TRANSPORT OF WATER AND SUGAR IN PLANTS

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Thursday,
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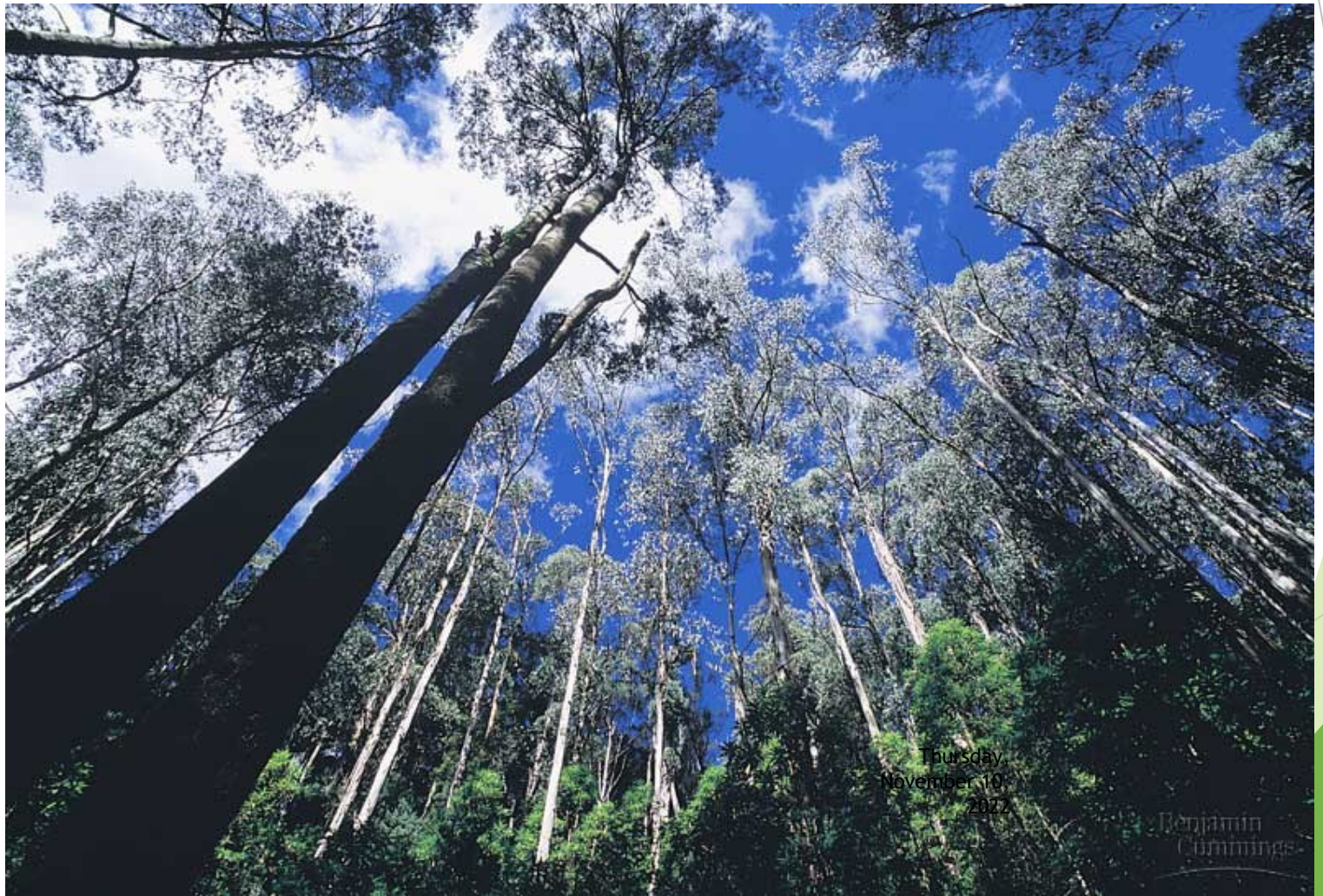
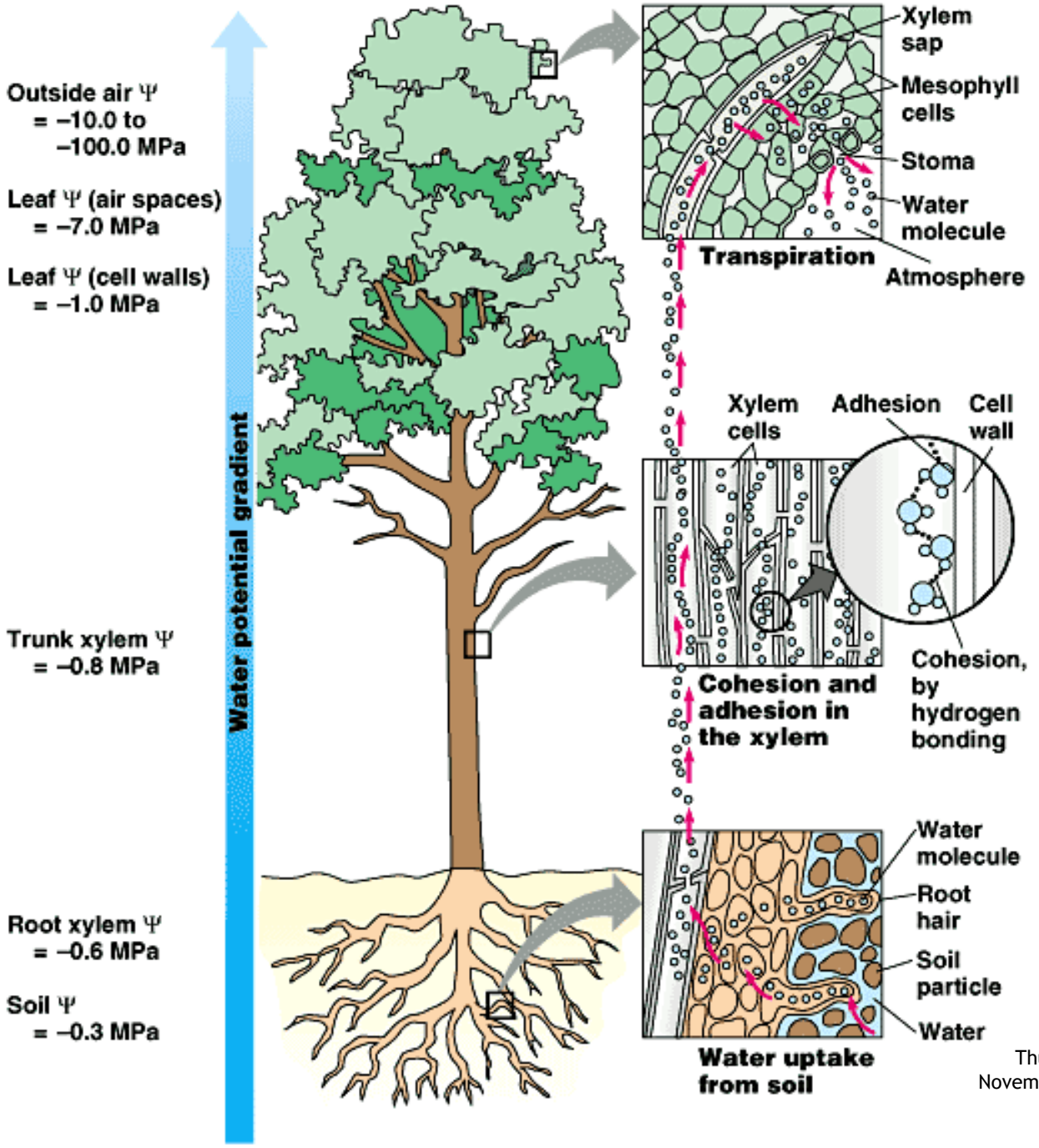
How does water get up a tree?

Transpiration Cohesion Tension Mechanism



- Water molecules in the xylem are transported up from the roots by transpiration, the evaporation of water from leaves.
- Water molecules' affinity for one another allows for the maintenance of a continuous water column.
- Water flows down a gradient of water potential (), from high to low (influenced by pressure, gravity, and solute content).
- Water potential ranges from -10 to -100 MPa at the leaf, and it gradually increases at the roots (-0.6 MPa).
- Water flow and cohesion sustain the tension of the water column.



Low water potential
(-10 to -100 MPs)

WATER FLOW

Medium water potential
(-0.8 MPs)

WATER FLOW

High water potential
(-0.3 MPs)

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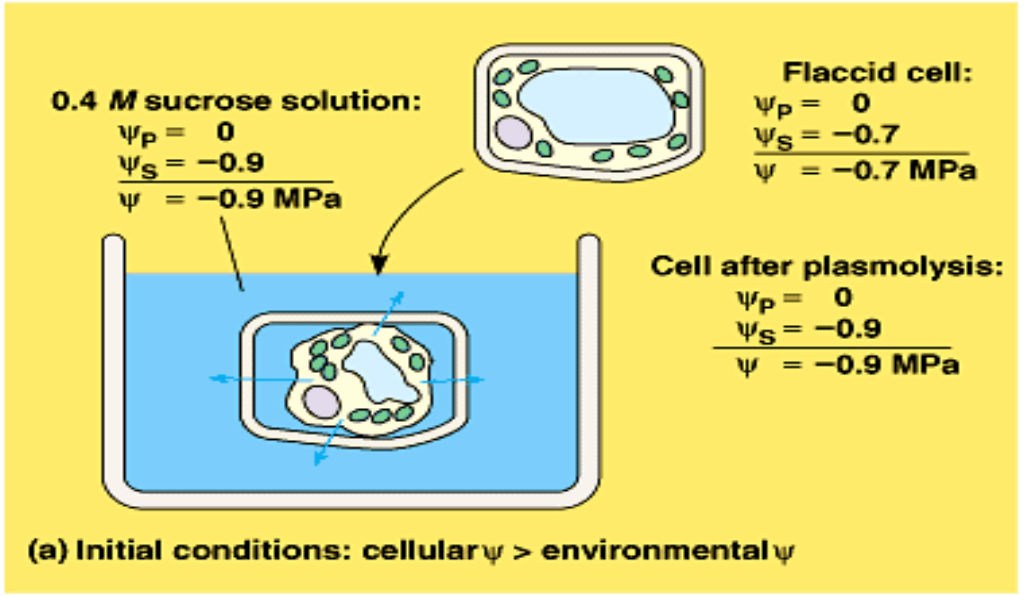
How is sugar transported?

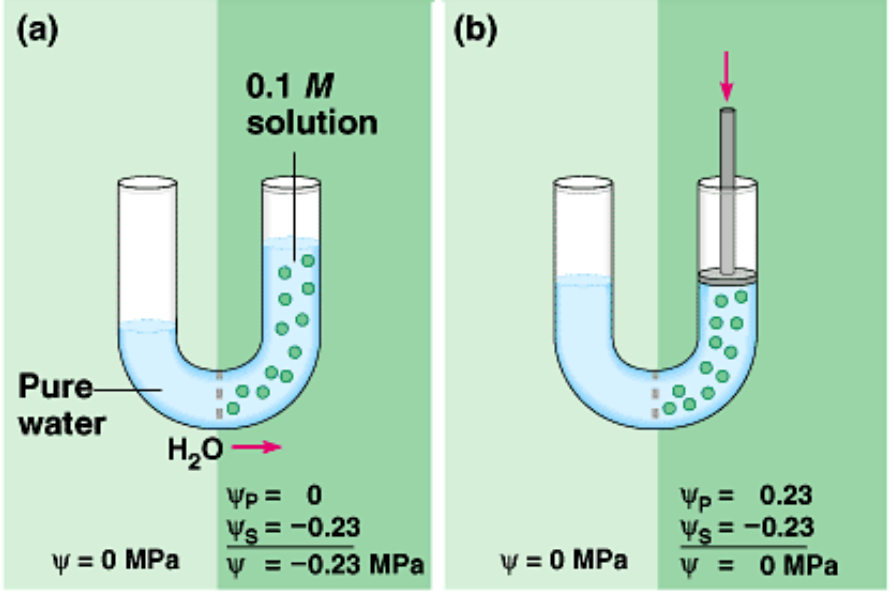
Movement occurs from a region of high concentration to low concentration:

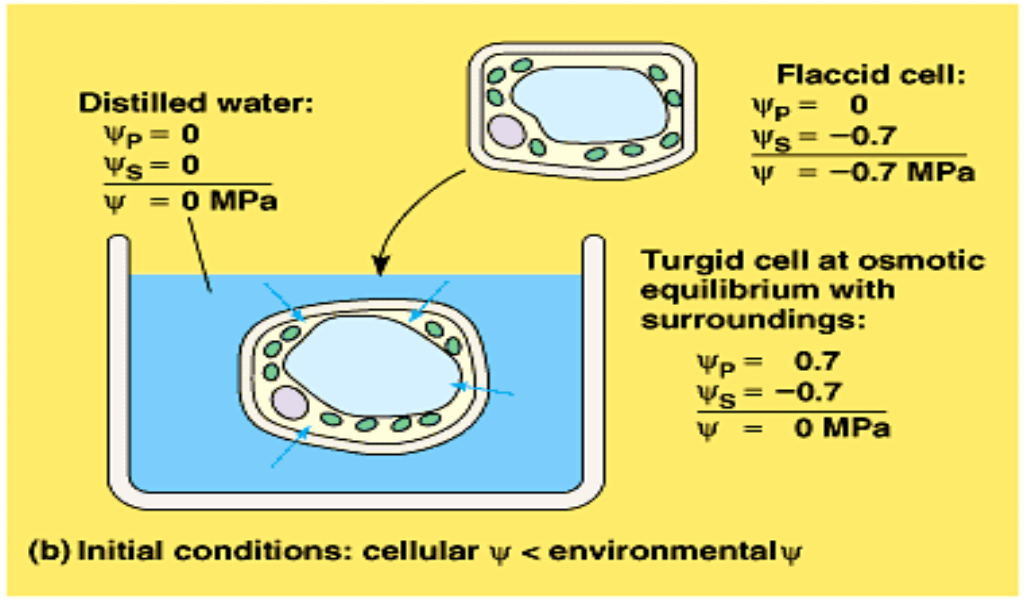
- **Sugar source (where sugar produced, e.g., from leaf or by breakdown of starch) to a**
- **Sugar sink (where it is utilized)**

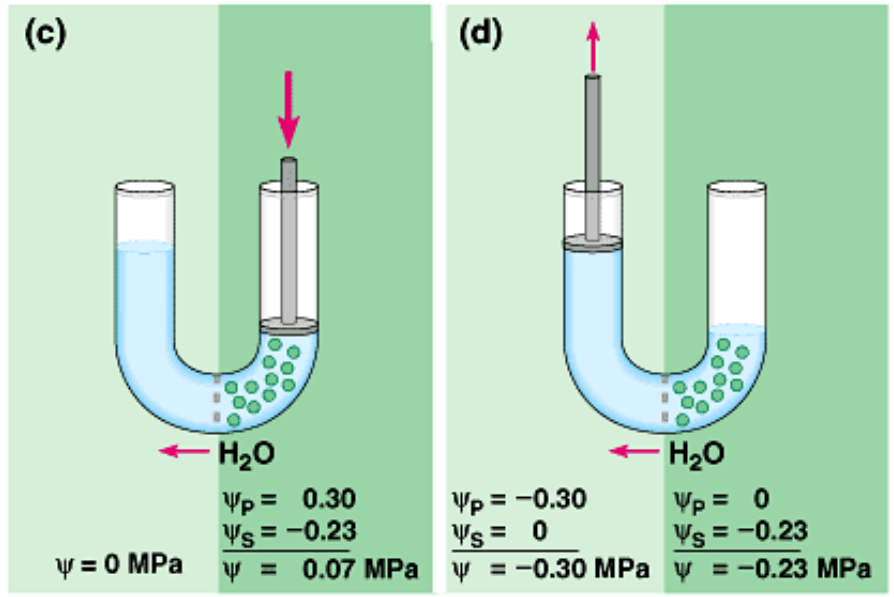
How is sugar transported?

1. Positive osmotic pressure is created when water enters sieve elements, and it is greatest where sugar concentration is highest.
2. As a result, sugars flow via pressure from a high-concentration (high pressure) region to a low-concentration zone (low pressure)









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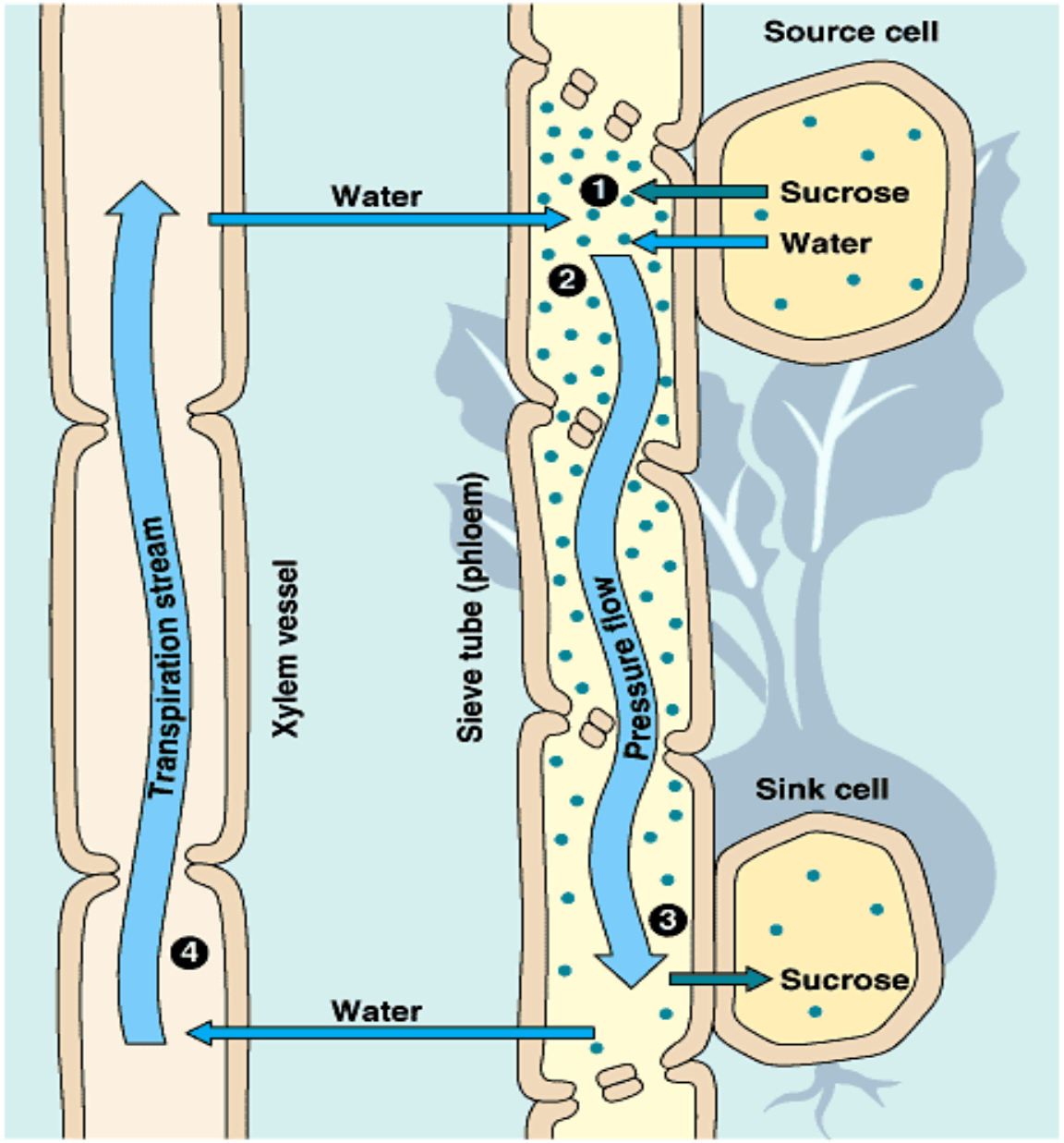
Osmosis-movement of water across a membrane from low to high concentration of solutes – results in **increased osmotic pressure**.



Pressure Flow:

Movement by osmotic pressure within sieve elements from high sugar concentration to low sugar concentration:

Sugar source (where sugar produced, e.g., from leaf or by breakdown of starch)
to a **Sugar sink** (where it is utilized).

Thank You

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