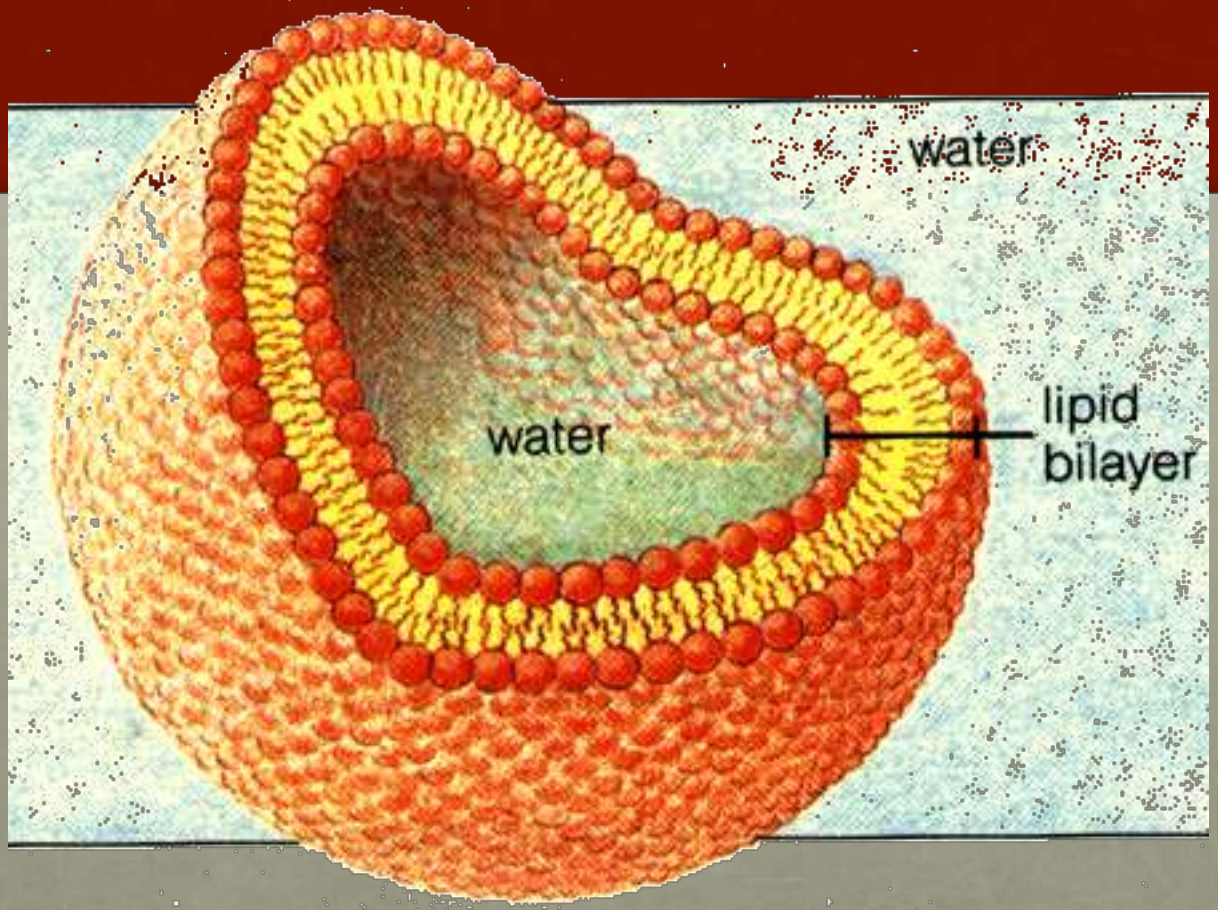
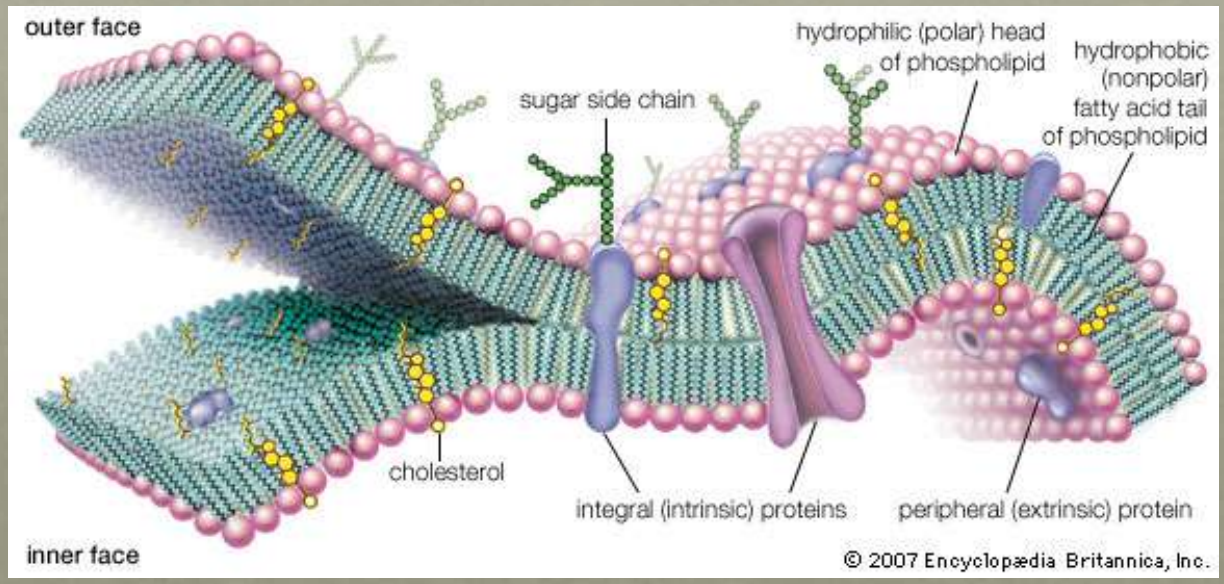
3.3 Cell Membranes



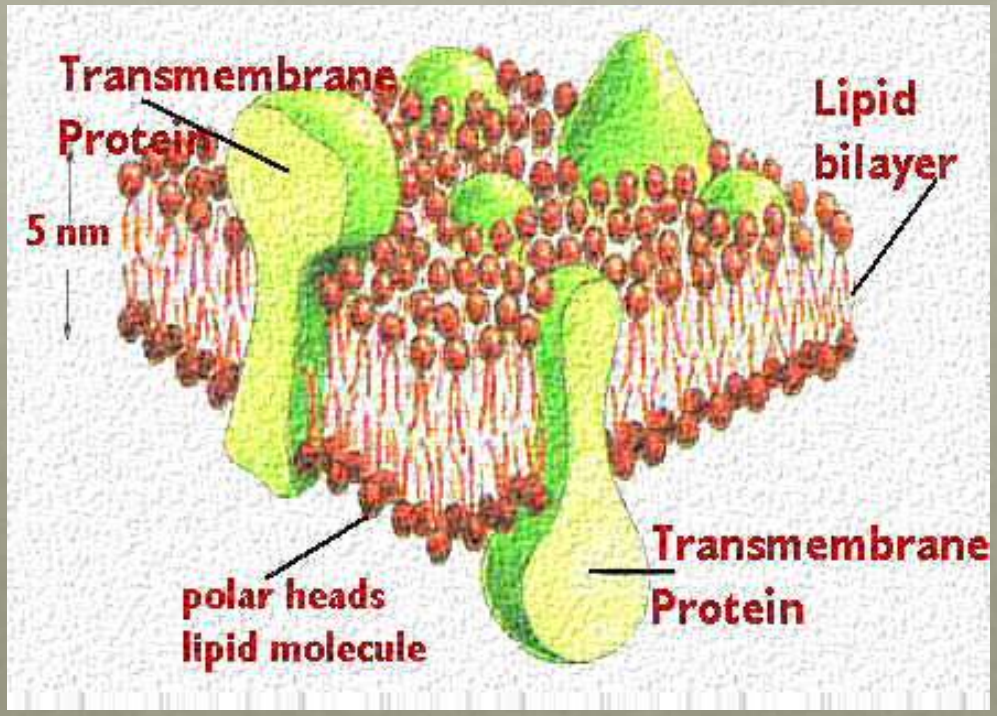
Cell Membrane

- Also known as plasma membrane
- Makes boundary between cell and outside world
- Selective channels, or pores, allow passage of certain materials in and out of cell
  - Like a bouncer or gate keeper



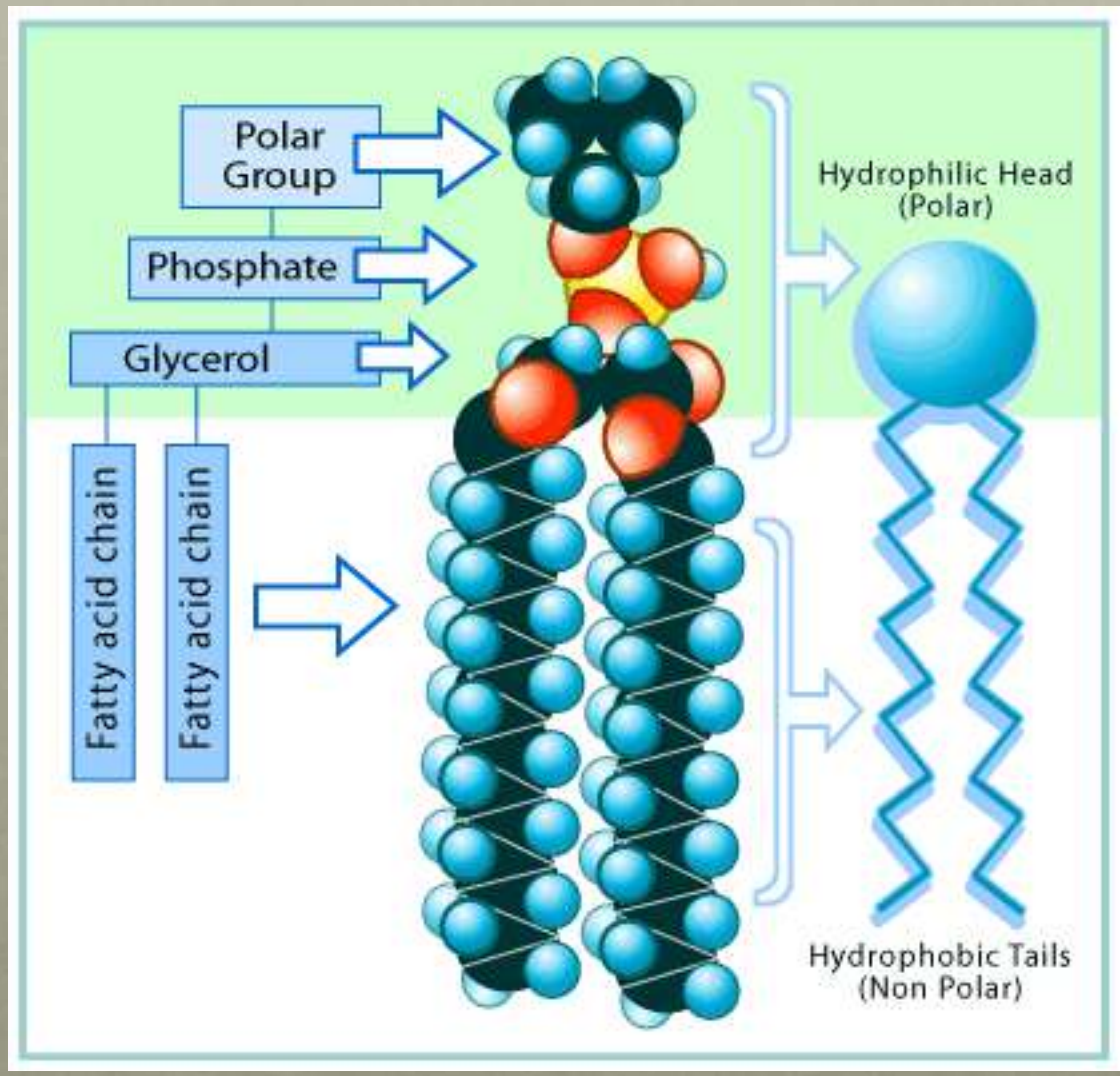
MEMBRANE STRUCTURE

- Two layers of phospholipids (**bi**layer)
- Various other molecules are dispersed through membrane as well



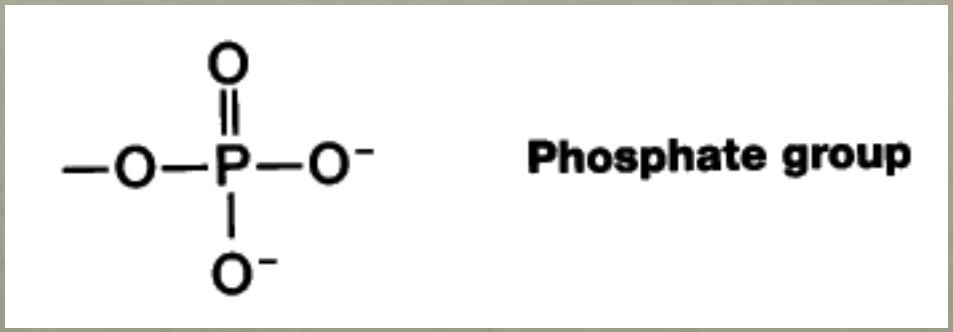
PHOSPHOLIPID STRUCTURE

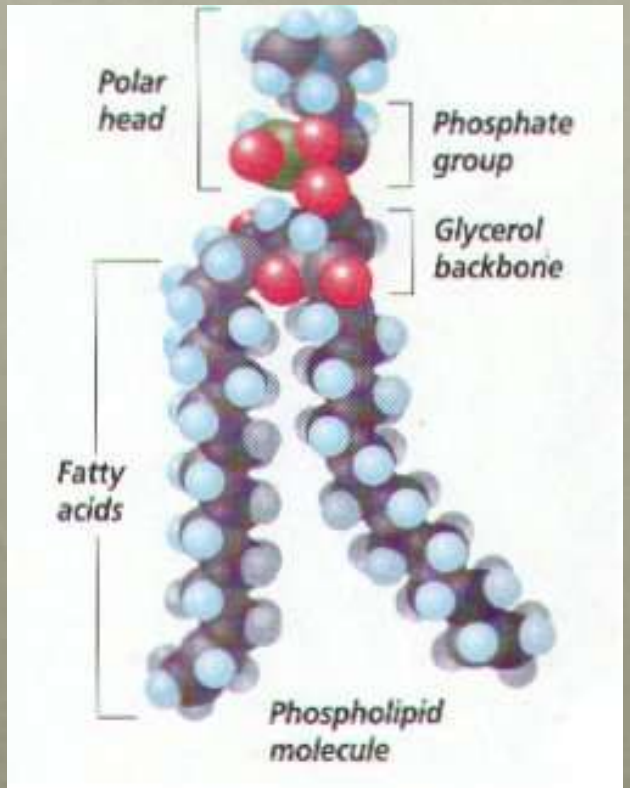
- Charged phosphate group
- Glycerol
- Two fatty acid chains
- Glycerol + phosphate group = head
- 2 fatty acid chains = tail



HEAD OF PHOSPHOLIPID

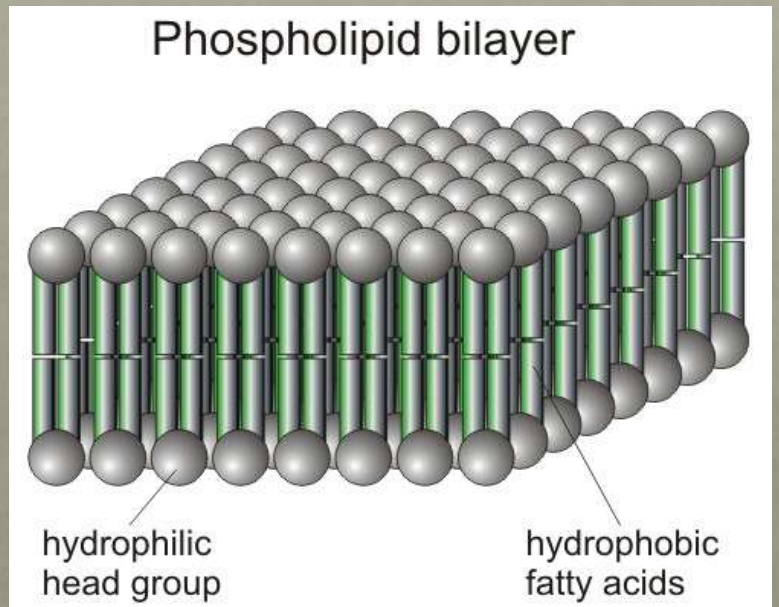
- Charged (polar)
- Can form hydrogen bonds with water
- Hydrophilic (hydro=water philic=loving)





TAIL OF PHOSPHOLIPID

- Nonpolar
- Hydrophobic (water fearing)
- Because the heads are exposed to the cytoplasm inside the cell and fluids on the outside of the cell, the tails are always pointing INWARD (away from water)
  - This is why a bilayer forms
    - Like a sandwich



SOME OTHER MOLECULES EMBEDDED IN MEMBRANE

- Cholesterol
  - Strengthens cell membrane
- Proteins
  - Extend through one or both layers and help different materials cross membrane
  - Different cells have different membrane bound proteins
- Carbohydrates
  - Attached to membrane proteins
  - Act as ID tag so cells can distinguish between one another

MEMBRANE FLUIDITY

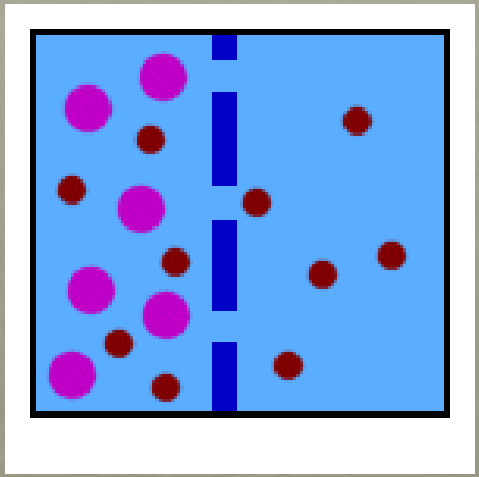
- Membranes are flexible, not rigid
- Phospholipids in each layer can slide past each other and move around
  - Very “fluid” motion

FLUID MOSAIC MODEL

- *video clip*

SELECTIVE PERMEABILITY

- Membrane allows SOME but not all materials to pass through
  - Allows cell to maintain homeostasis despite unpredictable outside surroundings
  - Cell must control import and export of molecules and ions



CROSSING THE MEMBRANE

- Some methods of crossing require energy, some do not.
  - Depends on many factors
    - Molecule size
    - Polarity
    - Concentration inside and outside cell
- Generally…
  - Small nonpolar molecules easily cross
  - Small polar molecules are transported by proteins
  - Large molecules moved in vesicles

CHEMICAL SIGNALS ARE TRANSMITTED ACROSS MEMBRANE

- **Receptor**- protein that detects a signaling molecule, binds to it and performs an action in response
  - Molecule it binds to is called a **ligand**
- When a receptor and ligand bind, a **conformational** (shape) change occurs
  - Allows interaction with other molecules
- **Intracellular receptor**- found inside cell and bind with molecules that have crossed the membrane already
- **Membrane receptor**- stuck in membrane and bind to molecules that cannot enter cell (changes shape and sends message)
- *inside the cell video clip!*