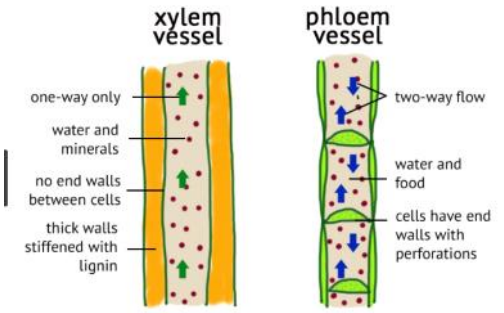
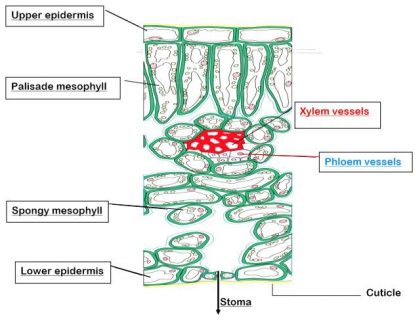
Xylem and phloem

Wednesday, 16 March 2022 3:12 pm





Xylem

- has a continuous lumen without protoplasm (adaptation)
  - ↳ enables water to move easily through the lumen (function)
- Lignin deposit in the inner wall of xylem vessel
  - ↳ provide mechanical support
  - ↳ prevent collapse of vessels

Main function: conduct water and dissolved mineral salts from roots to the leaves

phloem

contains sieve tube and companion cells

Sieve tube cells are joined with sieve plates in between

- elongated
- no nuclei, however contains
  - ↳ reduce resistance to the flow of substance
    - Allow glucose and amino acids to flow more easily

sieve plates contains many small pores

- ↳ Allows rapid flow of substances

Companion cells

provide seive cells with nutrients and energy

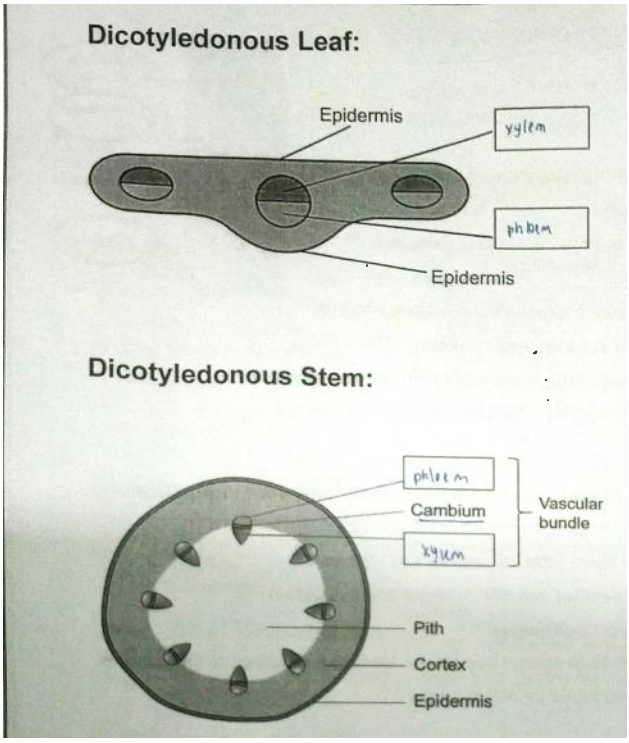
because sieve cells lack nucleus

- narrow thin-walled cytoplasm and nucleus
- has many mitochondria to release energy needed for loading of sugars from mesophyll cells into

Sieve tube cells into sieve tubes by active transport

Vascular bundle

Thursday, 24 March 2022 8:36 PM



xylem more important so it'll be on top
phloem → food → less important than H_2O
hence below

water → more important → stored deeper than phloem
food less important than H_2O so nearer to cortex

Translocation

Definition:

Transport glucose and amino acids in the plant

unlike xylem, phloem tube is bidirection, up or down

Wilting

Thursday, 24 March 2022
11:57 pm

Plants wilt because of excessive water loss

rate of water loss higher than rate of absorption

Plant cell become flaccid → leaf fold → reduce surface area exposed to sunlight

→ guard cell smaller → stomata smaller → less CO_2

↓ rate of photosynthesis

Entry of water

Thursday, 24 March 2022 9:20 pm

Water and mineral salts enter the plant via roots

H_2O → osmosis

thin film of water with low conc of mineral salts in soil (HWP)

Sap in root hair cells saturated with salt and sugar (LWP)

osmosis from HWP soil particles to LWP cell sap

mineral salts / (ions)

mineral salts enter via diffusion from high conc in soil to lower conc in root hair cell via diffusion

concentration of ions in the soil solution than in root hair cell, ions are taken in by active transport

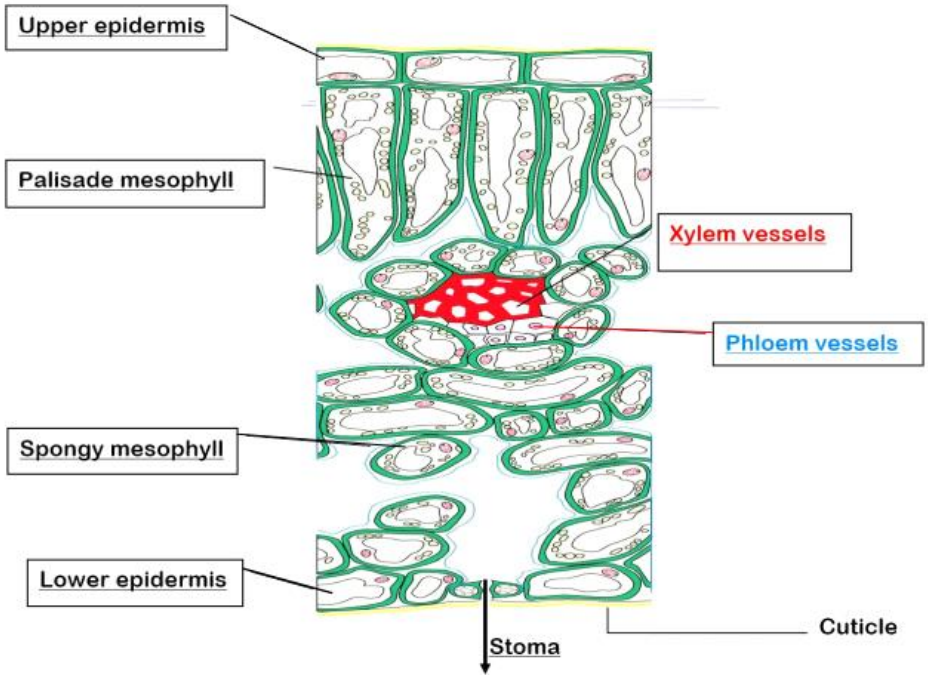
Transpiration

Thursday, 24 March 2022 9:18 pm

Definition:
Transpiration is the loss of water vapour from the aerial parts of the plant, especially through the stomata of the leaves

movement of water through a leaf

1. Water moves out of the spongy mesophyll cells to form a thin film of moisture around the spongy mesophyll cells around their surfaces
2. Water evaporates from the thin film of moisture to form water vapour in the intercellular air spaces
3. Water vapour diffuses through the stomata from the intercellular air space to the drier area outside the leaf
4. Water moves out of the spongy mesophyll to replenish the thin film of moisture that evaporated. Spongy mesophyll cell decreases in water potential
5. Spongy mesophyll cells will then draw water via osmosis from the xylem
6. This results in transpiration pull, a suction force that pulls the column of water up the xylem vessel



Transpiration importante

evaporation of water from the surface of mesophyll cells & temperature. no denature of enzymes

Factors

Thursday, 24 March 2022 11:57 pm

1. Temperature of air

↑ temp leads to ↑ rate of evaporation

↳ more H_2O to replenish thin film of moisture

2. Light intensity

higher light intensity → guard cell become more turgid from photosynthesis

↳ ↑ photosynthesis → ↑ glucose (↓ ψ_w) osmosis happen (↑ ψ_w)

3. Wind

When more wind, more water vapour blown near stomata

↳ decrease water vapour near stomata ∴ maintain conc gradient

4. Humidity

water vapour in leaf escape to atmosphere outside leaf

higher humidity, lower water vapour conc ∴ decrease transpiration