruvate can be converted into ethanol and carbon dioxide which takes place in yeast during fermentation. Since the process occurs in the absence of air (oxygen), it is called anaerobic respiration
- The pyruvate is broken down into a three-carbon pyruvate molecule in the presence of oxygen to give three molecules of carbon dioxide and water. This process takes place in mitochondria. Since this process takes place in the presence of oxygen, it is known as aerobic respiration

- The pyruvate is converted into lactic acid when there is a lack of oxygen in our muscle cells, which is also a three-carbon molecule. This build-up of lactic acid in our muscles during sudden activity causes cramps.

The whole process of breakdown of glucose is shown below:

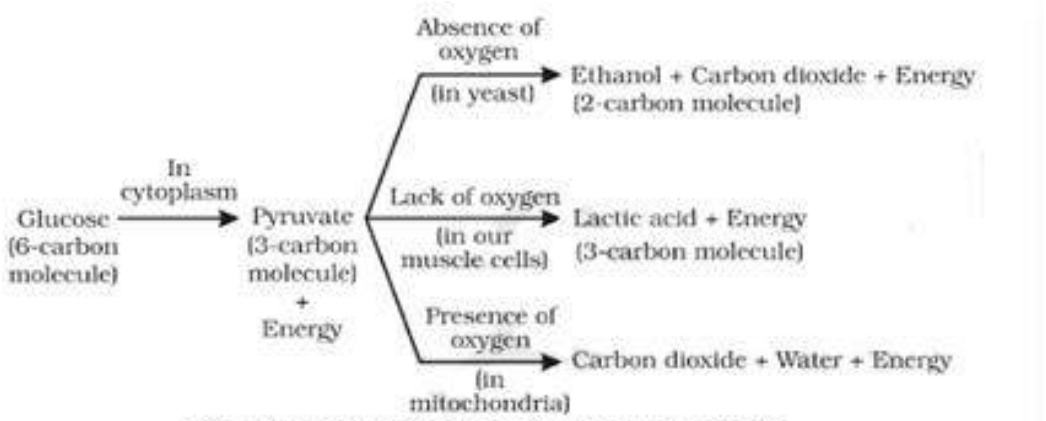


Fig: Break-down of glucose by various pathways

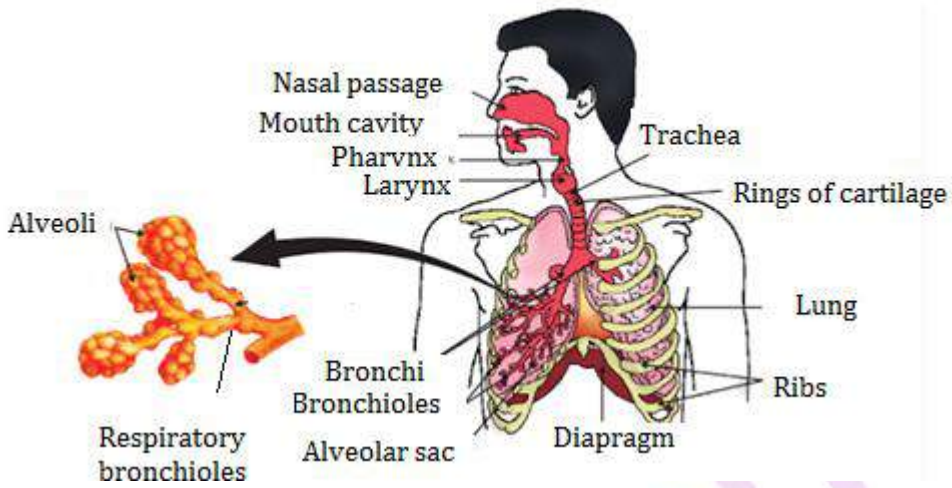
The energy released during cellular respiration is immediately used to synthesize a molecule called ATP which is used to fuel all other activities in the cell. In these processes, ATP is broken down giving rise to a fixed amount of energy which can derive the endothermic reactions taking place in the cell

The rate of breathing in aquatic organisms is much faster than that seen in terrestrial organisms because the amount of dissolved oxygen is fairly low compared to the amount of oxygen in the air.

Types of Respiration

Aerobic respiration	Anaerobic respiration
Occurs in the presence of oxygen	Occurs in the absence of oxygen
Occurs in Mitochondria	Occurs in Cytoplasm
End products and water and carbon dioxide	End products and lactic acid and alcohol
More amount of energy is released	Less amount of energy is released

Human Respiratory System

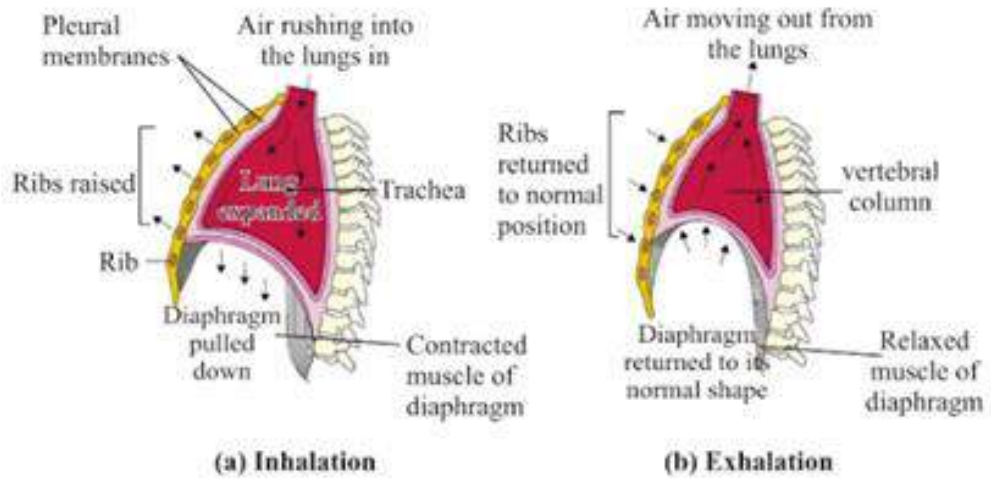


Passage of air through the respiratory system:

- Nostril - air is taken into the body
- Nasal passage - it is a channel for airflow through the nose
- Nasal cavity - it is lined with hair and mucous membrane. It warms, moisturizes and filters air before it reaches the lungs
- Pharynx - it contains rings of cartilage which ensure that the air -passage does not collapse
- Larynx - it houses the vocal cords and manipulates pitch and volume, which is essential for phonation. It is also known as the voice box
- Trachea - Pharynx splits into the trachea and oesophagus. It connects the larynx (or voice box) to the bronchi of the lungs. It provides airflow to and from the lungs for respiration
- Bronchi - They are the main passageway into the lungs. They are the extension of the windpipe that shuttles air to and from the lungs. The oxygen goes to the lungs and carbon dioxide leaves the lungs through them
- Bronchioles - Bronchi get smaller when they reach closer to the lungs tissues and are called Bronchioles. They are the passageways by which air passes through the nose or mouth to the alveoli of the lungs
- Alveoli - they are smaller tubes which finally terminate in balloon-like structures which are called alveoli. They allow carbon dioxide and oxygen to move between the lungs and the bloodstream
- Blood capillaries - They are the sites of transfer of oxygen and other nutrients from the blood stream to other tissues in the body. They also collect carbon dioxide and waste materials and return them to the veins.

Mechanism of Breathing

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



Exchange of gases between alveoli, blood and tissues

- Oxygen-rich air reaches blood which combines with haemoglobin in RBC and oxygen is released in alveoli tissues (through blood vessels)
- Carbon dioxide is released in the blood and dissolves into it and carried by blood vessels. The carbon dioxide is released in alveolar sacs which is sent out through nostrils
    - Terrestrial organisms - use atmospheric oxygen for respiration
    - Aquatic organisms - use dissolved oxygen for respiration

Respiration In Plants

Respiration in Plants is simpler than respiration in animals. Gaseous exchange occurs through:

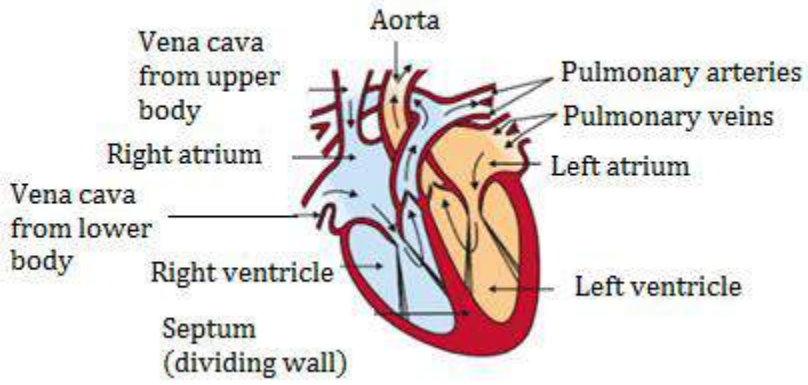
- Stomata in leaves
- Lenticels in stem
- General surface of the root

Transportation in Human beings

Human beings like other multicellular organisms need regular supply of food, oxygen etc. This function is performed by circulatory system.
The circulatory system is human beings consists of:

- Heart (pumping organ)
- Arteries and veins (blood vessels)
- Blood and lymph (circulatory medium)

Circulatory system in Human Beings



- The lungs supply oxygen-rich blood to the left atrium of the heart
- The left atrium relaxes when it is collecting the blood and contracts when blood is transferred to the left ventricle. The left ventricle expands when it receives blood
- The blood is pumped out of the body when the muscles of the left ventricle contracts
- Deoxygenated blood comes from the body to the upper chamber on the right i.e., the right atrium when it expands
- The corresponding lower chamber i.e., the right ventricle expands when right atrium contracts. It transfers the blood to the right ventricle which in turn pumps it to the lungs for oxygenation
- Right ventricles have thicker muscular walls so that they pump blood into various organs
- Valves ensure that blood does not flow backwards when the atria or ventricles contract

Blood circulation in the Human Body

Double Circulation: Blood travels twice through the heart in one complete cycle of the body

Direction of blood flow through Human Heart

- Pulmonary Circulation - Blood moves from the heart to the lungs and back to the heart
- Systemic Circulation - Blood moves from the heart to the rest of the body and back to the heart

Blood

Blood is a connective tissue which is fluid in nature. The solid components of Blood(Blood corpuscles) are:

- RBC(Red Blood Cells) - It carries oxygen and carbon dioxide and also contains Haemoglobin which imparts red colour to the blood
- WBC(White Blood Cells) - It provides body defence by engulfing the germs and produces antibodies
- Blood Platelets - During any injury, it helps in blood clotting

Liquid components (Plasma) - It is a yellow coloured fluid which is 90% water and 10% organic substances

Lymph

- It is a yellowish fluid which escapes from the blood capillaries into the intercellular spaces
- It contains less proteins than blood
- It flows from tissues to the heart which helps in transportation and destroying germs
- It carries digested and absorbed fat from intestine and drains excess fluid from extra cellular space back into the blood

Types of Blood vessels

There are two types of blood vessels

- Arteries
- Veins

Arteries	Veins
Carry oxygenated blood from heart to the 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
Deepseated (far from the skin)	Superficial (near to the skin) as compared to arteries

Transportation in Plants

- Plants take in carbon dioxide and photosynthesize energy stored in their chlorophyll-containing structures, the leaves
- For plants, soil is the is richest and the nearest source of raw material such as nitrogen, phosphorous and other minerals, the absorption of which occurs through roots
- The plant transport systems move energy stores from leaves and raw materials from roots. Both of these pathways are constructed independently through different conducting tubes
- Xylem moves water and minerals obtained from soil whereas phloem transports products of photosynthesis from leaves to other plant parts

Transport of water

- Vessels, tracheids of roots, stems and leaves of the xylem tissue are interconnected forming a continuous system of water-conducting channels reaching all plant parts
- Water moves into the root from the soil as a result of a difference created in the concentration of ions between the soil and the root. Thereby a steady movement of water is created into the root xylem, pushed upwards steadily
- When there is an adequate amount of water supply, water lost through stomata is replaced by water from the xylem vessels in the leaf
- Evaporation of water molecules from leaf cells creates a suction, pulling water from xylem cells of the roots. Transpiration is the process wherein water is lost in the form of vapour from the aerial parts of the plant

Advantages of Transpiration:

- Helps in the absorption and the upward movement of water and minerals dissolved in it from roots to leaves
- Helps in temperature regulation
- Acts as a major driving force during the daytime, as transpirational pull helps in the movement of water in the xylem

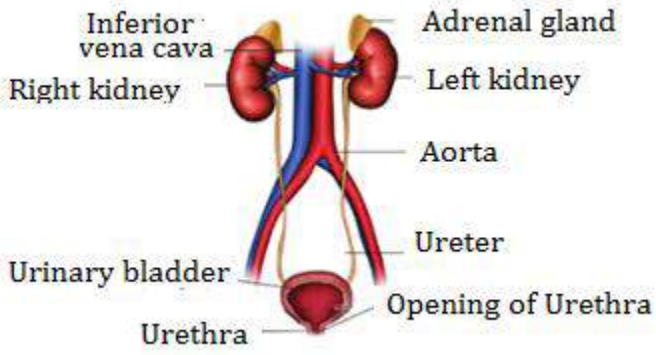
Transport of food and other substances

- Translocation occurs in the vascular tissue, phloem where apart from the transport of products of photosynthesis, it also transports amino acids and other substances which are specially delivered to the storage organs of fruits, roots and seeds and even to the growing organs
- Translocation of food and other substances occurs in the sieve tubes with the aid of adjacent companion cells in both the directions
- Translocation in phloem can be achieved by utilizing energy, derived from ATP, for instance, transfer of sucrose into phloem tissue

Excretion System in Human Beings

Excretory/urinary system consists of:

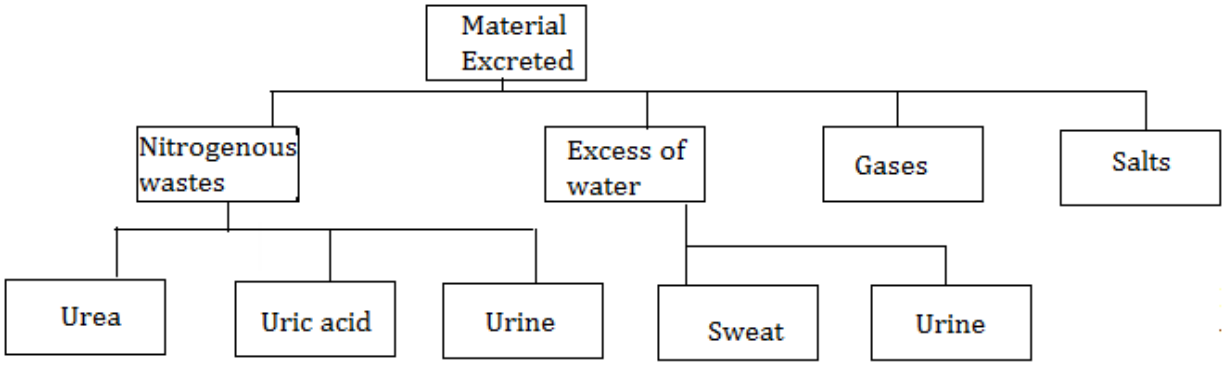
- The Kidneys - The excretory organ
- The ureters - The ducts which drain out urine from the kidneys
- The urinary bladder - The urinary reservoir
- The urethra - The channel to the exterior



Excretion

The metabolic activities in the body generates many kinds of wastes including nitrogenous wastes which are harmful for the body and hence needed to be removed. Excretion is a process by which these wastes are moved from our body. The unicellular entities remove these wastes by simple diffusion

Excretory wastes

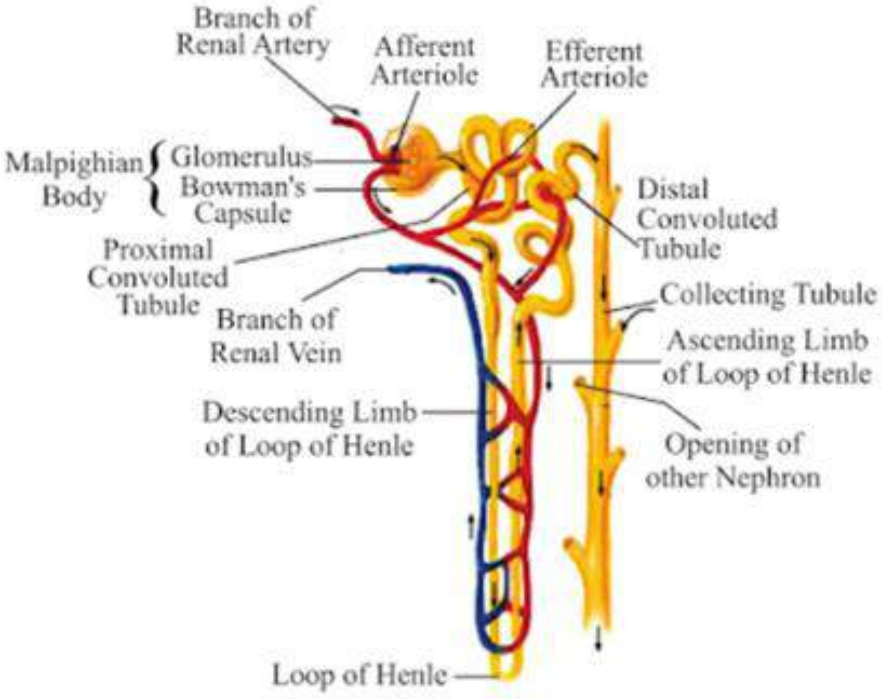


Formation of Urine in Human Beings

Each kidney contains many filtration units called as **nephrons.**

- Nephrons are made up of a cluster of thin walled capillaries called glomerulus which is associated with a cup like structure called as Bowman's capsule and the long tube which terminated through this capsule
- The renal artery brings oxygenated blood to the kidneys along with the nitrogenous wastes like urea and uric acid and many other substances
- The blood gets filtered through the glomerulus and this filtrate enters the tubular part of nephron
- As this filtrate moves down the tubular part, glucose, amino acids, salts and excess of water gets selectively reabsorbed by the blood vessels surrounding these tubules
- The amount of water reabsorbed depends upon
    - How much excess of water is there in the body and
    - How much nitrogenous wastes need to be excreted out
- So the fluid now flowing in the tubular part is urine which gets collected in collecting ducts of nephrons
- These collecting ducts together leave the kidney at a common point by forming the ureter
- Each ureter drains the urine in the urinary bladder where it is stored until the pressure of the expanded bladder leads to an urge to pass it out through urethra
- This bladder is a muscular structure which is under nervous control
- 180 litres of filtrate is formed daily but only 2 litres is excreted out as urine so the rest is reabsorbed in the body

Structure of Nephron



Functions of Nephron

- Excretion of nitrogenous wastes
- To maintain the water and ionic balance(osmic regulation)

Artificial Kidney

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

Excretion in Plants

Plants use different strategies for excretion of different products:

- Oxygen and carbon dioxide is diffused through stomata
- Excess water is removed by transpiration
- Plants can also lose some of their old parts like old leaves and bark of trees
- Other waste products like raisins and gums especially in old xylem cells which can also be lost by plants
- Plants also secrete some waste substances into the soil around them

Few Important Questions

- What is locomotion?
- Describe the process of Excretion in humans.

- Explain in detail how plants prepare their food?
- Give examples for Heterotrophic mode of nutrition.
- Write the differences between Aerobic and Anaerobic respiration.