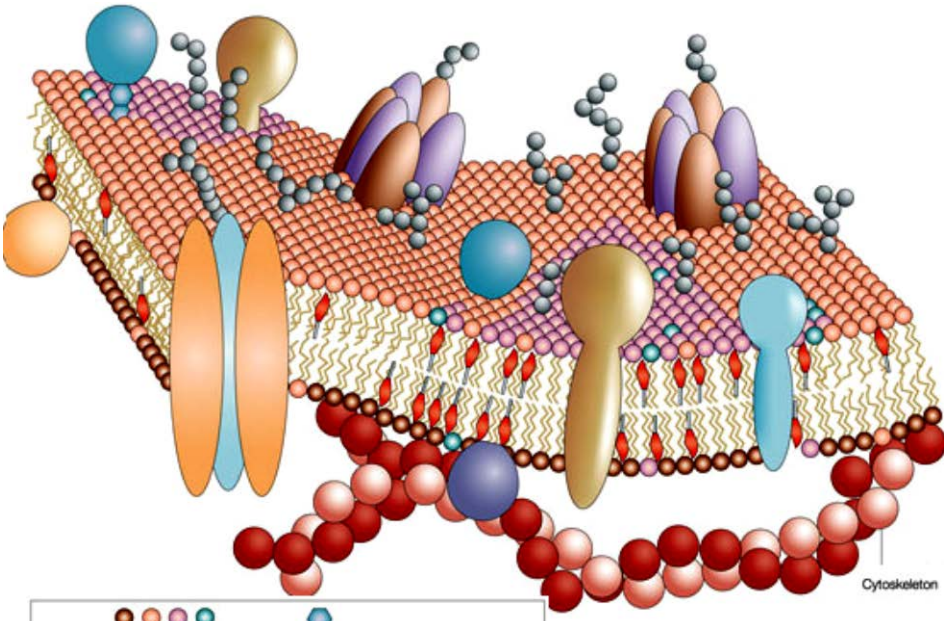
MEMBRANE FUNCTION, OSMOSIS, ACTIVE TRANSPORT

Revised 7 October 2016
Campbell's 5th, pp. 130-144, 6th: 138-152, 7th: 124-138, Sadava 8th: 96-116 , Campbell 9th: 124-140, 10th: 124-139

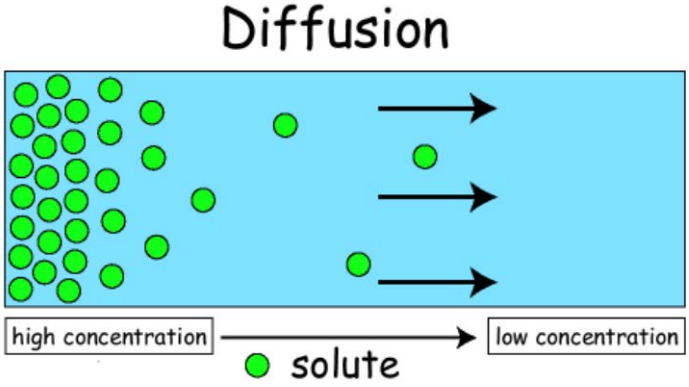
MEMBRANES: **bilaminar** ["two layers"] (p 125)
Due to amphipathic phosphodiglycerides



FLUID MOSAIC MODEL (LEARN)
currently accepted model (p 126 for fluidity)
https://www.youtube.com/watch?v=Qqsf_UJcfBc

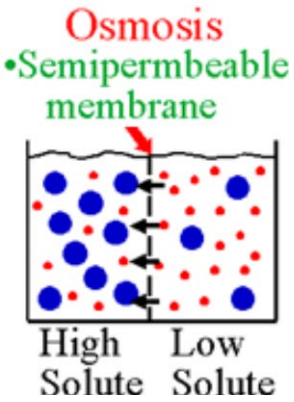
COMPOSITION: (p 125)
- **lipids**: phospholipids, cholesterol
  - fluidity is affected by: (p 126)
  - chain length
  - saturated/unsaturated
  - *cis vs trans* unsaturated
  - cholesterol (stabilizes)
- **proteins functions** (have 7 α helices, p 127)**:**
  (p 128) transport
  - enzymes
  - receptors
  - cell adhesion
  - embedded hydrophobic core
- **glycocalyx**: ["sugar cup"] "slime layer" outside
- **mucopolysaccharides** ["slime.many.sugar..."]
  - glycolipids
  - glycoproteins: (ABO system, cell-cell recognition, MHC)
  - Sliminess of fish an example

MOVEMENT ACROSS MEMBRANES: (LEARN both) (p 131)
LEARN: **solute** dissolves in a **solvent** = **solution** [sol- = "dissolve"]
DIFFUSION: "solute movement down a concentration gradient"



OSMOSIS : ["push process"] LEARN:
"diffusion of water through a **semi-permeable** ["per- thru"] **membrane** from **hypotonic** ["low strength"] to **hypertonic** ['high..."] region"
Diffusion and osmosis: https://www.youtube.com/watch?v=w3_8FSrqc-I

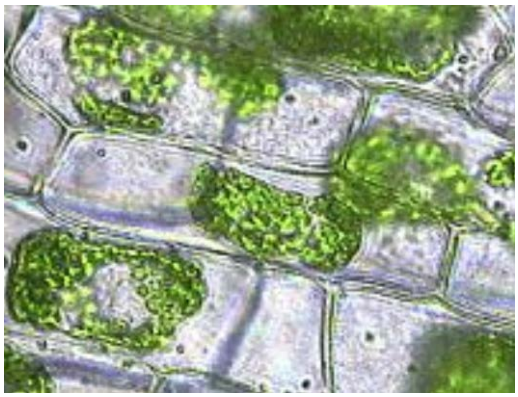
osmolarity: number of particles of solute/unit volume
hypertonic or hyperosmotic, etc. affect colligative properties)
isosmotic: no net flow.



plasmolysis: https://www.youtube.com/watch?v=OYoaLzobQmk (see @ 42 sec)
https://www.youtube.com/watch?v=gWkcFU-hHUk (Onion)

Implications of osmosis in organisms: (p 132)
PLANTS: hydrostatic pressure = turgor ["to swell"] pressure, gives structure to plants.
Lack hydrostatic pressure = wilting or **plasmolysis** ["form break process"] (see image below R)
ANIMALS: hemolysis ["blood break"] in hypotonic solutions (physiological Saline: 0.9% NaCl = isotonic)
Crenation in hypertonic solutions https://www.youtube.com/watch?v=yLx2F0GzEUI (see pliable @ 0 secs, crenation @35 secs)

LEARN: Three means for solutes to enter cell (p 135)
- **diffusion** oxygen diffuses in with no other agent participation (hydrophobic easy)
- **facilitated diffusion** uses protein to escort charged or polar molecules across (*i.e.*, glucose needs help)
- **active transport** uses energy to concentrate solutes against gradient:



ACTIVE TRANSPORT:
Antiport: Na/K pump mechanism: (p. 135) https://www.youtube.com/watch?v=xweYA-IJTqs
1) Na^+ (3 atoms) inside cell jumps into pump protein
2) ATP phosphorylates pump protein, changes conformation, switch to open to outside
3) Na^+ diffuses out
4) K^+ (2 atoms) jumps into pump from outside
5) PO_4 is removed on inside, change conformation back to open inside

6) K^+ diffuses into cell from pump, back to #1.

Co-transport: in plants, sucrose follows H^+ into cell as active transport.