

LIFE PROCESSES Part - 3

CLASS X | BIOLOGY

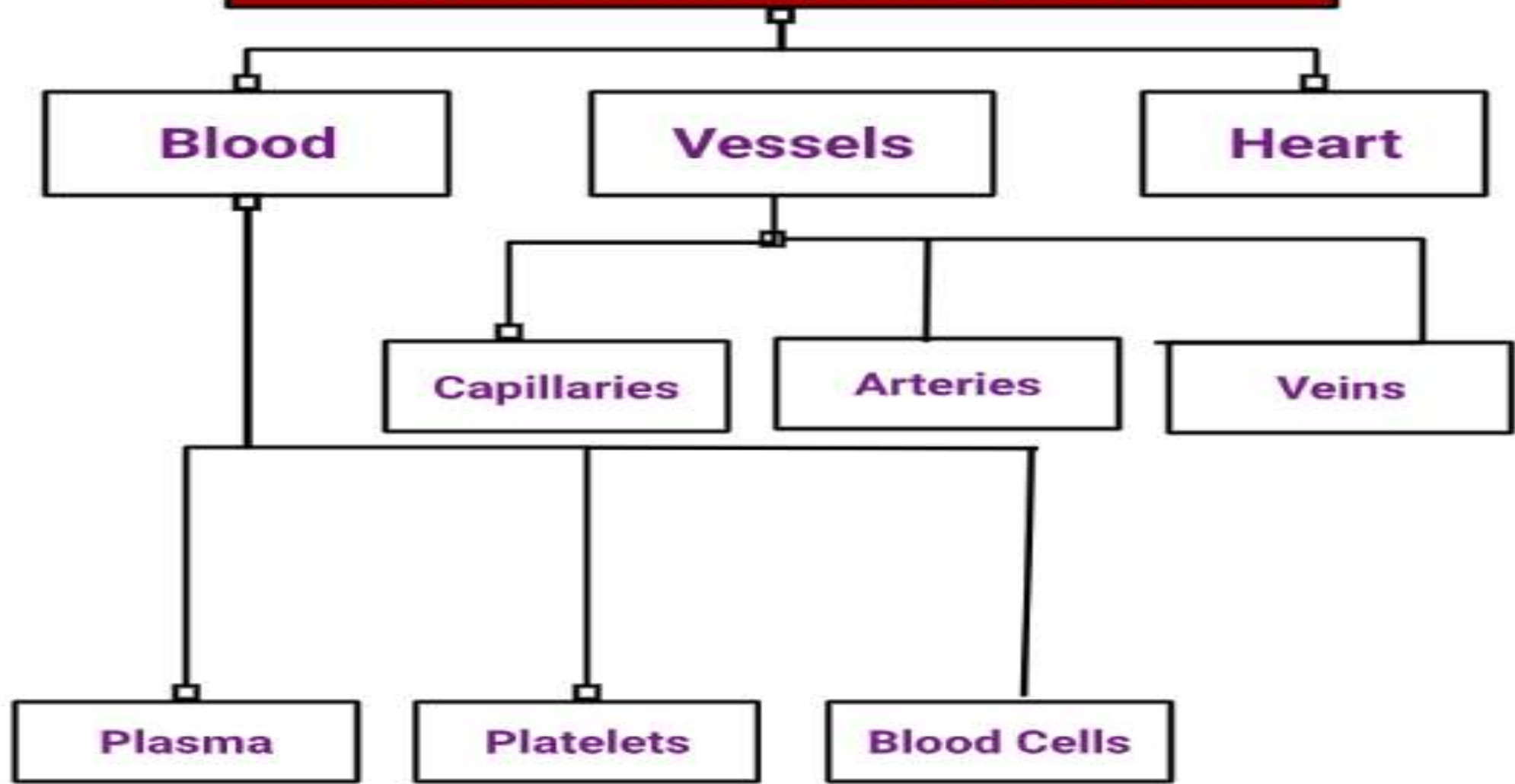
Transportation in human beings

Your heart and blood vessels make up the circulatory system. The main function of the circulatory system is to provide oxygen, nutrients and hormones to muscles, tissues and organs throughout your body. Another part of the circulatory system is to remove waste from cells and organs so your body can dispose of it

The parts of your circulatory system are your:

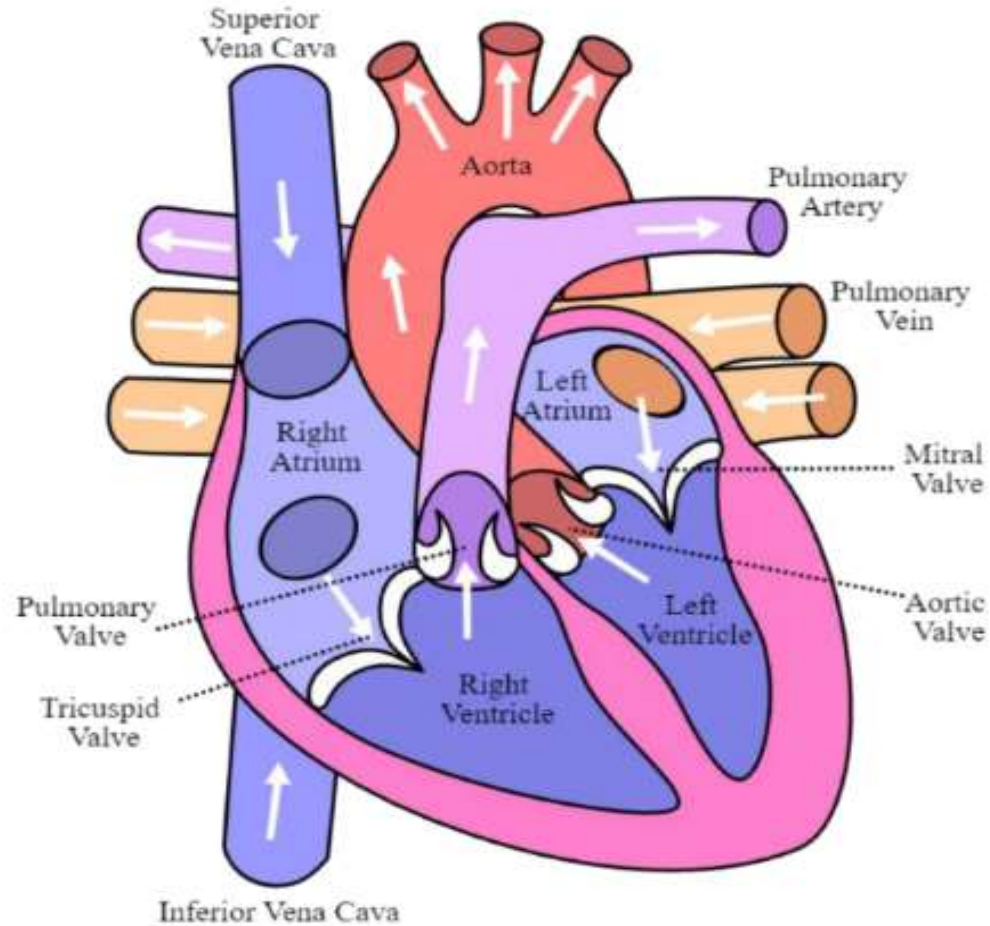
- **Heart**, a muscular organ that pumps blood throughout your body.
- **Blood vessels**, which include your arteries, veins and capillaries.
- **Blood**, made up of red and white blood cells, plasma and platelets.

Blood Circulatory System



There are three main types of blood vessels:

- **Arteries:** Arteries are thin, muscular tubes that carry oxygenated blood away from the heart and to every part of your body. The aorta is the body's largest artery. Since the blood emerges from the heart under high pressure, the arteries have thick, elastic walls. **EXCEPTION: Pulmonary artery** carry deoxygenated blood to the lungs.
- **Veins:** These blood vessels return oxygen-depleted blood to the heart. Veins start small (venules) and get larger as they approach your heart. The superior vena cava carries blood from the upper body (head and arms) to the heart. The inferior vena cava brings blood up from the lower body (stomach, pelvis and legs) to the heart. **EXCEPTION: Pulmonary veins return the oxygenated blood to the heart**
- **Capillaries:** These blood vessels connect very small arteries (arterioles) and veins (venules). Capillaries have thin walls that allow oxygen, carbon dioxide, nutrients and waste products to pass into and out of cells.

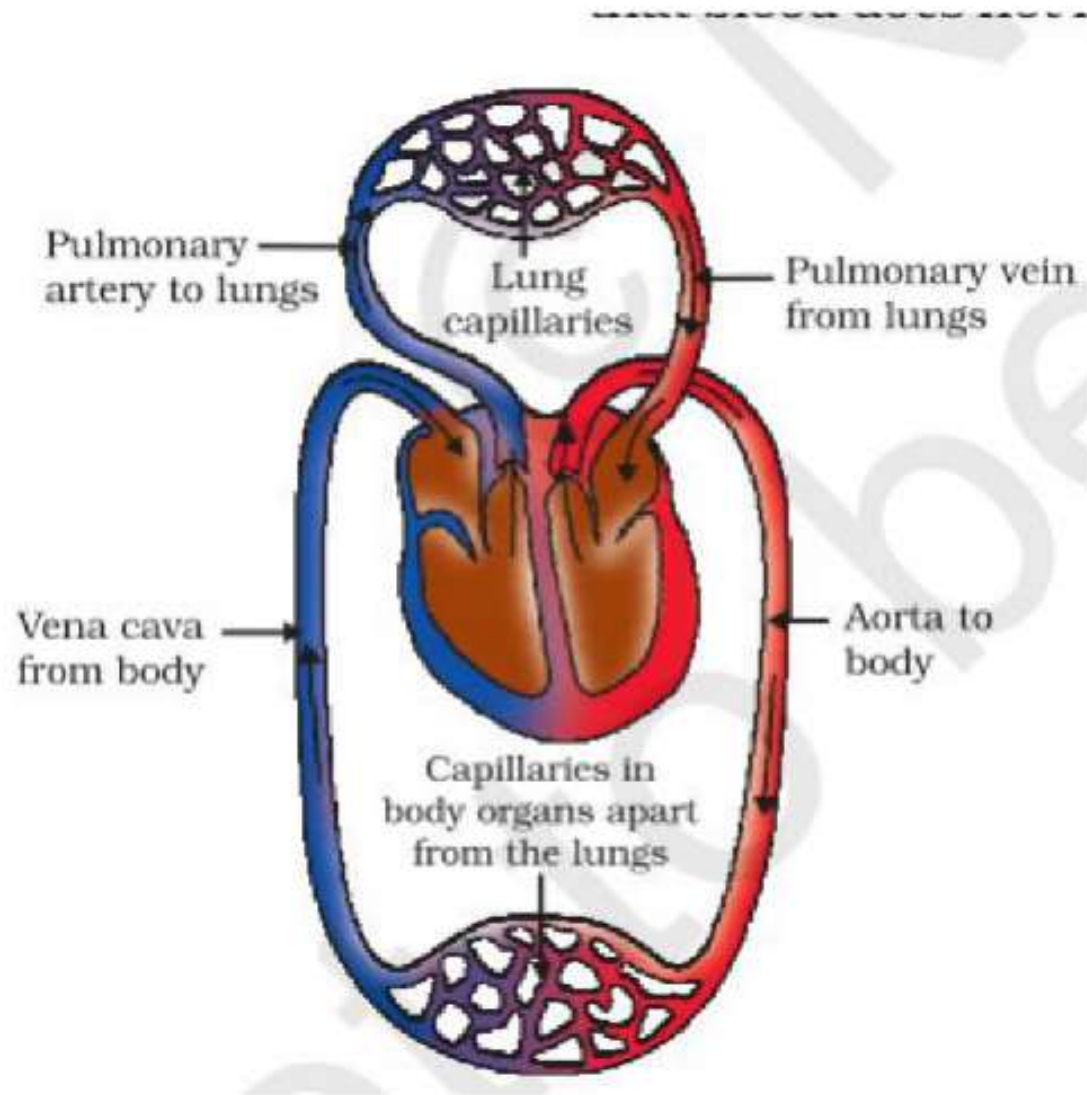


The heart is a muscular organ which is as big as our fist. Because both oxygen and carbon dioxide have to be transported by the blood, the heart has different chambers to prevent the oxygen-rich blood from mixing with the blood containing carbon dioxide

(Extra knowledge) STRUCTURE: The heart has four valves - one for each chamber of the heart. The valves keep blood moving through the heart in the right direction.

The **mitral valve and tricuspid valve** are located between the **atria and the ventricles**.

The **aortic valve and pulmonic valve** are located between the ventricles and the major blood vessels leaving the heart



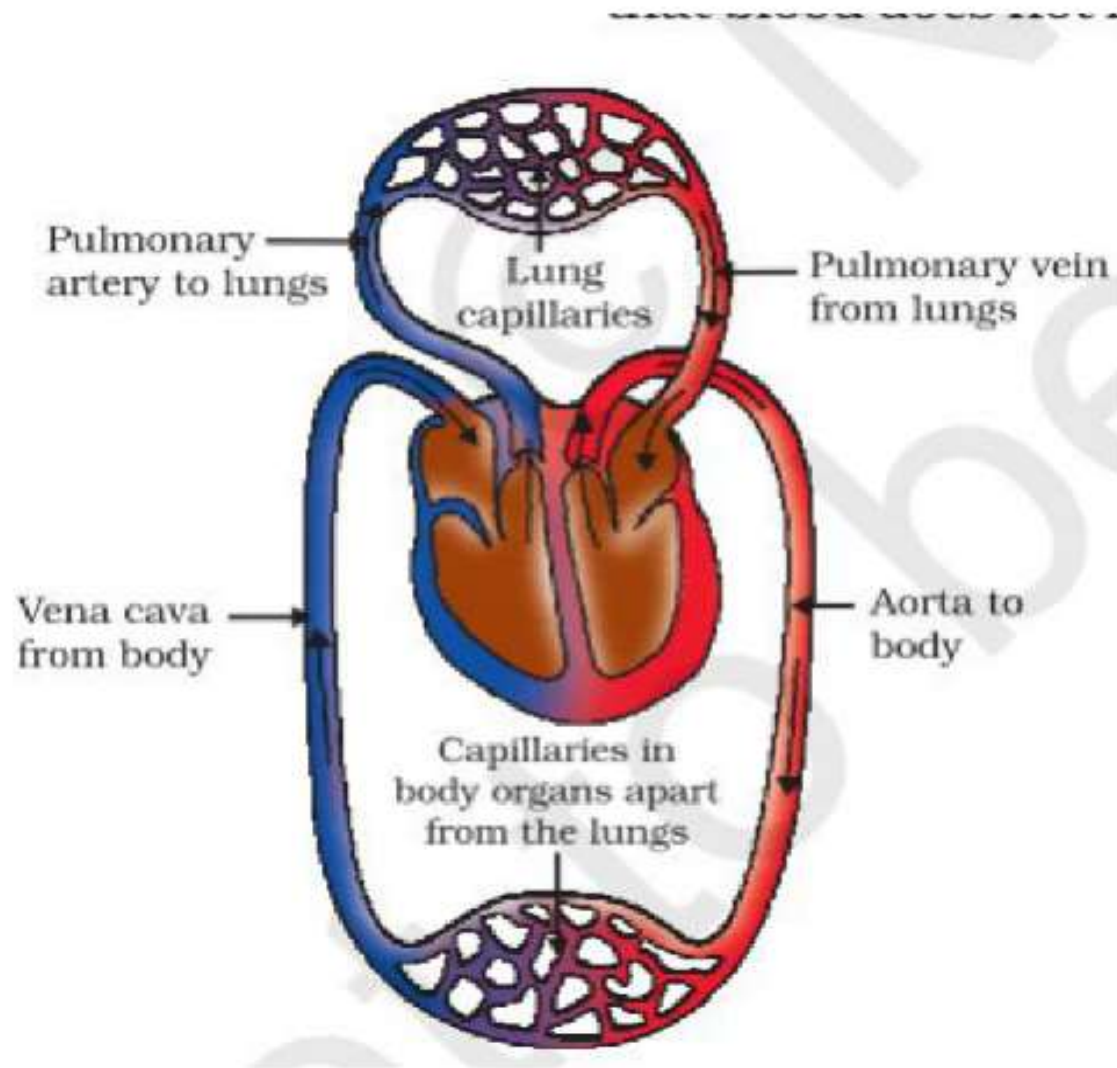
Step 1

Oxygen-rich blood from the lungs comes to the left atrium. It relaxes to receive blood.



Step 2

Left Atrium then contracts, while the next chamber, the left ventricle, expands, so that the blood is transferred to LV.



Step 3

LV contracts to pump out the blood into the body. Through an extensive network of capillaries, oxygenated blood reaches to every living cells for respiration.



Step 4

In return, deoxygenated blood (having CO_2) comes to the right atrium (which expands). When right atrium contracts, blood reaches to right ventricle which pumps it to the lungs for OXYGENATION.

Double Circulation

- In the human body, blood circulates through the heart twice in one heart beat.
- Once it goes through the heart during **pulmonary circulation** and second time during **systemic circulation**.

Pulmonary circulation

It transports deoxygenated blood to the lungs from right ventricle + return of oxygenated blood from lungs to left atrium.

Systemic circulation

Flow of oxygenated blood from the left ventricle to all body parts + deoxygenated blood from all body parts to right atrium

Amphibians or many reptiles have 3-chambered hearts, and tolerate some mixing of the oxygenated & deoxygenated blood streams.

Fishes have only two chambers to their hearts, and the blood is pumped to the gills, is oxygenated there, and passes directly to the rest of the body.

BLOOD: It is a red coloured MOBILE fluid connective tissue.

Consists of :

- Plasma – the fluid part of the blood and is composed of 90% of water.
- Red blood cells, white blood cells and platelets constitute the solid part of blood.

Functions of Blood:

- Transporting oxygen and nutrients to the lungs and tissues.
- Transporting Co₂ (waste) to the lungs to throw out of body.
- Forming blood clots to prevent excess blood loss.
- Carrying cells and antibodies that fight infection.
- to circulate nutrients, hormones, minerals and other essential components to different parts of the body.

Plasma :

- It is straw-coloured fluid part of the blood.
- It acts as a medium in which blood cells are suspended.
- Consists of water, minerals, nutrients, hormones, vitamins, dissolved gases, factors for clotting etc.

RBCs:

Also known as erythrocytes

Shape: Flattened disc like

Function : To transport Oxygen to all living cells.

Life Span : 4 months.

White Blood Cells (leucocytes)

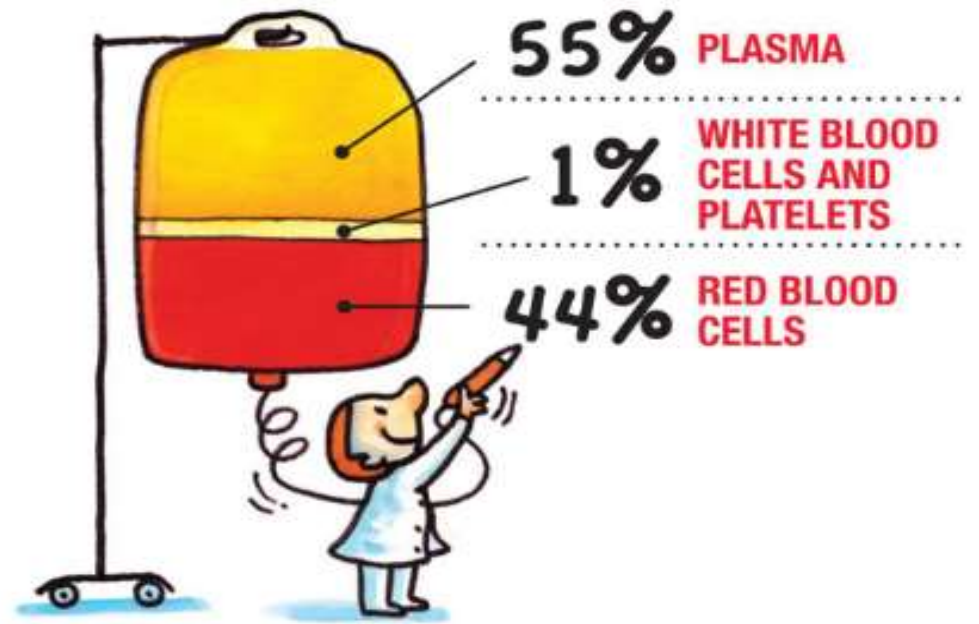
Types: Monocytes, Lymphocytes, Basophil, Neutrophil, and Eosinophils.

Shape : Irregular

Function: They protect us against illness and disease.

Think of white blood cells as your immunity cells.

Life Span: 13-20 days

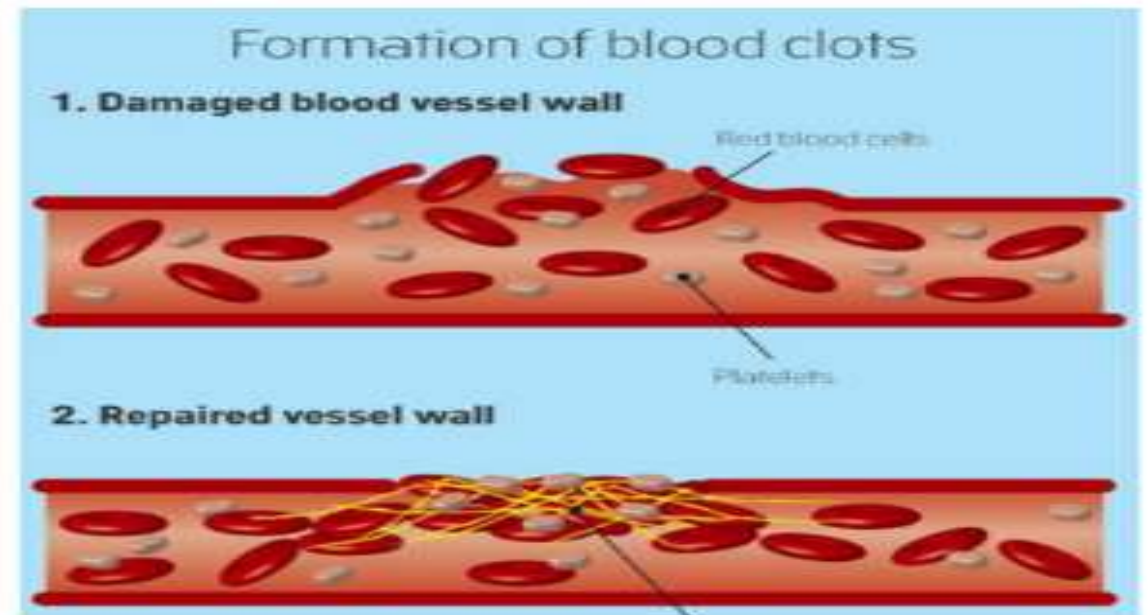


WHAT ARE BLOOD CLOTS?

When we are injured and start bleeding, the blood has platelet cells which circulate around the body and plug these leaks by helping to clot the blood at these points of injury.

The process of forming a clot or thrombus in order to prevent excess loss of blood from the body is called the clotting of blood.

A gelly mass like substance is formed by the platelets and fibrin in the blood. Platelets play a vital role in the clotting of blood.



LYMPHATIC SYSTEM

It consists of :

1. Lymph nodes
2. Lymphatic capillaries
3. Lymphatic ducts
4. Lymphatic vessels

Lymph :

It is a mobile connective tissue which has : Lymph plasma & lymph cells (only leucocytes).

It is similar to that of flood but has fewer blood proteins and high glucose concentration.

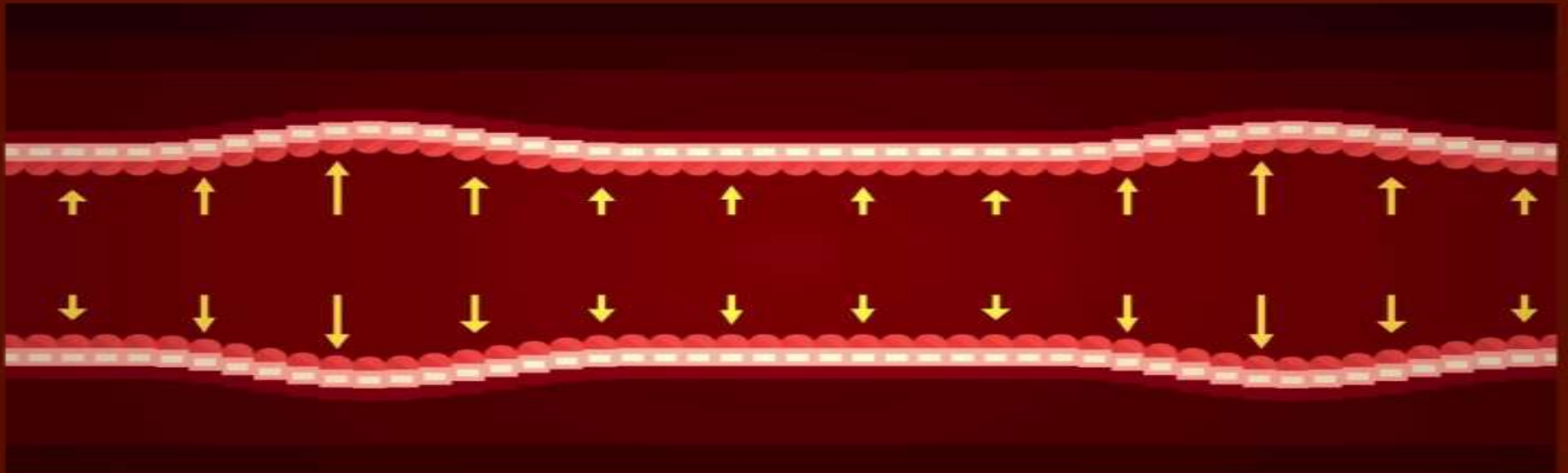
Function :

- Produce antibodies
- Absorbs and transports fat and fat soluble vitamins
- Maintains the volume of blood

The pressure at which the blood is pumped against the wall of a vessel is called as **BLOOD PRESSURE**

This pressure is much greater in arteries than in veins.

Instrument to measure : Sphygmomanometer
SI unit : mm of Hg



120

SYSTOLIC BLOOD PRESSURE

the peak pressure, produced by the contracting ventricles

80

DIASTOLIC BLOOD PRESSURE

the pressure in your arteries when the ventricles are relaxed

High blood pressure is also known as hypertension. It is caused by the constriction of arterioles and can lead to internal bleeding.

TRANSPORTATION In Plants

Energy needs differ between different body designs. Plants do not move, and plant bodies have a large proportion of dead cells in many tissues. As a result, plants have low energy needs, and can use relatively slow transport systems.

The distances over which transport systems have to operate, however, can be very large in plants such as very tall trees.

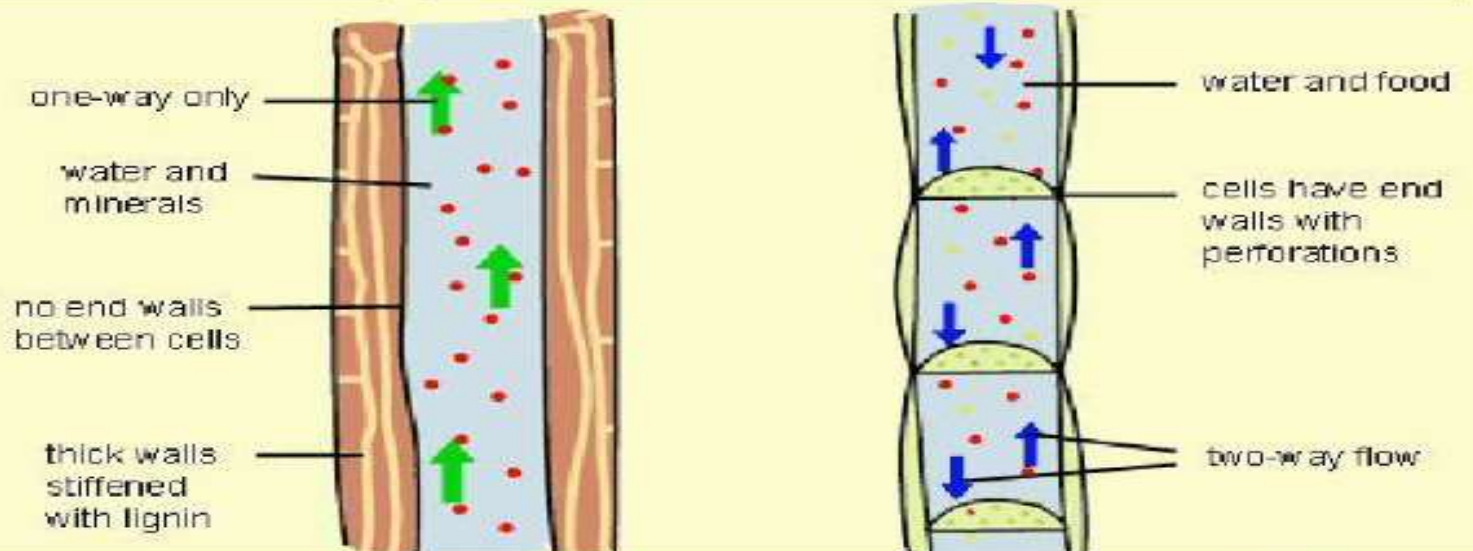
The plants have two types of conducting tissues:

Xylem

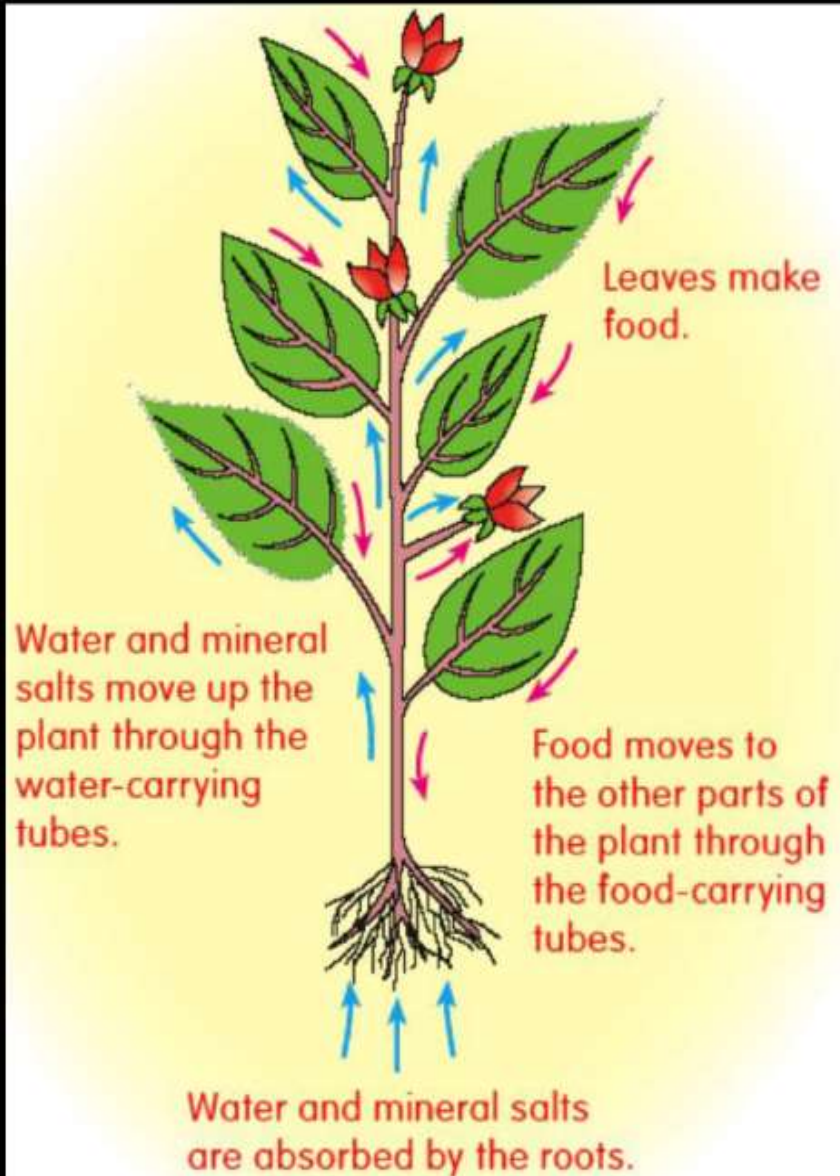
Carries water and minerals
Parts: Xylem Fibres, Tracheids, Xylem Parenchyma.

Phloem

Carries food materials.
Parts: Sieve Plate, Sieve Tube, Phloem Parenchyma, Companion Cell.



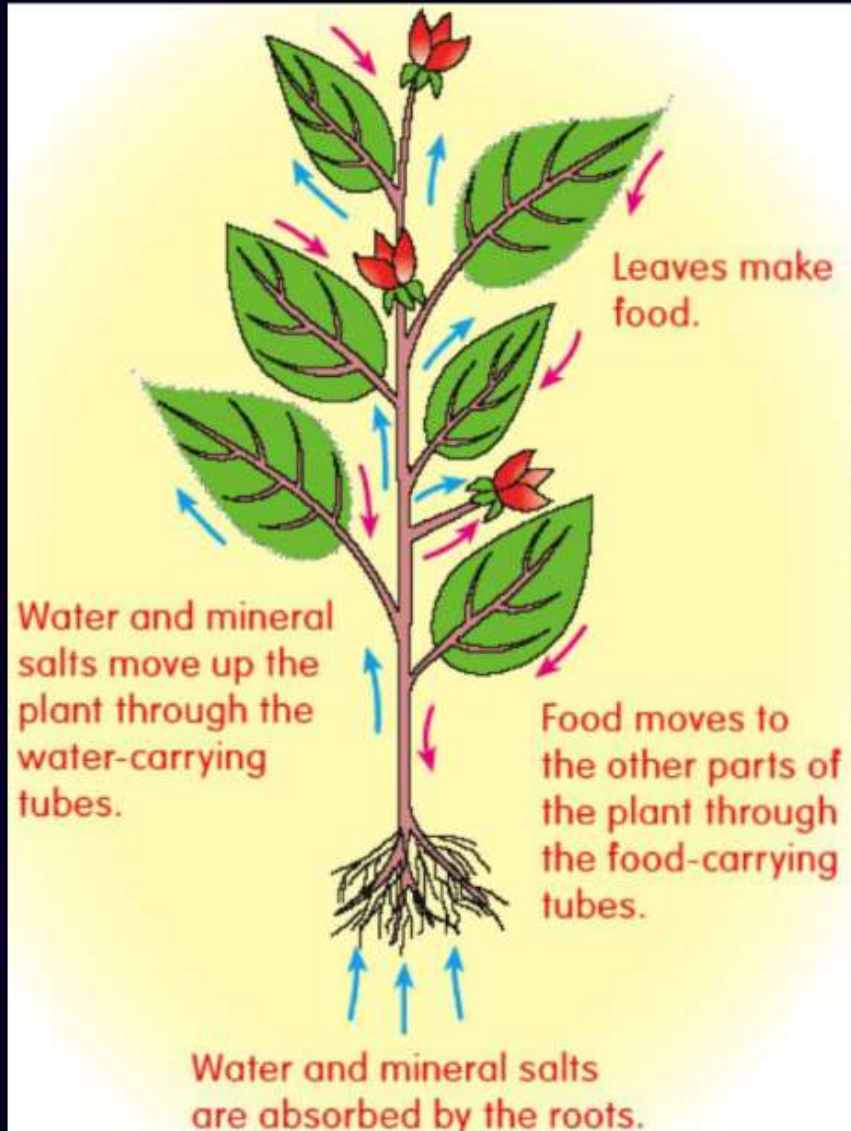
TRANSPIRATION



In xylem tissue, vessels and tracheids of the roots, stems and leaves are interconnected to form a continuous system of water-conducting channels reaching all parts of the plant.

At the roots, cells in contact with the soil actively take up ions. This creates a difference in the concentration of these ions between the root and the soil. Water moves into the root from the soil to eliminate this difference. This means that there is steady movement of water into root xylem, creating a column of water that is steadily pushed upwards. However, this pressure by itself is unlikely to be enough to move water over the heights that we commonly see in plants.

TRANSPIRATION



Definition: The loss of water in the form of water vapours from the leaves of the plants is known as **TRANSPIRATION**.

This evaporation creates a pull (transpirational pull) which pulls water from the xylem cells of the roots.

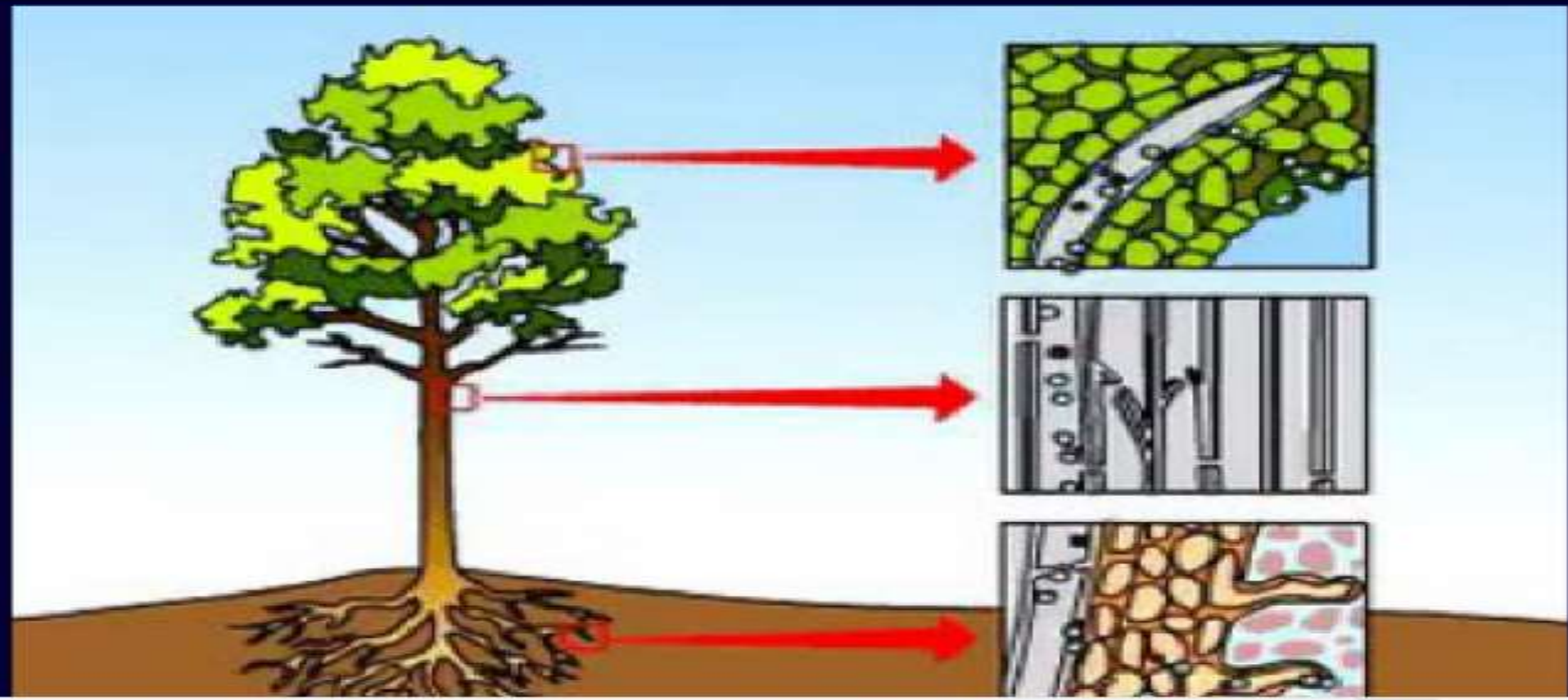
Advantages:

- Helps in the absorption and upward movement of water and ions dissolved in it from roots to the leaves.
- Removes extra water from the plant body.
- Helps in transportation of water in plant body.
- Helps in regulation of temperature in plant body

Transpiration is higher during the day because the sun shines during the day resulting in more water evaporation.

Key points

The effect of root pressure in transport of water is more important at night. During the day when the stomata are open, the transpiration pull becomes the major driving force in the movement of water in the xylem.



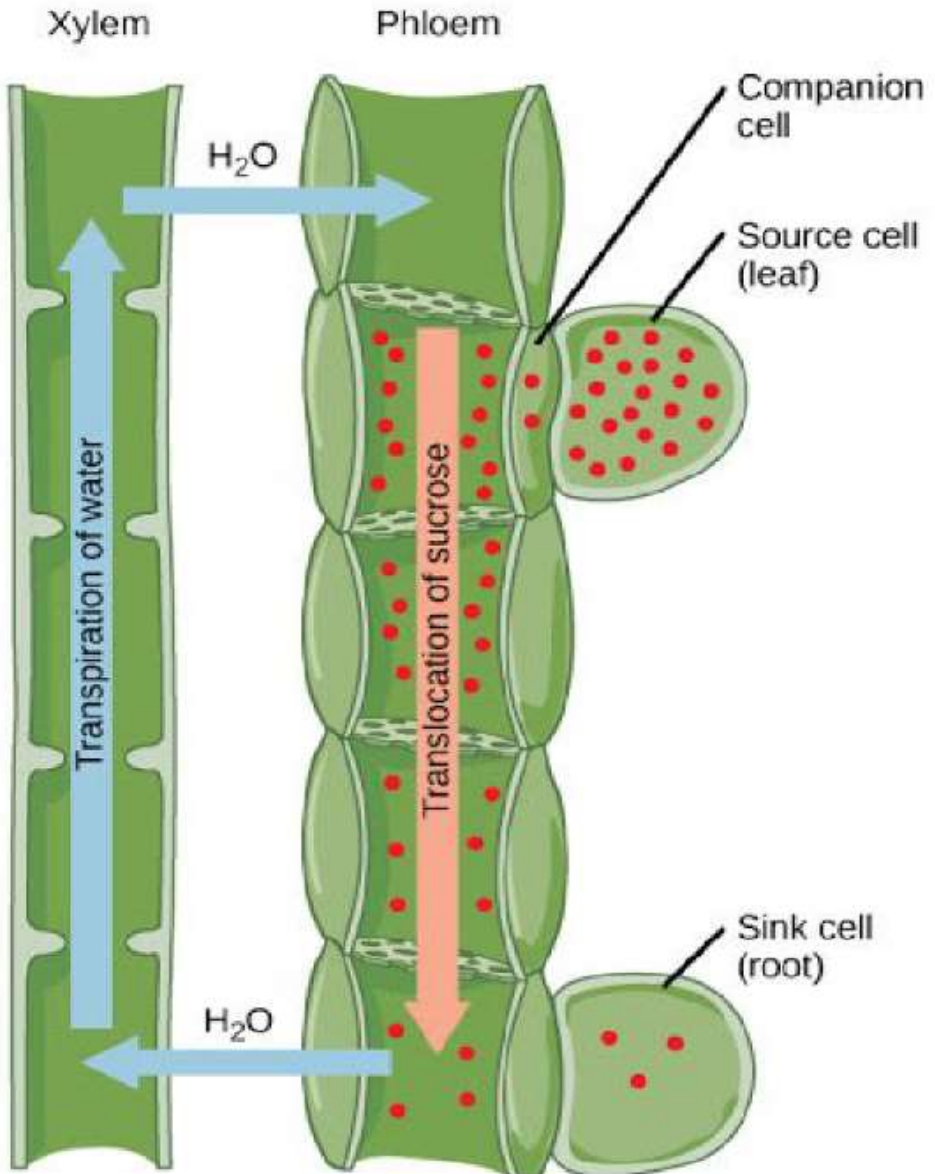
Besides the products of photosynthesis, the phloem transports amino acids and other substances. These substances are especially delivered to the storage organs of roots, fruits and seeds and to growing organs.

Transportation of Food

It is facilitated by **Phloem Tissues** in Plants.

Transport of soluble products of photosynthesis is called translocation and it occurs in the part of the vascular tissue known as phloem.

- **Translocation of food and other substances takes place in the sieve tubes** with the help of adjacent companion cells both in upward and downward directions.
- This process utilises energy (unlike transportation of water).



Material like sucrose is transferred into phloem tissue using **energy from ATP**.

This increases the osmotic pressure of the tissue causing water to move into it.

This pressure moves the material in the phloem to tissues which have less pressure.

This allows the phloem to move material according to the plant's needs.

For example, in the spring, sugar stored in root or stem tissue would be transported to the buds which need energy to grow.

