UNIT 14: TRANSPORTATION IN PLANTS AND CIRCULATION IN ANMALS

I .Choose the correct. (mark in book).

1. Active transport involves
   a) movement of molecules from lower to higher concentration b) expenditure of energy c) it is an uphill task
   d) all of the above

2. Water which is absorbed by roots is transported to aerial parts of the plant through
   a) cortex b) epidermis c) phloem d) xylem

3. During transpiration there is loss of
   a) carbon dioxide b) oxygen c) water d) none of the above

4. Root hairs are
   a) cortical cell b) projection of epidermal cell c) unicellular d) both b and c

5. Which of the following process requires energy?
   a) active transport b) diffusion c) osmosis d) all of them

6. The wall of human heart is made of
   a) Endocardium b) Epicardium c) Myocardium d) All of the above

7. Which is the sequence of correct blood flow
   a) ventricle - atrium - vein - arteries b) atrium - ventricle - veins - arteries c) atrium - ventricle - arteries - vein
   d) ventricles - vein - atrium - arteries

8. A patient with blood group **O** was injured in an accident and has blood loss. Which blood group the doctor should

   effectively use for transfusion in this condition?
   a) O group b) AB group c) A or B group d) all blood group

9. **'Heart of heart'** is called
   a) SA node b) AV node c) Purkinje fibres d) Bundle of His

10. Which one of the following regarding blood composition is correct
    a) Plasma - Blood + Lymphocyte b) Serum - Blood + Fibrinogen c) Lymph - Plasma + RBC + WBC
    d) Blood - Plasma + RBC+ WBC +Platelets

II. Fill in the blanks. (mark in book).

1. Transpiration involves evaporative loss of water from aerial parts.
2. Water enters the root cell through a root hair plasma membrane.
3. Structures in roots that help to absorb water are root hair
4. Normal blood pressure is 120 mm / 80mm Hg.
5. The normal human heartbeat rate is about 72 to 75 times per minute.

III. Match the following . (mark in book).

Section I

1. Symplastic pathway	Leaf 2
2. Transpiration	Plasmodesmata 1
3. Osmosis	Pressure in xylem 4
4. Root Pressure	Pressure gradient 3

Section II

1. Leukemia	Thrombocytes 2
2. Platelets	Phagocyte 3
3. Monocytes	Decrease in leucocytes 4
4. Leucopenia	Blood Cancer 1
5. AB blood group	Allergic condition 7
6. O blood group	Inflammation 8
7. Eosinophil	Absence of antigen 6
8. Neutrophils	Absence of antibody 5

IV. State whether True or False. If false write the correct statement. (mark in book) .

1. The phloem is responsible for the translocation of food. TRUE
2. Plants lose water by the process of transpiration. TRUE
3. The form of sugar transported through the phloem is **glucose**. FALSE sucrose

4. In **apoplastic** movement the water travels through the cell membrane and enter the cell. FALSE

Symplastic

Or

In apoplastic movement the water travels through the **cell membrane** and enter **…**the cell.

Intercellular space, walls of

5. When guard cells lose water the stoma **opens**. FALSE closes (flaccid)

Or

When guard cells **lose water** the stoma opens .becomes turgid

6. **……. . . . .** Initiation and stimulation of heart beat take place by **nerves**. FALSE In humans,

muscle .

7. All veins carry deoxygenated blood**……..** FALSE Except pulmonary vein.
8. WBC defend the body from bacterial and viral infections. TRUE
9. The closure of the mitral and tricuspid valves at the start of the ventricular systole produces the first

sound ‘LUBB’. TRUE

V. Answer in a word or sentence. (mark in book)

1. **Pericardium** is the two layered protective covering of human heart.

2. **Biconcave disc shape** is the shape of RBC in human blood.

3. The color of the blood is red because of **the presence of RBC with haemoglobin in blood.**

4. **WBC** type of cells are found in the lymph

.

5. **Semi lunar valve** are the heart valve associated with the major arteries leaving the ventricles.

6. **Coronary artery** is the artery which supplies blood to the heart muscle.

VI. Short answer questions. (write in class work)

1. Stomata are open in the day and closed at night. The opening and closing of the stomata is due to the change in turgidity of the guard cells. When water enters into the guard cells, they become turgid and the stoma open. When the guard cells lose water, it becomes flaccid and the stoma closes. (PAGE:202)

2. The force of attraction between molecules of water is called cohesion.(PAGE:204)

3. Atmosphere
↑
Transpiration creates transpiration pull
↑
Adhesion cohesion makes column of water molecules
↑
Root pressure pushes water to stem
↑
Capillary action results in rise up water at the base of stem
↑
Osmosis pushes water to root hairs. (PAGE:204)

4. Wilting would happen to the leaves of a plant that transpires more water than its absorption in the roots

6. In our body the blood circulates twice through the heart in one complete cycle it is called **double**
circulation.
In double circulation the oxygenated blood do not mix with the deoxygenated blood. So circulation in
man is referred as double circulation.(PAGE:208)

7. The rhythmic closure and opening of the valves cause the sound of the heart.

The **first sound LUBB** is of longer duration and is produced by the closure of the

tricuspid and
bicuspid valves after the beginning of ventricular systole.

The **second sound DUBB** is of a shorter duration and produced by the closure of semilunar valves at the end of ventricular systole. (PAGE:210)

8. i) valves in the heart regulates the flow of blood in single direction .

ii) Prevent the back flow of blood.

9. i) Rh factor was first discovered by Landsteiner and wiener in 1940 in Rhesus monkey.
ii) It was named so because it was first discovered in Rhesus monkey. (PAGE:211)

10..

S.No	Artery	Vein
1	Distributing vessel	Collecting vessel
2	Pink in colour	Red in colour
3	Deep location	Superficial in location
4	Blood flow with high pressure	Blood flow with low pressure
5	Wall of artery is strong, thick and elastic	Wall of vein is weak, thin and non-elastic
6	All arteries carry oxygenated blood except pulmonary arteries	All veins carry deoxygenated blood except pulmonary veins
7	Internal valves are absent	Internal valves are present

PAGE :(206)

11.
Sino-atrial node is called as the **'pacemaker'** of the heart because it is capable of initiating impulse
which can stimulate the heart muscles to contract. (PAGE: 209)

12.
Systemic circulation:

i) From left ventricle to the various organ.
ii) Circulation of oxygenated blood from the left ventricle of the heart to various organs of the body

return of deoxygenated blood to the right atrium.

iii) Aorta carries oxygenated blood to all the organs of the body.

Pulmonary circulation:

i) From right ventricle to the lungs.
ii) The path of pulmonary circulation starts in the right ventricle. Pulmonary artery arises from the

right ventricle and reaches the lungs with deoxygenated blood.

iii) Pulmonary veins collect the oxygenated blood from the lungs and supplies it to the left atrium

of the heart.

13.
Each cardiac cycle lasts about **0.8 second**. The events during a single cardiac cycle involves,

(a) Atrial systole: Contraction of auricles **(**0.1 sec).
(b) Ventricular systole: Contraction of ventricles **(**0.3 sec).
(c) Ventricular diastole: Relaxation of Ventricles (0.4 sec). (PAGE:210)

VII. Give reasons for the following statement. (write in class work).

1.

All minerals cannot be passively absorbed by the roots. Two factor account for this:

(i) minerals are present in the soil as charged particles (ions) that cannot move across cell membranes and

(ii) the concentration of minerals in the soil is usually lower than the concentration of minerals in the root. Therefore,

most minerals enter the root by active absorption through the cytoplasm of epidermal cells.This needs energy.

(PAGE:203)

2.

The opening and closing of the stomata is due to the change in turgidity of the guard cells. When water enters into the guard cells, they become turgid and the stoma open. When the guard cells lose water, it

becomes flaccid and the stoma closes.(PAGE:202)

3.

i) Phloem transports food (sucrose) from a source to a sink. The source is part of the plant that synthesize food, i.e., the

leaf, and sink, is the part that needs or stores the food.

ii) But, the source and sink may be reversed depending on the season, or the plant's need.

iii) The direction of movement in the phloem can be upwards or downwards, i.e., **bidirectional. (**PAGE:203)

4.

i) Minerals are remobilised from older dying leaves to younger leaves. This phenomenon can be seen in deciduous

plants.

ii)Elements like phosphorus, sulphur, nitrogen and potassium are easily mobilised, while elements like calcium are no

remobilised.

iii)Small amounts of material exchange takes place between xylem and phloem.(PAGE:203)

5. i) The right atrium just receives deoxygenated blood from different parts of the body through the main veins

superior vena cava, **inferior vena cava** and **coronary sinus. Hence it has thin walled than the ventricle.**

ii)The left and right ventricles have **thick walls** because the ventricles have to pump out blood with force away from the heart.(PAGE:207).

6.

i) Mammalian RBC lack nucleus and makes the cells biconcave and increase surface area for oxygen binding,

ii) Loss of mitochondria allows the RBC to transport all the oxygen to tissues,

iii) Loss of endoplasmic reticulum allows more flexibility for RBC to move through the narrow capillaries.

(PAGE: 205)

VIII. Long answer questions. (mark in book).

1. **Root hairs water absorbing unit.**

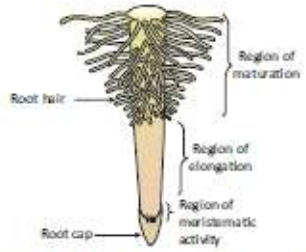


Figure 14.3 Root Tip with Root Hairs

There are millions of root hair on the tip of the root which absorb water and minerals by diffusion.

Root hairs are thin walled, slender extension of epidermal cell that increase the surface area of absorption.

Pathway of Water Absorbed by Roots

Once the water enters the root hairs, the concentration of water molecules in the root hair cells become more than that of the cortex. Thus water from the root hair moves to the cortical cells by osmosis and then reaches the xylem. From there the water is transported to the stem and leaves.

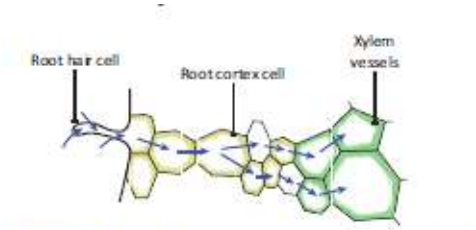


Figure 14.4 T. S. of the root showing movement of water from soil to xylem

Types of Movement of Water into the Root Cells

Once water is absorbed by the root hairs, it can move deeper into root layers by two distinct pathways:

- Apoplast pathway
- Symplast pathway
-

Apoplast Pathway

The **apoplastic** movement of water occurs exclusively through the intercellular spaces and the

walls of the cells.gradient.

Symplast Pathway

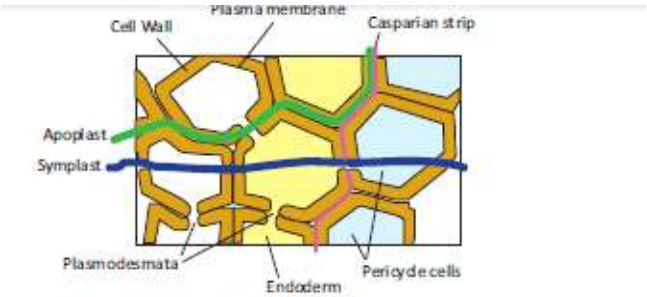


Figure 14.5 Symplastic and Apoplastic pathways of Water

In **symplastic** movement, the water travels through the cells i.e. their cytoplasm; intercellular movement is through

The plasmodesmata. Water enter the cells through the cell membrane, hence the movement is relatively slower.

Movement is again down a potential gradient. (PAGE:201,202).

2.Transpiration

Transpiration is the evaporation of water in plants through stomata in the leaves.

Stomata are open in the day and closed at night. The opening and closing of the stomata is due to the change in turgidity of the guard cellWhen water enters into the guard cells, they become turgid and the stoma open.

When the guard cells lose water, it becomes flaccid and the stoma Water evaporates from mesophyll cells of leaves through the open stomata, this lowers water concentration in mesophyll cells. As a result, more water is drawn into these cells from the xylem present in the veins through the process of osmosis. As water is lost from the leaves, pressure is created at the top to pull more water from the xylem to the mesophyll cells, this process is called **transpiration pull**. This extends up to the roots causing the roots to absorb more water from the soil to ensure continuous flow of water from the roots to the leaves.

Transpiration is affected by several external factors such as temperature, light, humidity, and wind speed. Internal factors that affect transpiration include number and distribution of stomata, percentage of open stomata, water status of the plant, canopy structure etc.(PAGE:202,203)

Importance of Transpiration.

- Creates transpirational pull for transport of water.
- Supplies water for photosynthesis .
- Transports minerals from soil to all parts of the plant .
- Cools the surface of the leaves by evaporation.
- Keeps the cells turgid; hence, maintains their shape.

3.

The white blood corpuscles can be grouped into two categories:

1. Granulocytes 2. Agranulocytes because

Granulocytes

They contain granules in their cytoplasm. Their nucleus is irregular or lobed. The granulocytes are of three types

(i) Neutrophils (ii) Eosinophils

(iii) Basophils

Agranulocytes

Granules are not found in the cytoplasm of these cells. The agranulocytes are of two types:

(i) Lymphocytes (ii) Monocyte

Granulocytes

(i) Neutrophils

They are large in size and have a 2 - 7 lobed nucleus. These corpuscles form 60% - 65% of the total leucocytes. Their numbers are increased during **infection** and **inflammation**.

(ii) Eosinophils

It has a bilobed nucleus and constitute 2% - 3% of the total leucocytes. Their number increases during conditions of **allergy** and **parasitic infections.** It brings about detoxification of toxins.

(iii) Basophils

Basophils have lobed nucleus. They form 0.5-1.0% of the total leucocytes. They release chemicals during the process of **inflammation.**

Agranulocytes

The agranulocytes are of two types:

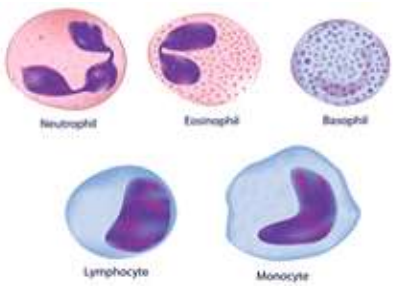
(i) Lymphocytes (ii) Monocyte

(i) Lymphocytes

These are about 20-25% of the total leucocytes. They produce **antibodies** during bacterial and viral infections.

(ii) Monocytes

They are the largest of the leucocytes and are amoeboid in shape. These cells form 5 - 6 % of the total .They are **phagocytic** and can **engulf bacteria.**



Leucocytes **page:(205,206)**

4. **systole** **Diastole**

Contraction phase of the heart Relaxation phase of the hert

Initiation and conduction of Heart beat

The human heart is **myogenic** in nature. Contraction is initiated by a specialized portion of the heart muscle, the **sino-atrial** (SA) **node** which is situated in the wall of the right atrium near the opening of the **superior vena cava**. The SA node is broader at the top and tapering below. It is made up of thin fibres

Sino-atrial node acts as the **'pacemaker'** of the heart because it is capable of initiating impulse which can stimulate the heart muscles to contract. The impulse from the sinoatrial node spreads as a wave of contraction over the right and left atrial wall pushing the blood through the **atrioventricular** valves into the ventricles. The wave of contraction from SA node reaches the **atrioventricular** (AV) **node** which is stimulated to emit an impulse of contraction spreading to the ventricular muscle via the **atrioventricular bundle** and **the Purkinje fibres**.

Atrioventricular bundle . (PAGE:209)

5. Functions of blood

- Transport of respiratory gases (Oxygen and CO2).
- Transport of digested food materials to the different body cells.
- Transport of hormones.
- Transport of nitrogenous excretory products like ammonia, urea and uric acid.
- It is involved in protection of the body and defense against diseases.
- It acts as buffer and also helps in regulation of pH and body temperature.
- It maintains proper water balance in the body.

IX. Assertion and Reasoning (mark in book).

Direction: In each of the following questions a statement of assertion (A) is given and a corresponding statement of

Reason (R) is given just below it. Mark the correct statement as.

a. If both A and R are true and R is correct explanation of A

b. If both A and R are true but R is not the correct explanation of A

c. A is true but R is false

d. Both A and R are false

1. **Assertion:** RBC plays an important role in the transport of respiratory gases.
   Reason: RBC do not have cell organelles and nucleus. (a)
2. **Assertion:** Persons with AB blood group are called an universal recipients, because they can receive blood from all groups.
   Reason: Antibodies are absent in persons with AB blood group. (a)

X. Higher Order Thinking Skills (HOTS) (MARK IN BOOK

1. Imbibition is a type of diffusion in which a solid absorbs water and gets swelled up

eg. absorption of water by seeds and dry grapes . If it were not for imbibition , seedlings would not have been able to emerge out of the soil. (PAGE:201)

2. i) The right atrium just receives deoxygenated blood from different parts of the body through the

main veins superior vena cava, inferior vena cava and coronary sinus. Hence it has thin walled

than the ventricle.

ii) The left and right ventricles have thick walls because the ventricles have to pump out blood with force away from the heart. (PAGE:207).

3.

A stethoscope is used to detect the sound produced by the internal organs of human body.

The heart sound is heard by placing the stethoscope on the chest.

It is a useful diagnostic tool to identify and localize health problems and diagnose disease.

The modern electronic stethoscopes are high precisioned instruments. (PAGE:210,211)

4. pulmonary artery

All arteries carry oxygenated blood except the pulmonary artery which carry deoxygenated

blood to the lungs.

Pulmonary vein

All veins carry deoxygenated blood except the pulmonary vein which carry oxygenated blood

from the lungs to the heart.(PAGE:206)

5. i) Transpiration is a necessary evil in plants because transpiration is in evitable but

potentially Harmful.

ii) loss of water from the surface of leaves ,is on a large scale ,may results in wilting,

desiccation and often leads to death of a plant in case of draught condition.

iii) The water stress may results in reduced growth rate.