

CLASS - 9 [BIOLOGY]

CHAPTER - 8 CIRCULATORY SYSTEM

Good Morning students,

This lesson is of class IX for the subject of Biology.  
Topic - Circulating Fluid Blood in human body  
which is covered in Chapter 8 'Circulatory System'  
starting on Page - 90 of your text book  
titled 'Concise Biology - Selina Publications  
and is being submitted to you on 04.11.2024

All students may now open page No 90  
of your text book and henceforth listen  
very carefully.

Students you very well know that the  
circulatory system consists of heart, blood  
and blood vessels. Before discussing all these  
parts of circulatory system, let us first  
understand the need of circulatory system  
in the body.

The human body consists of several organ  
systems. Each of the organ system requires  
the involvement of circulating body fluids

For Example -

- 1) Digestive system - The digested food is transported  
to all body cells through circulatory system
- 2) Respiratory system - The respiratory gases -  $O_2$  and  
 $CO_2$  are transported to all body parts through  
circulating fluid i.e. blood in the body
- 3) Excretory system - All excess salts, water,  
urea etc. is transported through blood from



various body parts to the excretory organs i.e. kidneys for throwing them out of the body.

Hormones - are chemicals secreted by certain glands in our body which are carried by blood to act wherever they are required in the body.

Thus, to conclude all such transportation of substances like food, gases, excretory substances, chemicals, secretions in the body takes place with the help of circulating fluids in the body. There are 3 main circulating fluids in the body -

- (i) Blood - which is present in the heart and blood vessels
- (ii) Tissue fluid - is the fluid present in between the cells in the organs.
- (iii) Lymph - which is present in the lymphatic organs and lymph vessels. We will learn about lymph later in the chapter.

Now before going further, let us first learn about the two types of circulatory systems, that is -

Closed Blood circulatory system and open blood circulatory system.

Closed blood circulatory system is the one present in human body in which the blood circulates all the time through the blood vessels in a closed manner.



Open blood circulatory system is present in insects where the blood is pumped by heart into the body cavities, where tissues are surrounded by the blood. In open blood circulatory system there are no blood vessels to conduct the blood.

Such a : open blood circulatory system is only present in the lower organisms like insects and other invertebrates.

Now before going further in the chapter let us recapitulate quickly what we have learnt so far.

Q1 Name two fluids that circulate in the body.

Q2 Name 4 substances transported by blood in body.

Q3 Name any organism possessing the -

(i) open blood circulatory system

(ii) Closed blood circulatory system.

Now students you may please pause the audio for 3 min. and write down the answers in notebook  
3 minutes break is over children

Listen to the answers of the questions being asked before the break to you.

A1 Blood and Lymph are two fluids circulating in body.

A2 4 substances transported by blood in the body are

i) Food

(iii) Excretory waste

ii) Respiratory gases ( $O_2$  &  $CO_2$ )

(iv) Hormones.

A3 Open blood circulatory system is present in Insects.

Closed blood circulatory system is present in Humans.



Children Let us take up the 'General plan of Circulation of blood through blood vessels and heart' in human body in brief right now. Details of which we will take up later in the chapter.

Now children you may all please look at the Fig 8.1 given on Page No 91 of your text book showing the diagrammatic representation of blood and lymph circulation in human body.

You may please note that since the blood is either contained in heart or blood vessels hence it is the closed circulatory system.

In the Fig 8.1 please note the following points -

- i) The arrows depict the direction of blood flow. Blood flows in the vessels, always in the same <sup>or one</sup> direction, passing repeatedly through the heart.
- ii) The oxygenated blood i.e. blood containing oxygen is carried from the heart to the body tissues and cells. In the cells the oxygen is used up and  $\text{CO}_2$  is given out. Thus the blood becomes deoxygenated. This exchange of gases occurs in blood capillaries. Then the blood vessels which carry deoxygenated i.e. carbon dioxide containing blood, called the veins, carry the deoxygenated blood to heart again. This deoxygenated blood again leaves the heart and through pulmonary artery it is taken to the lungs. Lungs



take up  $\text{CO}_2$  from blood and  $\text{O}_2$  is added to the blood. This oxygenated blood with the help of pulmonary vein is poured back into the heart.

Children this is a general plan of circulation of blood in human body, details of which <sup>we</sup> will learn further in the chapter.

- iii) Again look at fig 8.1 carefully. When the blood is flowing in the capillaries, the plasma and the white blood cells WBCs 'leak out' through their walls. This fluid bathes the cells and is called the tissue fluid. Some of this tissue fluid may be reabsorbed into the blood vessels, but most of it enters into lymph vessels and is now called the lymph. Lymph vessels ultimately pour the lymph into the veins close to their entry into the heart. and again comes into circulation.

Children details of lymph and lymph vessels we will learn further in the chapter.

- iv) Another point to be noted in Fig 8.1 is that the oxygenated blood is depicted in red colour while the deoxygenated blood is depicted in blue.

Now before going further in the chapter

let us take a 3 min break. All of you please write down the answers to the following questions in your notebook during the 3 mins break.

Q.1 What do you mean by oxygenated and deoxygenated blood? With which colour do we depict oxygenated and deoxygenated blood?

Q2 State the composition of lymph.

You may now pause the audio for break.  
Welcome back children! Break is over. Firstly listen to the answers of the questions being asked to you.

A1 Oxygenated blood means - blood containing oxygen. Deoxygenated blood means - blood containing carbon dioxide.

Oxygenated blood is depicted in Red colour  
Deoxygenated blood is depicted in Blue colour.

A2 Lymph majorly contains - Blood plasma and white blood cells.

Now children, Let us start with the next topic that is - Properties of blood - which are as follows-

- i) Blood is never stationary: It is always moving through the heart and blood vessels.
- ii) Blood is bright red when taken from artery and dark red when taken from vein
- iii) An average human has 5-6 litres of blood by volume in his body
- iv) Blood tastes saltish
- v) Blood is slightly alkaline with pH of 7.3 to 7.45



Now let us discuss the general functions of blood.

1. Blood helps to transport digested food from alimentary canal to all the body cells.
2. Haemoglobin a <sup>red coloured</sup> pigment present in the blood combines with oxygen to form oxyhaemoglobin and helps to transport oxygen in the body. On reaching the cells/tissues oxyhaemoglobin breaks up to deliver oxygen to the body cells.
3. Similarly  $\text{CO}_2$  combines with haemoglobin of blood to form carbamino haemoglobin and helps in transportation of  $\text{CO}_2$  from body tissues to lungs for exhalation.  $\text{CO}_2$  is also transported by blood plasma in the body.
4. Blood helps to transport excretory material from the body tissues to liver, kidney or skin for removal.
5. Blood helps to transport hormones from glands to various organs where they are required to function.
6. Blood helps in maintaining uniform body temperature of  $37^\circ\text{C}$  by distributing heat.

Now there are certain 'protective' functions of blood, let us discuss them one by one.

- i. During an injury or cut in body blood forms a clot. Clot prevents further loss of blood as well as prevents entry of germs into the body.



2. White blood cells of the blood provide us protection from disease causing germs by killing them, thus provide us immunity.
3. Blood produces antitoxins and antibodies which also provide us protection from disease causing germs or their poisonous secretions.

Now children let us discuss the composition of blood. Blood consists of -

- i. Plasma which is a pale yellow coloured alkaline liquid which forms 55-60% of blood. The approximate percentages of its main constituents are as follows -

Water - 90-92%

Proteins - 7-8%

Inorganic salts - 1% [mainly  $\text{NaCl}$ ,  $\text{NaHCO}_3$ ]  
other substances like glucose, amino acids, fibrinogen, hormones, urea, enzymes, antibodies etc. are present in traces

Blood plasma from which blood clotting protein called fibrinogen is removed is called serum. Without fibrinogen blood cannot make a clot.

- ii. The cellular elements of blood form 40-45% of blood. These are of 3 types -
  - a) Red Blood Cells or the Erythrocytes
  - b) White Blood Cells or the Leukocytes
  - c) Blood Platelets or the Thrombocytes.



Children let us conclude our discussion here now. Details of various blood cells we will take up in the next class.

Students now I will give you some home assignment questions. All students have to answer these home assignment questions in your notebooks -

Home assignment questions are as follows-

- Q1 State the functions of blood in human body.
- Q2 State the composition of blood.
- Q3 In a coloured diagram, why do we generally show the pulmonary artery in blue and pulmonary vein in red colour as shown in Fig 08.1 ?

— THANK YOU —