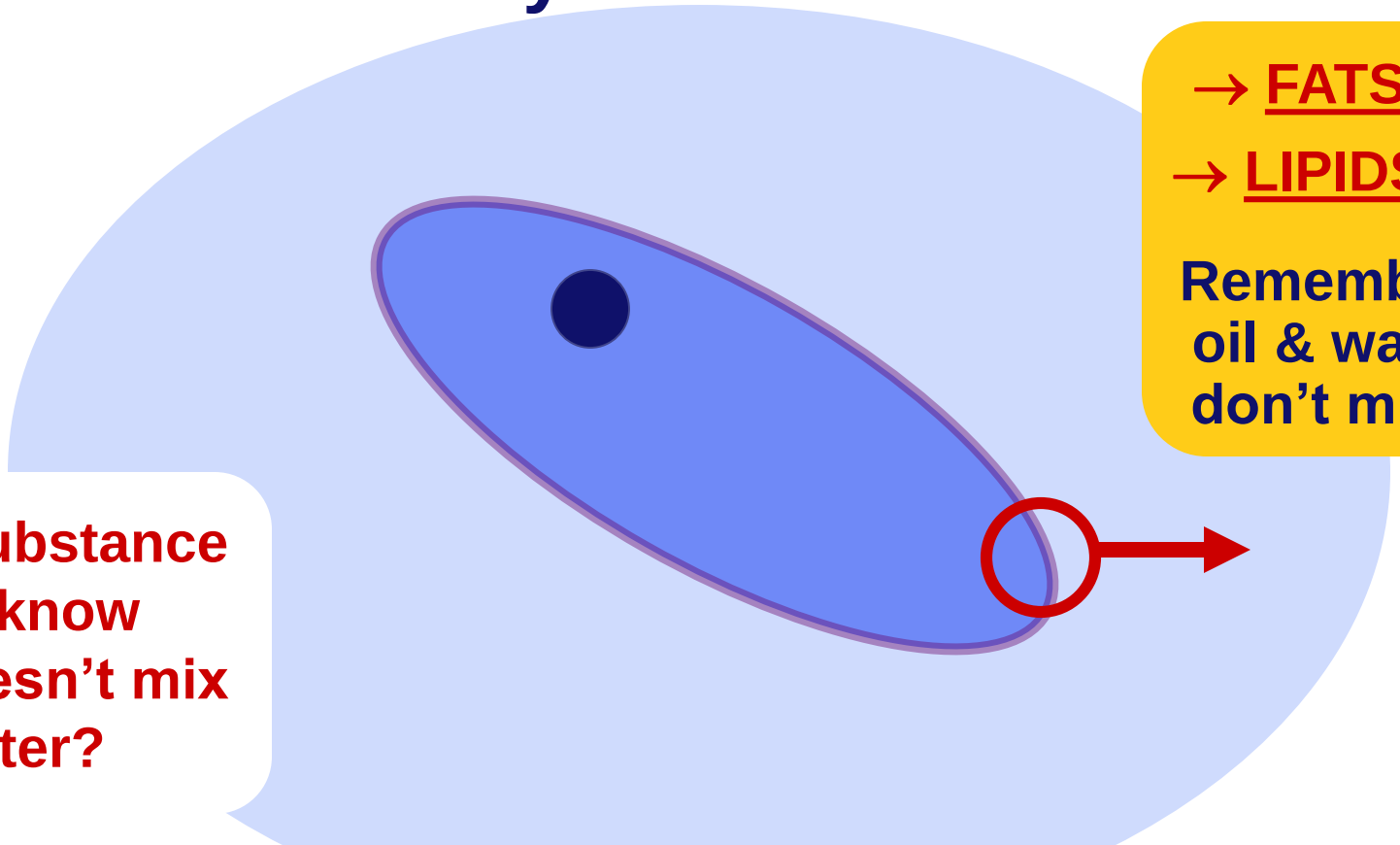
Building a membrane

- How do you build a barrier that keeps the watery contents of the cell separate from the watery environment?

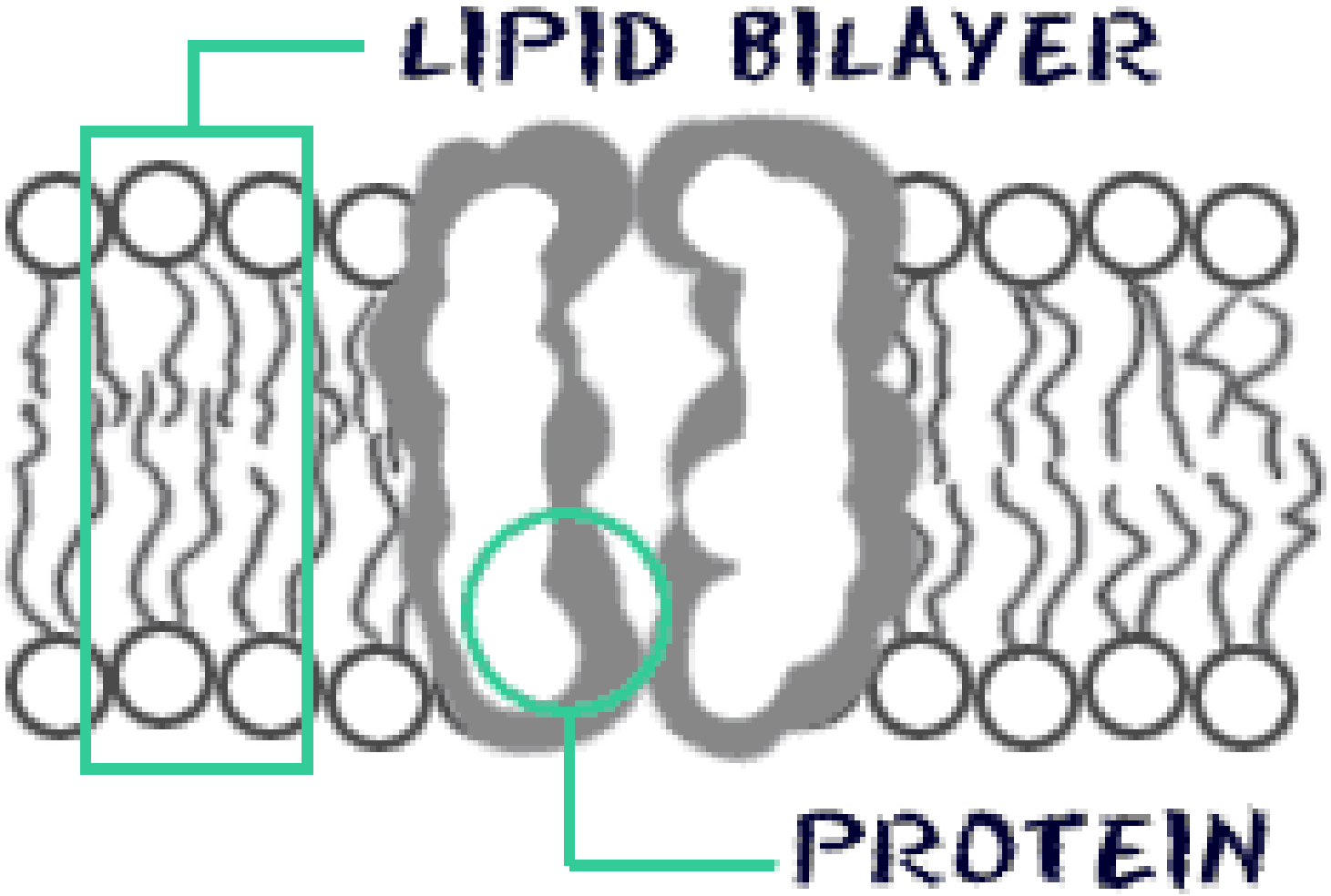


→ FATS ←

→ LIPIDS ←

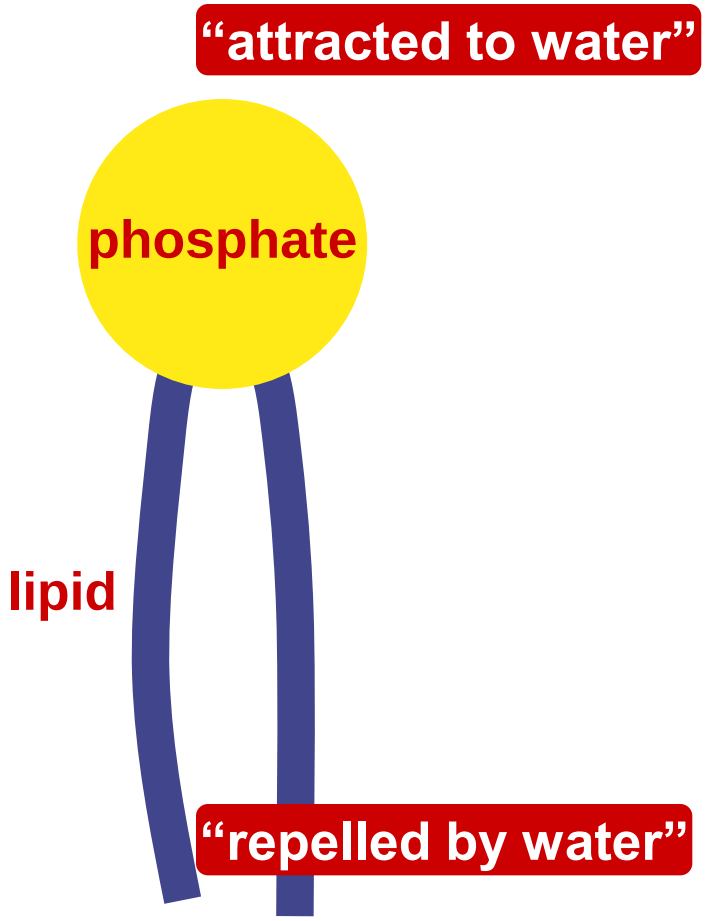
Remember: oil & water don't mix!!

What substance do you know that doesn't mix with water?


LIPID BILAYER
PROTEIN

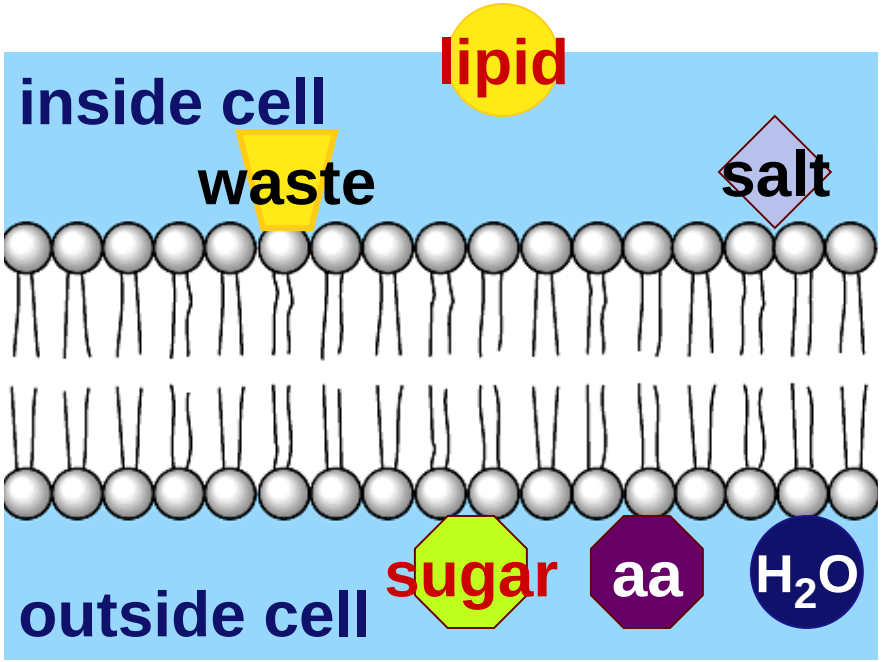
Lipids of cell membrane

- Membrane is made of special kind of lipid
  - phospholipids
  - “split personality”
- Membrane is a double layer
  - phospholipid bilayer



Crossing the cell membrane

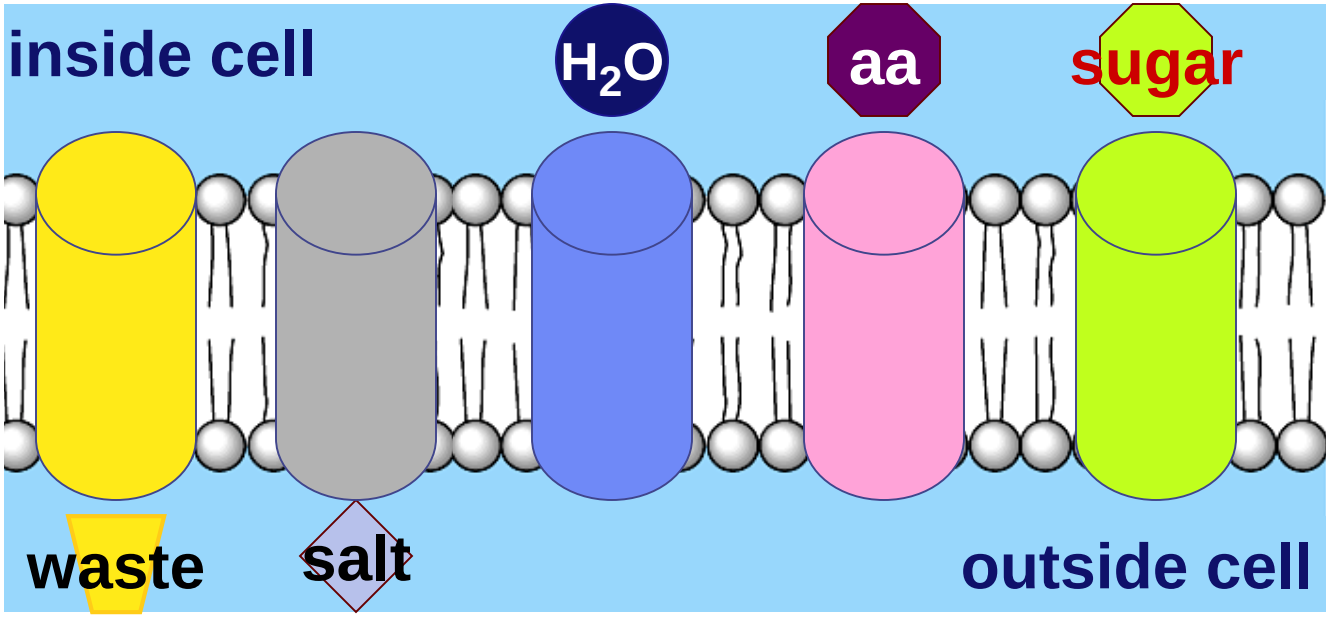
- What molecules can get through the cell membrane directly?
  - fats and oils can pass directly through

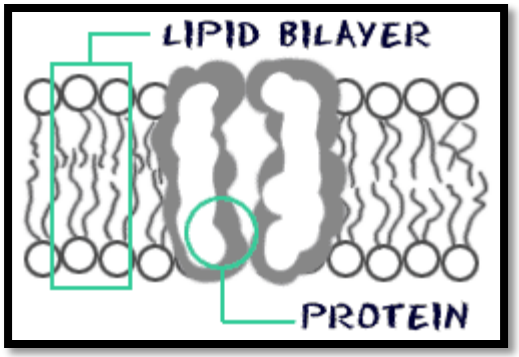


but…
what about other stuff?

Cell membrane channels

- Need to make “doors” through membrane
  - protein channels allow substances in & out
    - specific channels allow specific material in & out
    - H_2O channel, salt channel, sugar channel, etc.

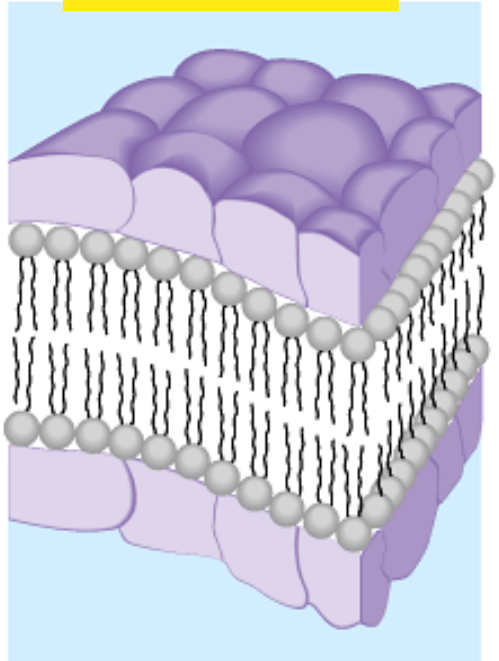




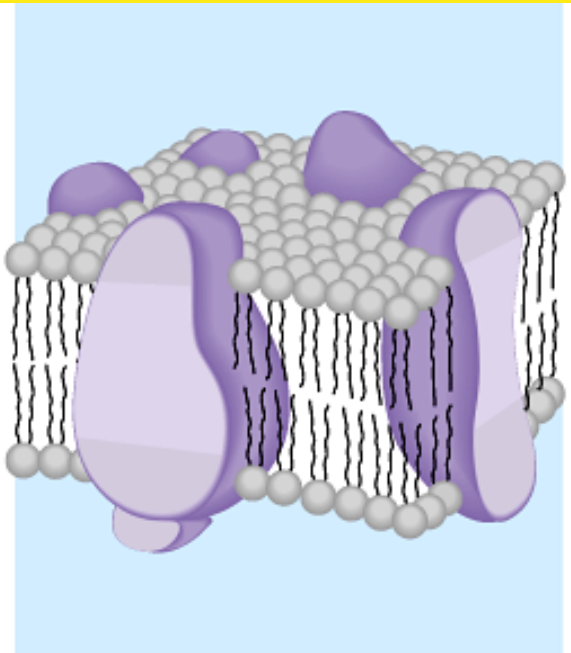
How do you build a semi-permeable cell membrane?

- **Channels are made of proteins**
  - proteins both “like” water & “like” lipids

bi-lipid membrane

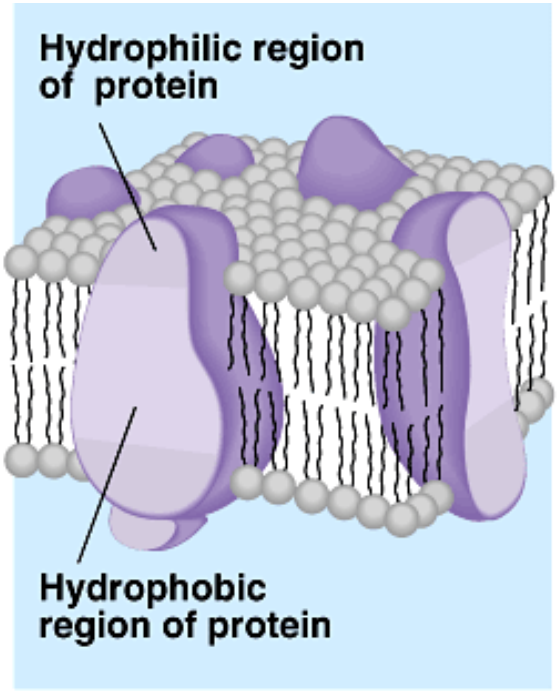


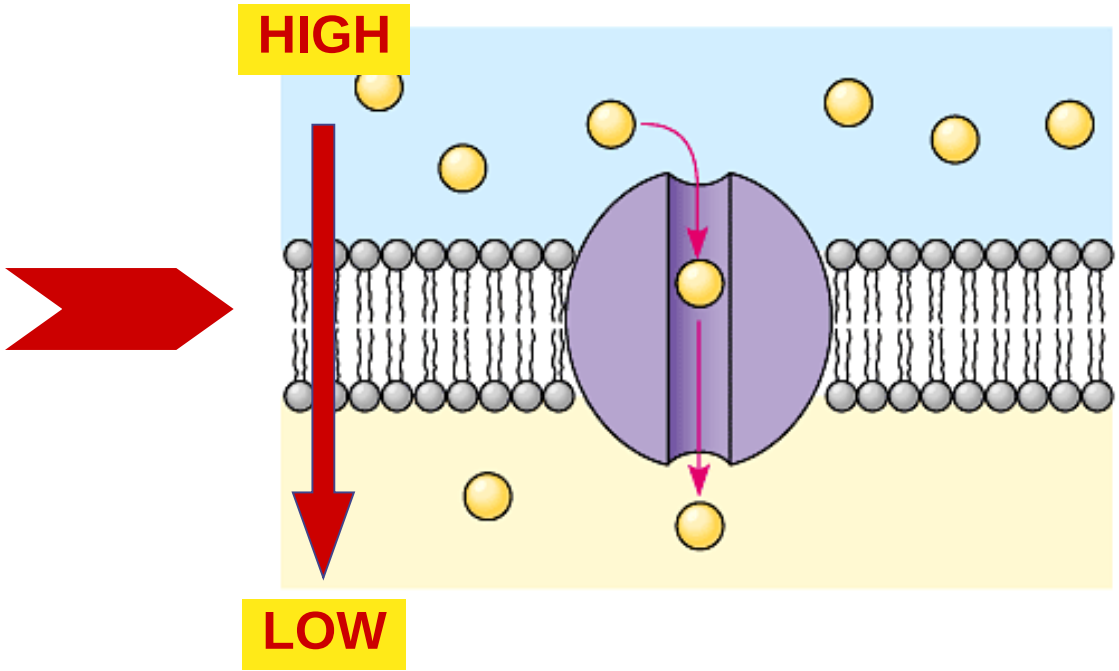
protein channels in bi-lipid membrane



Protein channels

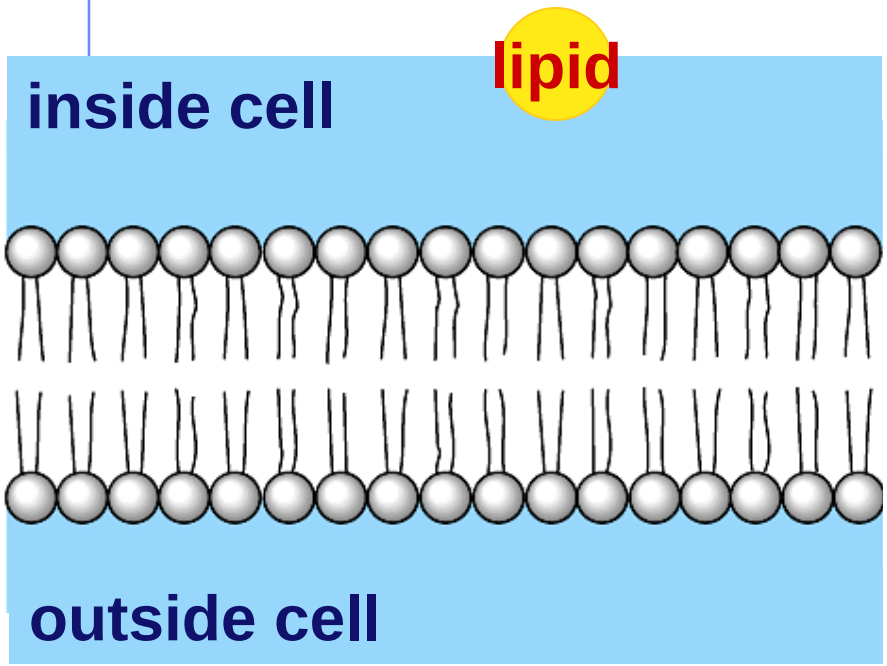
- **Proteins act as doors in the membrane**
  - **channels to move specific molecules through cell membrane**



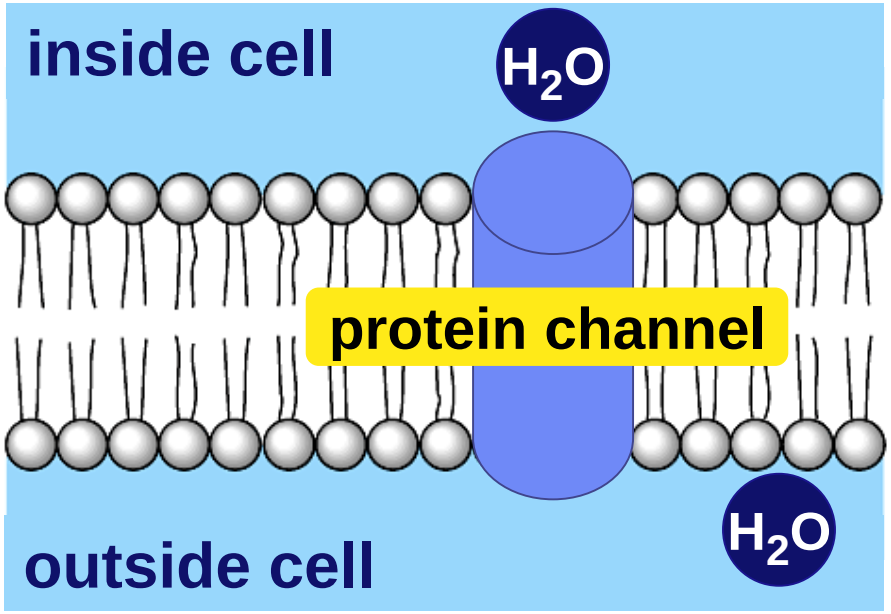


Simple vs. facilitated diffusion

simple diffusion

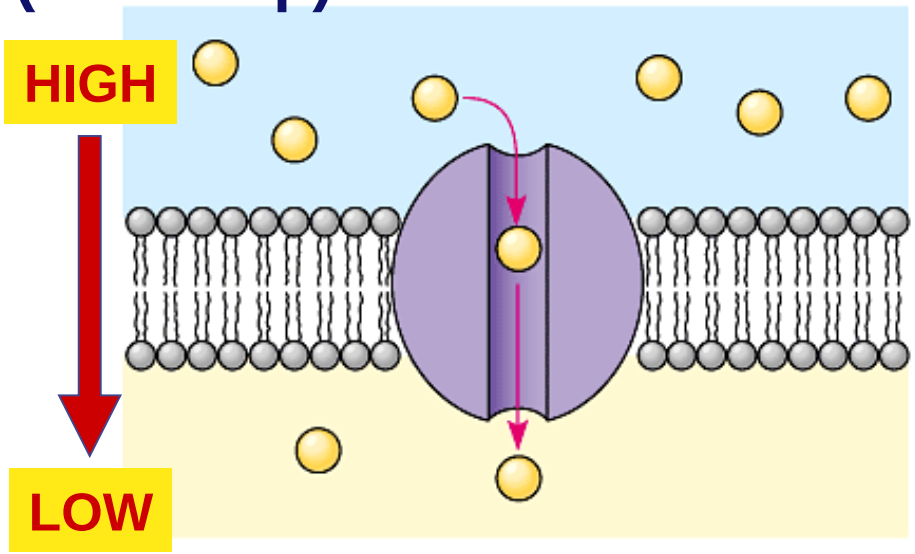


facilitated diffusion



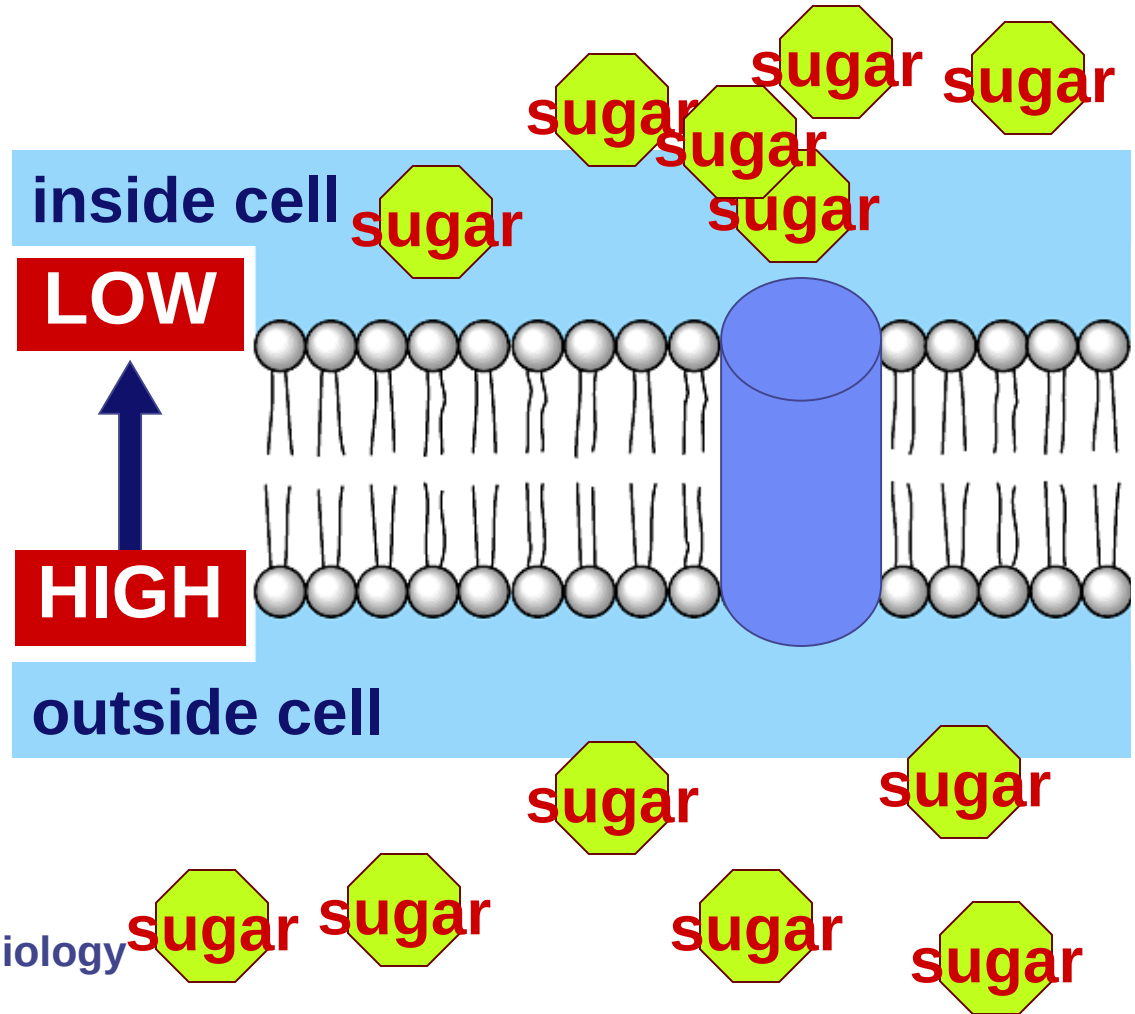
Diffusion

- Move from HIGH to LOW concentration
  - directly through membrane
    - simple diffusion
    - no energy needed
  - help through a protein channel
    - facilitated diffusion (with help)
    - no energy needed



Facilitated Diffusion

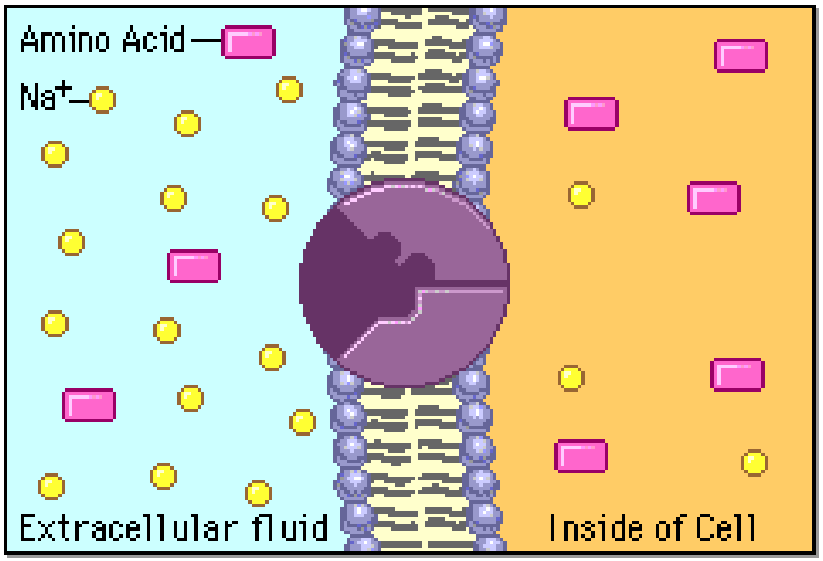
- Move from HIGH to LOW through a channel



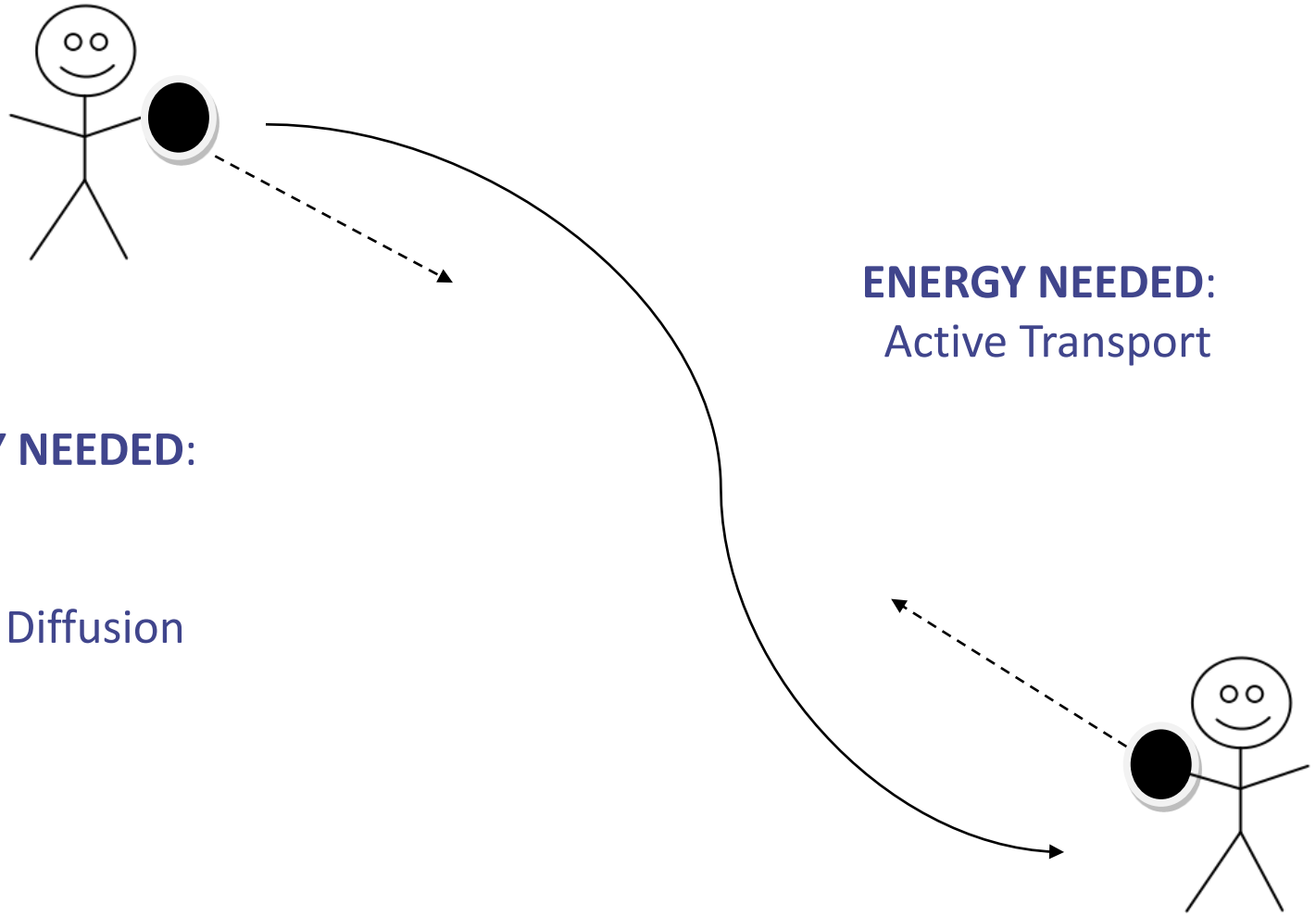
Which way will sugar move?

Active transport

- Cells may need molecules to move ***against*** concentration "hill"
  - need to pump "uphill"
    - from LOW to HIGH using energy
  - requires energy (ATP)



ANALOGY:

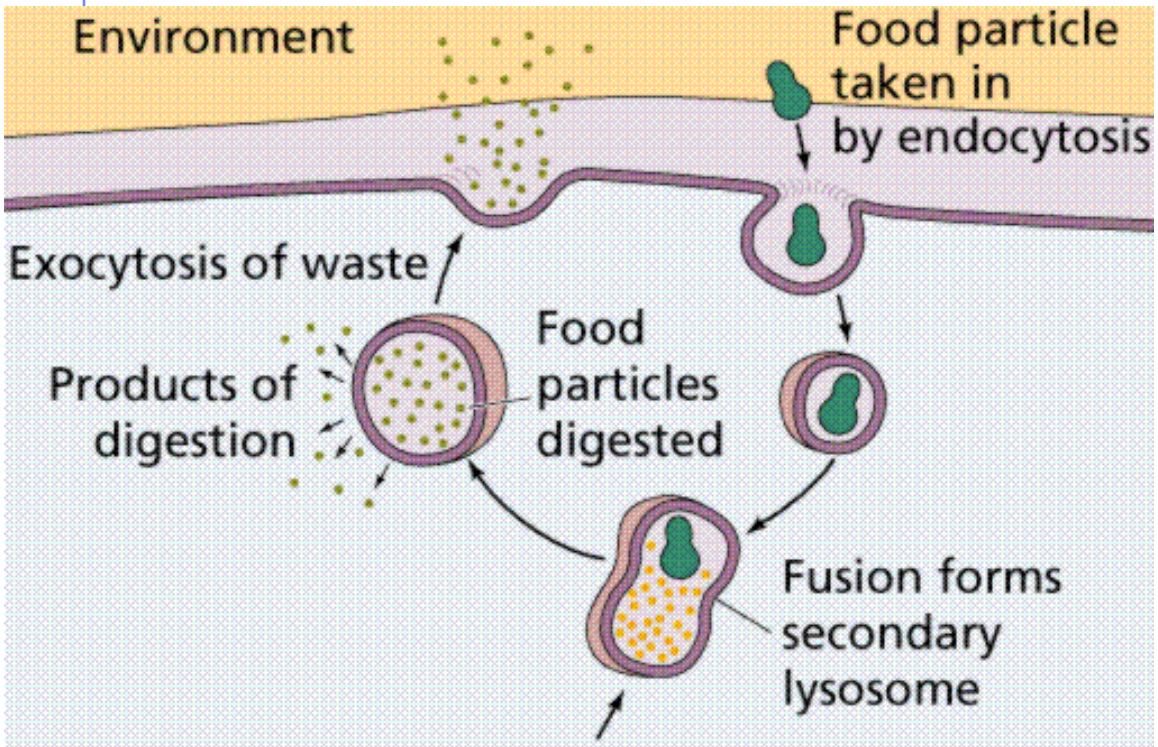


ENERGY NEEDED:
Active Transport

NO ENERGY NEEDED:
Diffusion
Osmosis
Facilitated Diffusion

Movement through Vesicles

- **Endocytosis and Exocytosis** is the mechanism by which **very large molecules** (such as food and wastes) get into and out of the cell



Food is moved **into the cell** by **Endocytosis**

Wastes are moved **out of the cell** by **Exocytosis**

animation

Type of Transport	Definition	Energy Needed Y/N	Protein Helpers	Type of Molecule Transported
Diffusion (p. 72)	Molecules moving from high to low concentrations	NO	None	ANY molecule
Osmosis (p. 73)	**WATER** moving from high to low concentrations across a membrane	NO	*None *Aquaporins	Water

Type of Transport	Definition	Energy Needed Y/N	Protein Helpers	Type of Molecule Transported
Facilitated Diffusion (pg. 73-74)	Diffusion through a **protein** in the cell membrane	No	YES	Some charged or Large molecules

Type of Transport	Definition	Energy Needed Y/N	Protein Helpers	Type of Molecule Transported
Active Transport (p. 74)	Molecules move from **LOW** to **HIGH** concentrations	YES	YES	*Large Molecules *Charged Molecules

Type of Transport	Definition	Energy Needed Y/N	Protein Helpers	Type of Molecule Transported
Vesicles (p. 74-75)	Large molecules are packaged in a vesicle for movement in or out of the cell	YES	None	LARGE molecules