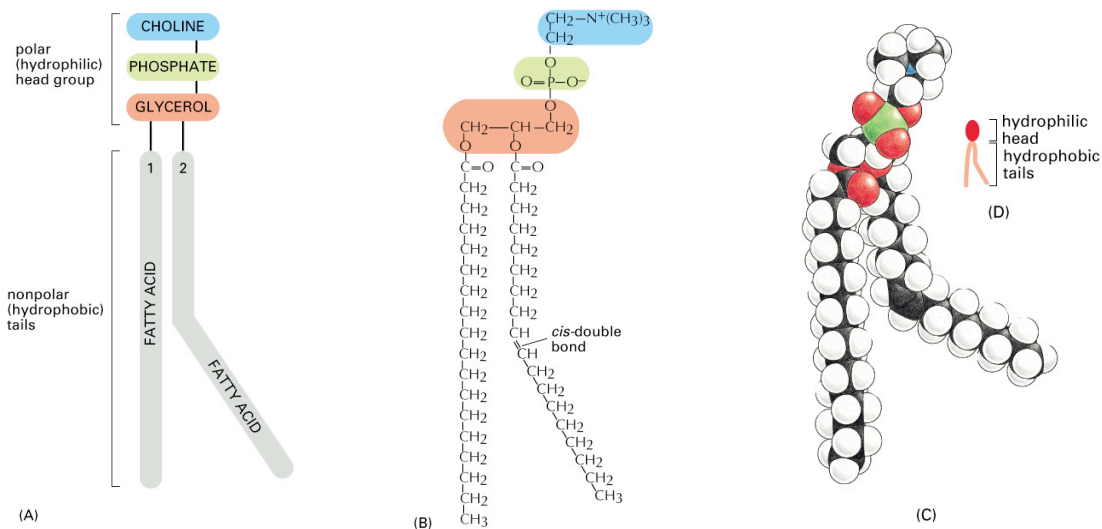
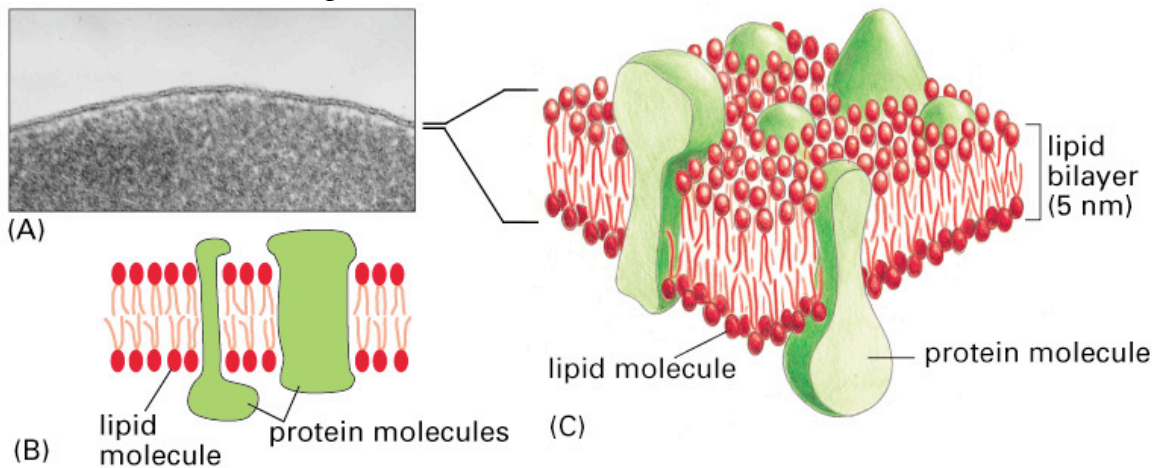


Membranes & Transport Across Membranes

The lipid bilayer

Interactions between lipids and water



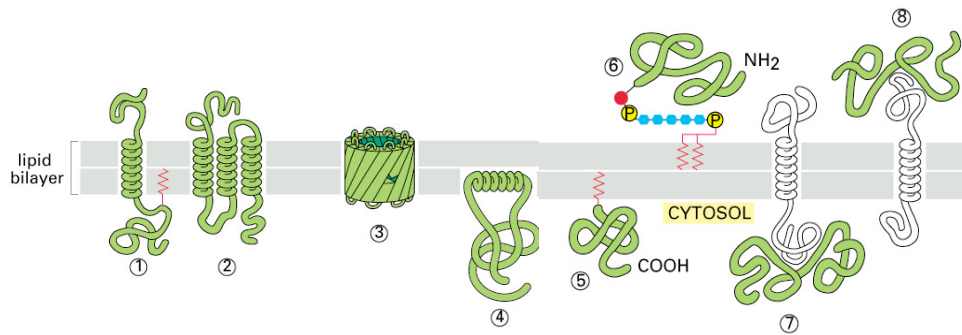
Fluidity of the bilayer

Asymmetry in the bilayer

Permeability

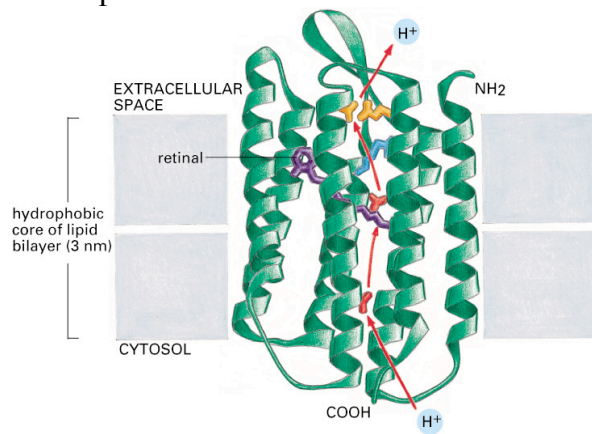
Membrane Proteins

How proteins associate with the bilayer



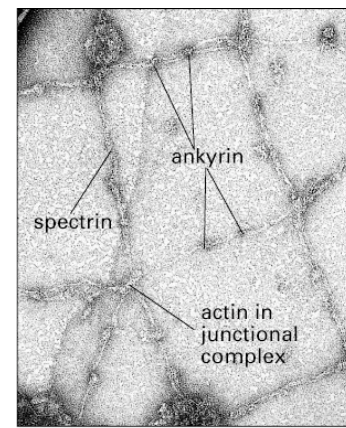
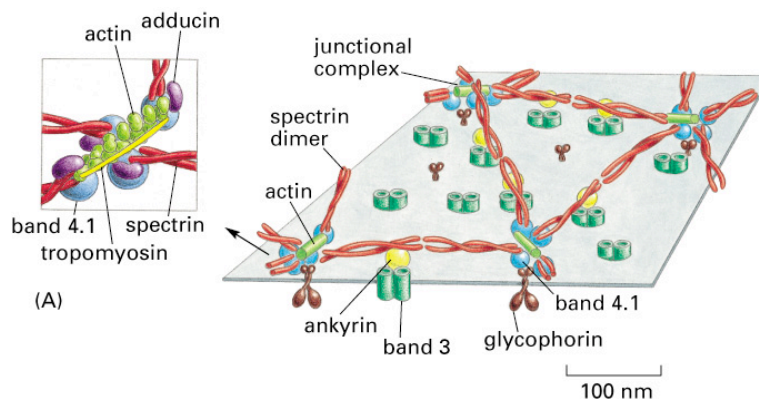
Studying membrane proteins

Bacteriorhodopsin



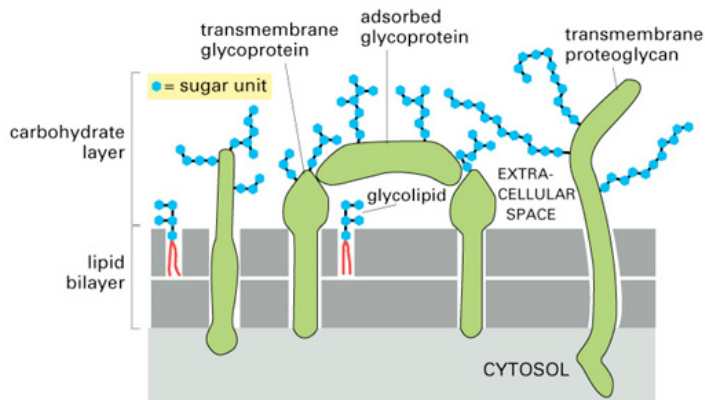
The cell cortex

cortex of a red blood cell:

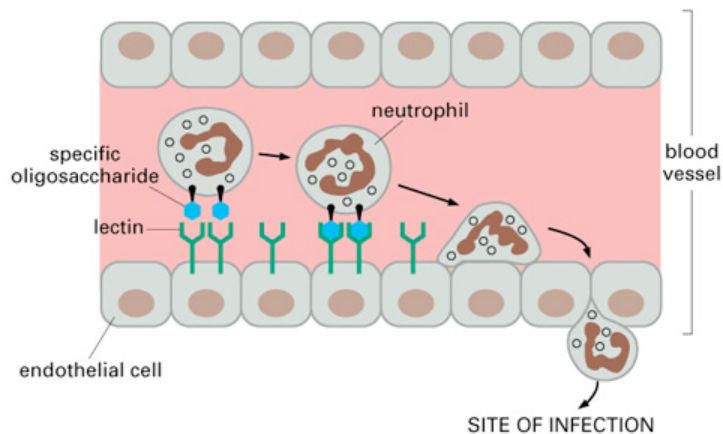


(B)

Carbohydrates on the cell surface



- lectins: proteins that recognize specific oligosaccharide side chains



Mobility of membrane proteins

Proteins involved in transport across membranes

Ion concentrations inside and outside of cells:

Component	Intracellular concentration (mM)	Extracellular concentration (mM)
Cations		
Na ⁺	5-15	145
K ⁺	140	5
Mg ⁺⁺ *	0.5	1-2
Ca ⁺⁺ *	10 ⁻⁷	1-2
H ⁺	7 x 10 ⁻⁵ (10 ^{-7.2} M or pH7.2)	4 x 10 ⁻⁵ (10 ^{-7.4} M or pH7.4)
Anions		
Cl ⁻	5-15	110
Fixed anions**	high	0

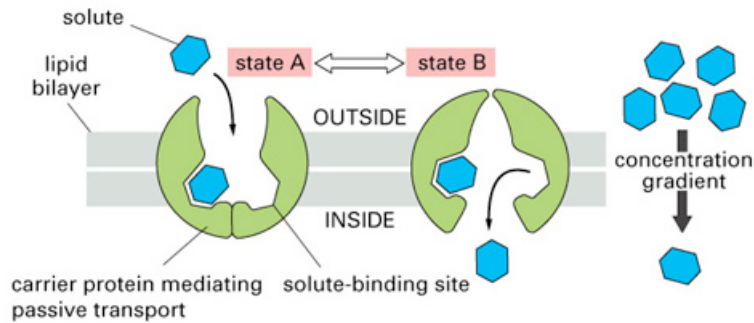
* Free Mg⁺⁺ and Ca⁺⁺ ions in cytosol. Much more is present bound to proteins or in compartments.

** Fixed anions are the negatively charged small and large organic molecules trapped in the cell.

Carrier proteins

Passive & active transport of solutes

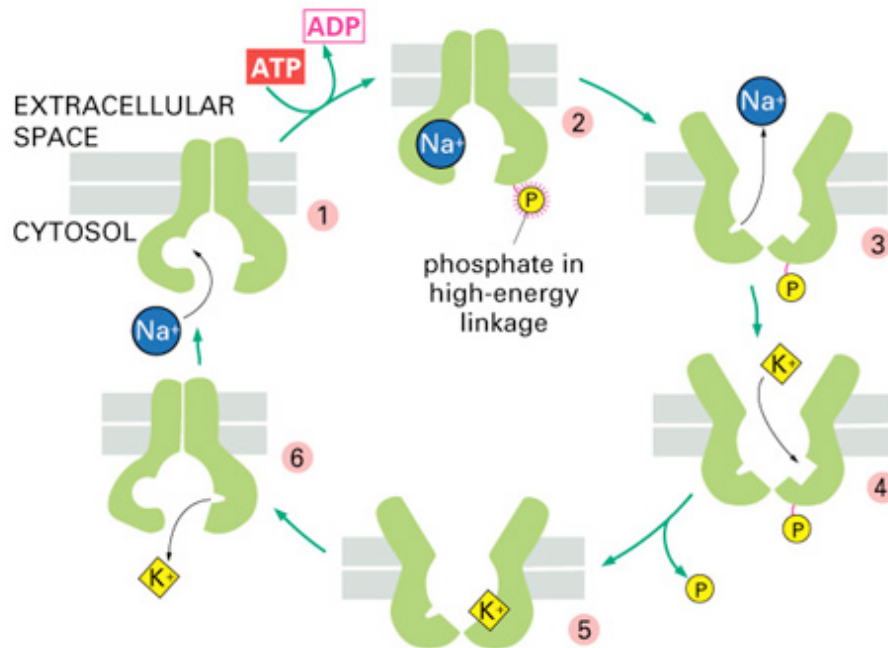
How a carrier protein can allow passive transport of a selected molecule:



Active transport

3 ways of driving active transport

The Na-K pump - a coupled transporter



Gated channels

voltage-gated channels

ligand-gated channel

stress-activated (mechanosensitive) channel:

