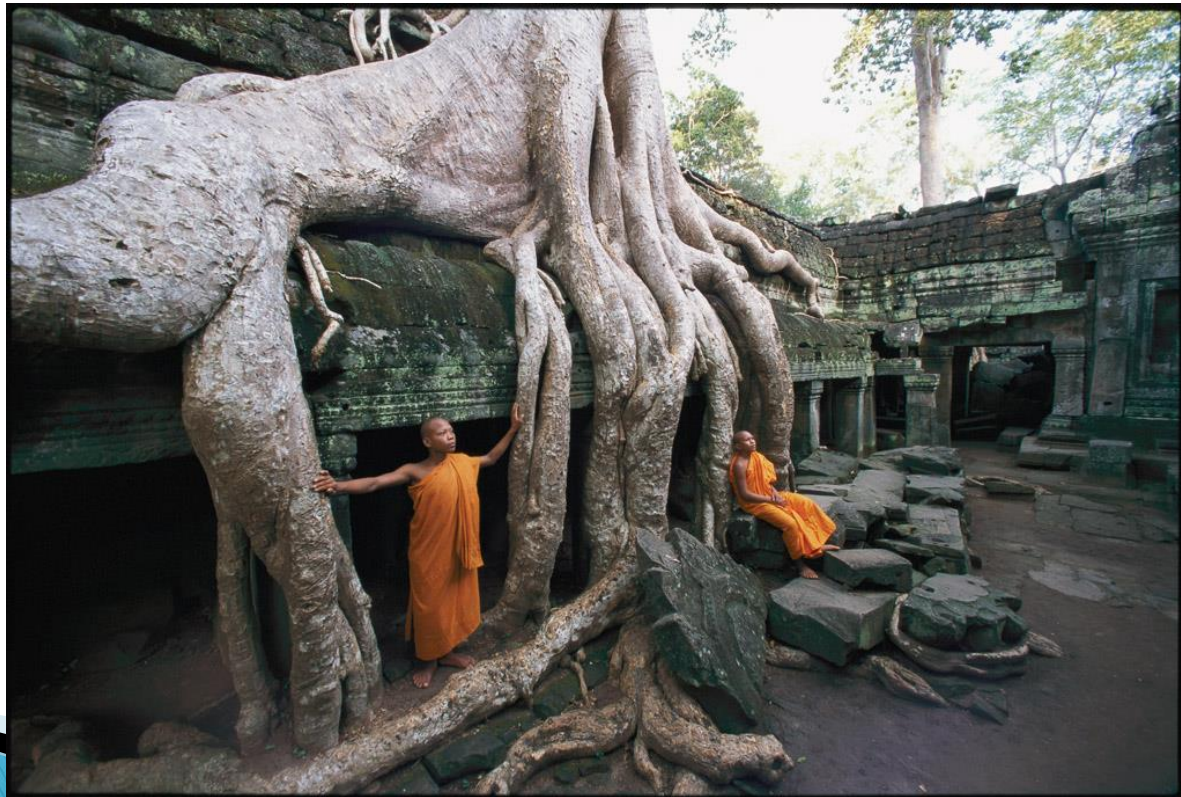


Plant Cells and Tissues



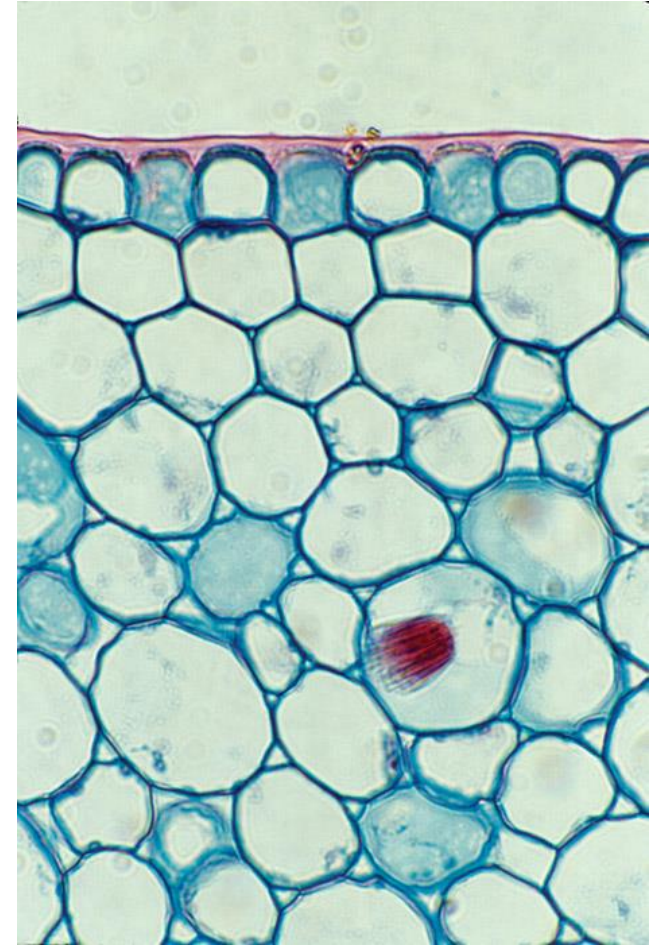
Key Concept:

- ▶ **Plants have specialized cells and tissue systems.**



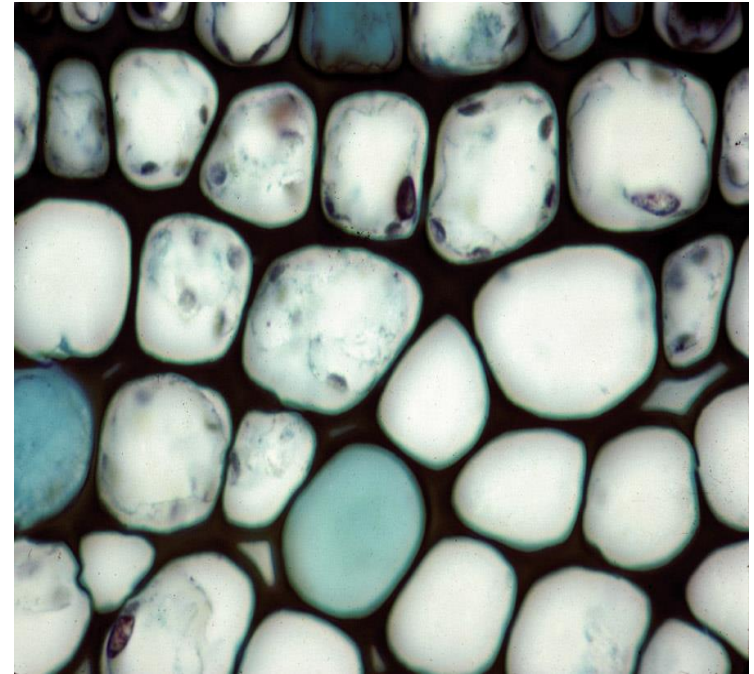
Plant tissues are made of three basic cell types.

- ▶ Parenchyma cells are the most common plant cell type.
 - store starch, oils and water
 - help heal wounds to the plant
 - have thin flexible walls



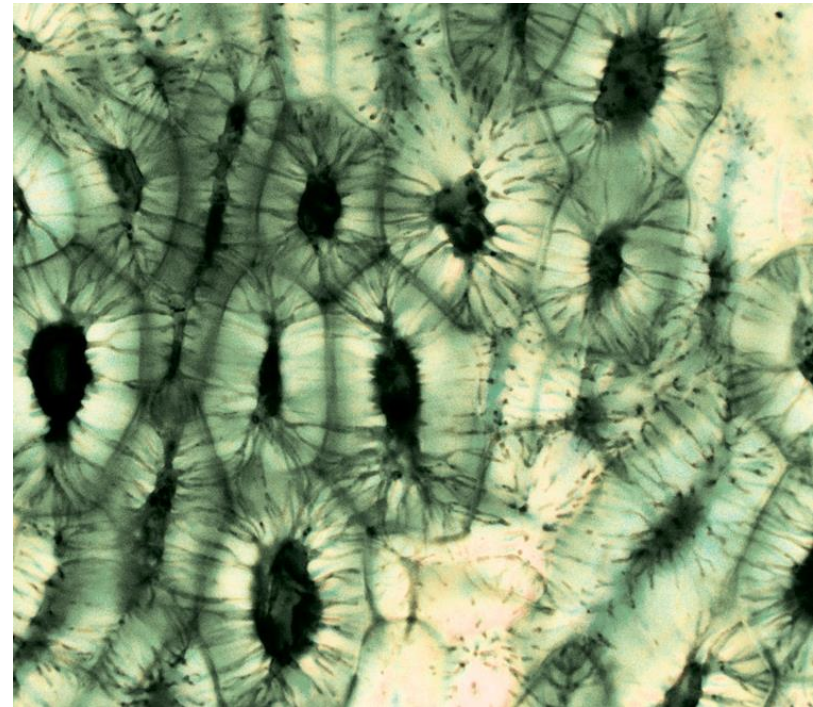
Plant tissues are made of three basic cell types.

- Collenchyma cells provide support to a growing plant.
 - they are strong and flexible.
 - celery strings are strands of collenchyma.
 - they have unevenly thick cell walls.



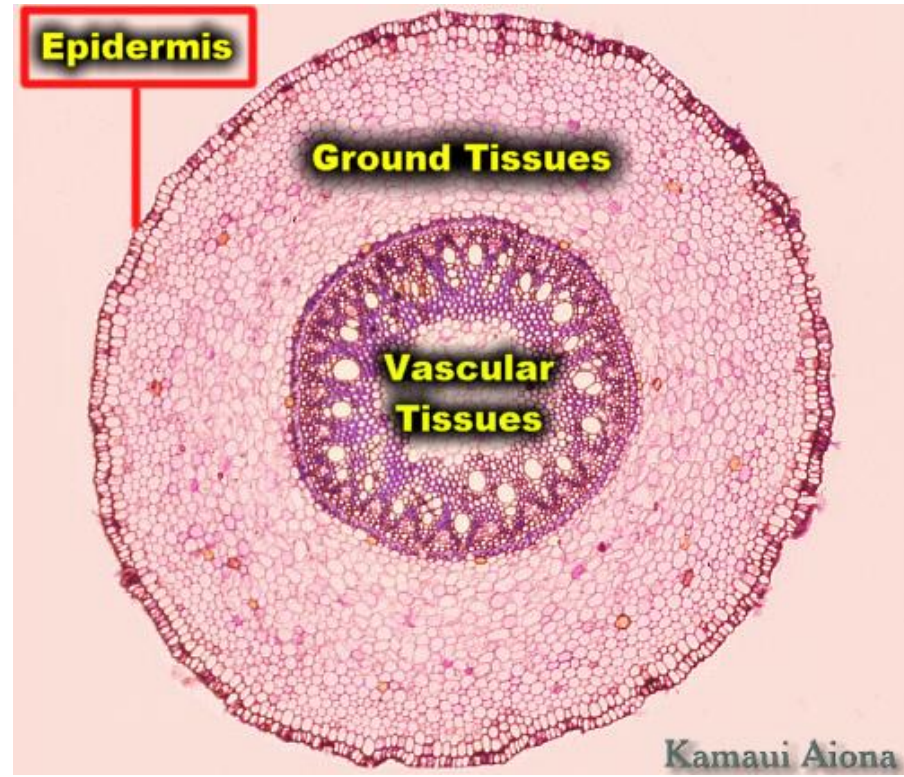
Plant tissues are made of three basic cell types.

- ▶ **Sclerenchyma cells** are the strongest plant cell type.
 - second cell wall hardened by lignin.
 - die when they reach maturity.
 - used by humans to make linen and rope.



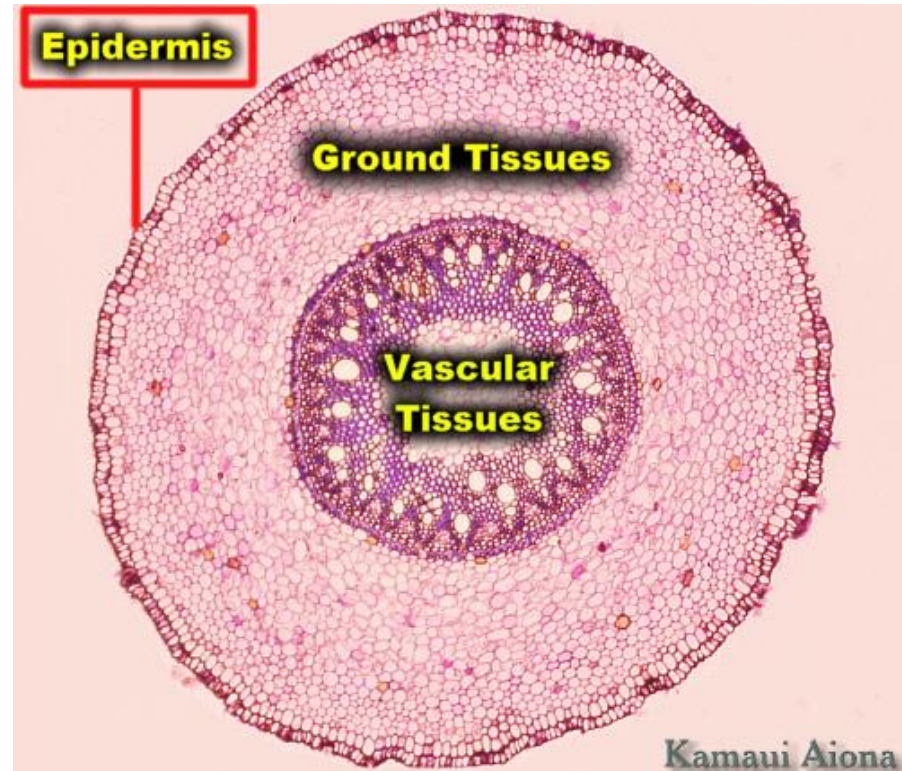
Plant organs are made of three tissue systems.

- ▶ Dermal tissue covers the outside of a plant.
 - protects the plant
 - secretes cuticle of leaves
 - forms outer bark of trees



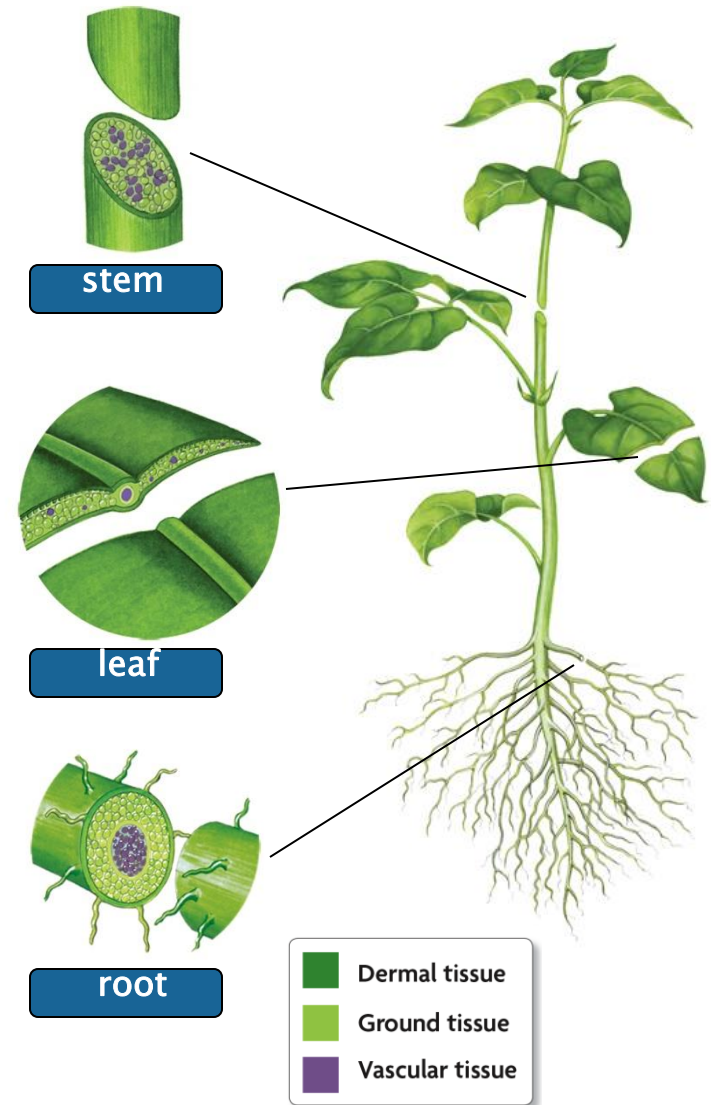
Plant organs are made of three tissue systems.

- Ground tissue is found inside a plant.
 - provides support
 - stores materials in roots and stems
 - most commonly made of parenchyma.



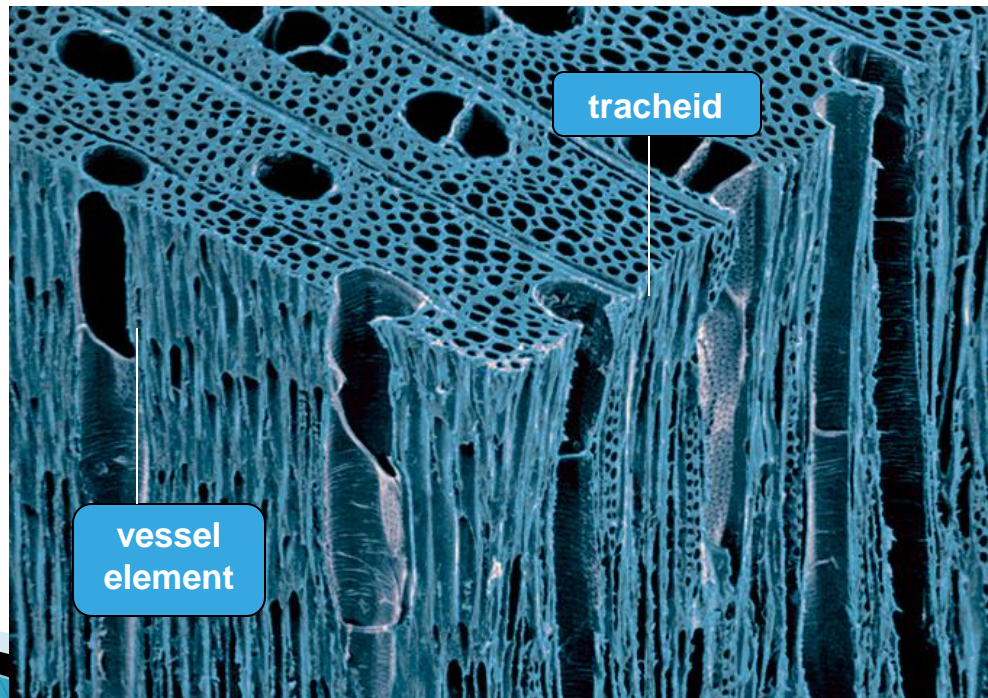
Plant organs are made of three tissue systems.

- ▶ Vascular tissue transports water, minerals and organic compounds.
 - two networks of hollow tubes
 - xylem transports water and minerals.
 - phloem transports photosynthetic products (glucose, starch).

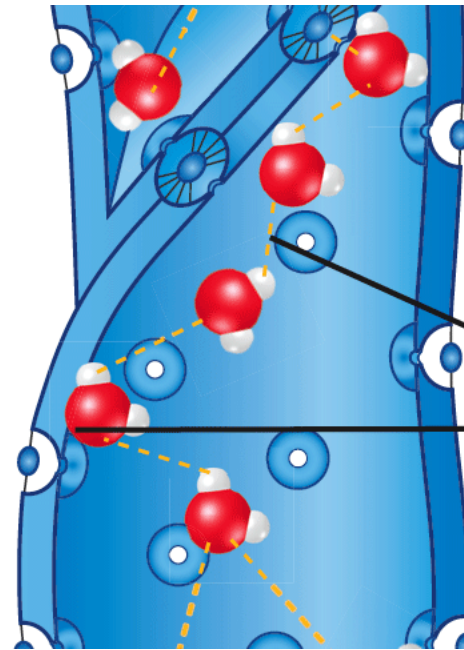


Water and dissolved minerals move through xylem.

- ▶ Xylem contains specialized cells.
 - vessel elements are short and wide
 - tracheid cells are long and narrow
 - xylem cells die at maturity



- The cohesion-tension theory explains water movement.
 - Plants passively transport water through the xylem.
 - Cohesion is the tendency of water molecules to bond with each other.
 - Adhesion is the tendency of water molecules to bond with other substances.



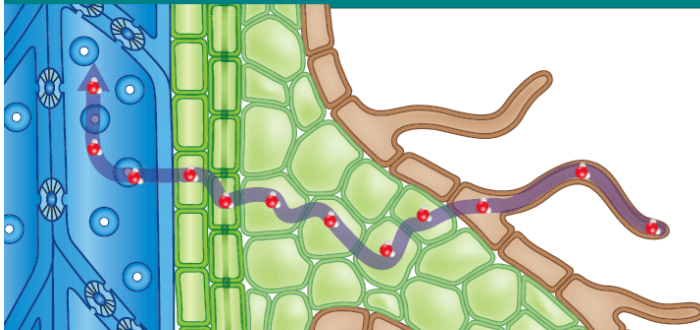
Cohesion and adhesion create tension within xylem that helps move water upward.

cohesion

adhesion

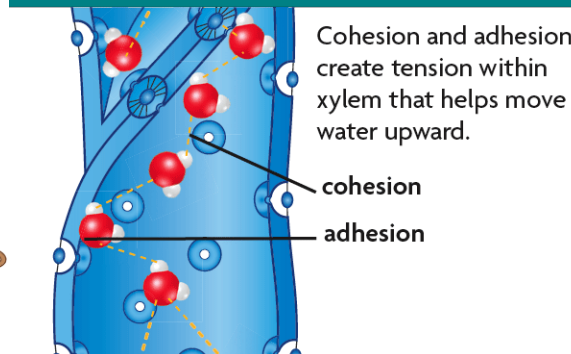
- Water travels from roots to the top of trees.
 - absorption occurs at roots
 - cohesion and adhesion in xylem
 - transpiration at leaves

ABSORPTION

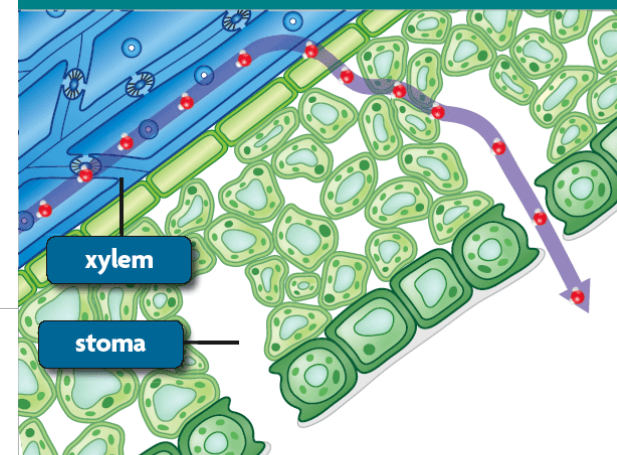


Water and dissolved minerals in the soil are pulled into roots through cell walls, through plasmodesmata (channels), or from cell to cell through their vacuoles.

COHESION AND ADHESION



TRANSPIRATION



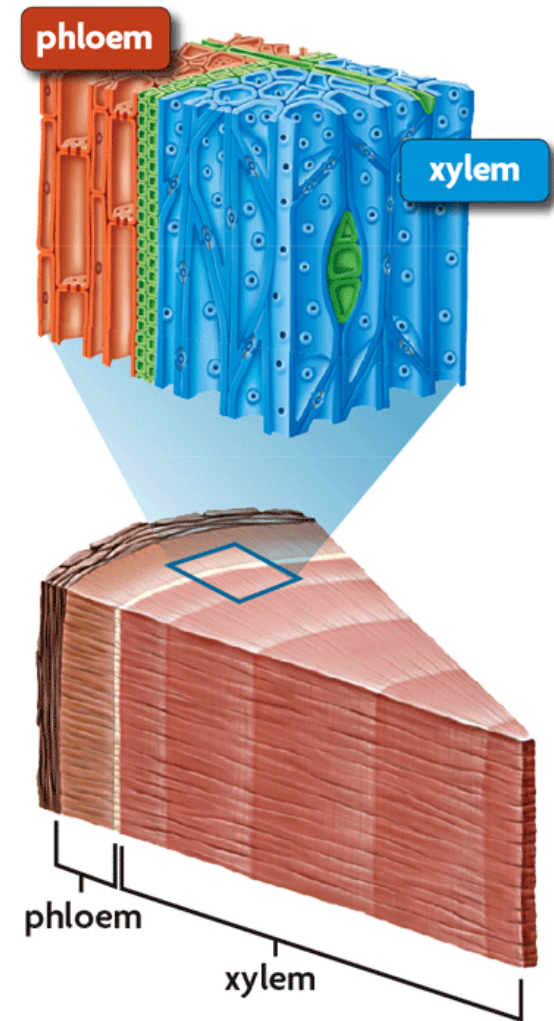
Transpiration is the evaporation of water through leaf stomata. It is the major force moving water through plants.

- Transpiration is the loss of water vapor through leaves.
 - water vapor exits leaf stomata
 - helps pull water to the top branches

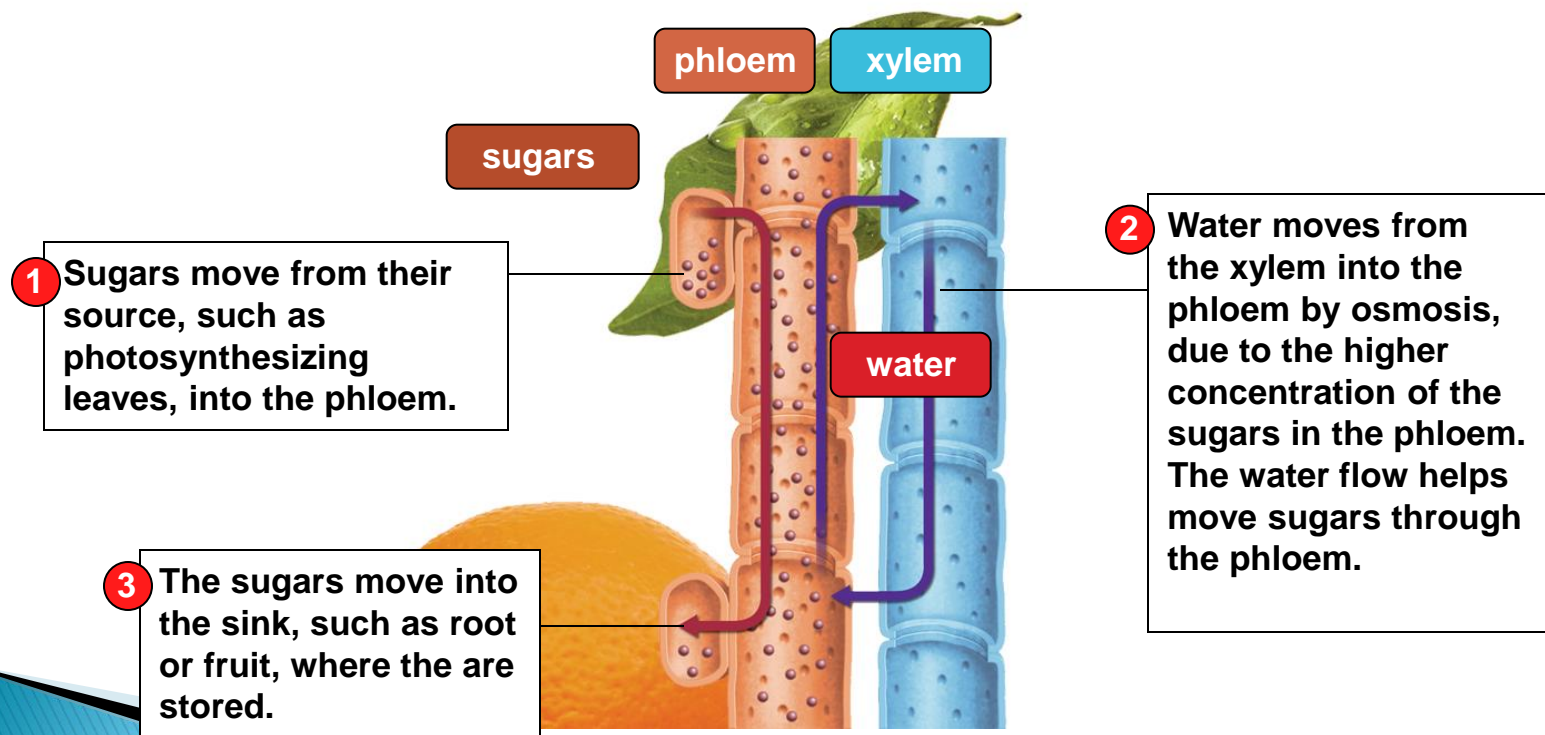


Phloem carries sugars from photosynthesis throughout the plant.

- ▶ Phloem contains specialized cells.
 - sieve tube elements have holes at ends
 - companion cells help sieve tube elements
 - unlike xylem, phloem tissue is alive



- The Pressure-flow model explains sugar movement.
 - plants actively transport sugar from the source
 - sugar flows to the sink due to pressure differences



Plants have special tissues for growth.

- ▶ Meristematic – Constantly dividing, producing new cells. (Regions of growth.)
 - Apical meristem – tips of roots or stems. Increase plant length.
 - Vascular cambium – between bark and wood. Increases diameter.

