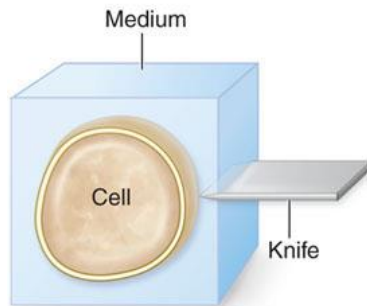


Cytoplasm

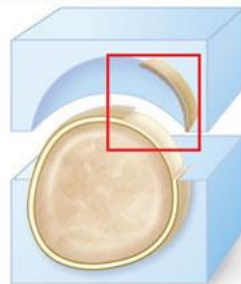
- Cytoplasm consists of all the cellular contents between the plasma membrane and the nucleus, and has two components:
- (1) **Cytosol**:- The cytosol (intracellular fluid) is the fluid portion of the cytoplasm that surrounds organelles and constitutes about 55% of total cell volume.
- (2) **Organelles**:- Organelles are specialized structures within the cell that have characteristic shapes; they perform specific functions in cellular growth, maintenance and reproduction.

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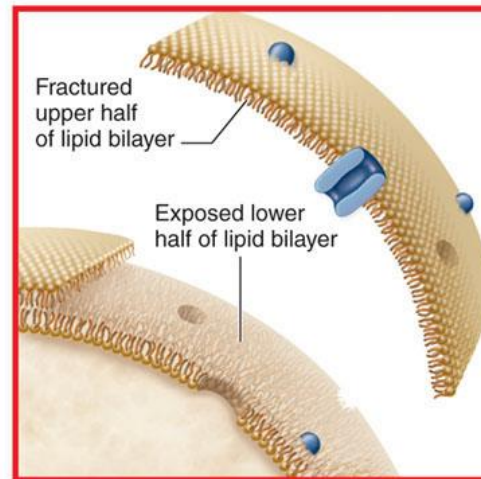
1. A cell frozen in medium is cracked with a knife blade.



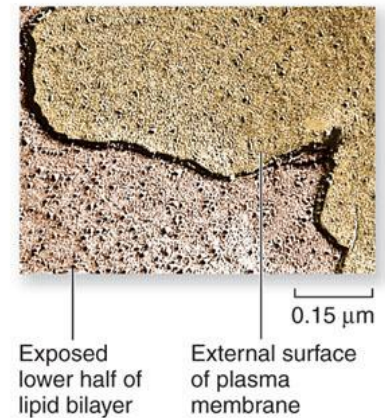
2. The cell often fractures through the interior, hydrophobic area of the lipid bilayer, splitting the plasma membrane into two layers.



3. The plasma membrane separates such that proteins and other embedded membrane structures remain within one or the other layers of the membrane.



4. The exposed membrane is coated with platinum, which forms a replica of the membrane. The underlying membrane is dissolved away, and the replica is then viewed with electron microscopy.



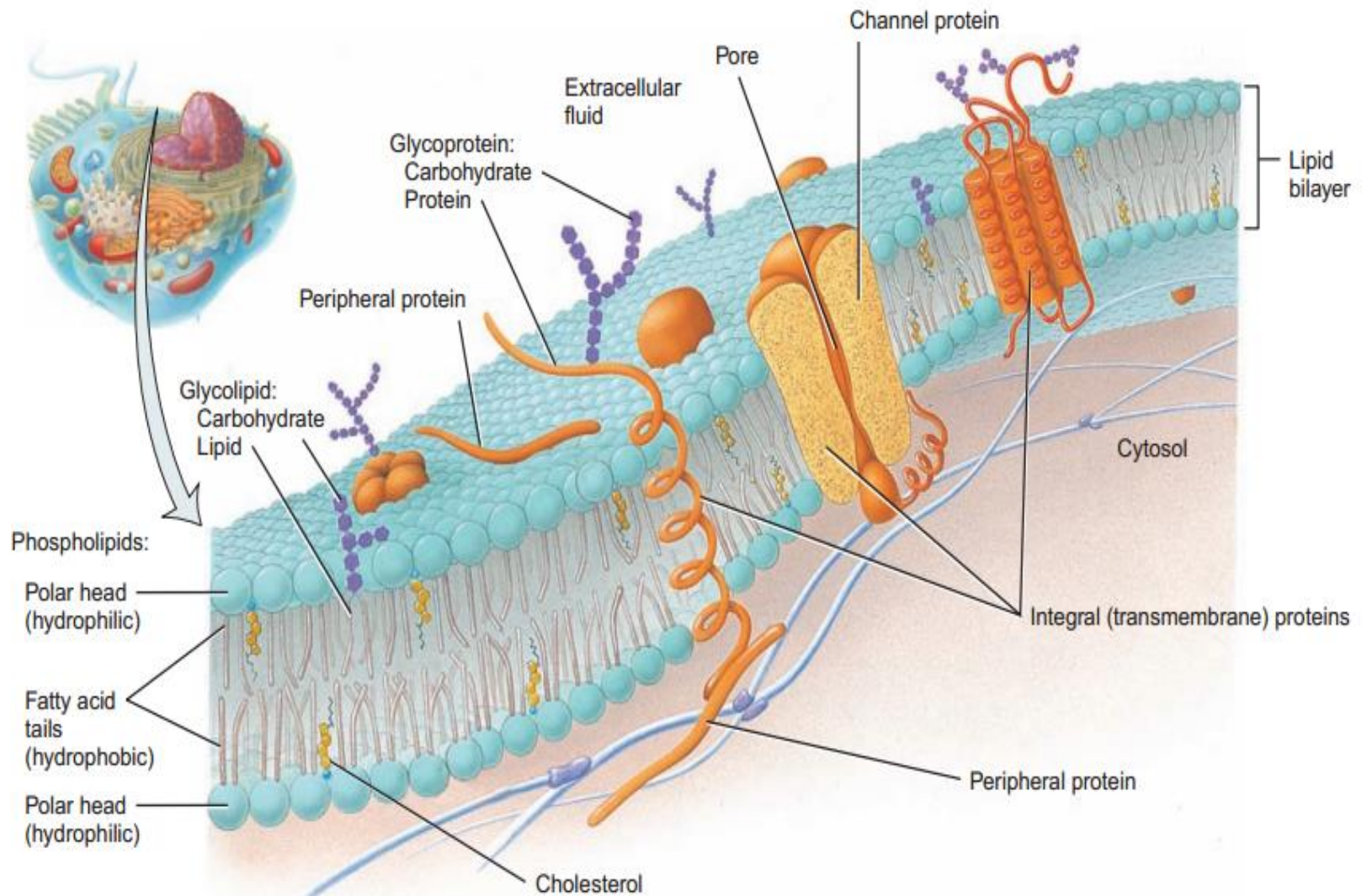
(top right): © Dr. Don W. Fawcett/Visuals Unlimited

Plasma membrane

- The plasma membrane is the **boundary** that separates the living cell from its nonliving surroundings
- The plasma membrane **exhibits selective permeability**, allowing some substances to cross it more easily than others
- **Phospholipids** are the most abundant lipid in the plasma membrane
- **Phospholipids are amphipathic** molecules, containing hydrophobic and hydrophilic regions
- The fluid mosaic model states that a membrane is a fluid structure with a “**mosaic**” of various proteins embedded in it



Membranes are fluid structures because the lipids and many of the proteins are free to rotate and move sideways in their own half of the bilayer.



The **fluid mosaic model** of membrane structure contends that membranes consist of:

- phospholipids** arranged in a bilayer
- globular proteins** inserted in the lipid bilayer

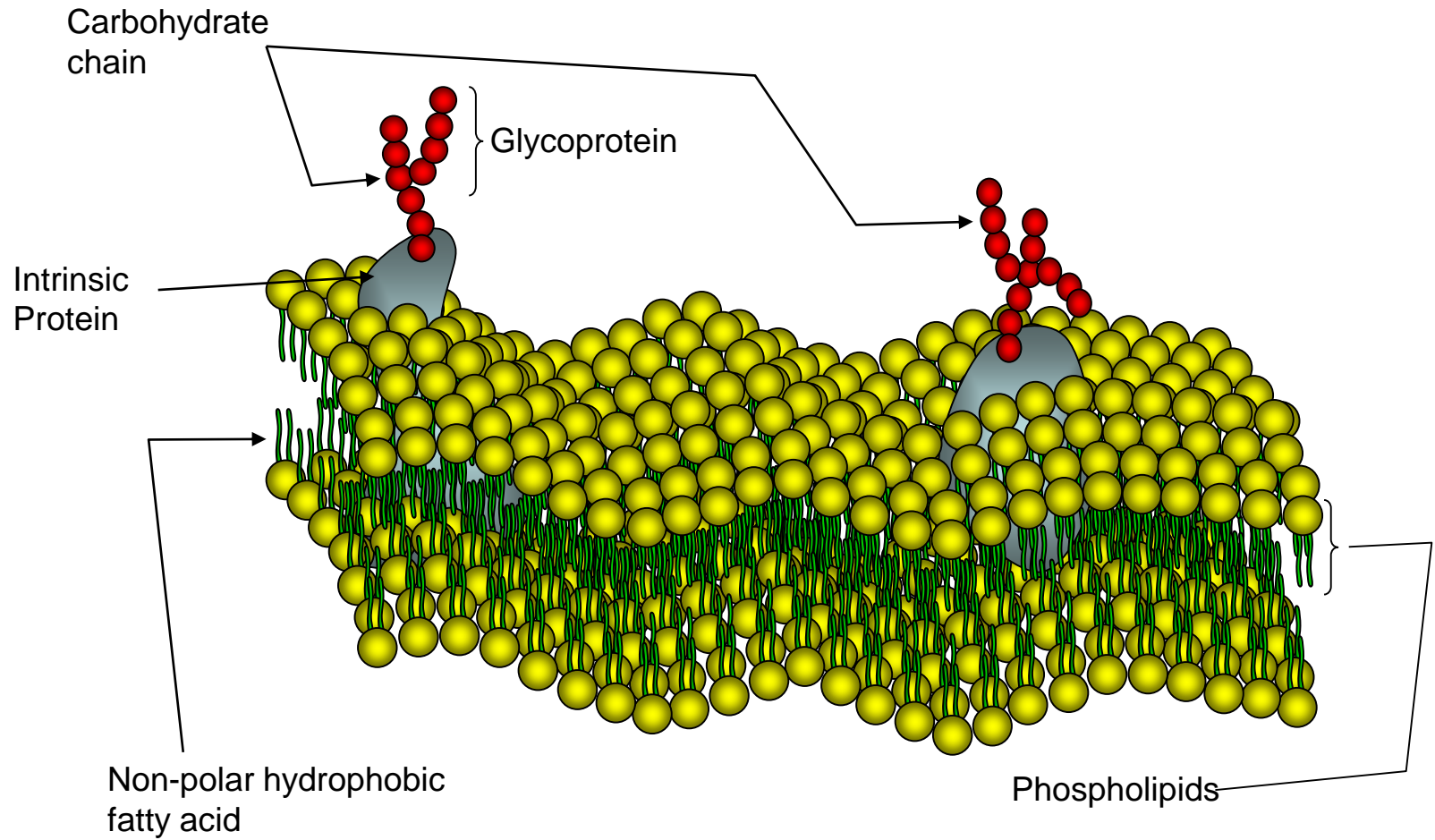
Cellular membranes have 4 components:

1. phospholipid bilayer
2. transmembrane proteins
3. interior protein network
4. cell surface markers

Phospholipid bilayers are fluid.

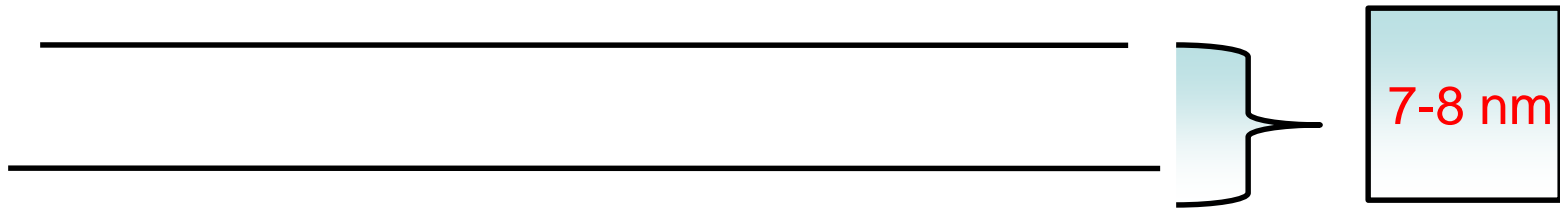
- hydrogen bonding of water holds the 2 layers together
- individual phospholipids and unanchored proteins can move through the membrane
- saturated fatty acids make the membrane less fluid than unsaturated fatty acids
- warm temperatures make the membrane more fluid than cold temperatures

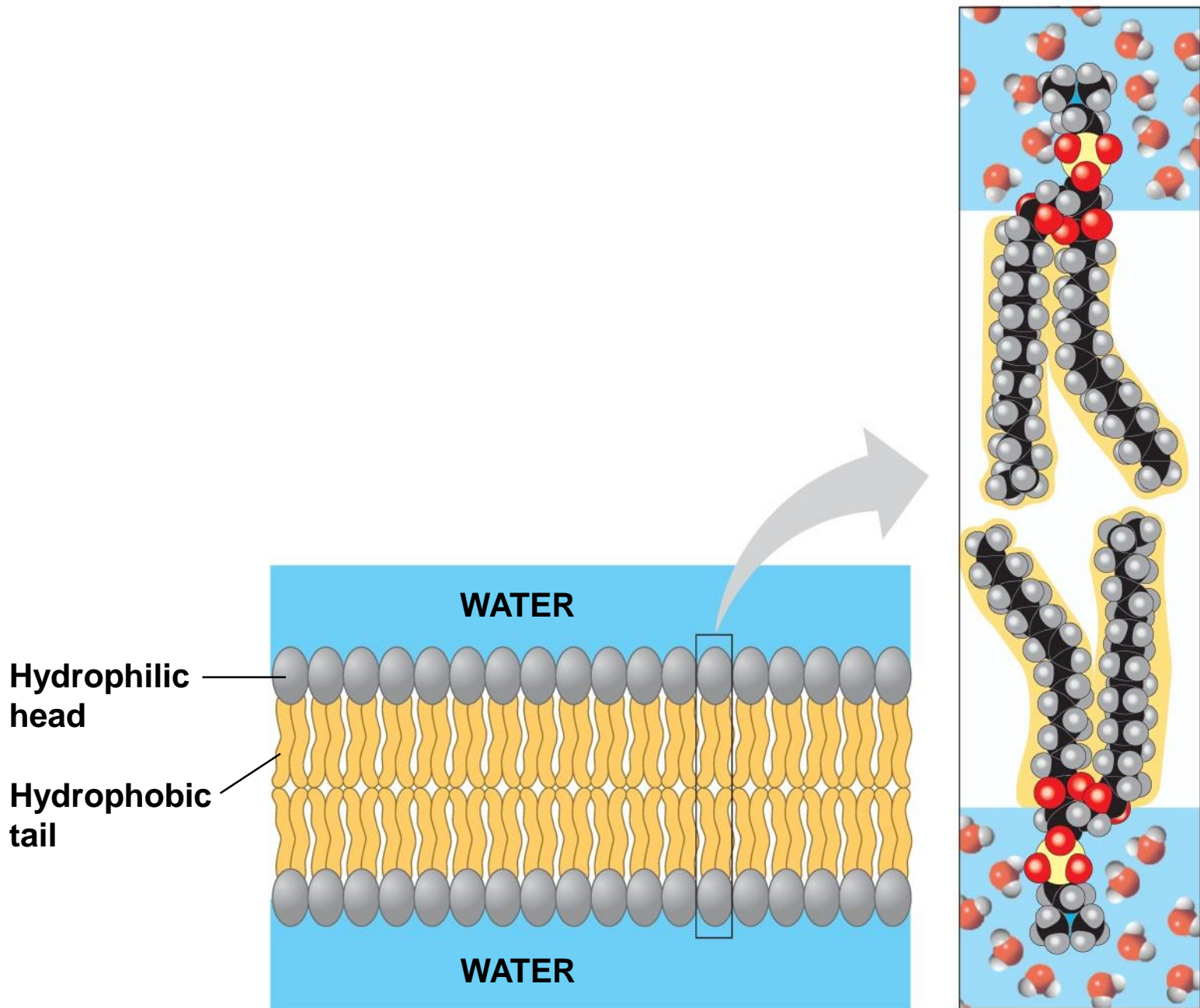
Fluid Mosaic Model of the Plasma Membrane



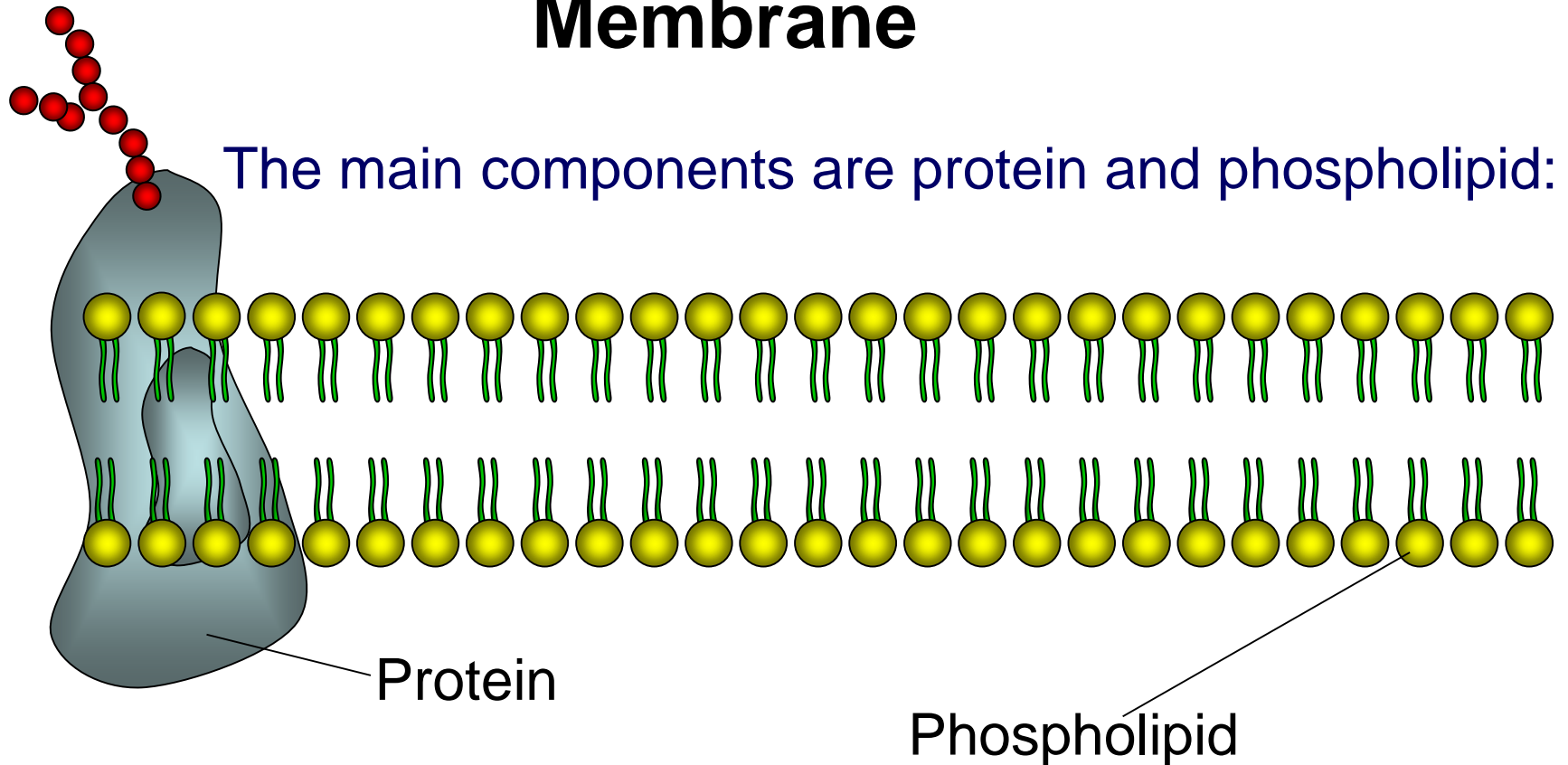
Appearance of the Cell Membrane

Seen using a light microscope, the cell membrane appears as a thin line, but with an electron microscope, it appears as a double line.



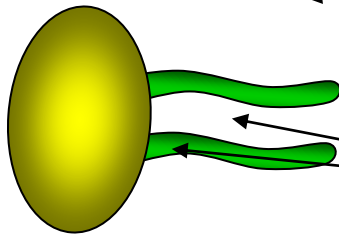
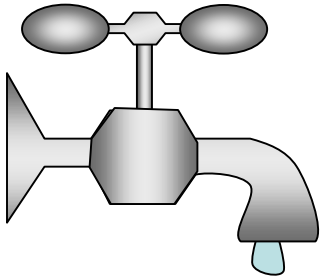


Biochemical Composition of the Plasma Membrane



Side view

Phospholipid



Hydrophilic head
- water loving

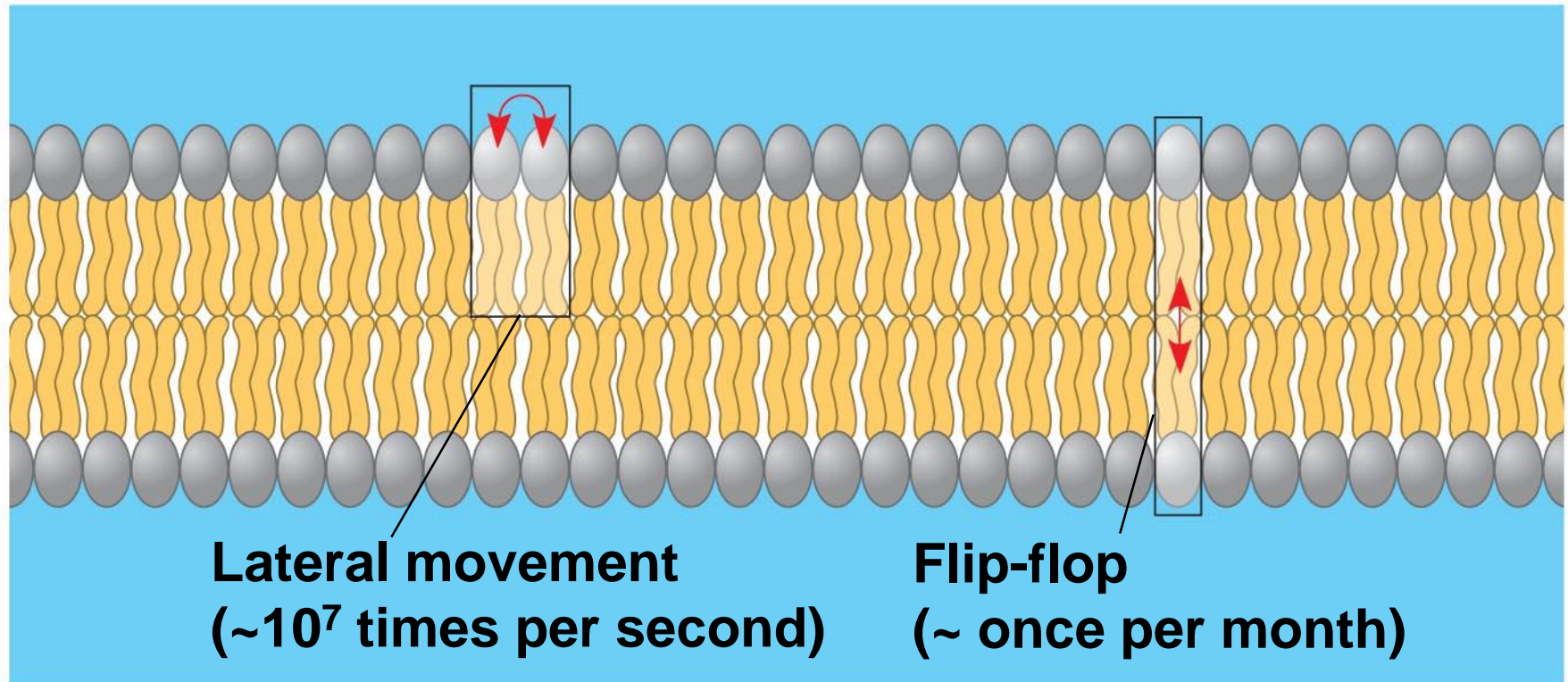


Hydrophobic tail
- water hating



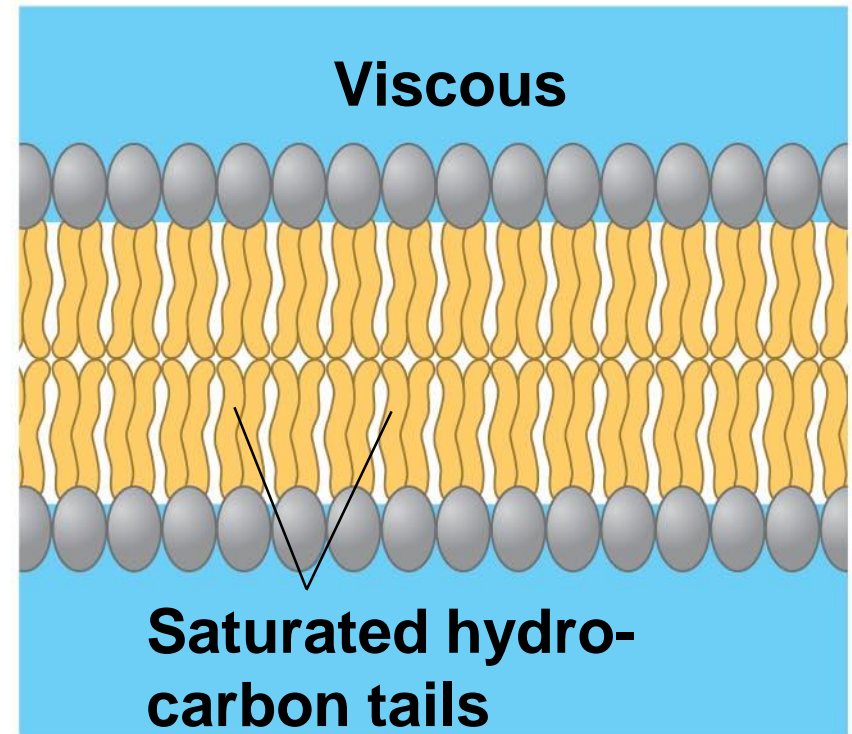
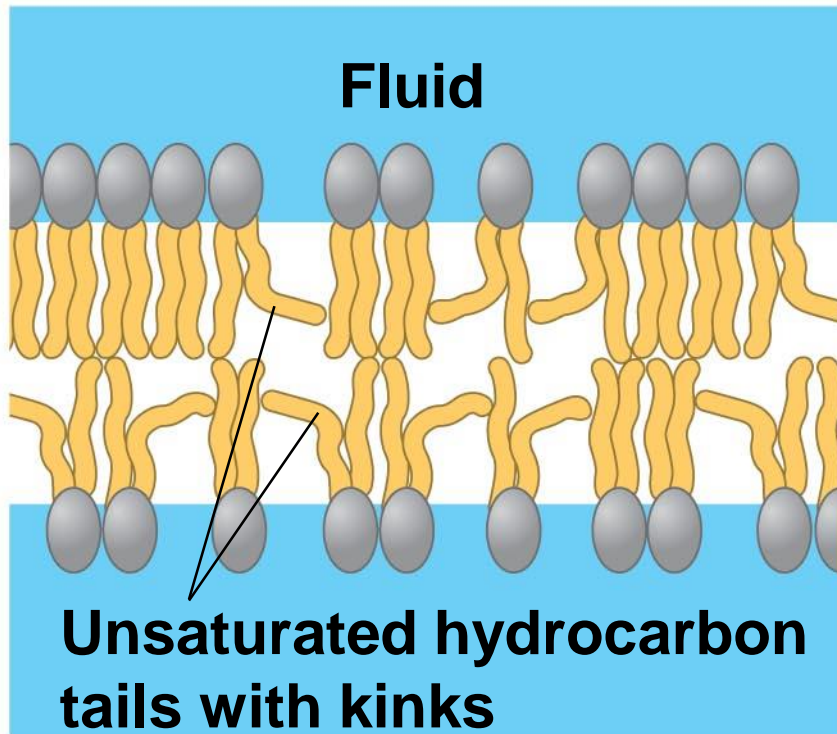
b. Space-filling model

11



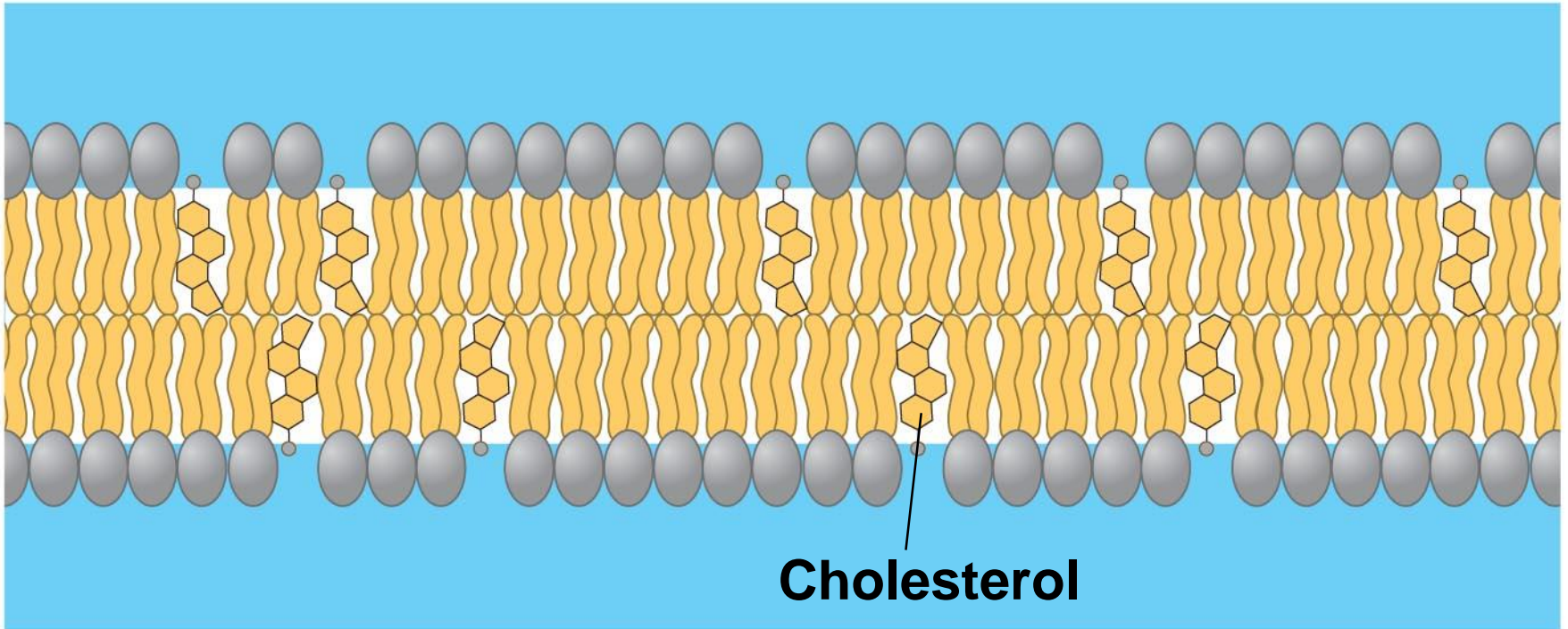
(a) Movement of phospholipids

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(b) Membrane fluidity

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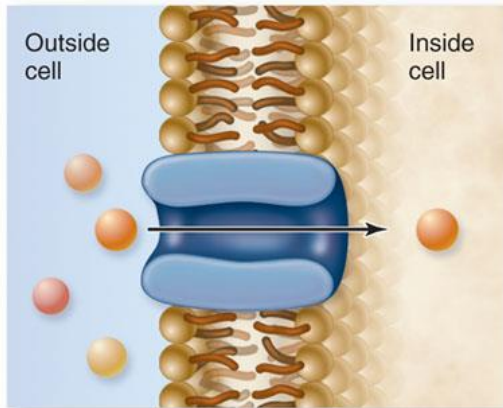
Cholesterol

(c) Cholesterol within the animal cell membrane

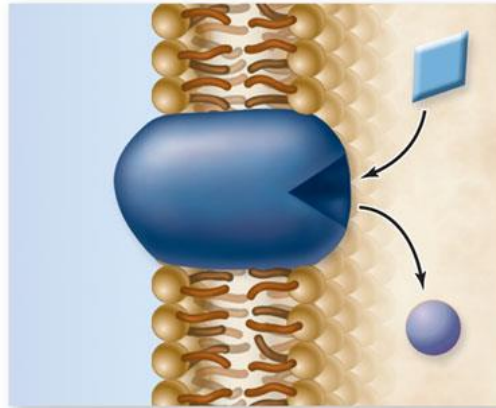
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- Six major functions of membrane proteins:
 - Transport – Channels &Transporter
 - Enzymatic activity - Enzymes
 - Signal transduction - Receptor
 - Cell-cell recognition – Cell Identity Marker
 - Intercellular joining - Linkers
 - Attachment to the cytoskeleton and extracellular matrix (ECM)

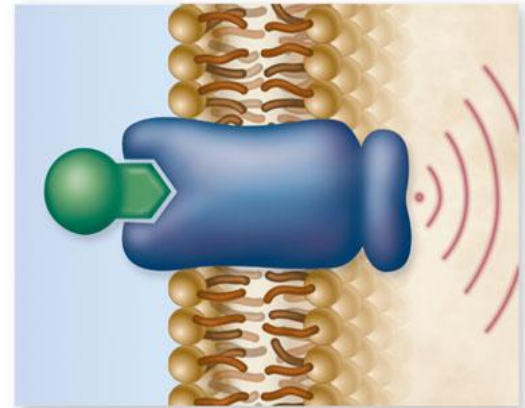
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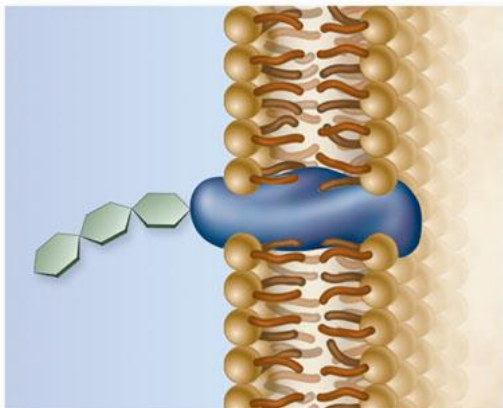
Transporter



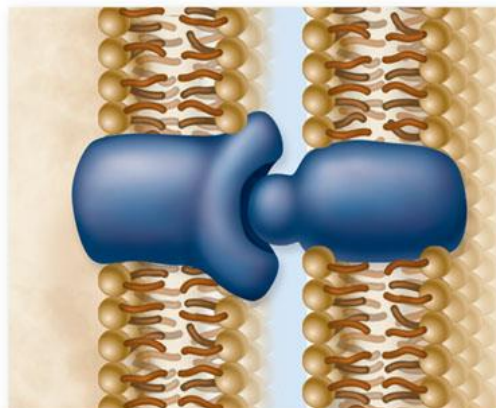
Enzyme



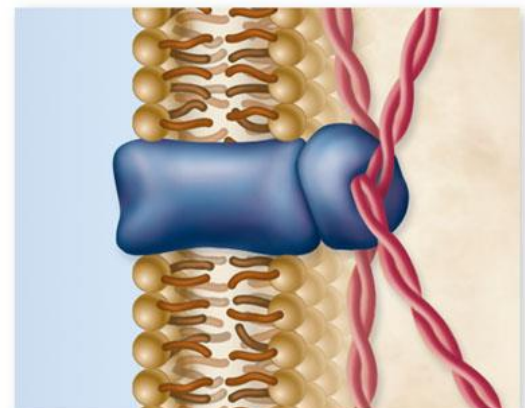
Cell surface receptor



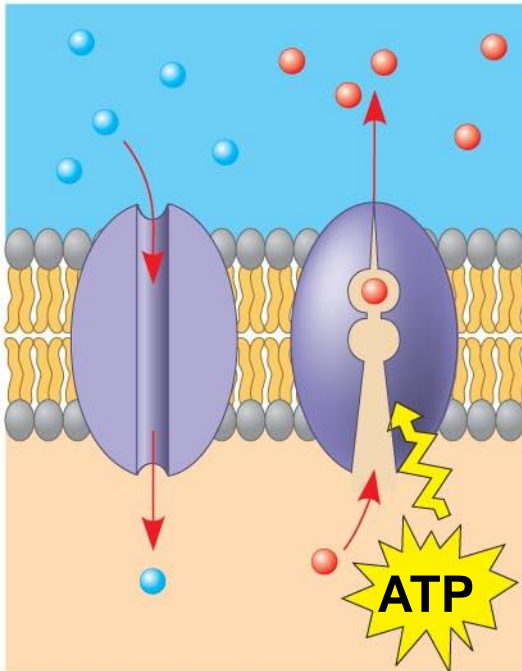
Cell surface identity marker



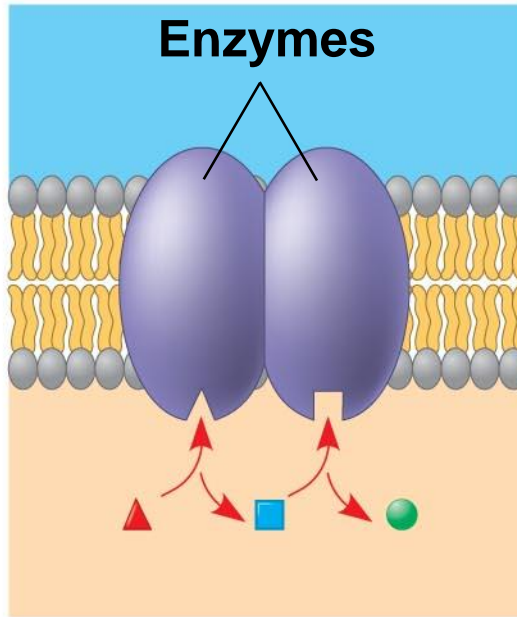
Cell-to-cell adhesion



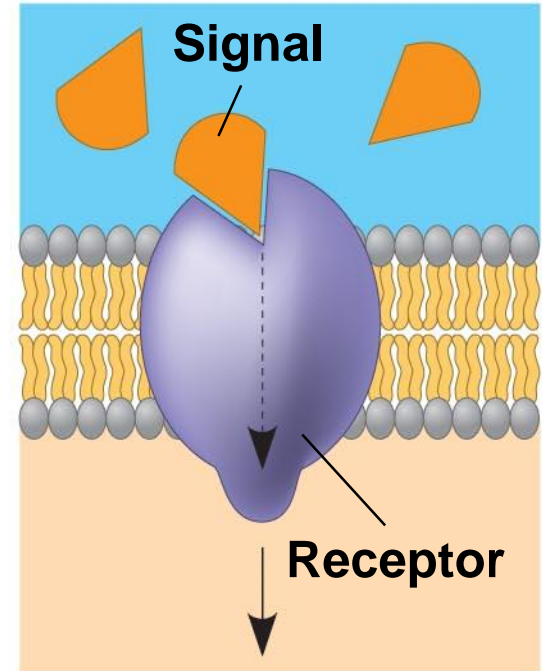
Attachment to the cytoskeleton



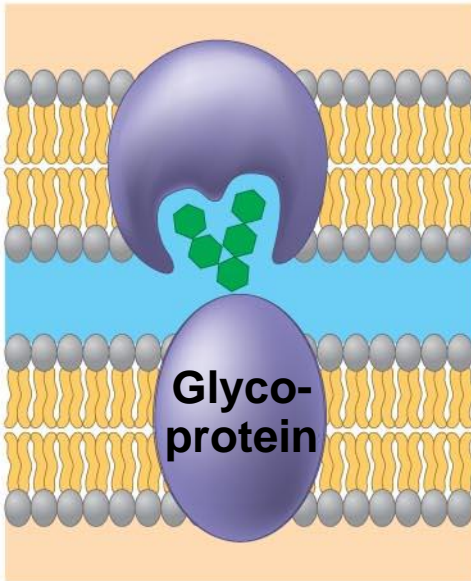
(a) Transport



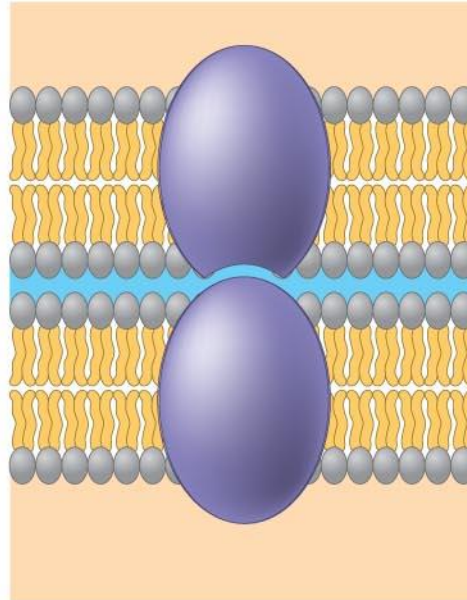
(b) Enzymatic activity



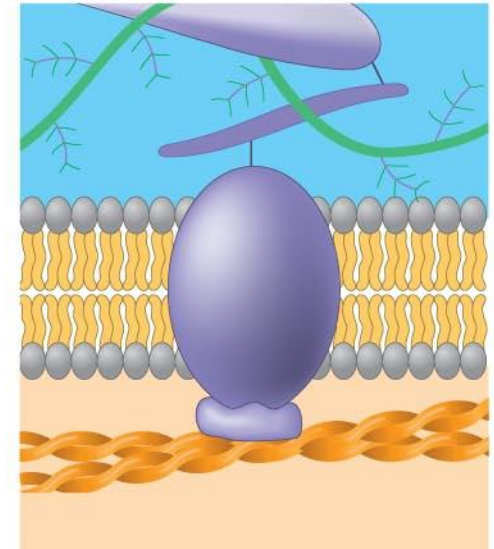
(c) Signal transduction



(d) Cell-cell recognition



(e) Intercellular joining



(f) Attachment to the cytoskeleton and extra-cellular matrix (ECM)

THANKS