Pressure-Flow Model:

- Only works to push H₂O for short distances (several meters) - must have cohesion-tension to pull in water up large trees.
- Because Ψₛ is more negative in the roots of the plant, water will enter into the xylem. The increase in water causes an increase in pressure within the tube (because it has thick secondary walls and rigid primary walls that will not expand significantly). Finally, the increased pressure pushes the water up the xylem to the stem/bark and into the plant/tree.
- Back explained this as the primary way sugar/starch molecules are transported in the phloem. But unlike xylem, it has a bidirectional flow, causing water to enter it when the Ψₛ is more negative due to solute concentration.

Cohesion-Tension Model:

- This model is described as the pulling of H₂O up the plant/tree, explained by the properties of water.
  1. Cohesion: water is extremely cohesive due to extensive hydrogen bonds between water molecules. Therefore, it likes to stick together.
  2. The hydrogen bonds also create a high surface tension for water.

Next, we know that transpiration (evaporation) of water is occurring all the time in plants through their stomata in leaves. Each time a water molecule evaporates, it causes a tension-pulling upward force on subsequent H₂O molecules to replace the vacant spot.

This pulling force creates a chain reaction, pulling strongly at the leaves (which transpiration occurred) running all the way down to the roots. Thus, there is always a bulk flow of H₂O being pulled up the xylem to replace water that has evaporated.