

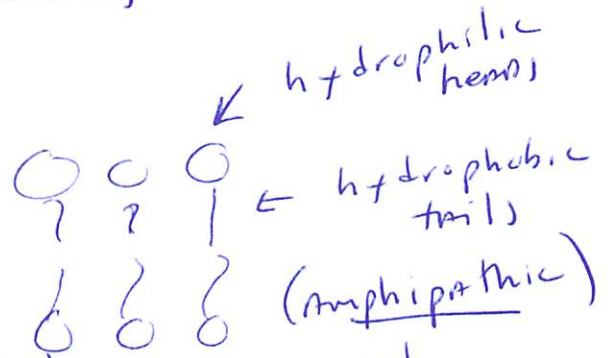
5-1 Fluid Mosaic Model

- Selectively Permeable (some things pass more easily than others)
- about 8nm thick

Aquaporins - membrane protein which facilitates movement of H_2O across membrane
- 3 billion per second - single file
- gets polar water through non-polar tails of phospholipids (hydrophilic channels)

Membrane

- ① Phospholipid Bilayer
- ② Membrane Proteins
 - INTEGRAL PROTEINS / Periplasm
 - (some transmembrane; some with channels)
- ③ Cholesterol (in animal cells)
- ④ Glycoproteins
- ⑤ Glycolipids
- ⑥ ECM - Extra-cellular Matrix (Fibers)



"Fluid" → lipids shift laterally
- even some membrane proteins "DRIFT" (perhaps with MOTOR PROTEIN ASSISTANCE)
- many are attached to ECM

- (2)
- phospholipids with unsaturated hydrocarbon tails remain fluid to LOWER TEMPS

⇓

the Double Bonds form KINKS which keep the tails from packing closely together
SO... STAY FLUID LONGER

⇒ CHOLESTEROL has an interesting impact on FLUIDITY

- ① AT HIGH TEMPS, makes membrane less fluid by restricting movement
- ② AT LOW TEMPS, prevents close packing of tails and lowers the temp of solidification.

MEMBRANES MUST BE FLUID TO WORK
(SAVED OIL)

↓

EVOLUTIONARY ADAPTATIONS

Always focus on this !!

→ membrane lipid composition ADAPTED TO SPECIFIC ENVIRONMENTAL CONDITIONS

- ① Fish in cold water - more unsaturated
- ② Archaea - special lipids

- ★ ③ ABILITY to CHANGE lipid composition !!
- winter wheat
 - bacteria

MEMBRANE PROTEINS

"MOSAIC" - each type of cell has different proteins

(1) INTEGRAL

- penetrate hydrophobic interior of bilayer
- majority are transmembrane
- hydrophobic parts coiled
- hydrophilic parts extend into aqueous solution on either side of membrane

(2) Peripheral

- bound to inner or outer surface of membrane
- many bound to integral proteins

Attached to ECM & cytoskeleton

FUNCTIONS !!

(1) TRANSPORT - channels + pumps

(2) ENZYMES - single or as teams

(3) BINDING to ECM / Cytoskeleton maintains shape & stability

(4) Cell-cell recognition - "tags"

(5) Inter-cellular JOINING - gap junctions

(6) SIGNAL TRANSDUCTION - receptor, relays

Cell-Cell Recognition

(4)

- membrane carbohydrates (15 or fewer sugars, branched chains) bonded to lipids or proteins

(1) Glycolipids

(2) Glycoproteins (mostly)

> marker.

↓
i.e. human blood type (A, B, AB, O) is type or absence of certain glycoproteins

5-2 Permeability → "form fits function"

Non-polar molecules - hydrocarbons
- CO₂
- O₂ } hydrophobic
Don't need membrane proteins

Polar Molecules/Ions - have a hard time getting through the  hydrophobic tails.
- glucose
- water
- charged molecules } need TP's

Transport Proteins

Channel Proteins - type of transport protein (hydrophilic linings)
i.e. Aquaporins

Carrier Proteins - conformational change to shuttle across membrane
- i.e. sodium-potassium pump

Specific

NOTE - O₂ and CO₂ have no net dipole