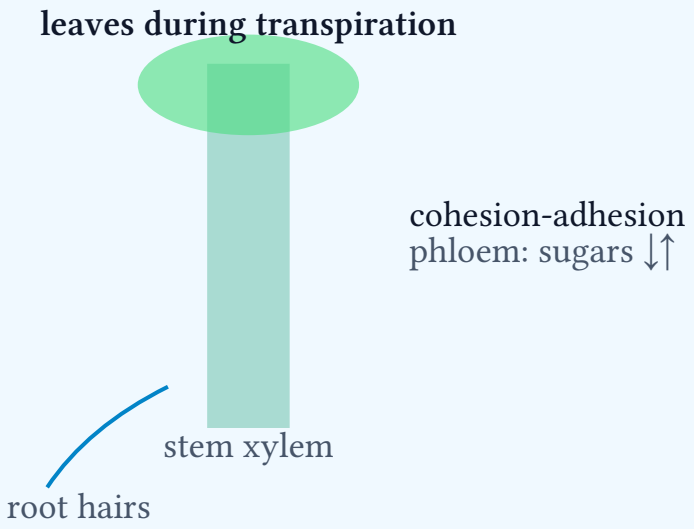
Science 10

Unit C: Cycling of matter in living systems

Plant water transport and transpiration

Water transport in tall trees

- A tall tree has no heart-like pump, yet its leaves can release litres of water on a sunny day.
- Cohesion, adhesion, and pressure differences move the column.



From root hair to stoma

- Follow water from the soil into a root hair, up the xylem, and out through a stoma.
- Water enters root hairs when a water-potential difference produces net osmosis into root cells.
- Cohesion holds water molecules together, while adhesion attracts water to xylem walls and helps stabilize the column.

Key terms

xylem

Plant vascular tissue that transports water and dissolved minerals mainly upward.

phloem

Plant vascular tissue that transports sugars and other organic substances between sources and sinks.

transpiration

Loss of water vapour from plant surfaces, mainly through stomata.

cohesion

Attraction between molecules of the same substance, such as water molecules.

Key terms

adhesion

Attraction between molecules of different substances, such as water and xylem walls.

turgor

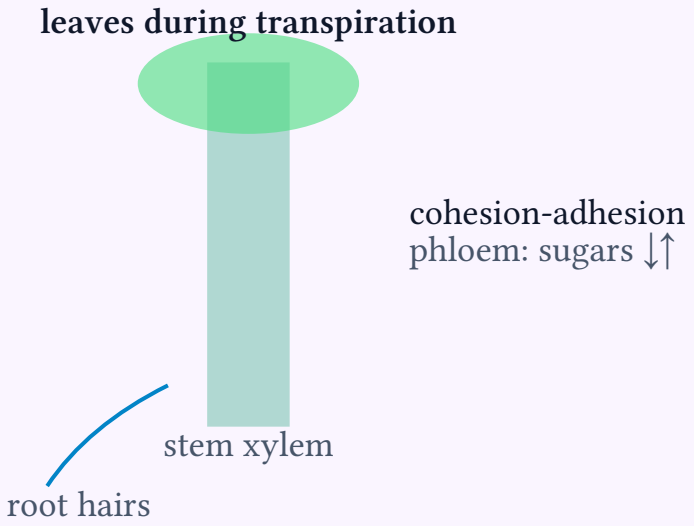
Pressure of cell contents against the cell wall after water enters a plant cell.

root hair

A root epidermal-cell extension that increases surface area for water and mineral uptake.

Xylem and upward flow

- Xylem vessels carry water and dissolved minerals from roots to shoots.
- Transpiration from stomata lowers water potential in leaves: pull on the water column.
- Cohesion (water-water) and adhesion (water-xylem wall) help maintain the column.



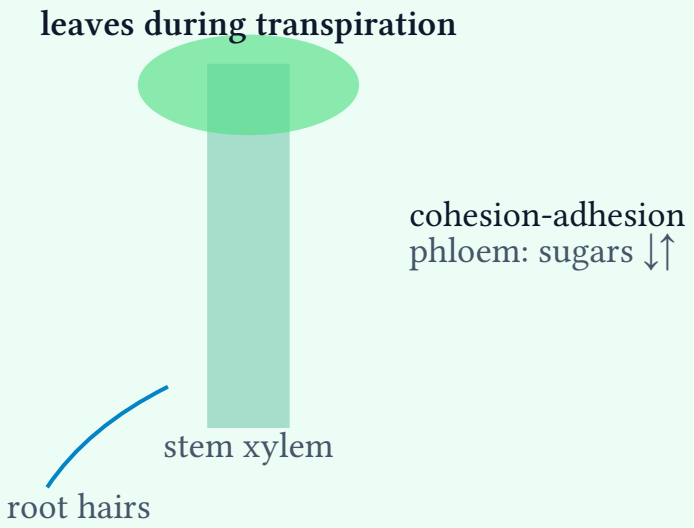
Roots and phloem

- Root hairs add surface area, and water enters those cells by osmosis before it reaches the xylem.
- Phloem carries sugars from leaves toward roots and fruits, and that flow can change direction.



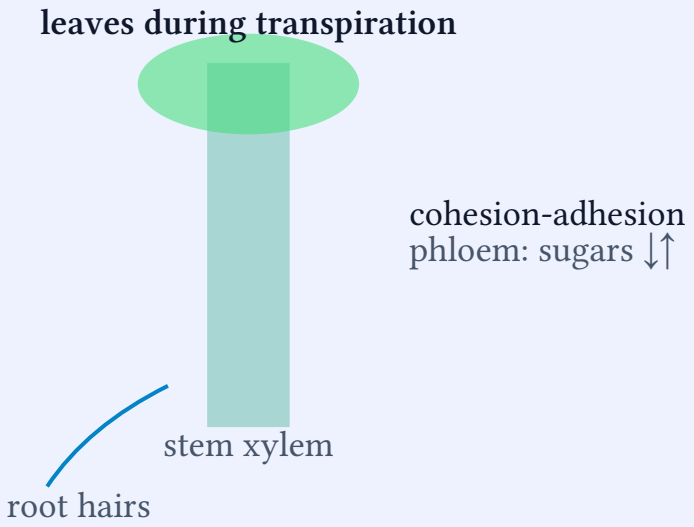
Dye in celery

- Coloured water in the xylem shows the path. Predict which tissue changes colour first.
- When a cell loses enough water, it loses turgor and the tissue wilts.



Alberta agriculture

- Crop irrigation and drought stress link to transpiration rates and soil moisture.
- On the prairies, irrigation is a stewardship choice because crops lose water through their leaves.
- A hot windy afternoon raises transpiration, so the watering decision depends on soil moisture.



Pathway diagram

- Sketch the path from soil to a root hair, up the xylem, out of the leaf, and into the air.
- Label osmosis, cohesion and adhesion, and transpiration on that path.

Plant transport retrieval check

- Trace water from soil through a root hair, xylem, leaf, and stoma.
- Explain the different roles of cohesion, adhesion, and transpiration.
- Contrast xylem transport with phloem translocation.

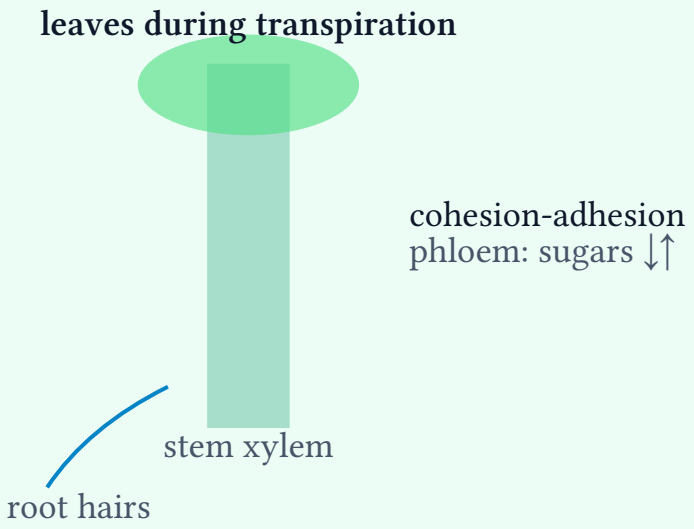


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