CHAPTER 11: Transportation in Animals and Plants

- Food, water and oxygen are the basic requirements of all living organisms.
- The circulatory system is responsible for the transportation of all these essential components to each and every cell in the body.
- In animals an extra step of throwing out waste material generated also takes place.

➢ **Circulatory system:**

1.) BLOOD:
- Blood is the transport fluid in most of the animals which flows through the blood vessels.
- Blood carries oxygen, nutrients absorbed after digestion of food to all the body parts.
- It also plays an important role in waste removal.

2.) COMPOSITION OF BLOOD:
- Blood has two components:

a) Plasma: the fluid or water like liquid part of blood is known as plasma.
b) Cells: different types are blood cells are found in suspended form in plasma.
   1) Red blood cells: Hemoglobin is the oxygen carrying pigment present in the red blood cells imparts the red color to these types of cells. These cells do not have nucleus. Oxygen is transported with help of hemoglobin.
   2) White blood cells: White blood cells are fighters of the body and help in fighting of infections and wound healing. They have nucleus and may be granular or a granular.
   3) Platelets: These are Irregular shaped cells which help in clotting.

3.) BLOOD VESSELS: these are of two types
   a.) Arteries: These are blood vessels which carry oxygenated blood from heart to all body parts.
   b.) Veins: they are thin walled and carry deoxygenated blood containing $CO_2$from all the body parts to the heart for oxygenation. They have valves to prevent backflow of bloodin the veins.
   c.) Capillaries: the very small arteries which are thin tube supplying blood to all the cells in the body. On the other hand. The capillaries combine to form veins that go to the heart.

4.) PULSE: The pounding generated due to flowing of blood in arteries is called pulse

5.) PULSE RATE: it is defined as the number of beats per minute. It is usually seventy-two to eighty beats per minute.

6.) BLOOD DONATION: this is an easy, harmless and painless practice which can save a lot of lives due to unavailability of blood. This can be done at blood banks.

7.) HEART:
- It is also called aortic pump which pumps out blood along with nutrients to all body parts.
- It is situated in the upper part of the chest cavity.
- It is around the size of a fist.
- The human heart has 4 chambers of which 2 are atria and 2 ventricles which prevents the mixing of oxygenated blood from deoxygenated blood.
- The blood enters the heart from the right atrium and then enters the lower ventricles.

- The blood enters the lungs from for oxygenation and reenters the heart from the left atrium and then passed onto the left ventricle.
- From here the blood is sent out to the whole body.

8.) HEARTBEAT:

- Heart is made up of muscles which pumps the blood by relaxing and contracting in a rhythm.
- This periodic contraction and relaxation makeup a heartbeat.
- Doctors feel the heart beat with an instrument like the stethoscope.
- A stethoscope is made up of a cheat piece, two ear pieces and a long joining tube.
- The heart beats about 72 beats for a minute and one beat generates one pulse in the arteries.
- The beating of heart maintains the circulation of blood and supplies it to all body parts.

➢ Small animals like sponges and *Hydra* do not have a circulatory system.
➢ In these animals' blood is not the circulatory fluid but the water in which they live does this job.
➢ William Harveydiscovered thecirculation of blood.

9.) EXCRETION IN ANIMALS:

➢ All hazardous substances are released from the cells and needs to be removed out of the body.
➢ This process is called excretion performed by excretory system.
➢ Excretory system in humans:
- The waste generated is the cells is taken up by blood.
- After this the blood carries this to the kidneys where it is filtered out.
- Blood capillaries in kidney filter the blood out form the glomerulus.
- The useful nutrients are absorbed back into the blood.
- On the other hand, wastes water is removed as urine.
- The urine is excreted from the urinary bladder where the urine is stored before being passed out through the urethra.
- About 1–1.8 L of urine in 24hours in adult human beings.
- The urine is composed of 95% water,2.5% urea and 2.5% other wasteproducts.
- Apart from this sweat composed of water and salts is also an execratory product.
- Ammonia is exerted by aquatic animals like fishes as ammonia is excreted directly in water.
- Uric acid is excreted birds, lizards,snakes. It is a semi-solid, whitecolored compound.
- In humans' urea is the major human excretory products.
- Kidney failure may be caused by infection or injury and may result in waste products getting collected into the blood.
- Dialysis is used to artificially filter blood.

10.) TRANSPORT INPLANTS:

1.) Water along with essential minerals and nutrients are absorbed by the roots and is then sent to the leaves.
2.) The leaves make use of these nutrients, water and carbon dioxide to carry out photosynthesis i.e., generate food.

3.) All living organisms require food as a source of energy to carry out all different activities.
4.) Hence transport of food as well as water and minerals is an essential process.

11.) Transport of water andminerals:

1.) The plants have root which absorb water and minerals from the soil.
2.) The roots have specialized organ called root hair which increase the surface area which help in absorption of water and minerals.
3.) These nutrients and water are transported by a special vessel cell which form the vascular tissue in plants.
4.) The vascular tissue has two types of cells

a) Xylem: the xylem tissue is involved in transport of water and nutrient etc. xylem formed a continuous network and is made of dead cells. This tissue is present in the stem and carries water against gravity.
b) Phloem: food is synthesized in leaves and is supplied to all plant parts through the vascular tissue called phloem.

12.) Transpiration:

1.) The process by which plants loose water through small pores on surface of leaves is called transpiration.
2.) The loss of water is by the process called evaporation.
3.) Transpiration pull is a suction pull generated from the leaves which pull water to a height in trees.
4.) It also helps in cooling of the plants.