

Question

- What is the name for the respiratory system of insects?
- Gas is exchanged in human lungs in small air sacs called what?
- _____ helps maintain a constant pressure potential of oxygen in bird lungs.

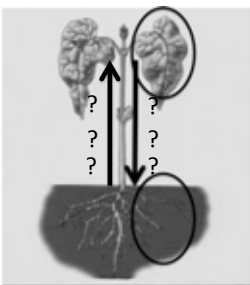
Review



- Photosynthesis – how plants make energy
- How plants obtain nutrients and water through the root hair and travel to the xylem

http://video.ecb.org/badger/download/Mc/animations/thumbs/Plant_Diagram.jpg

Questions



- How do those nutrients get from the leaves to the roots and shoots?
- How does the water get from the roots to the shoots?

http://video.ecb.org/badger/download/Mc/animations/thumbs/Plant_Diagram.jpg

Questions

Shoot System

Root System

- How do those nutrients get from the shoots to the roots?
Translocation

- How does the water get from the roots to the shoots?
Transpiration

http://video.ecb.org/badge/download/Mc/animation/thumb/Plant_Diagram.jpg

Transpiration vs. Translocation

Transpiration	Translocation

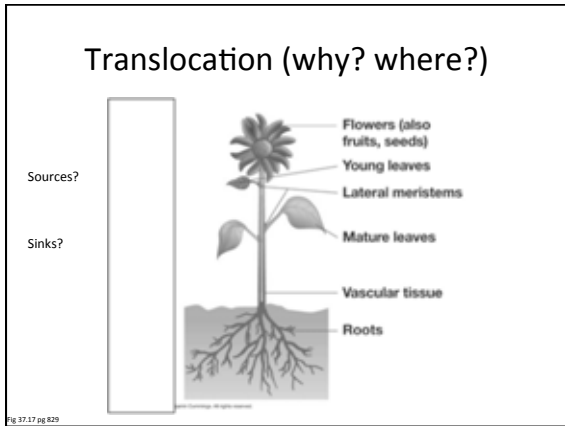
Translocation

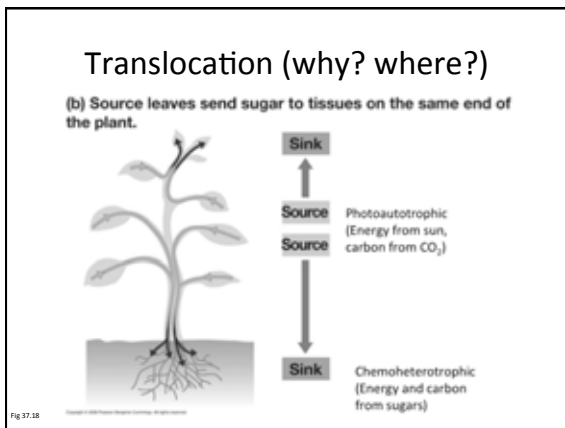
- Movement of sugars through the plant

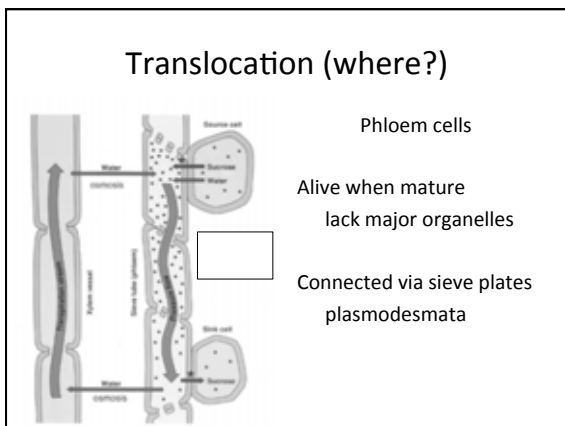
- Phloem cells

- Movement in either direction

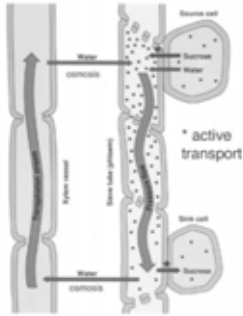
- Energy required







Translocation (how?)



- Think cause and effect
1. Sugars (actively) transported into phloem from source (how?)
 2. Osmotic potential pushes water in, creates high pressure
 3. Pressure potential causes movement of water to low pressure (sink)
 4. Sugars (actively) transported into sink

Transpiration


- Loss of water at the stoma (leads to movement of water throughout plant)
- Xylem cells
- Movement from root to shoot only
- Passive process

- Evaporation, capillary action, root pressure, guttation
- Xylem, dead cells, tracheids

Transpiration (how?) Root pressure

- Combination of 3 factors
1. Root pressure
 2. Capillarity
 3. Evaporation

Transpiration: root pressure (osmotic "push")



ions accumulate in roots from soil.

Water from the soil moves in by osmosis.


Accumulating water in the root causes a high water potential.

Water potential pushes water up the xylem.

Can push water up to a meter up.

This is not "dew" condensing!

Transpiration: root pressure (osmotic "push")



The veins (coarse and fine) show that no cell in a leaf is far from xylem and phloem (i.e. water and food!).

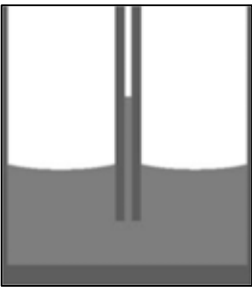
The xylem of the veins leaks at the leaf margin in a modified stoma called the hydathode.

These droplets are xylem sap.

Root pressure accounts for maybe a half-meter of "push" up a tree trunk.

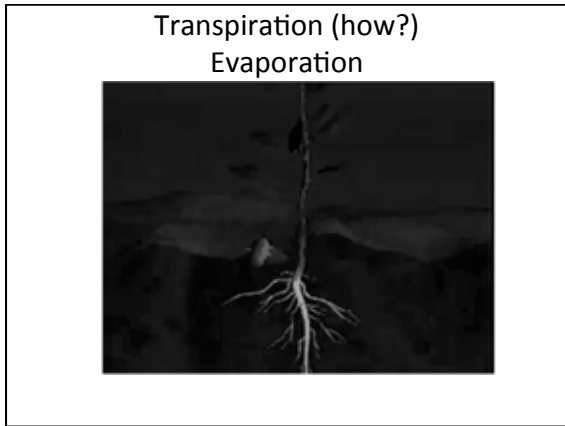
<http://img.fotocommunity.com/photos/6489473.jpg>

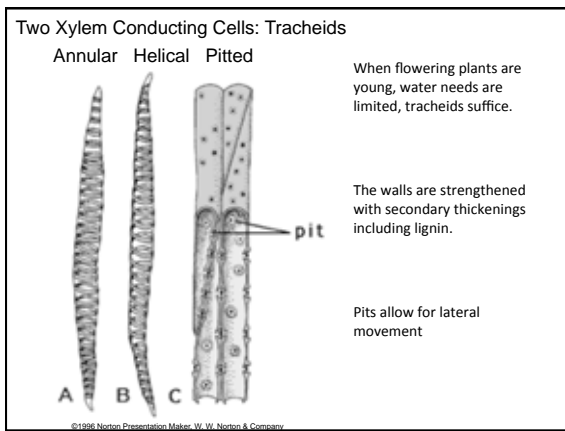
Transpiration (how?)
Capillary Action

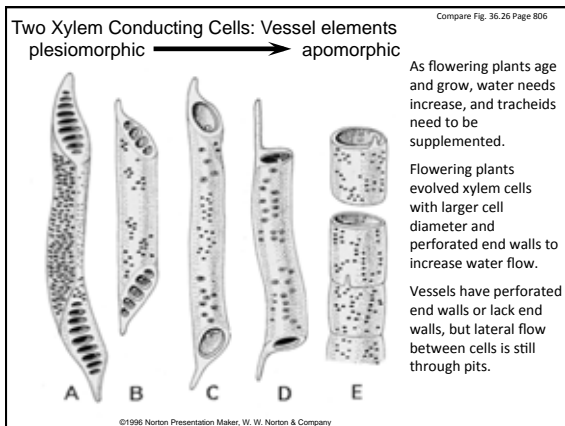


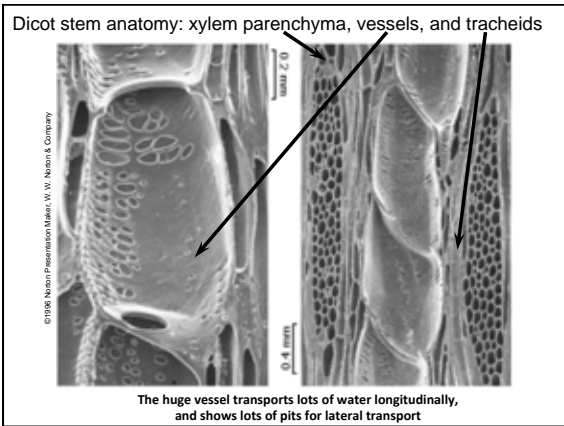
- Adhesion
 - Attraction to unlike molecules
 - Xylem cells
- Cohesion
 - Attraction to like molecules
 - Water molecules
- Both possible through hydrogen bonding

<http://www.cse.ohio-state.edu/~whhin/Wang.2005-WDS/Wang.2005-WDS.htm>









Questions

- Translocation of material moves through which cells?
- Which type of transport is a passive process?
- What three things are necessary to move water up xylem cells?
