

Chapter 11

Transportation in Animals and Plants

Circulatory System

Transport of materials in Plants and Animals is necessary because:

→ Every cell needs a regular supply of nutrients and oxygen to release energy through respiration. These nutrients and oxygen need to be transported to all the cells of the body, through a transport system, so that they can produce energy.

→ The waste product generated by cells needs to be transported to the excretory organs.

Circulatory System:

The circulatory system in the human being is the blood:

→ It carries digested food, water, and oxygen to all parts of the body.

→ It transports digested food from the small intestine to the other parts of the body.

→ It carries oxygen from the lungs to the cells of the body. It also transports waste products (like carbon dioxide) for removal from the body.

◆ Blood:

Blood is a red-coloured fluid that flows in blood vessels and circulates in our body. Blood consists of four components:

(a) Red blood cells (RBCs):

Red blood cells are red in colour because it contains a red pigment called haemoglobin. Haemoglobin binds with oxygen and transports it to all parts of the body and ultimately to all the cells.

(b) White blood cells (WBCs):

White blood cells fight against germs that may enter our bodies and protect us from diseases.

(c) Plasma:

The liquid part of blood is called plasma. Plasma carries water and dissolved substances such as digested food and waste products from one part to another part of the body.

(d) Platelets:

Platelets help in the clotting of blood in a cut or wound area.

◆ Blood Vessels:

Blood flows in blood vessels and circulates in our bodies. There are two types of blood vessels in the body:

(a) Arteries:

Arteries are the blood vessels that carry oxygen-rich blood from the heart to all parts of the body. The arteries lie quite deep under the skin and hence they are not seen easily. Since the blood flows from the heart is rapid and at high pressure, the arteries are thick and elastic walls.

(b) Veins:

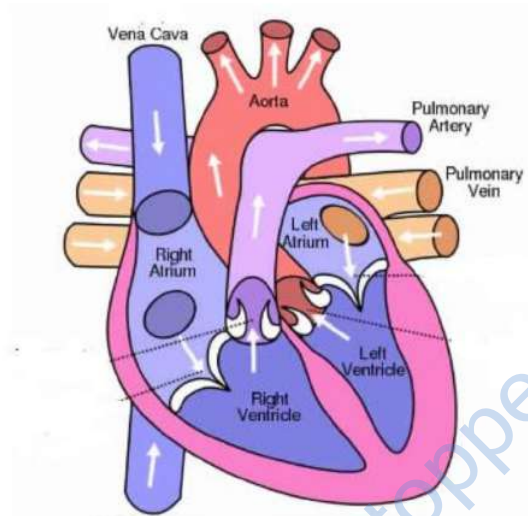
Veins are the blood vessels that carry carbon dioxide-rich blood from all parts of the body back to the heart. The veins are less deep than arteries and hence can be seen easily. The greenish-blue lines which we see just below the skin on our hands and legs are the veins. Since the blood flows at low pressure through the veins, so veins have thin walls. Veins have valves that allow blood to flow only in one direction (towards the heart). Valves prevent the backflow of blood in the veins.

• Capillaries:

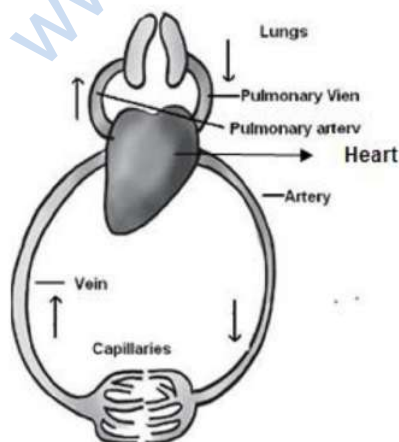
Capillaries are thin blood vessels that connect arteries to veins. The oxygenated blood from arteries enters into the capillaries and the dissolved substances present in the blood (O_2 and food) pass into the cell through the capillaries. The waste products (like CO_2) formed in the cells enter into the blood through the thin walls of capillaries. Thus, the exchange of substances

(like food, O₂ and CO₂) between the blood and the body cells takes place through capillaries.

◆ Heart:



The heart is an organ that pumps blood to all parts of the body through blood vessels. For the transport of blood, our heartbeats continuously like a pump. The heart has four chambers. The upper two chambers are called atria (singular: atrium) and the lower two chambers are called ventricles. The partition between the chambers helps to avoid mixing up blood rich in oxygen with blood rich in carbon dioxide.

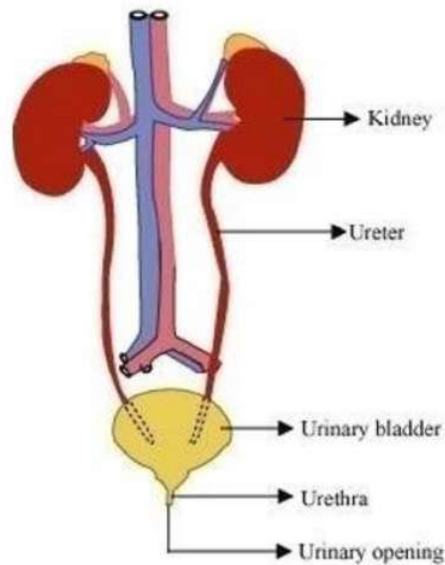


- Pulmonary vein brings oxygenated blood from the lungs to the left atrium.

- Oxygenated blood from the left atrium goes into the left ventricle.
 - The left ventricles pump oxygenated blood into the main artery for taking it to all the body organs.
 - Vena cava brings deoxygenated blood into the right atrium from all parts of the body.
 - Deoxygenated blood from the right atrium goes into the right ventricle.
 - The right ventricle pumps deoxygenated blood into the pulmonary artery for taking it to the lungs.
- * Tip: Every time the heart beats, blood is forced into arteries due to this the arteries expand a little. The expansion of the artery each time the blood is forced into it is called a pulse. So, the pulse rate of a person is equal to the number of heartbeats per minute.

Excretory System in Humans

- The process of removal of wastes materials produced in the cells of living organisms is called excretion.
 - The parts involved in the excretion form the excretory system. The organs for the removal of various wastes from the body are the lungs, kidneys, and sweat glands.
 - The waste materials produced in the cells of the human body are carbon dioxide, urea, and sweat.
- Carbon dioxide is removed from our bodies by the lungs during exhalation.
- Sweat is removed by sweat glands.
- Urea is removed from the blood by the kidneys.



Human excretory system

- The function of the kidney is to filter the blood and remove urea.
- The blood containing urea and other waste enters into kidneys.
- Kidney filters the blood and removes urea and other waste in the form of a liquid called urine.
- Urine enters into the urinary bladder through the ureter and is passed out from the body.



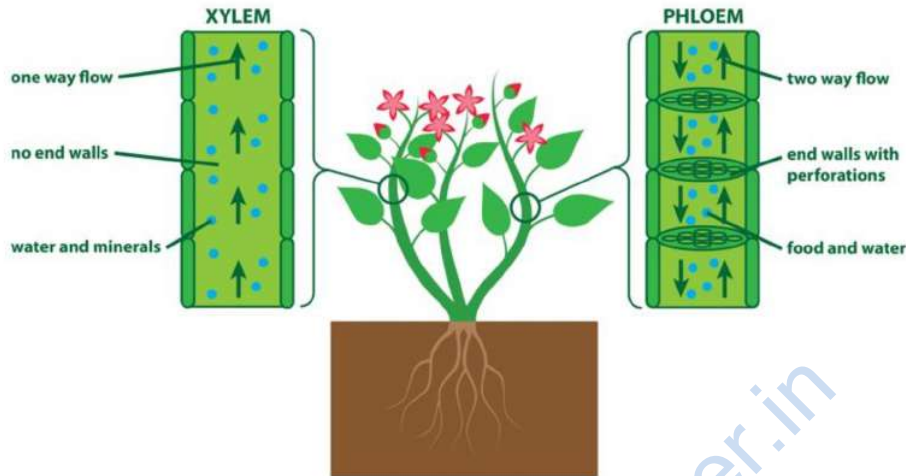
Dialysis:

If a person is having kidney failure, the waste products start accumulating in the blood. The person cannot survive unless his blood is filtered periodically through an artificial kidney machine to remove urea. This process is called dialysis.

Transport of Substances in Plants

- Plants have pipe-like vessels to transport water and nutrients from the soil. These vessels are made of special cells, forming the vascular tissue.

- The vascular tissue for transport of water and dissolved nutrients as well as prepared food are xylem and phloem.



◆ Xylem:

Roots absorb water and nutrients present in the soil and these are transported to the leaves and other parts of plants by the xylem.

◆ Phloem:

Leaves prepare food in the form of glucose by the process of photosynthesis and this food is transported to all parts of the plants including roots by phloem.

Transpiration:

The water evaporates through the stomata present on the surface of leaves by the process of transpiration. The transpiration generates suction force which can pull water to great heights in the tall trees. Transpiration also keeps the plants cool in hot weather.