7th – Transportation in Plants and Animals I

Transportation is the movement of substances from one location to another in an organism. In **unicellular organisms**, transportation is easy. The simple processes like diffusion and osmosis can take care of the movement of various substances. In **multicellular organisms** different parts of the body perform different functions but they have to stay connected to receive required substances and eliminate unwanted materials from the body. They cannot depend or processes like diffusion and osmosis alone as it would take a lot of time.

Transportation in Plants

- There are three different kinds of plants, i.e., **herbs, shrubs and trees**. Plants need to transport water from the roots to the leaves. Then the food manufactured in the leaves is transported to different parts of the plant. Though the complexity may vary, the mode of transport in all the three types of plants is essentially the same
- A tissue called **xylem** acts as the pipeline, and takes water and minerals from the roots up the stem, and to the leaves. Absorption of water and minerals is a continuous process. Water is continuously being lost from the leaves by the process of **transpiration** (loss of water vapour from the stomata of leaves).
- Foods in plants are manufactured by the leaves. Once the food is prepared, it needs to be sent to all parts of the plant. The process by which this takes place is called **translocation**.

- Special types of tissues called **phloem** act as pipelines, and carry the prepared food to all parts of the plant. Xylem and phloem are known as **conducting tissues** of a plant. They are also called **vascular tissues** as they are present in special structures called vascular bundles.
- **Transpiration** is the evaporation of water molecules in the form of water vapours from plant surface, especially from the stomata on leaves. It creates a suction pull which helps water to be transported to great heights in tall trees.

Transportation in Animals

In unicellular animals such as amoeba and paramecium, no special transport system is required. Every part of the organism gets nutrients and oxygen directly through **cell diffusion**. In hydra, water transports food and oxygen to all parts of the body and takes wastes away from the different organs for excretion. In multicellular organisms, the transportation is done by a specialized system known as the **circulatory system**. It consists of the heart, arteries, veins and capillaries. **Blood** is the medium for transport of all the necessary materials to different parts of the body.

Transportation in Humans

Humans have a well developed and efficient circulatory system. It consists of
(a) **blood** (b) **blood vessels**: they are of three kinds namely, arteries, veins, and capillaries, and (c) a thick muscular organ called the **heart**. In higher animals including human beings, there is a circulatory system for transportation of different substances (example digested food, oxygen, carbon dioxide, excretory waste etc.

Blood

Blood is a fluid that flows in the blood vessels. It forms a medium through which nutrients, important gases, water and waste water products are transported inside the organisms, it constitutes about **8%** of the body weight. Blood consist of several

cells floating in straw coloured liquid called plasma. These cells are **red blooded (RBCs), white blood cells (WBCs) and blood platelets.**

Red blood cells: are flat and disc-like in shape with a depression in the centre. They contain the red pigment, **hemoglobin**. This pigment combines with oxygen to form oxyhaemoglobin that helps in transporting oxygen to all parts of the body.

White blood cells: are larger than RBCs but do not have hemoglobin. They move actively and protect the body against disease-causing microorganisms by destroying them.

Whenever you have a cut on your body, blood comes out. The bleeding is stopped after sometime by the **blood platelets** present in the blood. Blood platelets are colorless, irregularly shaped, and much smaller than the RBCs.

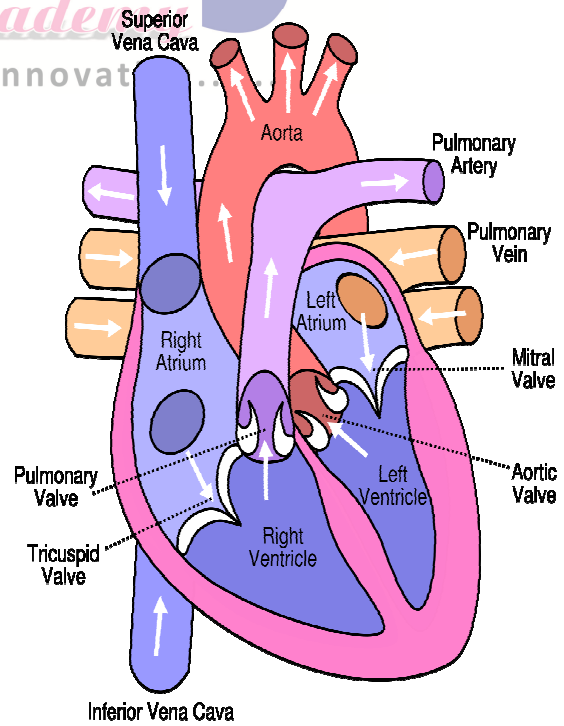
Functions of blood:

1. Blood helps to distribute digested food to all parts of the body.
2. Circulation of blood also helps to maintain body temperature by its distribution in the body.
3. Clotting of blood is needed to prevent bleeding. Blood platelets help in clotting of blood.
4. Blood transports oxygen from the lungs to the tissues.
5. Blood also transports carbon dioxide from the tissues to the lungs, where it is transported to the blood by diffusion.

Blood vessels

Blood vessels are an intricate network of tubes that transport blood to the entire body. Blood can travel to all parts of the body through these **bloods vessels**. Blood vessels are of three types- **arteries, veins and capillaries**.

Arteries carry oxygen rich blood from heart to all parts of the body. Blood flows through the arteries have thick, elastic walls. The arteries branch out into smaller tubes known as capillaries when they enter the organs. **Veins** carry the oxygen deficient and carbon dioxide rich blood back to the heart. Veins have thinner walls than arteries since blood flows at a lower pressure. Veins have valves that prevent backflow of blood flows at a lower pressure. Veins have valves that prevent backflow of blood, so blood flows in one direction, that is, towards the heart. **Capillaries** are thin walled blood vessels and form a network of extremely tiny blood vessels between arteries and veins. The walls of the capillaries are so thin that diffusion of gases and chemical substances takes place very easily.



Heart

- The heart is a four chambered muscular organ that pumps blood into the blood vessels.
- The pressure that this pumping

generates is enough for the blood vessels to carry this blood to all parts of the body.

- The heart is able to do by the rhythmic contractions and relaxations of its muscles. These are known as the heart beats.
- A normal heart beats about 60 to 80 times per minute. We can hear our heart beat with the help of an instrument called a stethoscope.
- A muscular wall called septum divides the heart lengthwise into left and right sides. A value divides each side into two chambers: an upper atrium and a lower ventricle.
- When the heart muscles contract, they squeeze the blood through the atria and then through the ventricles.
- Oxygenated blood from the lungs flows into left atrium and then to all parts of the body.
- Deoxygenated blood returning from the body flows into right atrium and then to lungs for oxygenation.
- The four chambers of the heart are (i) the right auricle (ii) the left auricle (iii) the right ventricle (iv) the left ventricle.

Arteries	Veins
1. They carry blood away from the heart.	They carry blood to the heart.
2. They are thick walled tubes.	They have thinner walls.
3. They are deeply placed under the skin, and 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.

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