

Why plants and animals need a transportation system?

- We know that all living organisms like plants and animals need food, oxygen and water so that they can survive.
- These elements need to be delivered to their body parts so that they can function properly.
- Hence, all living organisms need a transport system in their bodies.

Human Circulatory System

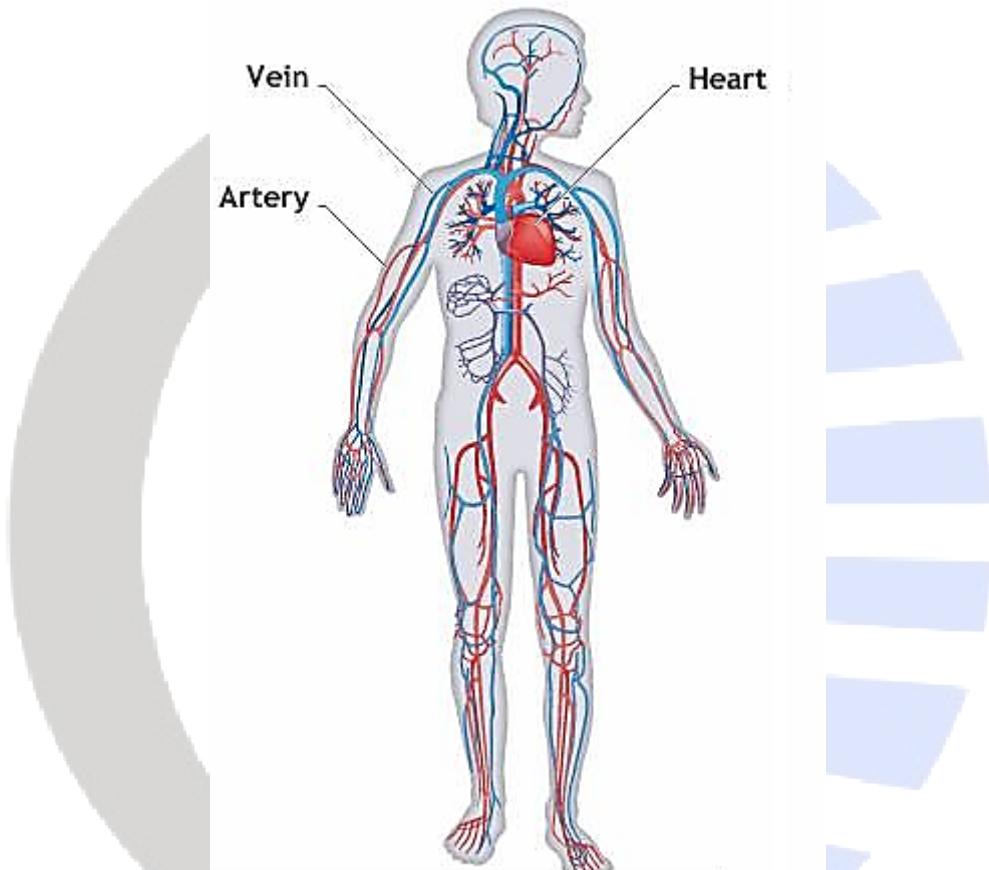


Figure 1 Human Circulatory System

- The circulatory system is a transport system of the human body which consists of a network that supplies food, water, oxygen and other substances throughout the body.
- The main parts of the circulatory system are:
 - Blood
 - Blood Vessels
 - Heart

Blood

Blood is a red colour fluid that flows in our body through the blood vessels.

Functions of blood:

- The blood acts as the medium of transportation of essential substances throughout our bodies such as oxygen and nutrients. Blood carries oxygen from the lungs and transports it to different cells of the body.
- The blood also carries waste material to the kidneys which then filters the blood. The small intestine digests the food and absorbs its nutrients. These nutrients are provided to all the parts of the body through blood.
- The blood also protects the body from losing blood by forming a blood clot at the place of injury.
- The blood contains a special substance that helps in regulating the temperature of the body.
- **Components of blood** - Blood can perform several functions because of different substances present in it.
- **Blood plasma** – the liquid substance present in the blood is called blood plasma. Almost 55% of the blood is blood plasma. The plasma facilitates the transportation of different substances throughout the body. The blood plasma is made up of water, salt, fats, proteins and sugar.
- **Red blood cells (Erythrocytes)** – They are present in ample amount in the blood (40% to 45%). They are red in colour because they contain a special pigment called haemoglobin. The oxygen we take in binds itself with the haemoglobin and hence reaches every cell of the body through the blood.
- **White blood cells (Leukocytes)** – They are present in fewer amounts (almost 1%) but perform a vital function in the body. These cells fight against the germs present in the body.
- **Blood platelets** – These are the cells that help in the formation of a blood clot and prevent the blood from flowing out of the body due to an injury.

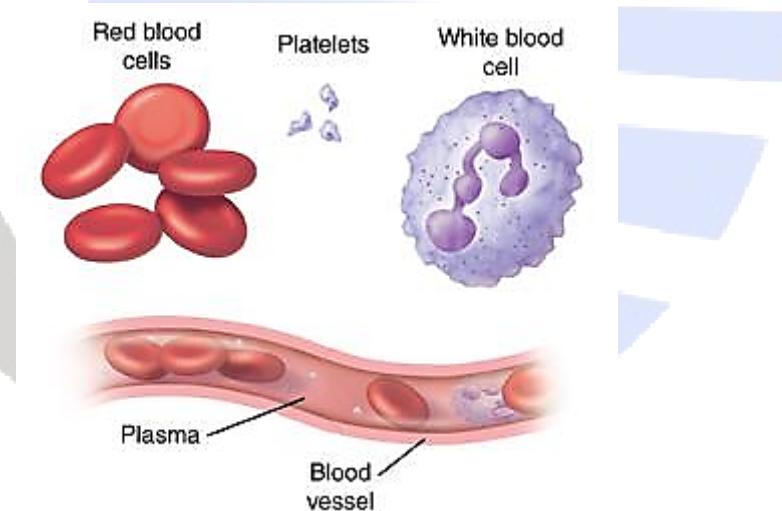


Figure 2 Components of blood

Blood Vessels

Our body contains tube-like structures called the blood vessels that help in the transportation of blood throughout our body. Our body contains two types of blood vessels based on the function that they perform:

Arteries

Veins

These blood vessels carry blood from the heart that contains oxygen into different parts of the body.	These blood vessels carry blood that is rich in Carbon dioxide from the body organs to the heart.
Arteries have thick walls as the blood pressure is quite high in these blood vessels.	Veins do not have thick walls as the blood pressure is quite low in them.
They are narrow so that the blood can flow quickly through them.	They are slightly wider than the arteries.
They do not contain valves as the blood in arteries always flows in the right direction due to the pumping of the heart.	They contain valves that prevent blood from flowing in opposite direction.

Pulse

We know that the heart pumps the blood in the arteries. This continuous pumping of blood in the arteries results in their rhythmic throbbing which is called Pulse.

Pulse rate

Pulse rate is defined as the number of pulse beats per minute. The normal pulse rate of human beings is 70 to 80 beats per minute.

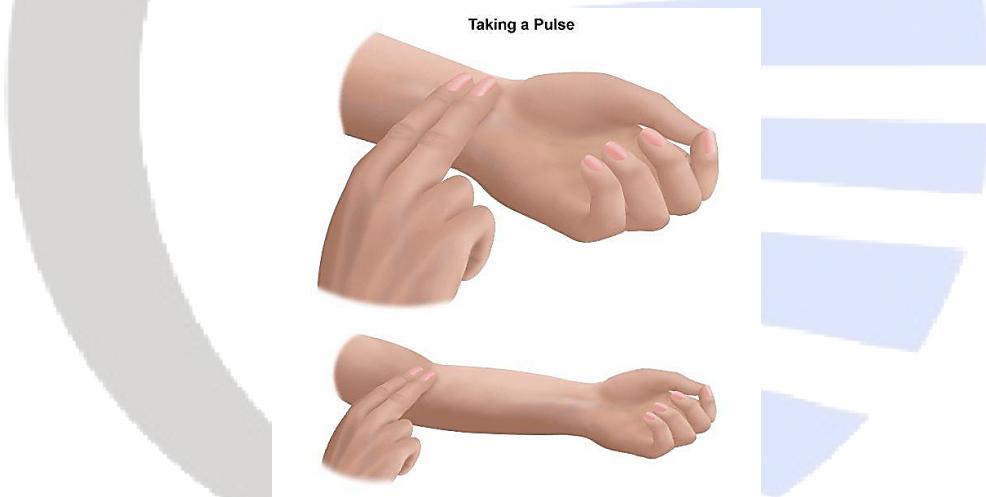


Figure 3 Checking the Pulse Rate

Pulmonary Artery

The pulmonary artery is a special blood vessel that connects the heart to the lungs. It takes blood that contains less oxygen (deoxygenated blood) from the heart to the lungs. Hence, it is unlike all other arteries that carry oxygen-rich blood.

Pulmonary Vein

The Pulmonary vein is a special blood vessel that connects the lungs and the heart. It carries oxygen-rich blood from the lungs to the heart. Hence, it is unlike all other veins that carry oxygen-less blood.

Capillaries

Small blood vessels are called capillaries. The arteries divide themselves into capillaries which then deliver oxygenated blood to the tissues in the body. Then these capillaries take up the deoxygenated blood from the tissues to the veins.

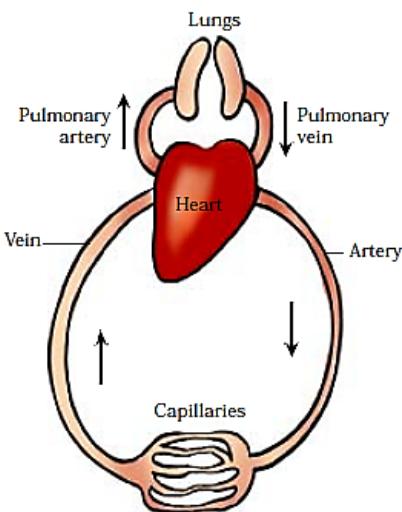
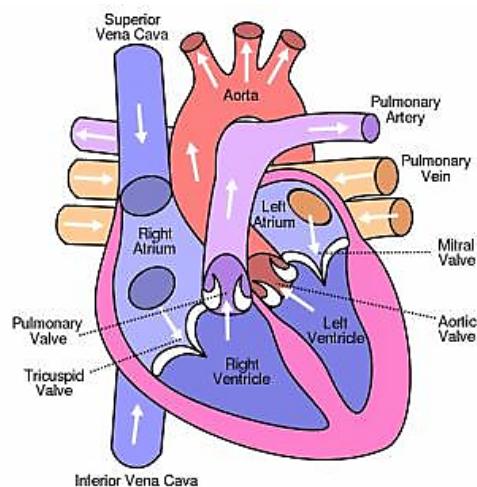


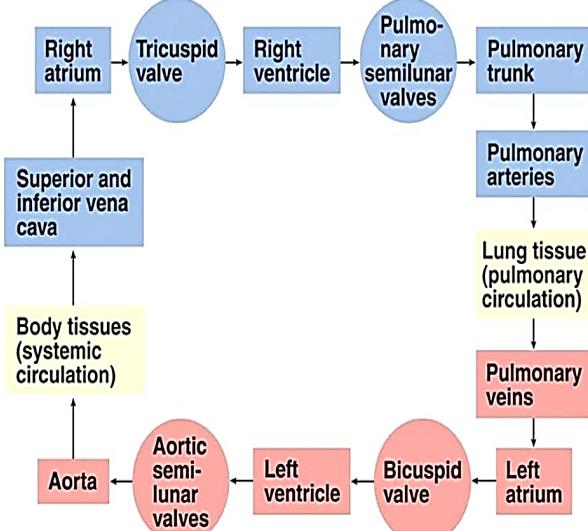
Figure 4 How Blood Circulates

The Heart

- The heart is an organ present in our body that pumps the blood in the blood vessels.
- It is located in the chest cavity.
- Its lower part is a little tilted towards the left.
- The heart is divided into four chambers which prevents the oxygen-rich blood from mixing with carbon dioxide-rich blood.
- The Atria or upper chambers contain the blood with no oxygen.
- The Ventricles or the lower chamber of the heart contains oxygen-rich blood.
- The Atria and Ventricles both are individually divided within themselves into two chambers with the help of valves.
- From the left ventricle, the biggest artery of our body called aorta begins.
- The right Atrium of the body receives deoxygenated blood from the body through a vein called Vena cava. Vena cava is the largest vein of our body.


Figure 5 Heart

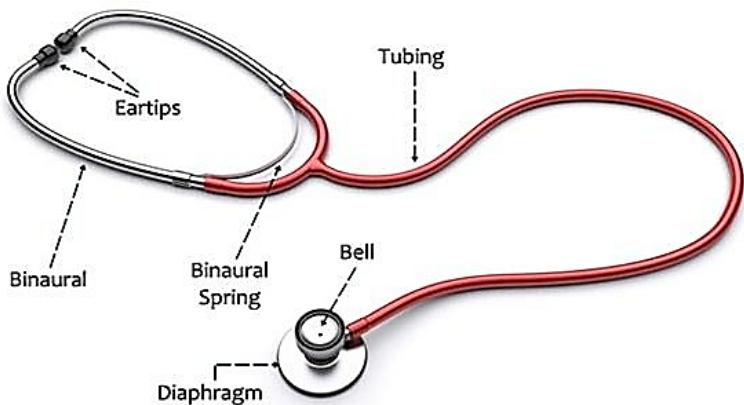
Blood Flow Through Heart



Flow of Blood in Human Body

Heartbeat

- The muscles of the heart relax and contract continuously as it pumps the blood in the arteries. This rhythmic contraction and relaxation of the heart is called a heartbeat.
- The stethoscope is an instrument that is used to listen to the Heartbeat of a person. It amplifies the Heartbeat so that the doctors can monitor it and find out about the patient's condition.
- It contains two earpieces, a tube that connects them to a chest piece comprising of a sensitive diaphragm.


Figure 6 Stethoscope

Do all animals possess a circulatory system?

- No, animals like Hydra and Sponges do not possess a circulatory system.
- These animals live in water and hence get food and oxygen from the water as it enters their bodies.
- As the water comes out of their bodies, it takes away the carbon dioxide and waste materials out of it.

Excretion in Animals

- The cells in animals release some waste products as they perform different functions.
- These waste products are toxic and hence they must be removed from the bodies of the living organisms.
- The process of removal of waste products produced in the cells of the living organisms is called Excretion.

The Excretory System in Human Beings



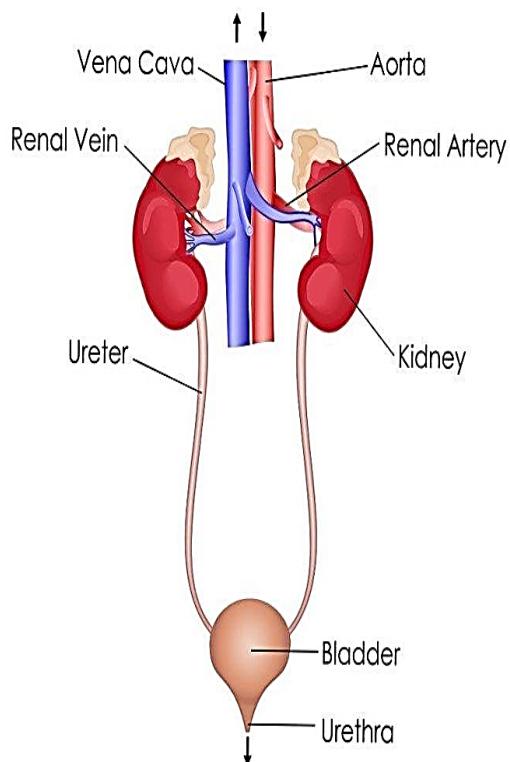


Figure 7 The Excretory System

The excretory system is a system of organs in living organisms that undergo excretion. The excretory system consists of different organs:

1. **Kidneys** – there are two organs called Kidneys present in our body. These Kidneys contain blood capillaries that filter out the unwanted substances from the blood in the form of urine.
2. **Urinary bladder** – The urine produced by the Kidneys is stored in a bladder called urinary bladder.
3. **Ureters** – There are two tube-like structures which connect the Kidneys and the urinary bladder together. They allow passage of urine from the kidney to the bladder.
4. **Urethra** – There is a muscular tube through which the urine moves out of the body.

Different organisms excrete different wastes:

- The major excretory product in humans is urea. The urine consists of toxic wastes (2.5%), urea (2.5%) and water (95%).
- The way in which waste chemicals are removed from the body of the animal depends on the availability of water. Fishes and aquatic animals excrete ammonia in the water.
- Birds, Snakes and lizards excrete semi-solid, white coloured uric acid.

Dialysis – Sometimes people use artificial Kidneys, that is, they get the blood purified artificially periodically. It is called dialysis. They have to do so in a case of Kidney failure in which the Kidneys of a person are unable to perform their function due to an infection or an injury.

How is sweat useful to us?

Sweat contains water and some salts and hence help in getting rid of toxic wastes from the body.

Also, as the sweat evaporates from our skin, it takes up our body heat and this makes us feel cool, especially during the summer days.

Transportation in Plants

Transportation of Water and Minerals

- The roots of the plants absorb the essential minerals and water from the soil.
 - The roots have hair like structures present on them.
 - These hairs increase the surface area of the roots and hence allow more amount of absorption.

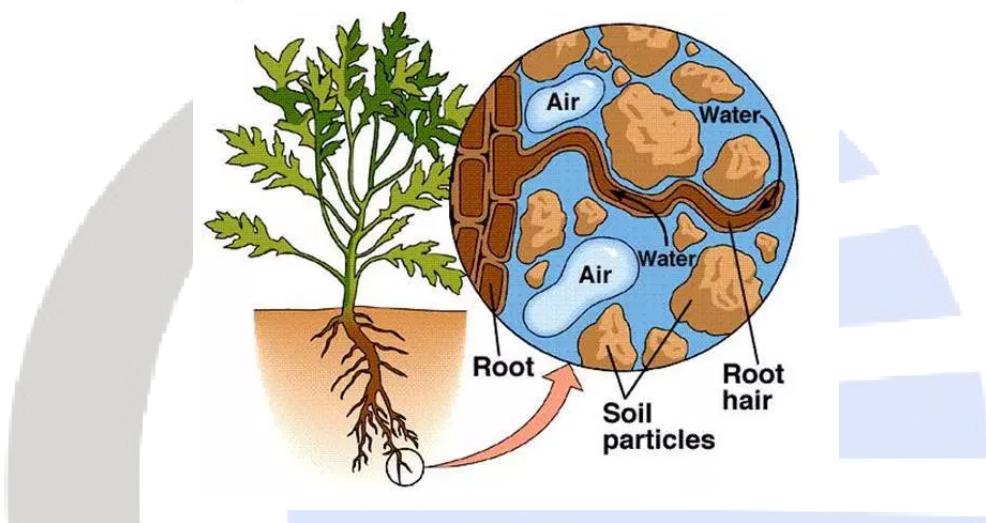


Figure 8 Absorption by Roots

- From the roots, the water and minerals are transported to other parts of the plant through special kind of tissues called vascular tissues. There are two vascular tissues present in the plants:
 - **Xylem** – It is a vascular tissue that is responsible for transporting nutrients and water in the plants. The root cells absorb water and minerals and transport it to xylem. Xylem carries it to other parts unidirectionally without usage of energy.
 - **Phloem** – It is a vascular tissue that transports the food produced by the leaves (source) to all parts of the plant (sink) . This flow is bidirectional and utilizes energy. This is known as translocation.

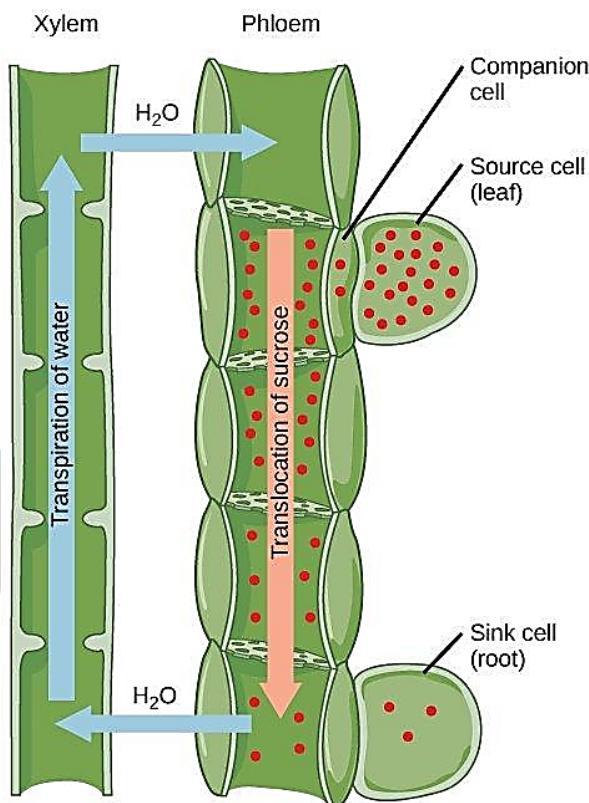


Figure 9 Transportation by Xylem and Phloem

Transpiration

- Sometimes not all the water that plants absorb is used by them.
- Hence they need to get rid of the excess water in them.
- This loss of water in plants takes place through the process of transpiration in which the water evaporates in the atmosphere through the stomata present on the leaves.
- Stomata are tiny pores present on the leaves that allow the movement of gases and water through them.
- **Transpiration results in absorption of water:** As the water from the leaves evaporates, it generates a suction pull in the plants that bring the water from the roots upwards.
- **Transpiration helps in cooling down the plants:** As the water evaporates, it utilizes the heat of the plant and results in cooling of the internal temperature of the plant.

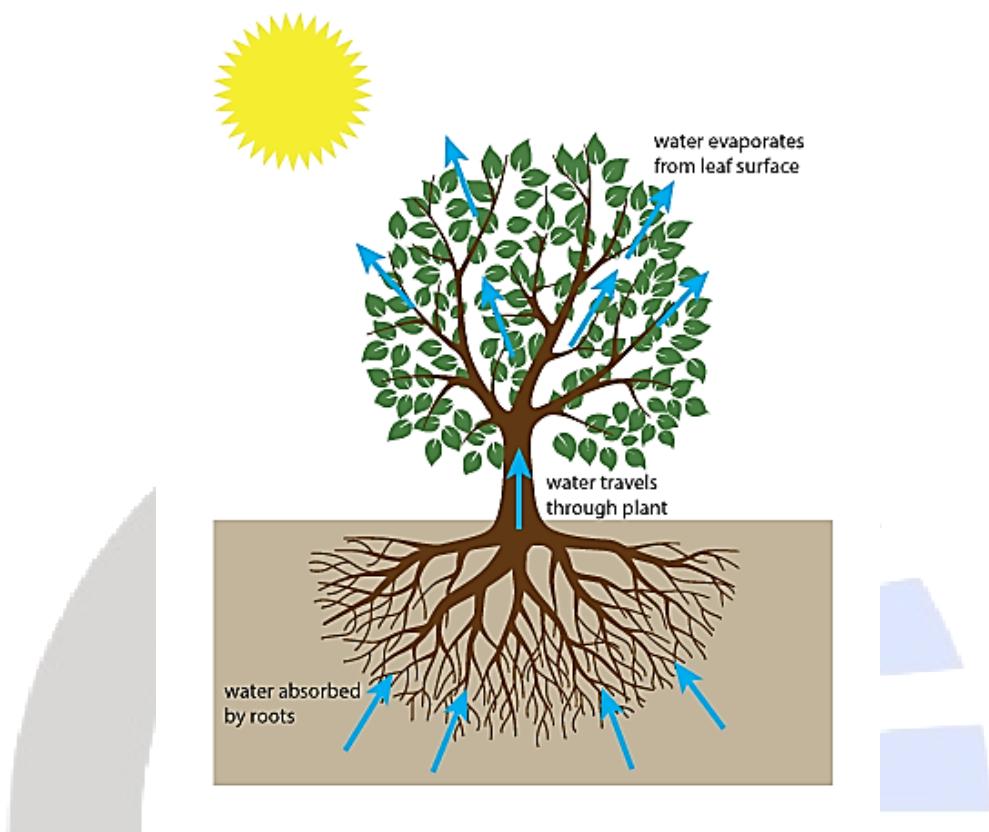


Figure 10 Transpiration

Carbon dioxide enters, while water and oxygen exit, through a leaf's stomata.

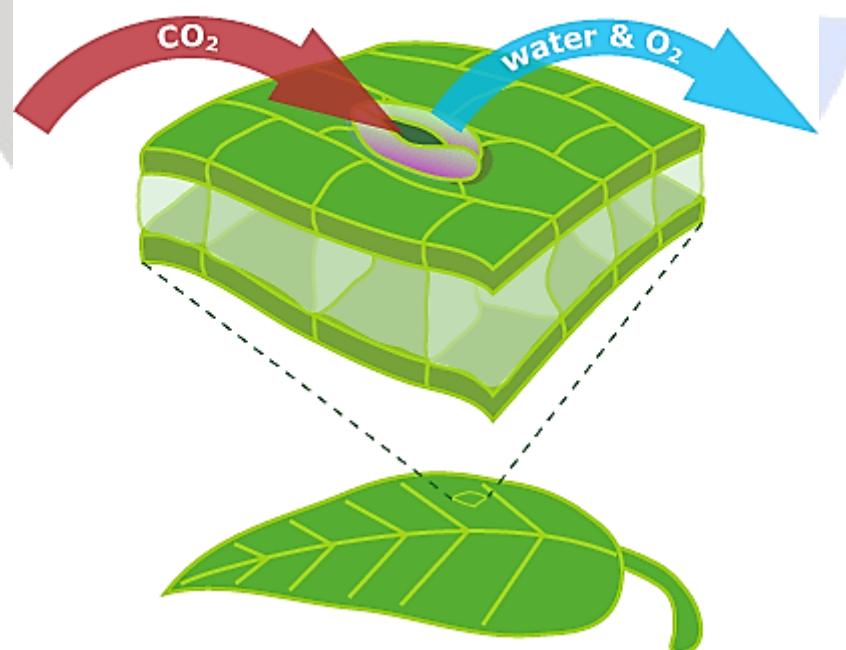


Figure 11 Removal of Water through Stomata

