

PENANG SANGAM HIGH SCHOOL
P.O.BOX 44, RAKIRAKI
LESSON NOTES

Subject: Biology
Week 17

Year/Level: 11

Strand	1 Structure and Life Processes
Sub Strand	1.5 Structure And Functions In Plants
Content Learning Outcome	Discuss gas exchange in stems and the cohesion theory of water transport in plants. Compare sexual and asexual reproduction.

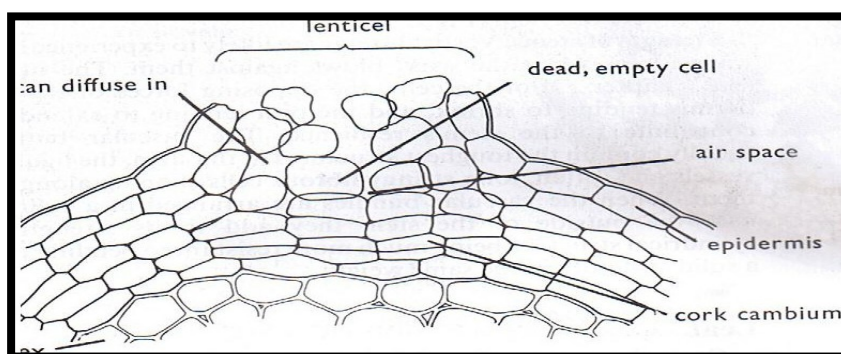
Gas Exchange in Stems

A. Herbaceous Stems

- Have small holes between the epidermal cells
- Internal stem cells receive oxygen for respiration

B. Woody Stems

- Have lenticels present in the bark
- Air diffuses into **lenticels** to spongy layer of cork tissue to inner portions of the stem



Gas Exchange in Roots

- Have small pores in the epidermis for getting oxygen for respiration
- Plants grow best in well aerated soil.

TRANSPORT IN PLANTS

2 Types of Vascular Tissues:

- **Xylem**-transports water and minerals
- **Phloem**-transports food

Transport of Water involves:

- Absorption by the roots
- Transport through the stems
- Evaporation from the leaves

Roots Adaptations for Water and Mineral Absorption:

- **Root hairs**- increase surface area for absorption
- **Roots spread out in the soil**- to absorb water and minerals from a larger area
- **Roots show hydro and geo-tropism**- growth towards water and gravity

Mechanism of Water and Mineral Transport:

- **Root Pressure**- osmosis causes water to enter the root cells
- **Active Transport**-enables minerals to enter root cells
- **Transpiration Pull**- water is sucked up the xylem to replace the water lost through evaporation from leaves

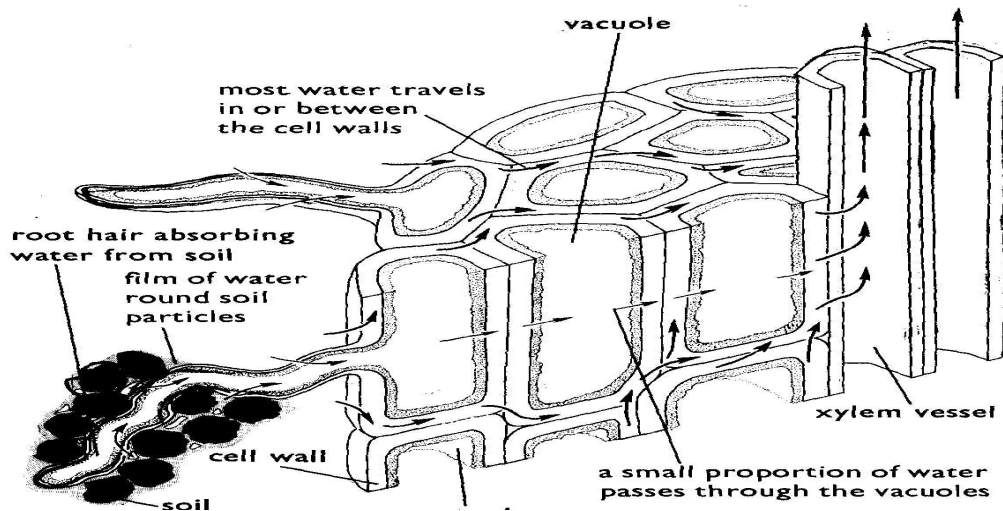
- **Water Cohesion**- water molecules stick together. As water particles move out of the leaves, others are pulled up in their place

The cohesion theory of water transport

1. Root Pressure

- Combined force of water entering the roots pushes water up the xylem
- It can be observed when water continues to exude from a freshly decapitated (cut) stem of a plant.

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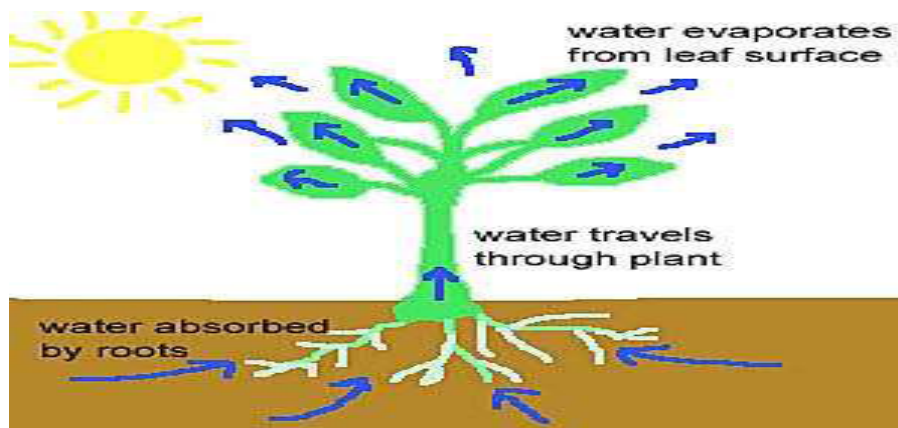


2. Capillary Action (capillarity)

- Water molecules are linked to each other and to the walls of the narrow xylem vessels.
- Force that holds the water molecules together is called cohesion.
- When one water molecule is moved, the molecule next to it is also drawn along.
- Cohesion tension is produced which pulls an unbroken column of water in the xylem.

3. Transpiration Pull (stream)

- Loss of water from the leaves of a plant by evaporation
- Loss of water from the mesophyll cells pull in water from the neighboring cells.
- Tension or pull is created on the column of water in the xylem vessels which extends all the way to the roots.
- Water is pulled up to the top of the plant in continuous column. This flow of water is known as **transpiration pull** or stream.



Note:

Food is the form of a **water and sugar** solution called **sap** which moves to all parts of the plant through phloem by a process called **Translocation**.

REPRODUCTION IN PLANTS

1. Asexual Reproduction
2. Sexual Reproduction

Advantages of Sexual and Asexual Reproduction

Asexual Reproduction	Sexual Reproduction
1. Only one parent required so does not need to find a mate	1. Offspring are genetically unique so creates variations
2. Offspring are supported by the parents	2. Seeds can be dispersed, thus reduces competition
3. New plants are produced in conditions already favorable to the parents	3. Leads to new colonies springing up

Disadvantages of Sexual and Asexual Reproduction

Asexual Reproduction	Sexual Reproduction
1. Genetically identical offsprings so vulnerability do diseases, as all species have the same genetic composition,	1. Genetically unique offsprings so hard to preserve characteristics
2. Limited range of adaptations to enable survival of species in changing environmental conditions	2. Two parents required therefore plants have to find a mate.
3. Dispersal problem - no fruits/seeds so leads to overcrowding therefore competition with parent plant	3. Offspring not supported by parent plant.

Activity

1. Discuss the gas exchange in herbaceous and woody stems.

2. By which process does mineral enter the root cells?

3. How does water enter the root cells?

4. Give one importance of reproduction.
