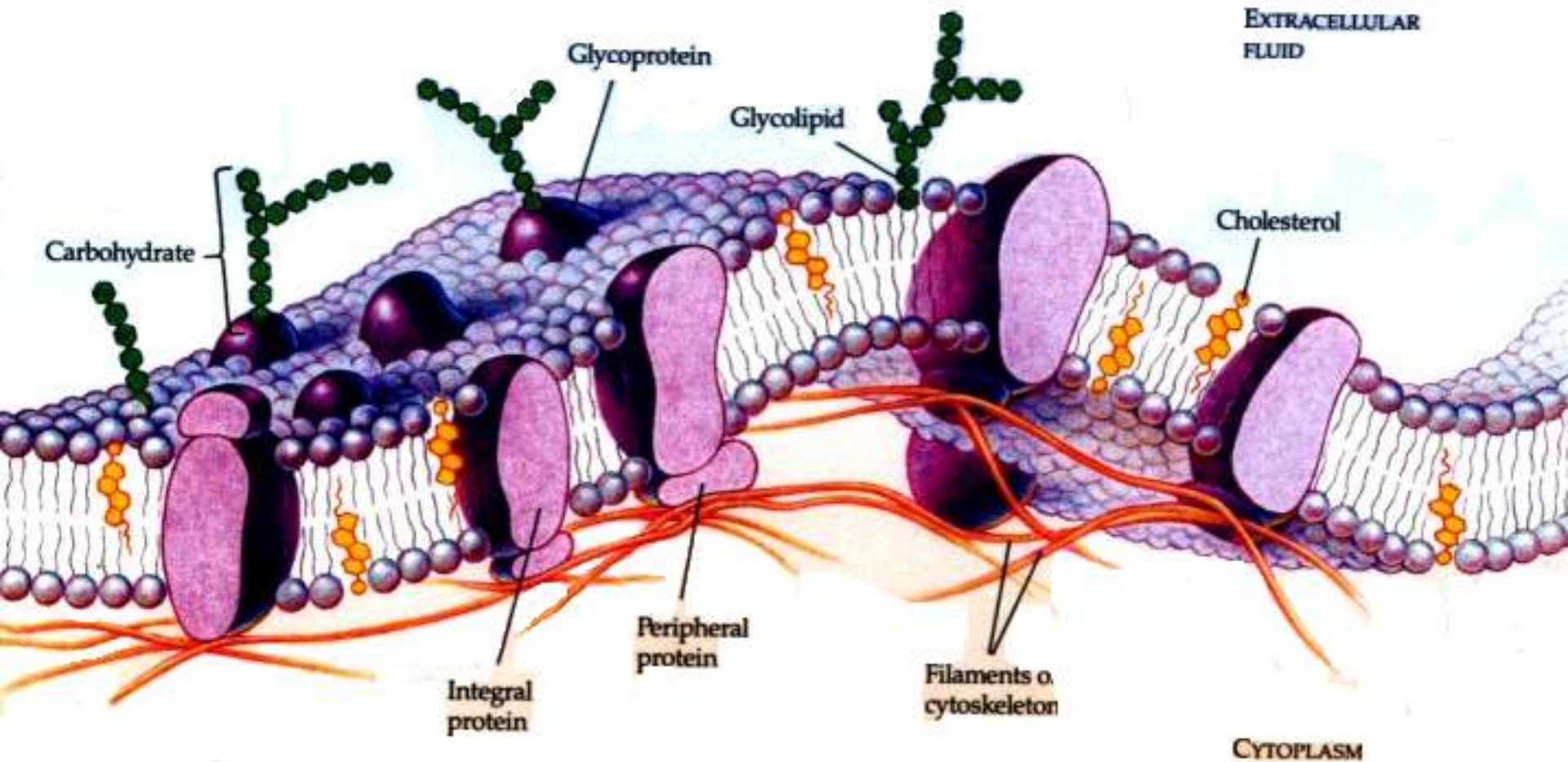


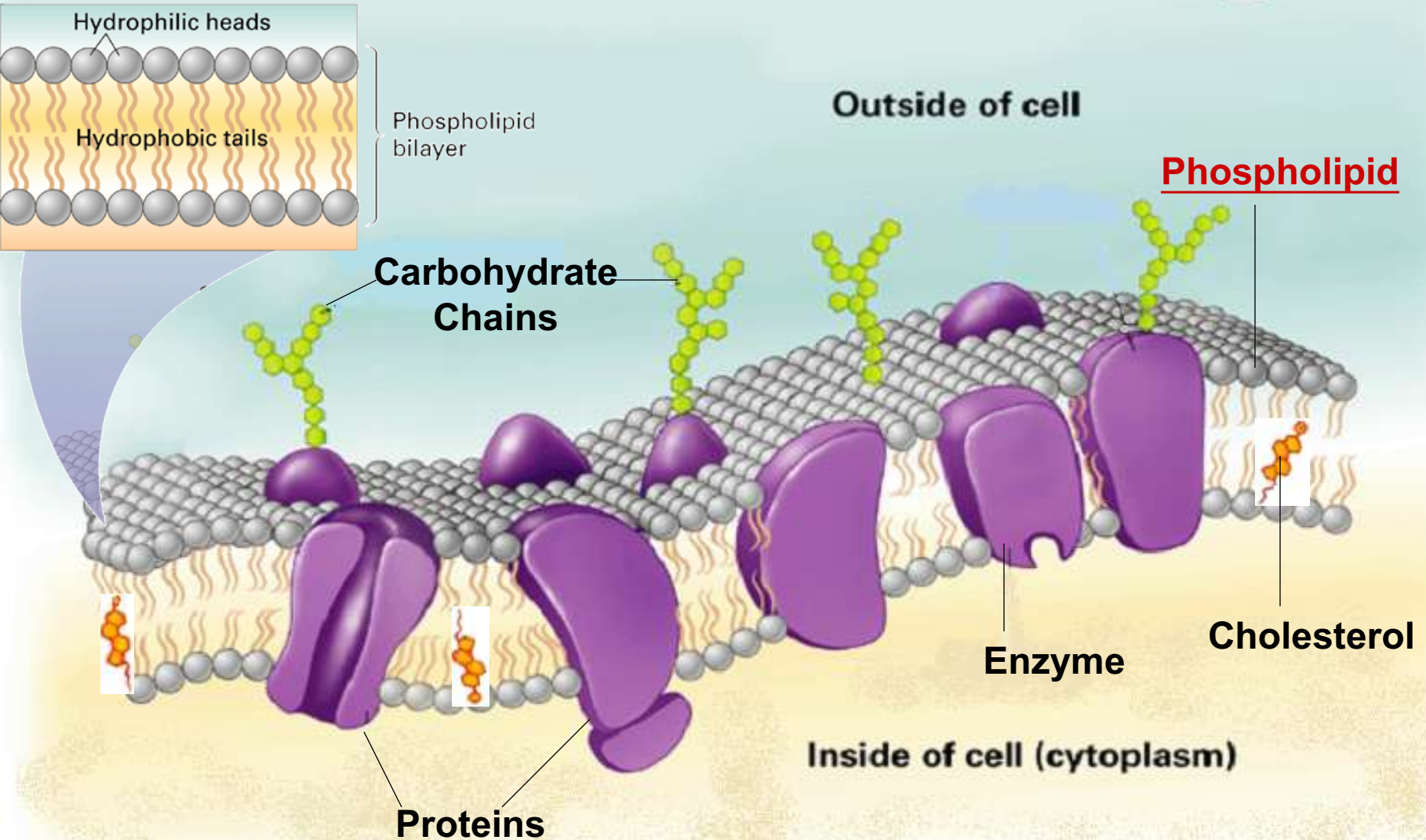
II. The Cell Membrane and Cellular Transport



A. Membrane Function

- Membranes are Selectively Permeable. That is, they control what materials enter and exit the cell.
- Membranes receive information concerning the cells environment and maintain structural and chemical relationships between neighboring cells

B. Membrane Structure



B. Membrane Structure

1. The cell membrane consist of a **Phospholipid bilayer**
 - The phospholipids may move freely within the plane of the membrane and are described as **fluid**
 - **Proteins** are embedded in the membrane and perform many diverse functions.
 - **Cholesterol** is found within the membrane and stabilize its structure

C. Cellular Transport:

Diffusion

- **Diffusion**- The process by which solutes move from an area of high concentration to low concentration.
- **Brownian Movement**- molecules within a substance are constantly in motion. Collisions between solute and solvents cause diffusion

3. The rate of diffusion is based on 3 factors:

- **Concentration** - the higher the concentration of solute, the greater the rate of diffusion
- **Temperature** - increased temperature increases the kinetic energy of the particles causing them to move faster and collide more thus increasing diffusion
- **Pressure** - the more particles in a fixed volume, the greater chance for molecular collision, therefore increasing diffusion

D. **Osmosis**- The diffusion of water through a membrane.
**Membranes prevent most solutes from crossing; however,
water may move freely**

1. The concentration of dissolved solutes and water is inversely proportional. Therefore, diffusion and osmosis are opposites.

OSMOSIS

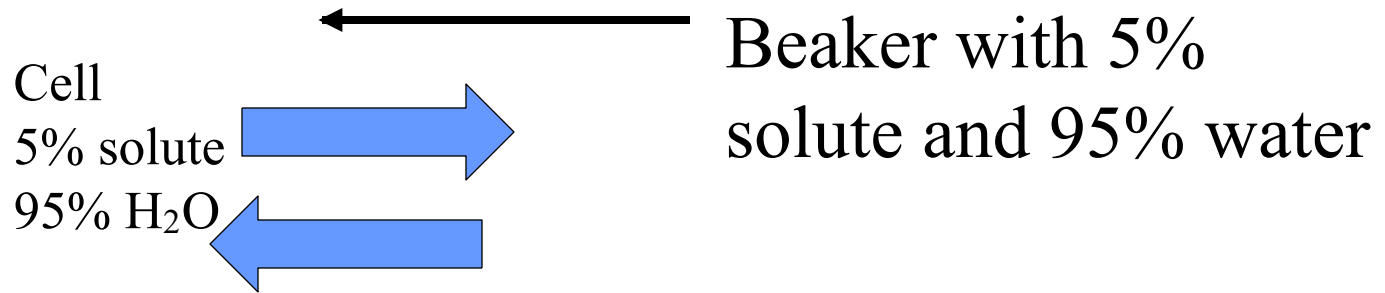
High Solute concentration ← High H₂O concentration

Low H₂O concentration → Low solute concentration

DIFFUSION

2. Cells may be in One of Three Conditions

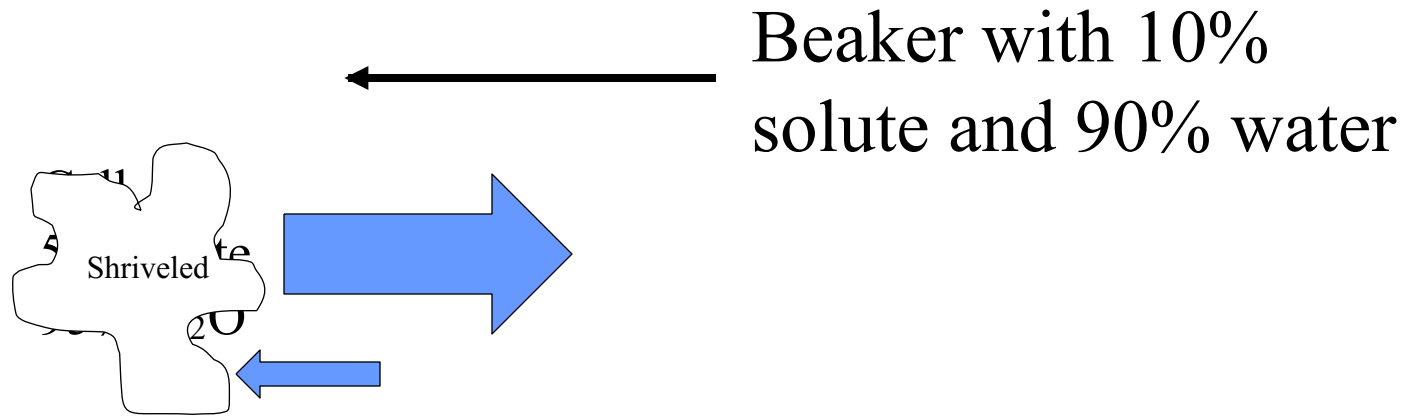
A. **Isotonic Environment**- equal amount of solute and water on both sides of a membrane



Water will move equally in and out of the cell

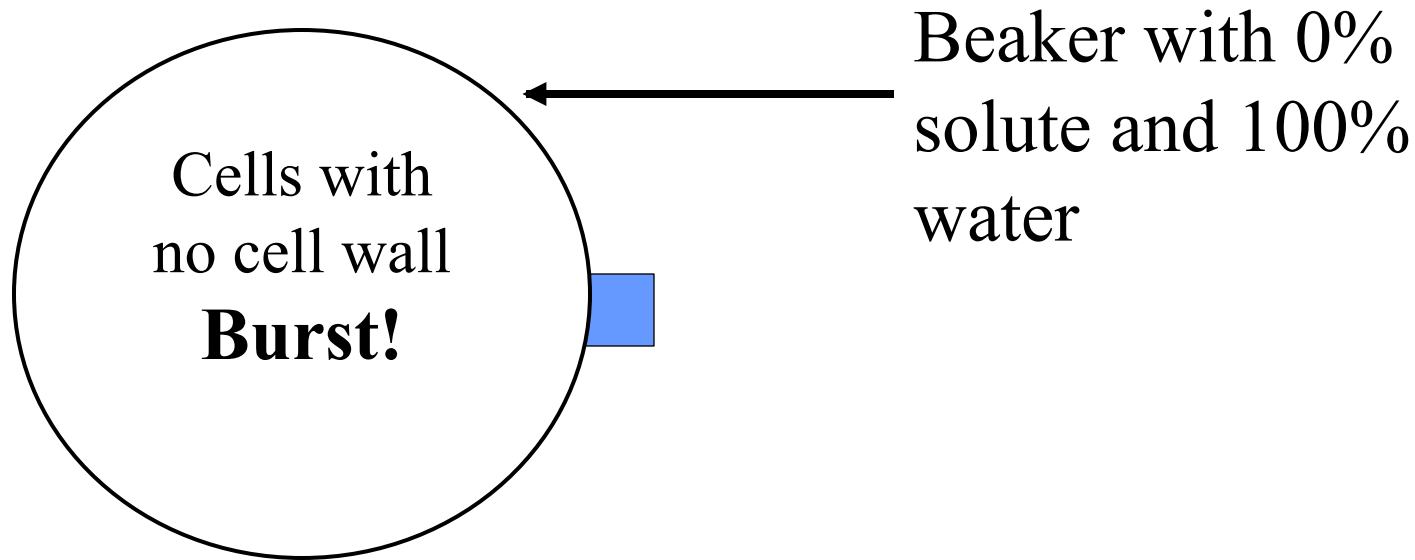
B. Hypertonic Environment-

more solute outside the cell and more water in the cell



Water will move out of the cell

C. Hypotonic Environment-
less solute and more water outside the
cell.



Water will move into the cell

3. Water balance in cells:

- Cells without cell walls swell and burst in hypotonic environments unless they have contractile vacuoles which pump water out of the cell
- Plants, bacteria and fungus have cell walls which prevent them from bursting
- Cells will dehydrate and die if exposed to hypertonic environments

E. Other Means of Transport Across the Membrane

- 1. Facilitated Diffusion-** specific protein create "tunnels" through the phospholipid bilayer
 - Only specific solutes may travel through the protein
 - Like osmosis and diffusion, facilitated diffusion is Passive - the cell doesn't expend energy.

2. Active Transport- a protein in the cell membrane "picks up" and carries a molecule across the membrane

- very specific
- The process is Active- the cell must expend energy to move the molecules

3. **Bulk Transport**- moves very large particles into and out of the cell

a) **Endocytosis**- moves particle into the cell

- Phagocytosis - engulfing solids

- **Pinocytosis**- engulfing liquids for the desired solutes

b) **Exocytosis** - moves materials out of the cell