

October 22, 2009  
PMB 102/IB 102

## Transport

The transport in plants of water and nutrients over long distances, without the aid of a pump, is second only to photosynthesis as the most unique and outstanding biophysical process in plants.

- Apoplast= non-living component; no membrane = xylem (in rare circumstances includes intercellular space)
- Symplast = living tissues with membranes = phloem
  - Phloem
    - principal conducting element = sieve element/cell
    - close spatial relationship with xylem
    - rates of transport 500-1500 mm/hr
    - Source/sink
    - Münch Pressure Gradient Flow Hypothesis
    - Phloem Development
      - Origins from procambium
      - Maturation of sieve element/companion cell
      - Status of sieve plate when phloem operating
    - Evolutionary history
    - Provides route of movement in plants for pathogens
  - Xylem
    - principal conducting elements are vessel members (which form vessels) and tracheids.
    - status of end walls..open versus perforated
    - Mechanism of water transport involves "tension"
    - Cavitation=air bubble formation in xylem
    - velocity of movement in wide vessels....16-45m/hr
    - problems caused by water being under tension.
      - possible collapse of cell walls
      - embolisms
      - mechanisms for overcoming embolisms
    - pits; bordered pit (torus, margo)
    - Tyloses = outgrowth from a parenchyma cell into a vessel, partially/completely blocking it.