

TRANSPORTATION IN PLANTS & ANIMALS

Key Points

"Transportation whether in plants or animals is the key to the efficient assimilation of the nutrients that the organisms synthesize, get from their environment or digest."

TRANSPORTATION

Transportation in Animals
(Circulatory systems)

Transportation in plants
(Vascular-system)

TRANSPORTATION IN ANIMALS

Unicellular animals

No special transport system is required.
e.g. *Amoeba* and *Paramecium*

Multicellular organisms

The transportation is done by a specialized system known as the circulatory system.

Human circulatory system

- A transport system moving substances throughout our body with the help of blood.
- Consists of the heart, arteries, veins and capillaries that forms a broad network which carries blood to all parts of the body.

"Blood circulation was explained by William Harvey"

- Blood is the medium for transport of all the necessary materials to different parts of the body.
- In an adult human body- contains about 5.5 litres of blood.
- Humans have a very well-developed and efficient circulatory system.

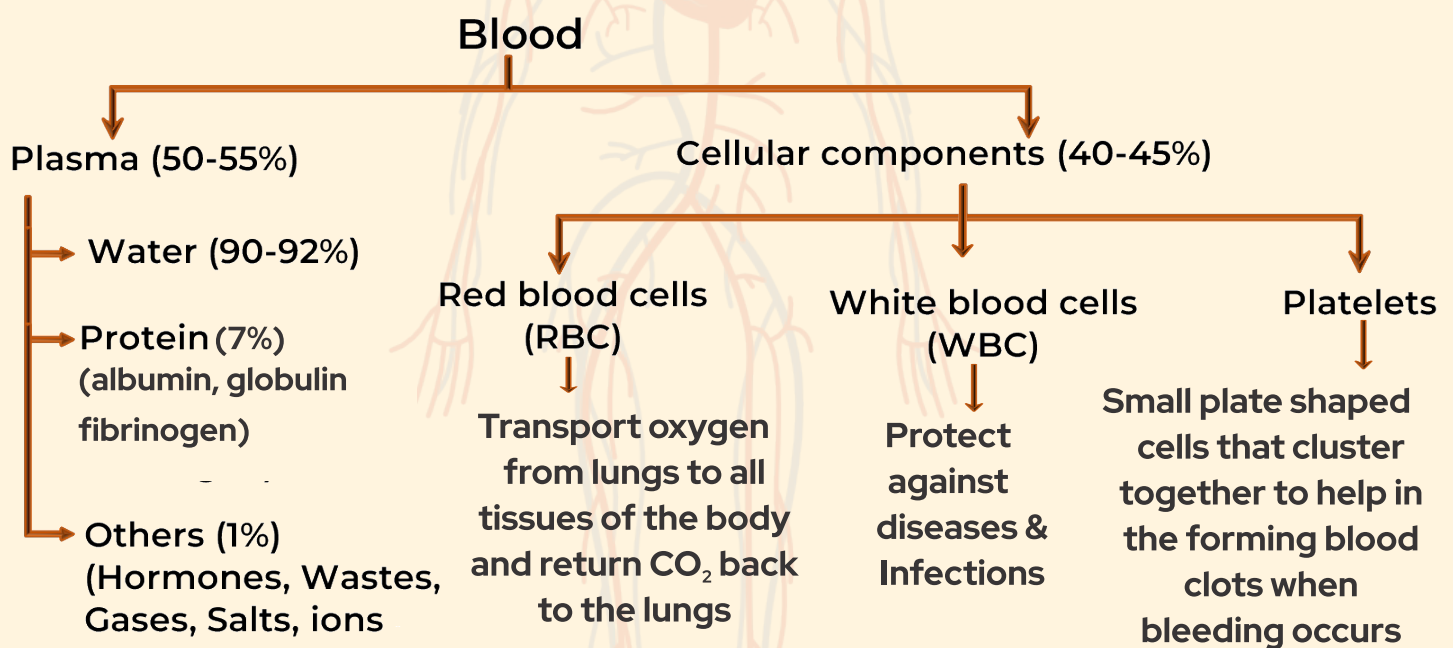
Human Circulatory System consists

- Blood
- Blood vessels
- Heart

Blood

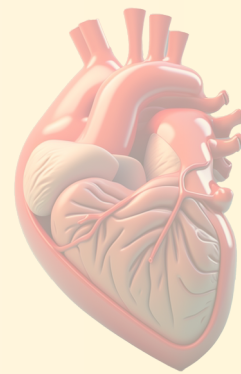
- A bright red-coloured fluid flowing inside blood vessels.

Composition of blood



Red Blood Cells/Erythrocytes

- Red blood cells (RBC) are disc shaped cells with a depression in the centre.
- Contain a red pigment called haemoglobin. The presence of haemoglobin makes blood appear red.
- Haemoglobin bind with oxygen and transports it to all the parts of the body and ultimately to all the cells.



White Blood Cells/Leucocytes

- White blood cells (WBC) are colourless cells and do not have a definite shape.
- Their function is to protect the body against germs or infection.

Platelets (Thrombocytes)

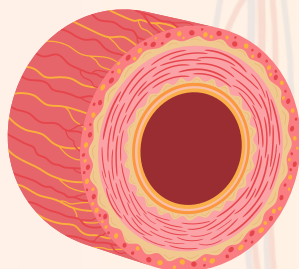
- Blood platelets are colourless, small, irregularly shaped, and much smaller than the RBCs.
- The platelets help in clotting of blood, whenever there is a blood flow due to some injury.

Functions of blood

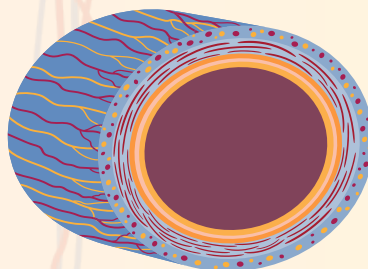
- Transports substances like digested food from the small intestine to the other parts of the body.
- Carries oxygen from the lungs to the cells of the body.
- Transports waste for removal from the body.
- Protect the body against germs or infection.
- Regulates the body temperature.

Blood vessels

- Blood flows through our body in a complex system of tubes called blood vessels.



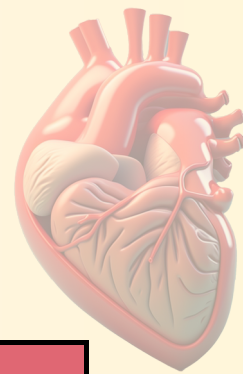
Artery



Vein

NOTE

Pulmonary artery carries blood from the heart, so it is called an artery and not a vein. It carries carbon dioxide-rich blood to the lungs.



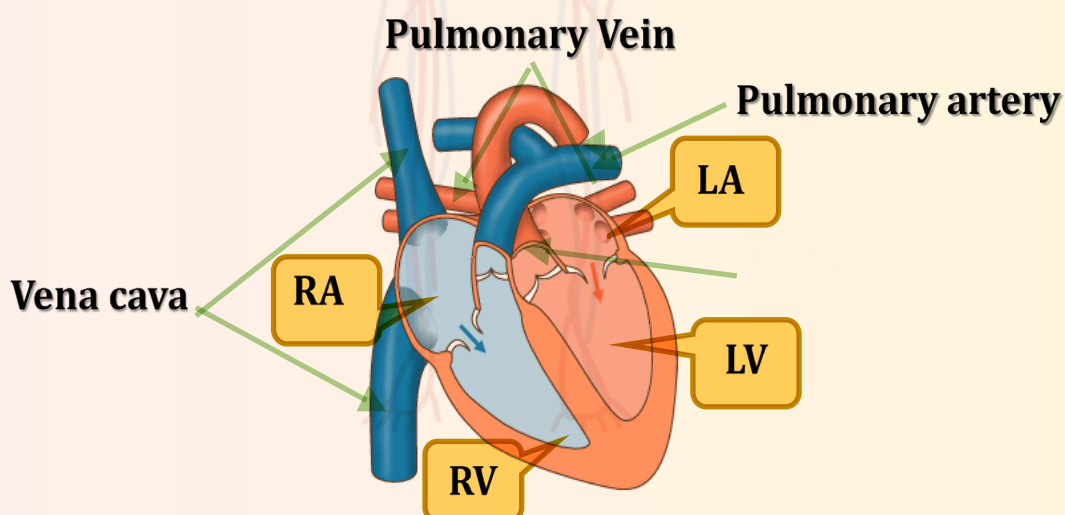
Arteries		Veins
1	They carry blood away from the heart.	They carry blood towards the heart.
2	They are thick - walled tubes.	They have thinner walls.
3	They are deeply placed under the skin, blood moves under high pressure.	They are superficially placed and blood does not move under pressure.
4	There are no valves inside arteries.	There are a series of valves present in the veins. These prevent the blood from flowing back to the organs.

Capillaries

- On reaching the tissues, the arteries divide into very fine thin walled branches called capillaries.
- The capillaries join up to form veins which empty into the heart. Gases and nutrient can easily pass through the walls of capillaries.

HEART

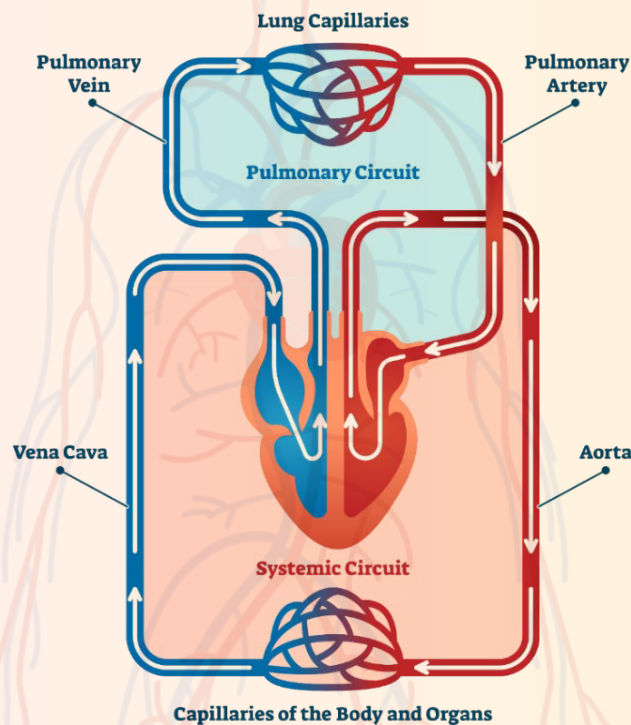
- The heart is a muscular organ which is located in the chest cavity between the lungs with its lower tip slightly tilted towards the left and beats continuously to act as a pump for the transport of blood.



Section of human heart

Blood circulation

- Blood circulates throughout the body by the pumping action of the heart.



NOTE

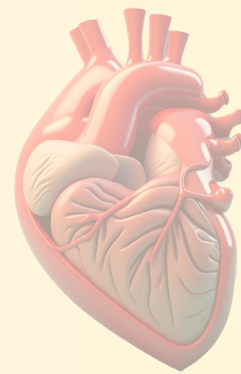
Pulmonary vein carries oxygen-rich blood from the lungs to the heart.

NOTE

Each heart beat generates one pulse in the arteries and the pulse rate per minute indicates the rate of heart beat.

Heartbeat and Pulse

- The heart shows regular contraction and relaxation. This rhythmic contraction of muscles followed by expansion constitutes a heartbeat. The rhythmic beating of the various chambers of the heart maintain circulation of blood and transport of substances to the different parts of the body.
- Arteries lie deep in the tissues, except at the wrist and along the side of the neck. The pulse can be felt at any of these places. Veins lie closer to the surface to the skin and can be seen as greenish blue lines in our hands and legs.



Pulse rate

- The number of beats per minute.

Stethoscope

- The heart beat can also be measured by using an instrument called stethoscope.
- A stethoscope is a device that amplifies the sound of a heart beat and is used to hear heart beats in the chest, by placing the chest piece of the stethoscope at the appropriate place.
- A stethoscope consists of three parts.
 - A chest piece, that carries a sensitive diaphragm.
 - Two earpieces.
 - A tube joining the chest piece and the ear-pieces.



Stethoscope

Transport of substances in plants

- In plants, there are special tubes called xylem and phloem, which comprise the conducting tissues or vascular tissues.
- Water required for food manufactured by the plants is absorbed from the soil, through the root system and food is synthesised in the leaves.

NOTE

A tissue is a group of cells that perform specialised function in an organism.

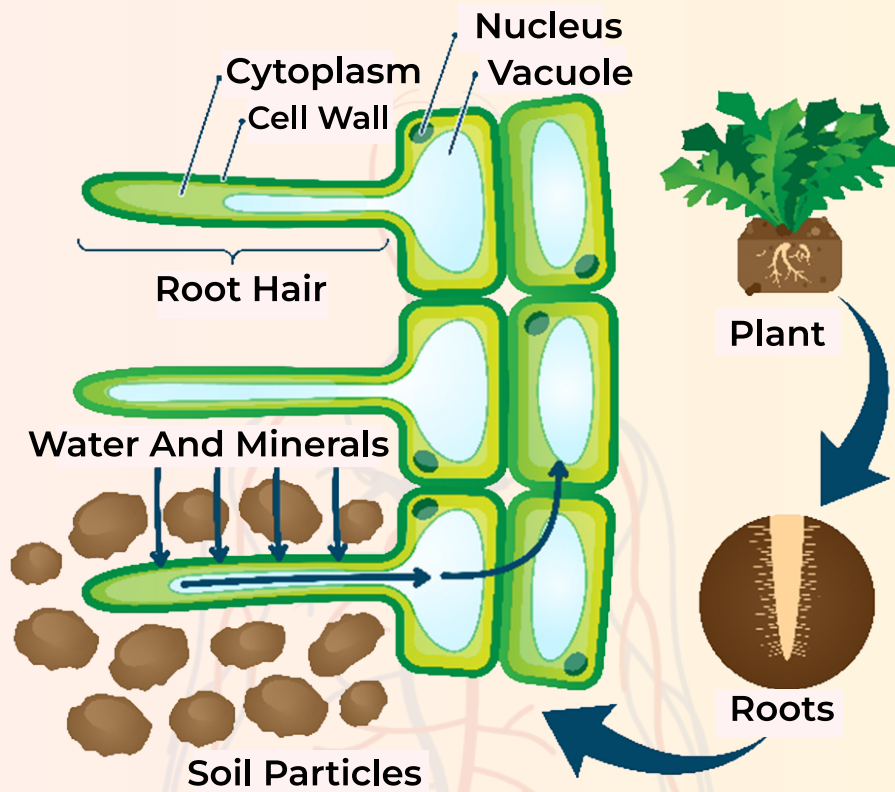
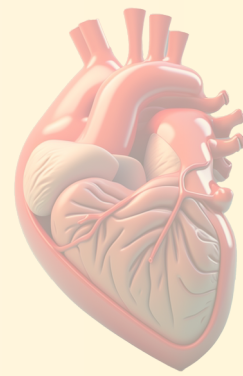
Transport in plants

Transport of water and minerals

Upward movement of water and minerals occurs through pipe-like structures or channels, called xylem elements, present in roots, stem and leaves of plants.

Translocation of food

The prepared food material is carried in a soluble form through another channel, constituted by phloem, from the leaves to all other parts of the body.



Exchange of gases through stomata and root

- Plants absorb water and minerals by the roots which have root hair.
- These root hairs increase the surface area for absorbing water and minerals.
- The root hair absorbs water present between the soil particles and from there it reaches the xylem elements.

Transpiration

- The loss of water in the form of water vapours from leaves is known as transpiration.
- It occurs through stomata present in the leaves by the process of diffusion.

Importance of transpiration

- It results in the transport of water and minerals from the soil to the leaves. In the leaves, water forms the raw material for photosynthesis.
- It produces a cooling effect which helps in preventing hot sunlight from damaging delicate cells.

EXCRETION IN ANIMAL

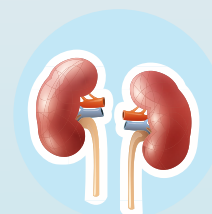
- The process of removal of wastes produced in the cells of the living organisms is called excretion.
- When the cells perform metabolic functions, certain waste products are released and these toxins are needed to be removed from the body.
- The various parts involved in excretion form the excretory system.

The way in which waste chemicals are removed from the body of the animal depends on the availability of water.

Product formed	Example
Ammonia	Aquatic animals (Fishes)
Urea	In human
Uric acid	Birds, reptiles and insects.

Excretory organs in humans

- Primary/major excretory organs
- Other excretory organs



Kidney

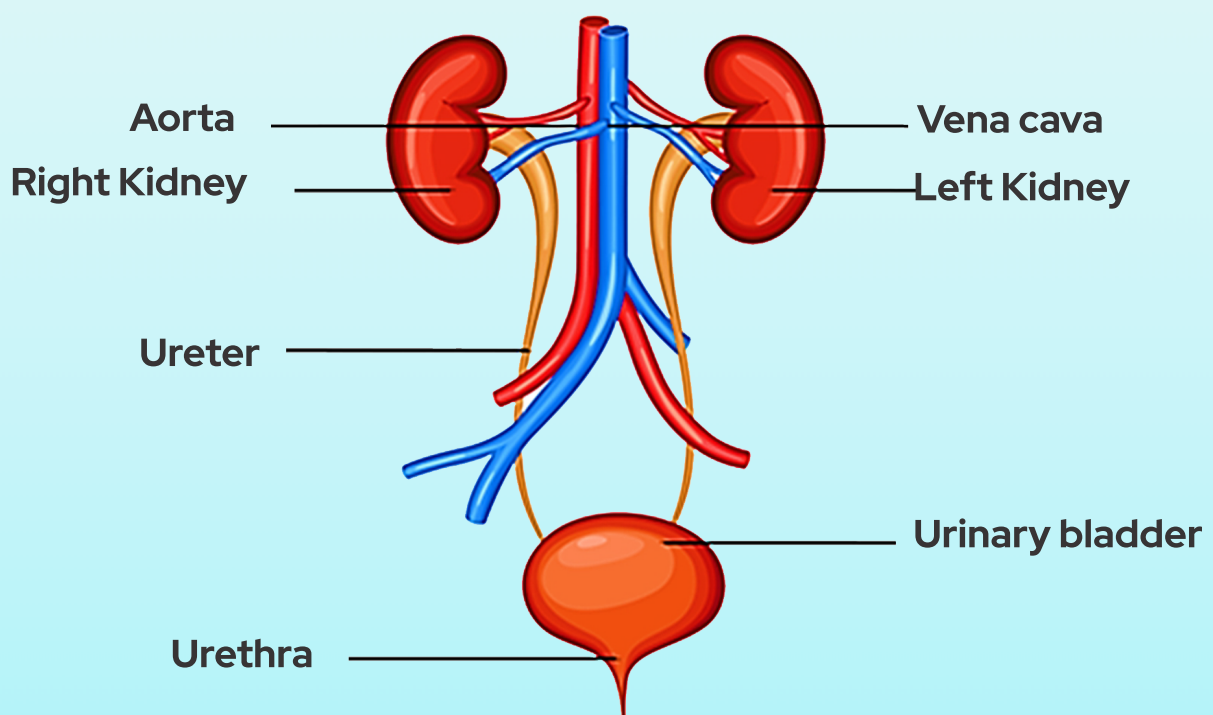
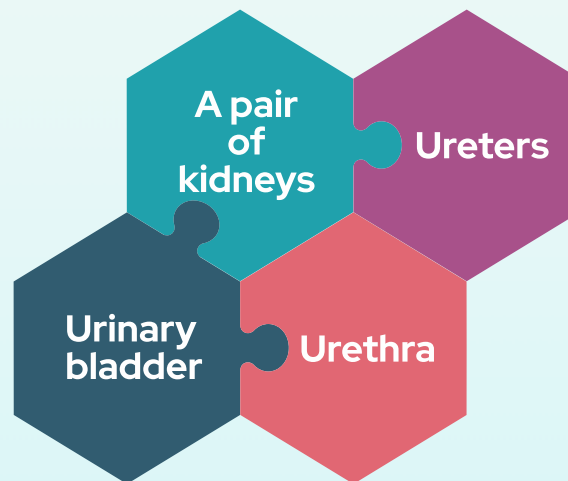


Skin: Sweat

Sweating is the production of a watery fluid from sweat glands in the skin. The watery fluid contains dissolved salts.

Human excretory system in humans

- The waste which is present in the blood has to be removed from the body.
- A mechanism to filter the blood is required which is done by the blood capillaries in the kidneys. When the blood reaches the two kidneys, it contains both useful and harmful substances.
- The useful substances are absorbed back into the blood. The wastes dissolved in water are removed as urine.
- Excretory system consists of the following organs:



- Kidney are 2 bean shaped organs which help in filtering blood to remove waste.
- A narrow tube called the ureter runs from the inner side of each kidney.
- The ureters, in turn, are connected to a large sac called the urinary bladder. Urine passes from the kidney through two ureters into the urinary bladder. Urine is collected and stored here.
- Leading from the bladder is another tube called the urethra. Urethra works as the outlet passage for urine.

Dialysis

- Kidneys are vital organs for survival.
- Nitrogenous waste products remain in the blood when kidney reduce its activity due to several reasons.
- Blood is not filtered, survival becomes difficult, so it is filtered through an artificial kidney. The process is called dialysis.
- About 1.0–1.8 litres of urine is passed out by an adult human being in 24 hours. The urine consists of 95% water, 2.5% urea and 2.5% other waste products.