

Lesson at a Glance

- **Circulatory system:** In multicellular organisms like man there is an efficient system which carries the blood from the heart to different parts of the body and brings it back to the heart. This is called *circulatory system*. It consists of the heart, blood and blood vessels. The circulation of blood was discovered by the English Physician, William Harvey.
- **Components of Circulatory System:** Circulatory system consists of *Blood, blood vessels*—arteries, veins and capillaries and *heart*.
- **Pulse:** It is rhythmical throbbing of the arteries as blood is propelled through them, especially felt in the wrist, temples etc.
- **Pulse Rate:** The number of heart beats per minute is called *pulse rate*. A normal resting person has a pulse rate between 72 to 80 beats per minute.
- **Heart:** *Heart* is the most sensitive part of our body. It is located in the chest cavity, slightly tilted towards the left. It is a tireless pumping station. It pumps blood through arteries, which comes back to it through veins. The heart is a pear-shaped structure nearly equal in size to that of our fist. The human heart has four chambers—right and left *atria (auricles)*, and right and left *ventricles*. The partition between the chambers helps to avoid mixing of blood rich in oxygen with the blood rich in carbon dioxide. Heart works by alternate contraction and relaxation. When it contracts, it pumps blood into the arteries. When it relaxes, it receives blood from the veins.
- **Heartbeat:** Muscles of the heart (cardiac muscles) contract and relax rhythmically. This rhythmic contraction followed by its relaxation constitute a *heartbeat*.

- **Stethoscope:** It is a device to amplify the sound of the heart. It consists of:
 - (i) a chest piece that carries a sensitive diaphragm.
 - (ii) two ear pieces.
 - (iii) a tube joining the parts.
 Doctors can get clues about the condition of your heart by listening through a stethoscope.
- **Excretion:** The process of elimination of waste products from the body is called *excretion*.
Excretion of urea, water, excessive salt, sugars and other substances is controlled by the kidneys. Kidneys along with other organs, namely, *ureters, urinary bladder* and *urethra* form excretory system. The system excretes urea, salt, excessive sugar, water and other substances to keep the body free from toxic substances.
- **Kidneys:** *Kidneys are magic filters*. They are said to be this because they filter only unwanted substances from the blood. There are two kidneys in the human body, one each on the right and left side. These are located on either side of the vertebral column, just below the level of the stomach. Like the kidneys of a goat the kidney of a man is also bean-shaped. It is brick-red in colour, about four inches long, weighing about 150 g. It is richly supplied with blood vessels.
- **Excretion of Urine:** The urine is composed of 95% water, 2.5% urea and 2.5% other waste products. The nitrogenous wastes are formed by breakdown of protein such as ammonia which is later on converted into urea. Urea is less harmful as compared to ammonia. Accumulation of urea in blood may even cause death. In this process a small amount of uric acid is also formed.
The filtration of waste products from the blood takes place in each kidney. The urine thus formed by each kidney is passed through the ureter attached to each kidney. The two ureters carry urine from both kidneys to a bladder called the urinary bladder. In the urinary bladder urine is temporarily stored. Finally, the urine is ejected through a urinary passage called urethra. The act of ejection of urine is called micturition. The opening of the urinary bladder is

closed by a ring of muscles called the bladder sphincter. Only when the bladder is full, the sphincter opens and permits the urine to flow out.

An adult human being normally passes 1-1.8 L of urine in 24 hours.

Sweat: It is the moisture exuded through the pores of the skin. Sweat is produced by sweat glands in the skin. It removes water and salts from the body.

When we sweat, it helps to cool our body.

• **Dialysis:** The blood of a person having kidney failure can be cleaned regularly by using a dialysis machine. The process used for cleaning the blood of a person by separating the waste substances is called *dialysis*.

• **Root hair:** Plant roots have hair like structures called *root hair*. The root hair is in contact with the water present between the soil particles. They increase the surface area of the root for the absorption of water and minerals dissolved in water.

• **Tissue:** It is a group of cells that perform specialised function in an organism.

• **Vascular Tissues:** Plants have pipe-like vessels to transport water and dissolved nutrients from the soil. The vascular tissue for the transport of water and nutrients in the plant is called the xylem.

• **Xylem:** The *xylem* forms a continuous network of channels that connects roots to leaves through the stem and branches. Thus, it transports water and dissolved minerals to the entire plant.

• **Phloem:** The *phloem* consists of vessels, called *sieve tubes*, that transport the food synthesised in the leaves to all parts of the plant.

• The vascular bundles form a fine network in a leaf. This network in a leaf is called *venation*.

• **Transpiration:** The process of evaporation of water through the stomata present on the surface of the leaves is called *transpiration*.

• **Transpiration is necessary for plant:** Transpiration causes loss of water from the plant but it is necessary for the plants because:

- (i) The evaporation of water from leaves generates a suction pull. This suction pull can pull water to a great

height in tall trees from roots to the leaves and other parts of the plants.

- (ii) Transpiration produces cooling effect thereby saving the delicate cells from the heat of the sunlight.

• **Blood Transfusion:** There is a limited quantity of blood in our body which is constantly renewed slowly. In case of a major injury or an accident or an operation or due to disease, there may be rapid loss of blood from the body. Our body is not able to make blood very fast to cope with the loss. So, considerable loss of blood from the body results in blood deficiency or anaemia. In all such cases, blood obtained from another healthy person is given to the deficient person. This process is called *blood transfusion*. But the blood of all human beings is not exactly similar. It can be classified into certain groups. A person deficient in blood can receive blood from that person who has blood similar to his group. Because blood transfusion of different group can be dangerous. For the same reason, doctors match the blood of the recipient with that of donor before blood transfusion.

TEXTBOOK QUESTIONS SOLVED

Q.1. Match structures given in Column I with functions given in Column II.

Column I	Column II
(i) Stomata	Absorption of water
(ii) Xylem	Transpiration
(iii) Root hairs	Transport of food
(iv) Phloem	Transport of water
	Synthesis of carbohydrates

Ans.

Column I	Column II
(i) Stomata	Transpiration
(ii) Xylem	Transport of water
(iii) Root hairs	Absorption of water
(iv) Phloem	Transport of food.

Q.2. Fill in the blanks :

- (i) The blood from the heart is transported to all parts of the body by the _____.
- (ii) Haemoglobin is present in _____ cells.
- (iii) Arteries and veins are joined by a network of _____.
- (iv) The rhythmic expansion and contraction of the heart is called _____.
- (v) The main excretory product in human beings is _____.
- (vi) Sweat contains water and _____.
- (vii) Kidneys eliminate the waste materials in the liquid form called _____.
- (viii) Water reaches great heights in the trees because of suction pull caused by _____.

- Ans.** (i) arteries (ii) red blood cells
 (iii) capillaries (iv) heartbeat
 (v) urea (vi) salts
 (vii) urine (viii) transpiration.

Q.3. Choose the correct options:

- (a) In plants, water is transported through
 - (i) Xylem (ii) Phloem (iii) Root hair
 - (iv) Stomata
- (b) Water absorption through roots can be increased by keeping the plants

- | | |
|---------------------|-----------------------------------|
| (i) In the shade | (ii) in dim light |
| (iii) under the fan | (iv) covered with a polythene bag |

- Ans.** (a) (i) Xylem (b) (iii) under the fan

Q.4. Why is transport of materials necessary in a plant or an animal? Explain.

Ans. Transport of materials is necessary for plants or animals because due to it the nutrients and oxygen are made available to all the parts of the body. If the transport of necessary nutrients and oxygen does not take place in the body, the body will not be able to survive.

Q.5. What will happen if there are no platelets in the blood?

Ans. The blood platelets are responsible for the clotting of the blood. When some injury occurs blood starts flowing.

But it clots on its own. If there are no platelets, the blood will not be able to clot and keep on flowing. Huge loss of blood ultimately causes death.

Q.6. What are stomata? Give two functions of stomata.

Ans. There are small openings on the lower surface of the leaves. These pores are called stomata. These openings are surrounded with guard cells.

Functions of stomata:

1. It helps in the transpiration of water, i.e., the loss of excess water from the plant.
2. Loss of water from the stomata creates an upward pull, i.e., suction pull which helps in absorption of water from the roots.
3. They help in exchange of gases.

Q.7. Does transpiration serve any useful function in plants? Explain.

- Ans.** (i) It helps to enhance the absorption of water and dissolved minerals by creation of a suction pull.
 (ii) It helps in getting rid of the excess water.
 (iii) It helps in transport of water and minerals to leaves and leaves use the water for photosynthesis.
 (iv) It produces a cooling effect on the plant.

Q.8. What are the components of blood?

Ans. There are four components of blood:

- (i) Plasma is a liquid part of blood which is yellowish in colour and contain 90% water. It contains food, enzymes, wastes and proteins etc.
- (ii) Red blood cells are disc shaped cells containing red coloured pigment called haemoglobin in it. Haemoglobin helps in transportation of oxygen.
- (iii) White blood cells are the fighting cells which protect us against bacteria and foreign materials causing infections.
- (iv) Platelets help in clotting of the blood.

Q.9. Why is blood needed by all the parts of a body?

Ans. Blood is needed by all the parts because it contains the digested food and oxygen in it. It supplies the oxygen and digested food to various parts of the body to provide essential energy to them which helps the body to perform various functions.

Q.10. What makes the blood look red?

Ans. A red pigment called haemoglobin gives the blood its red colour. This pigment helps in carrying oxygen to various parts of the body by blood.

Q.11. Describe the function of the heart.

Ans. The right auricle and ventricle receive blood with carbon dioxide from all parts of the body. The collected blood is then pumped to the lungs for the purification. In lungs, the exchange of gases takes place and purified blood is sent back to left auricle. It pumps it to the left ventricle, which in turn pumps off the purified blood to all parts of body through arteries.

Q.12. Why is it necessary to excrete waste products?

Ans. Certain waste and toxic products are formed during functioning of body cells. The waste products like urea etc. are toxic. When these toxic materials are not removed from the body, they get mixed with blood and can damage the cells of body. It is necessary to remove such poisonous waste materials from our body.

Q.13. Draw a diagram of the human excretory system and label the various parts.

Ans.

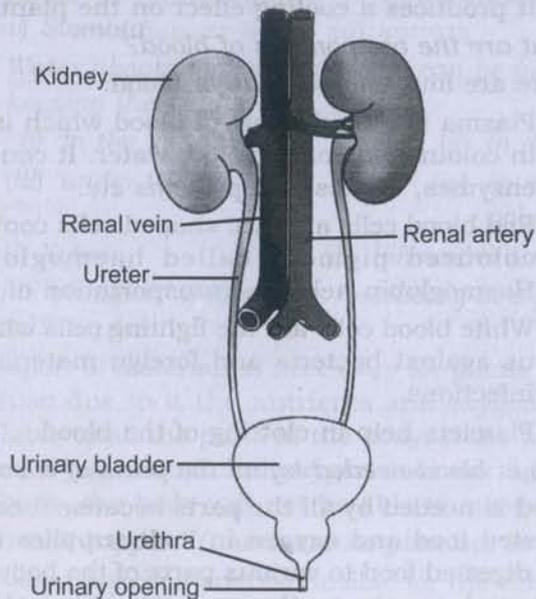


Fig. 11.1 Human excretory system.

EXTENDED LEARNING — ACTIVITIES AND PROJECTS

Q.1. Find out about blood groups and their importance.

Ans. Blood Groups. Every human being has an individual blood group which remains unchanged throughout life. Human blood can be divided into four groups named as A, B, AB and O. Here letters A and B refer to certain substances which are present in the Red Blood cells. The blood group AB contains both A and B substance in the Red Blood cells (RBC) whereas both these substances are absent in the blood group O. Every person has one of these four groups. Blood groups are inherited and cannot be changed throughout the life.

Importance. In case of heavy blood loss due to an accident, injury or disease there is urgent need to give blood of other person to the patient. The person who gives blood is called the donor and the person who receives blood is called the recipient. This donation of blood of one person to another person is called blood transfusion.

You must know that if the blood of the donor is not compatible with the blood of the patient, the red blood cells of the patient will stick together. This may cause death of the patient.

Table showing Compatibility of blood groups for blood transfusion

Blood Group	Can Donate blood to	Can Receive blood from
A	A and AB	A and O
B	B and AB	B and O
AB	AB	All blood groups
O	All blood groups	O

Q.2. When a person suffers from chest pain, the doctor immediately takes an ECG. Visit a doctor and get information about ECG. You may even look up an encyclopaedia or the internet.

Ans. The muscle fibres (muscle cells) of certain part of the heart are specialised to generate electric currents that cause the normal rhythmic heart beats. An instrument called the *Electrocardiograph*, can record the electrical changes during heart beat. This graphic records the electrical changes during heart beat. This graphic recording is called *ECG* (Electrocardiography). ECG is done to detect the area of malfunctioning of the heart.