

Chapter 6 The Plasma Membrane

Cell (plasma) membrane

- Cells need an inside & an outside...
 - separate cell from its environment
 - cell membrane is the boundary

Can it be an impenetrable boundary?

IN

food
carbohydrates
sugars, proteins
amino acids
lipids
salts, O₂, H₂O

OUT

waste
ammonia
salts
CO₂
H₂O
products

Building a membrane

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

Your choices

- carbohydrates?
- proteins?
- nucleic acids?
- lipids?

Lipids of cell membrane

- Membrane is made of **phospholipids**
 - phospholipid **bilayer**

Phospholipids

(a) Structural formula

(b) Space-filling model

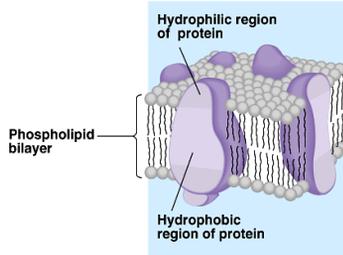
(c) Phospholipid symbol

More than just a barrier...

- Expanding our view of cell membrane beyond just a phospholipid bilayer barrier
 - phospholipids plus...

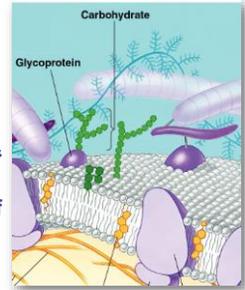
...proteins. Plus...

- In 1972, S.J. Singer & G. Nicolson proposed that membrane proteins are inserted into the phospholipid bilayer

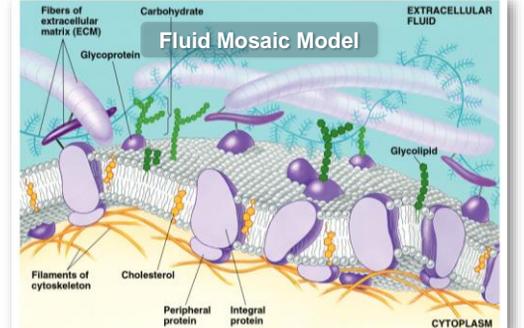
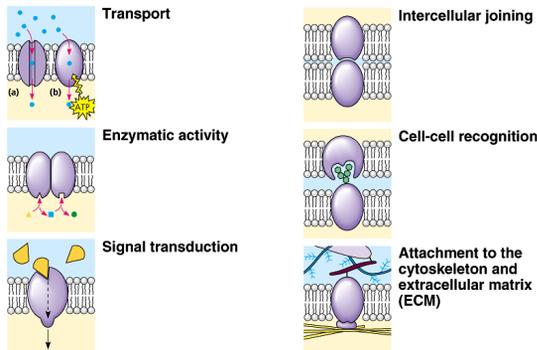


...membrane carbohydrates

- Play a key role in cell-cell recognition
- called **glycoproteins**
 - ability of a cell to distinguish neighboring cells from another
 - important in organ & tissue development
 - basis for rejection of foreign cells by immune system (**ABO blood system**)



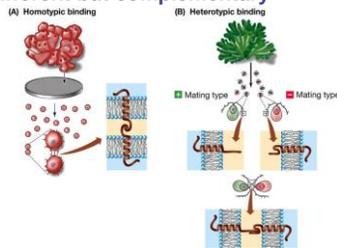
Membranes provide a variety of cell functions



A membrane is a collage of different proteins embedded in the fluid matrix of the lipid bilayer.

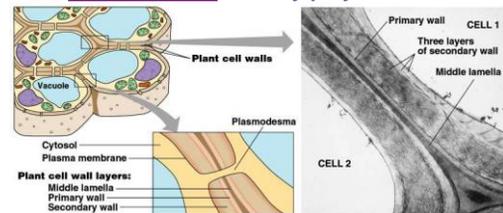
Cell Recognition and Adhesion

- Cells → Tissues
 - binding can be **homotypic** (between molecules of the same protein) or **heterotypic** (between different but complementary proteins)



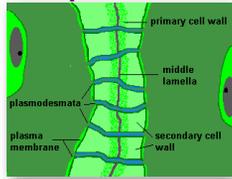
Plant cell wall

- Structure
 - cellulose
 - primary cell wall
 - secondary cell wall
 - middle lamella = sticky polysaccharides**

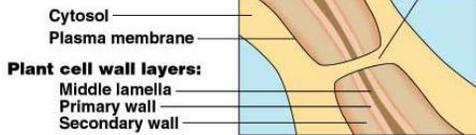


Intercellular junctions in plants

- Plant cells
 - ◆ plasmodesmata
 - channels allowing cytosol to pass between cells

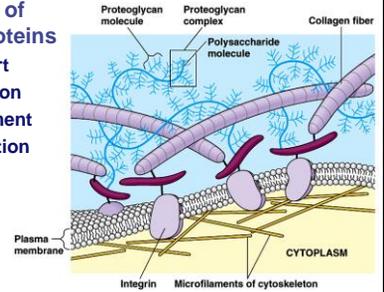


plasmodesmata

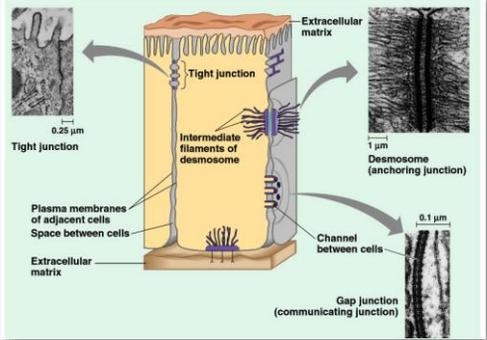


Animal cell surface

- Extracellular matrix
 - ◆ collagen fibers in network of glycoproteins
 - support
 - adhesion
 - movement
 - regulation

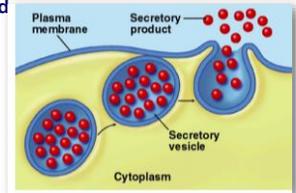


Intercellular junctions in animals

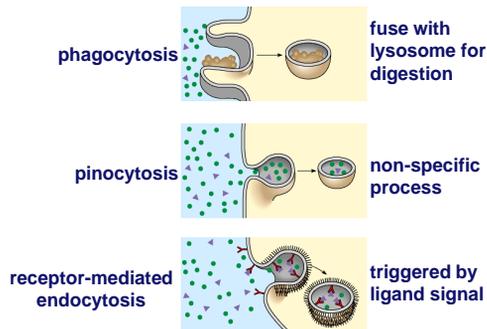


Large molecule movement

- Moving large molecules into & out of cell through vesicles & vacuoles
 - ◆ endocytosis
 - phagocytosis = “cellular eating”
 - pinocytosis = “cellular drinking”
 - receptor-mediated endocytosis
 - ◆ exocytosis



Endocytosis



Receptor-Mediated Endocytosis

