UDAAN

2025

LIFE PROCESSES

Biology

Lecture - 10

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Topics to be covered

1. Transportation of water
2. Transportation of food
3. MCQ practice and Homework

4. Transportation in Plants

Question of the Day

Reptiles ⟶ 3 Chamber.

Crocodiles - 4 chambered heart

↳ Cold-blooded Animal.

Q. Think and answer

Complete

Double circulation is a characteristic feature of which group of animals ?

A Pisces → Fishes → Single Circulation

B Aves → Birds → Double Circulation

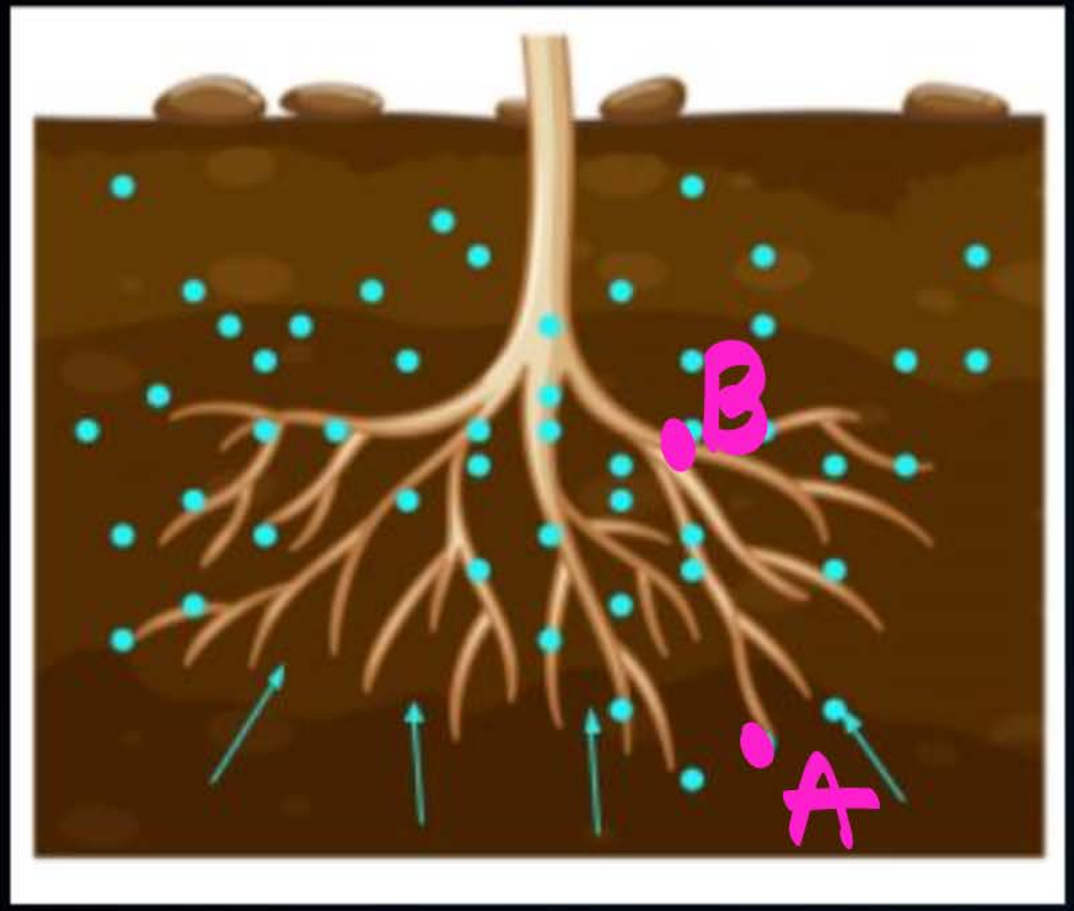
C Mammals → Double Circulation

D Both B and C

Transportation in plants

* Water
* Minerals
* Oxygen & CO_2
* Food etc.
* Hormones
* Waste Material

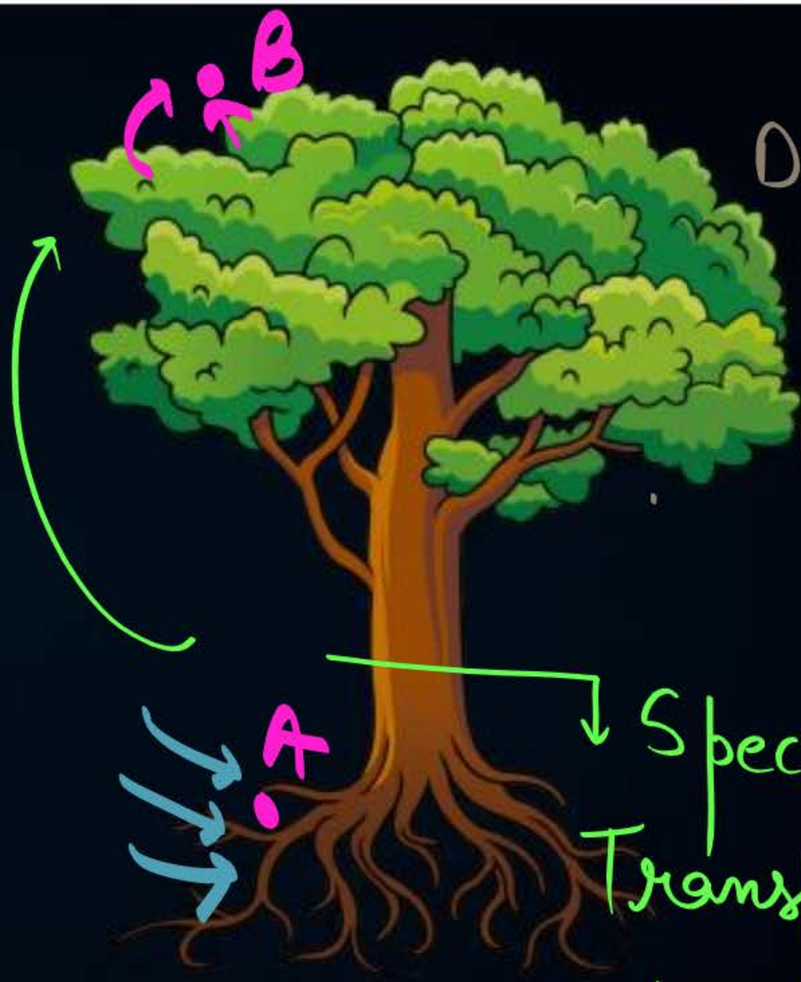
If the distance between two cells is small



Diffusion & Osmosis

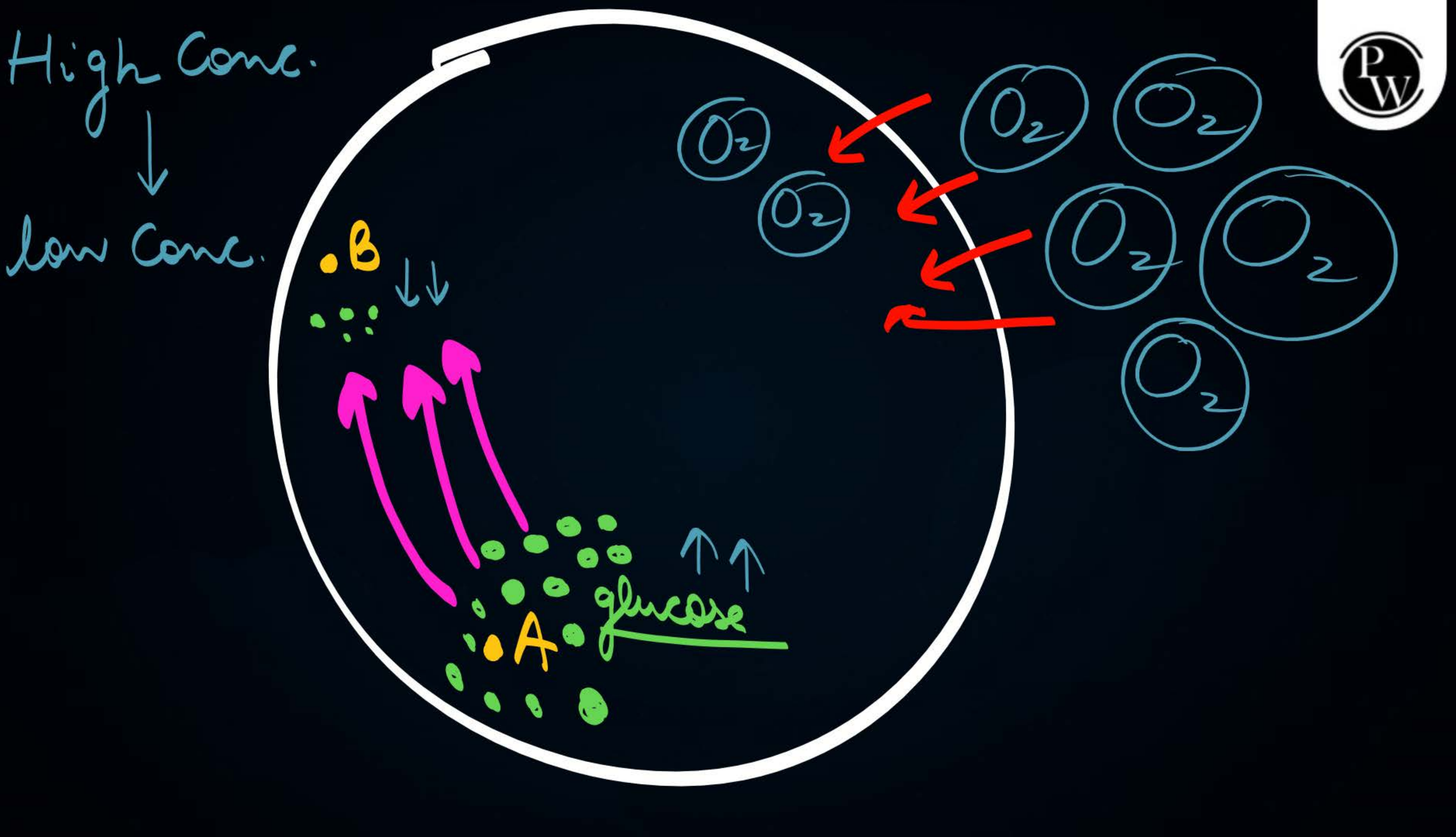
(Solid, gas, liquid) + H_2O

If the distance between two cells is large



Diffusion & Osmosis is not sufficient

Specialized Transport system in plant


High Conc.
low Conc.
B
A
glucose
O2
O2
O2
O2
O2
O2

Transport system in plants → Vascular System

Vascular bundles

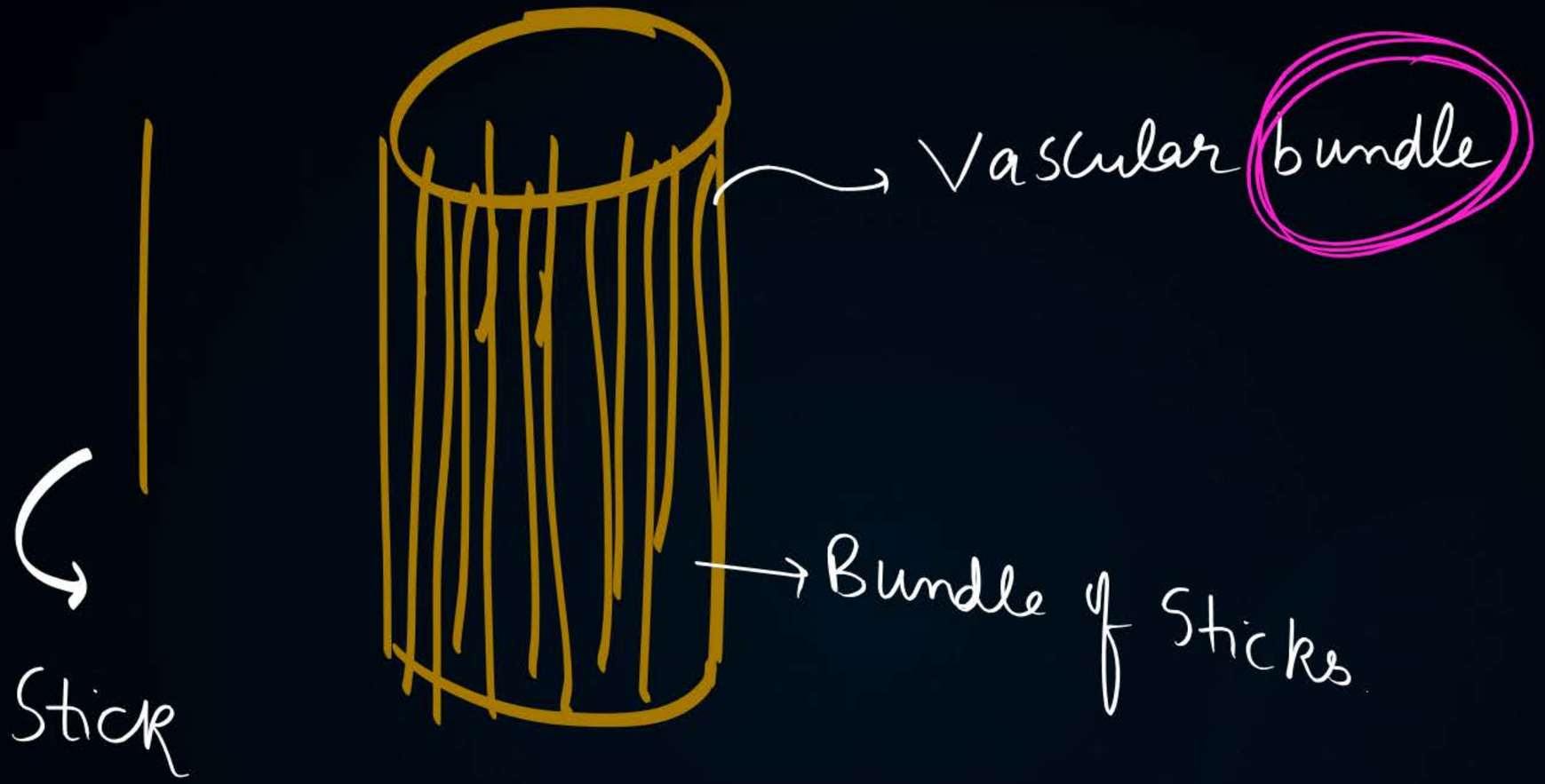
Made up of Vascular tissue

Xylem

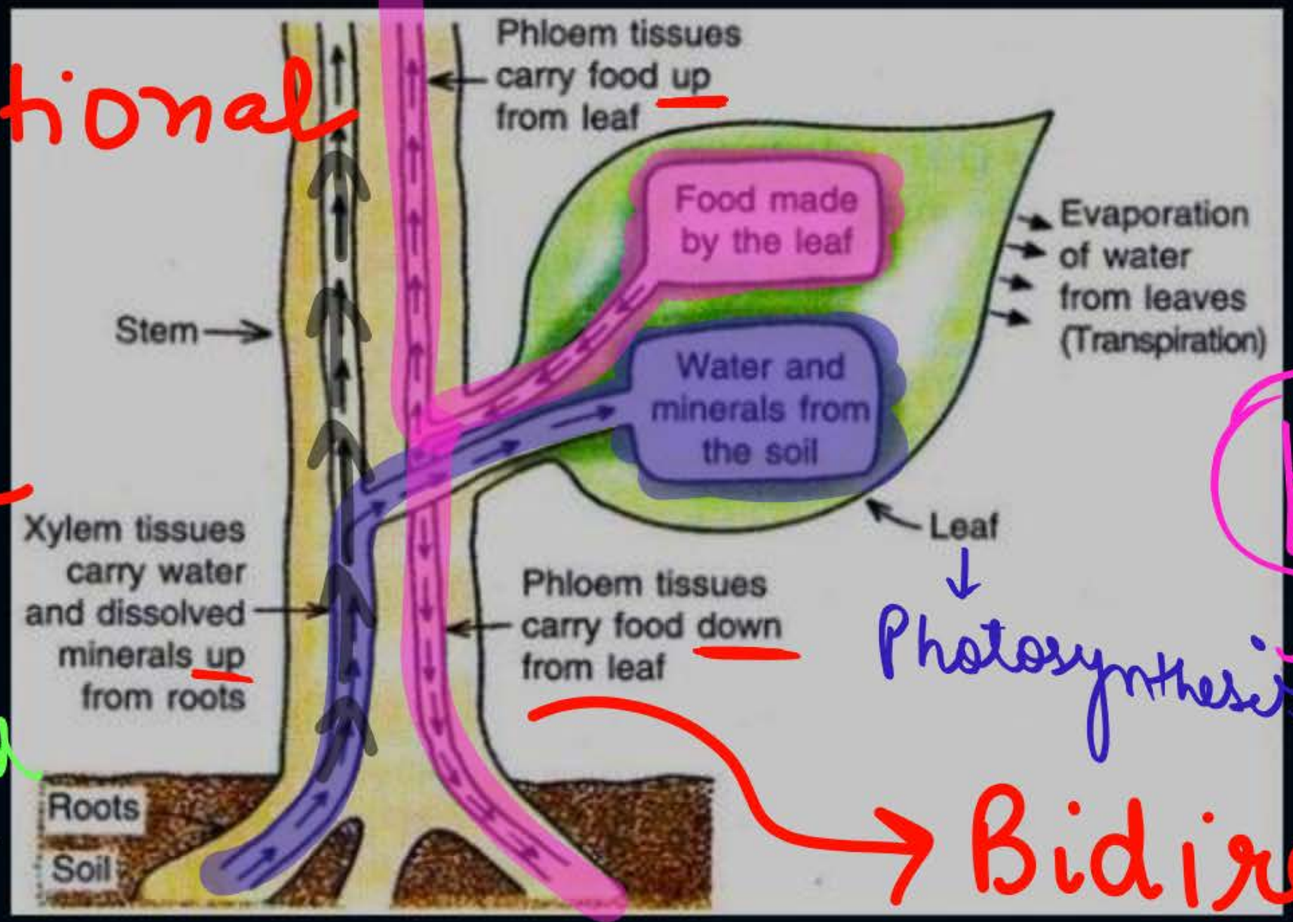
Transport of Water & Minerals

Phloem

Transport of food.


Vascular bundle
Bundle of Sticks
Stick

Xylem and phloem → Vascular System



Unidirectional

food → glucose.

Photosynthesis

#Ch

dissolved

- Water
- Minerals (N, P, K, Ca, Fe, Na, S)

→ Bidirectional.

Why plants have slow transport systems ?

- Plants do not move → therefore require low / less Energy.
- Plant bodies have a large proportion of dead cells in many tissues.

Do not require water & food.

Therefore plants have low energy needs which means no rush to transport water and food at faster rate.

NO Jaldi bazi.

Transport of water & minerals Via Xylem

Ascent of sap : The Upward movement of water and minerals from the root to the upper part of the plant against the gravity via xylem tissue is called ascent of sap.

- Transport of substances in xylem occurs only in the upward direction.

NO Energy (ATP) is required

upward direction (unidirectional movement)

Transport of water & minerals Via Xylem

dead Tissue
group of cells

- Xylem is made up of four types of elements:

Dead Cells

- Tracheids
- Vessels

→ Main Water Conducting Channels
↓
Water Transport.

- Xylem fibres → Support & Strength

Living Cells

- Xylem parenchyma
  - → Food Storage
  - → Lateral (Sideways) movement of Water

1. Water in the ground
Goes to the root

Soil

2. Absorbed by Root hair cells

3. Goes to inner root cells

4. Pulled up by Xylem

5. Upward movement

6. To the cells in the leaves

7. Diffuses through the stomata in leaves

Transport of Water from Root to Leaves

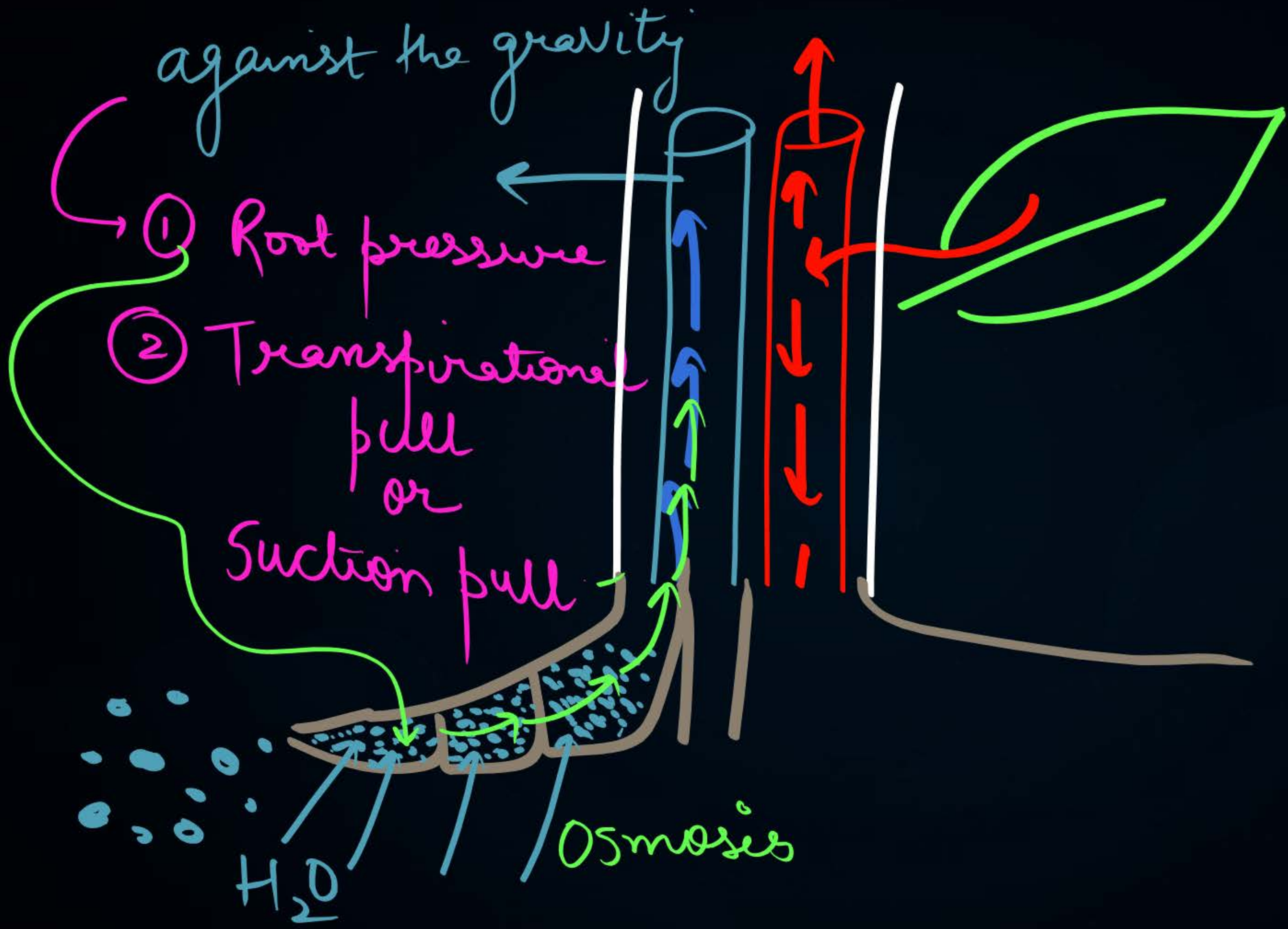
H_2O

H_2O → Waste

Photosynthesis

Transpiration

Stomata


against the gravity
① Root pressure
② Transpirational pull or Suction pull
H_2O
Osmosis

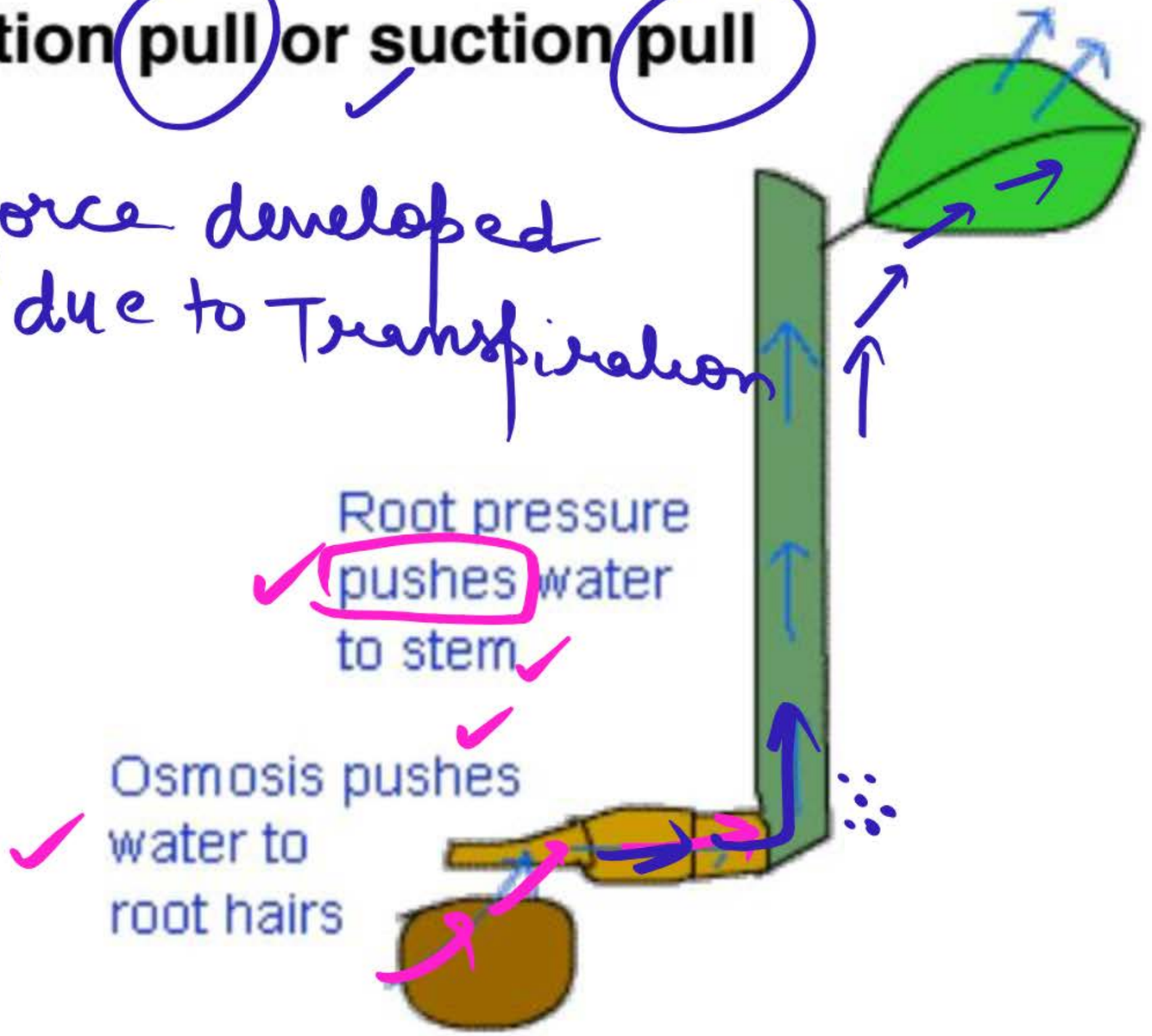
The forces that contribute to ascent of sap are as follows:

1.Root pressure

2.Transpiration pull or suction pull

Transpiration creates transpiration pull

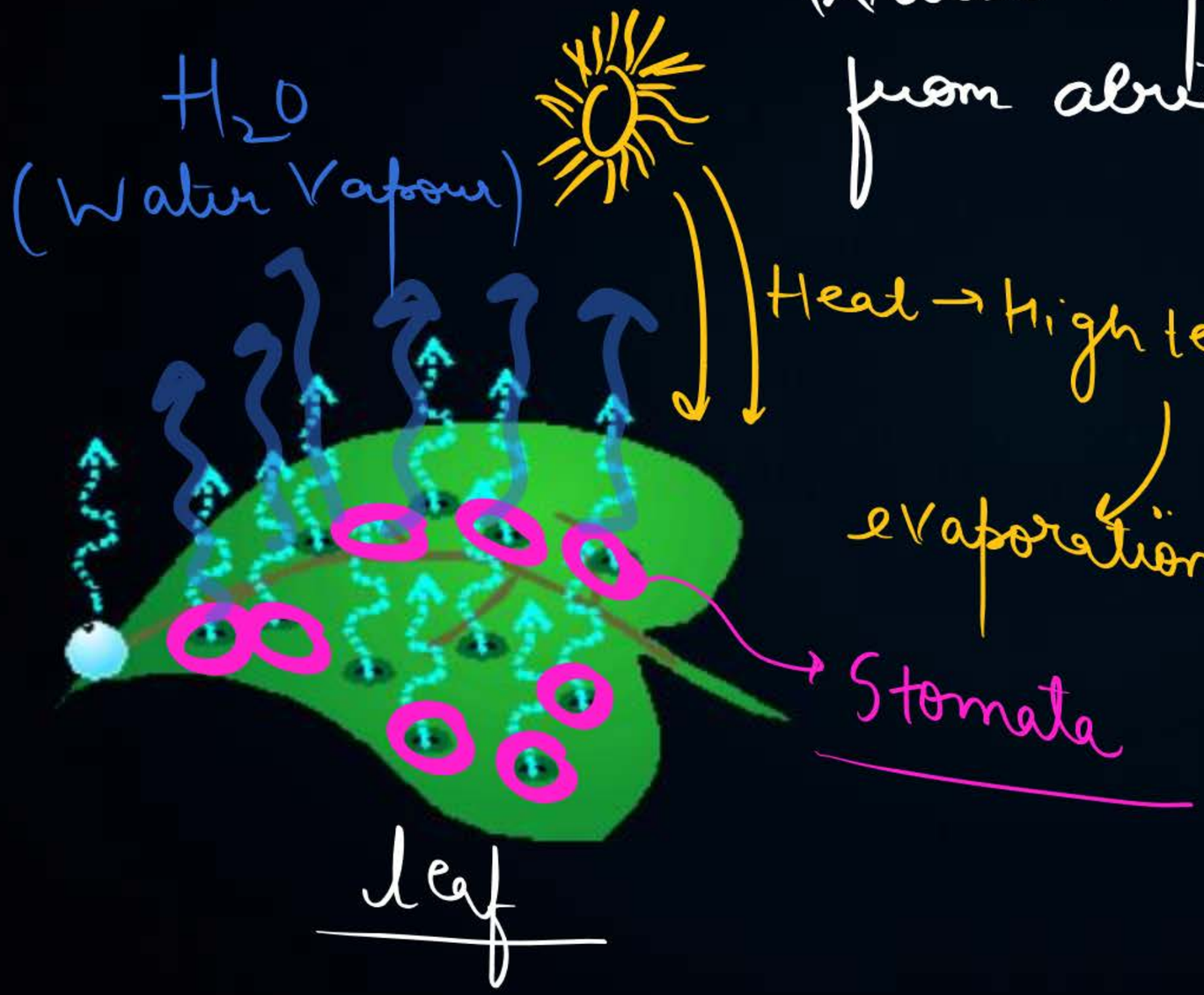
force developed due to Transpiration



1.Root pressure : When water enters into root cells by the process of osmosis a pressure is generated in the roots which helps in transporting the water and other ions from the soil in upwards directions into the Xylem. This hydrostatic pressure is known as root pressure.

Transpiration

→ Loss of Water in form of Water Vapour (evaporation) from aerial parts of the plants



Evaporation of water molecules from the cells of a leaf creates a suction which pulls water from the xylem cells of roots

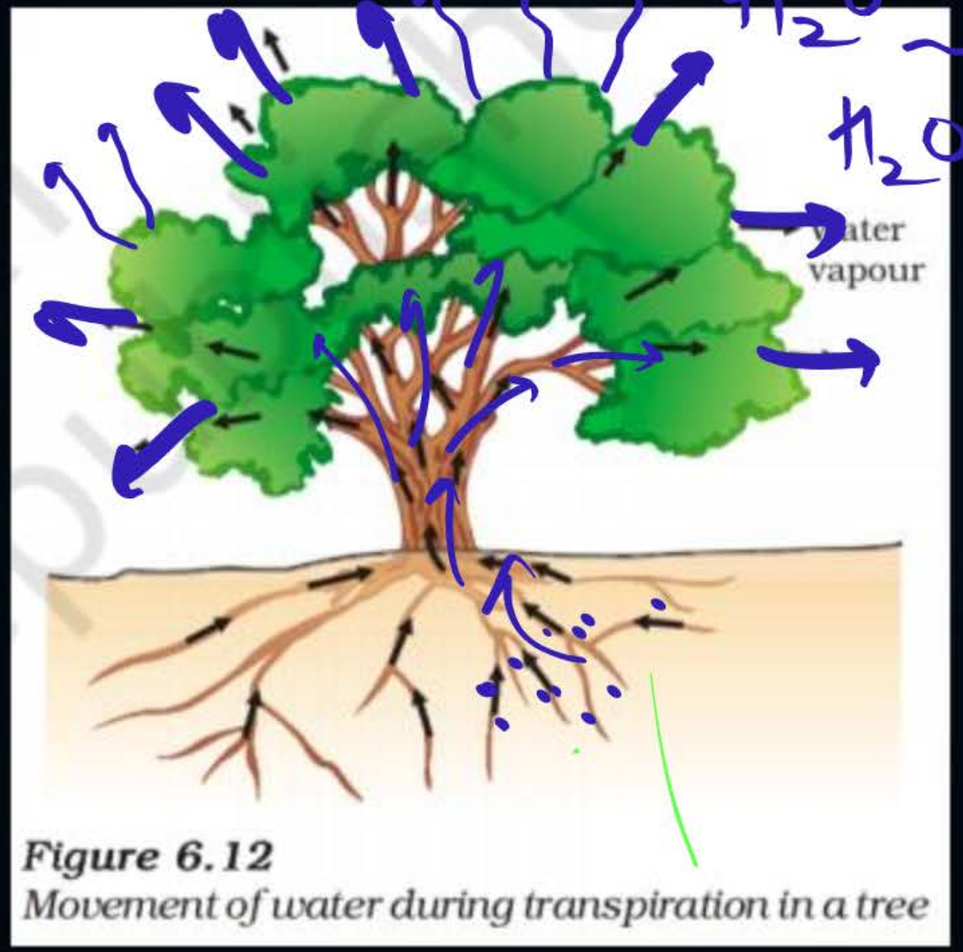


Figure 6.12
Movement of water during transpiration in a tree

Transpirational pull.

↓

pulling force

2.Transpiration / Suction pull : When water is lost from the surface of leaves due to process of transpiration a pulling force is developed inside the xylem tissue. This pulling forces is known as transpiration pull.This force helps in the upward movement of water in xylem from root to the leaves.

Transpiration is a Necessary Evil → Water Loss =

→ Water absorb, Transport

Functions of Transpiration :

1. Transpiration helps in the absorption (1) and upward movement (2) of water and minerals dissolved in it from roots to the leaves.
2. It also helps in temperature regulation (Evaporation Causes Cooling)
3. Transpiration helps to get rid of excess water

DAY

Stomata open

More transpiration

Transpirational pull : ↑↑↑↑↑

Root pressure : ↑↑

NIGHT

Stomata closed

Very less/ No transpiration

Transpirational pull : ↑↑

Root pressure : ↑↑↑↑↑↑

Transport of Food Via Phloem

photosynthesis product → food

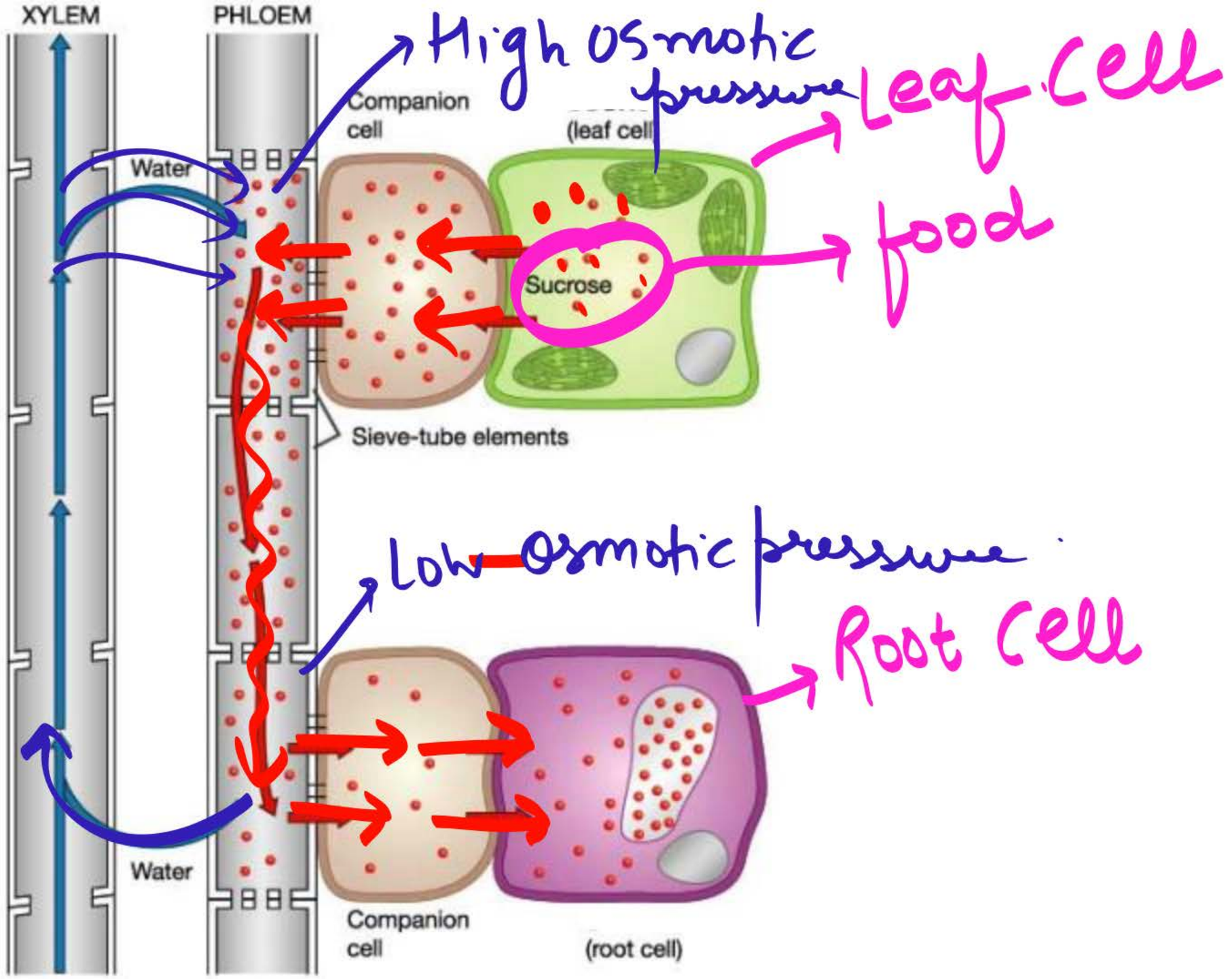
Translocation : The Upward and downward movement of photo assimilates (Food) from leaves to other part of the plant via phloem tissue is called translocation.

Energy(ATP) required

- Transport of substances in phloem occurs in both upward and downward direction.

(Bi directional)

Osmosis


XYLEM
PHLOEM
High Osmotic pressure
Leaf cell
food
Companion cell
(leaf cell)
Water
Sucrose
Sieve-tube elements
Low Osmotic pressure
Root cell
Water
Companion cell
(root cell)

Transport of Food Via Phloem

→ Living Tissue.

- Phloem is made up of four types of elements:

Living Cells ←

- Sieve tube elements (Nucleus absent)
- Companion cells (Nucleus cells)

→ Main Food Transportation

- Phloem parenchyma → Storage of food

dead Cell ←

- Phloem fibres → Strength & support

Xylem	Phloem
1) It transports water and minerals from roots to the apical parts of the plant.	1) It transports food material from the leaves to growing parts of the plant.
2) Xylem consists of tracheids, vessels, xylem fibres and xylem parenchyma.	2) Phloem consists of sieve tubes, sieve cells, companion cells, phloem fibres and phloem parenchyma.
3) Only xylem parenchyma is living.	3) Sieve tubes, sieve cells, companion cells and phloem parenchyma are living.
4) Tracheids, vessels, xylem fibres are dead tissues.	4) Phloem fibres are dead tissues.
6) Conduction of water by xylem is unidirectional i.e., from roots to apical parts of the plant.	6) Food material conduction is bidirectional i.e., from leaves to storage organs or growing parts or from storage organs to growing parts of plants.

#notes

energy. Material like sucrose is transferred into phloem tissue using energy from ATP. This increases the osmotic pressure of the tissue causing water to move into it. This pressure moves the material in the phloem to tissues which have less pressure. This allows the phloem to move material according to the plant's needs. For example, in the spring, sugar stored in root or stem tissue would be transported to the buds which need energy to grow.

food

Bud → flower

food → development

Question

Which of the following components of xylem are main water conducting channels ?

A Xylem parenchyma and Vessels

B Vessels and Xylem fibres

C Vessels and Trachieds

D Trachieds and Xylem parenchyma

Question

Which of the following statements is true regarding translocation?

A a. Translocation is achieved by utilising energy

B b. Food is transported by the process of translocation

C c. Translocation is bidirectional process

D d. All of the above

Question

Which of the following is major driving force for the ascent of sap during daytime ?

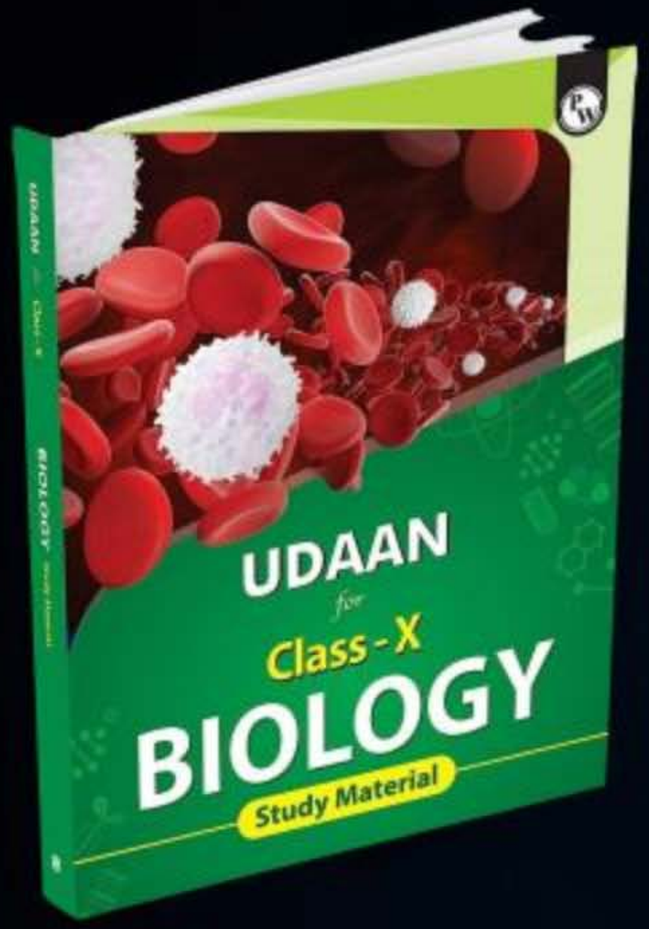
A Root pressure

B Gravitational pull

C Transpirational pull

D None of these

↳ Night time. Stomata open → Transpiration



Homework

FROM PW MODULE

(Udaan - CLASS 10)

PAGE : 57 Q-38, Q-39

Question of the Day

Average size and weight of a single human kidney

Joke/Meme of the Day

Transpiration losses alot of plant's water and also create transpiration pull for water absorption

DHA

THANK YOU