

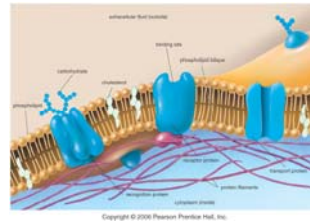
## Biological Membranes

- Structure
  - Phospholipid bilayer
  - Membrane Proteins
  - Fluidity
- Transport
  - Diffusion
    - Osmosis
  - Facilitated Diffusion
  - Active Transport
  - Endo/Exocytosis

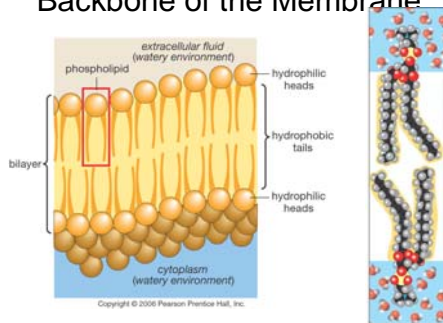


## 3 Types of Membrane Proteins

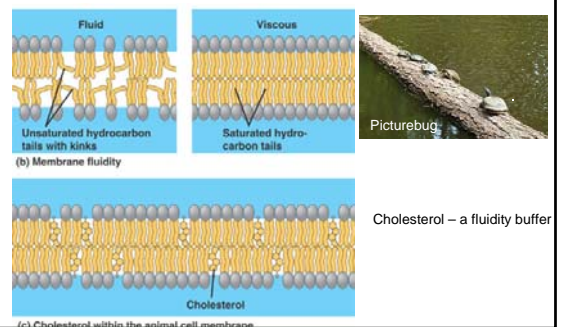
- Transport Proteins
- Receptor Proteins
- Recognition Proteins



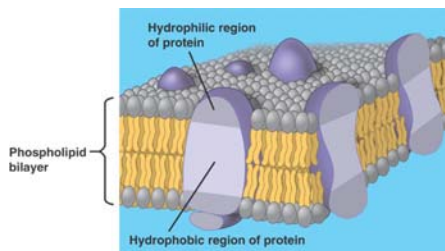
## Phospholipid Bilayer Backbone of the Membrane



## Maintaining Membrane Fluidity



## Membrane Proteins



Fluid Mosaic Model of Membrane Structure

## Caribou Plasma membranes



Cells of lower leg are typically near freezing temperatures in winter

Cells of the upper leg are near 37°C

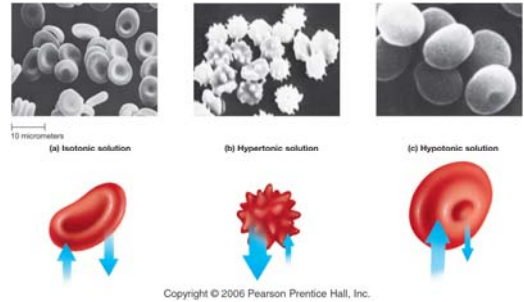
Predict how caribou might alter saturation levels in phospholipids of different cells to keep the cells functioning across this range of temperatures.

## Semi-Permeable Membranes

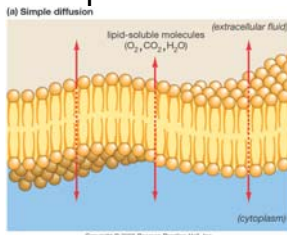
-Only some molecules can move across the membrane

- Simple Diffusion
  - Osmosis
- Facilitated Diffusion
- Active Transport
- Endo/Exocytosis

## Osmosis

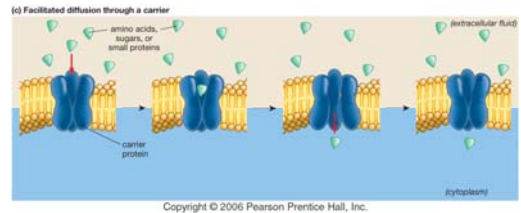


## Simple Diffusion



Types of Molecules – Small uncharged molecules  
 Membrane proteins – non required  
 Direction of movement – with the concentration gradient  
 Energy – passive – no cellular energy required

## Facilitated Diffusion

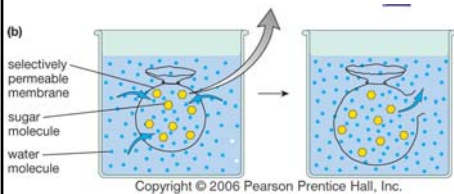


Types of Molecules – **Specific** ions, monomer, dimer ect  
 Membrane Protein – Carrier Protein (or Channels)  
 Direction of movement – with the concentration gradient  
 Energy – passive – no cellular energy required

## Osmosis

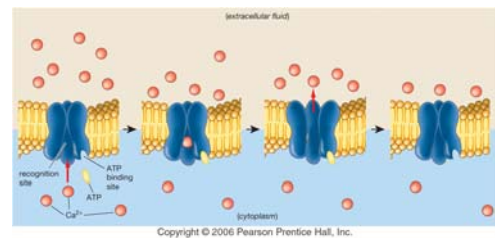
- Movement of water across membranes

Types of Molecules – Water  
 Membrane proteins – non required  
 Direction of movement – From area of low solute concentration to high solute concentrations  
 Energy – passive – no cellular energy required

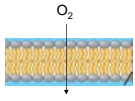


## Active Transport

Types of Molecules – **Specific** ions, monomer, dimer ect  
 Membrane Protein – Membrane Pumps  
 Direction of movement – against the concentration gradient  
 Energy – requires cellular energy

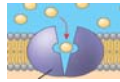


## Overview of membrane Transport



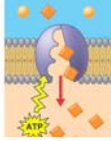
**Simple Diffusion**  
**Mol** - Small uncharged mol  
 - hydrophobic mol  
**Mech** - dissolve in lipid bilayer  
 - no protein needed  
**Direction** - With Conc Grad  
**Cell Energy** - none

**Regulation** - none  
**Special** - Osmosis



**Facilitated Diffusion**  
**Mol** - Specific ions  
 - specific hydrophilic mol  
**Mech** - Carrier Protein  
 (Channels)  
**Direction** - With Conc Grad  
**Cell Energy** - none

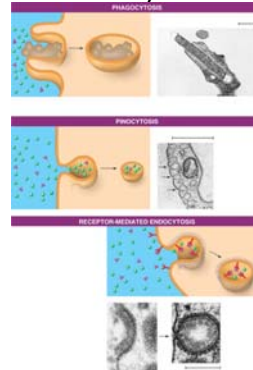
**Regulation** - Gated Channels  
**Special** - Specificity



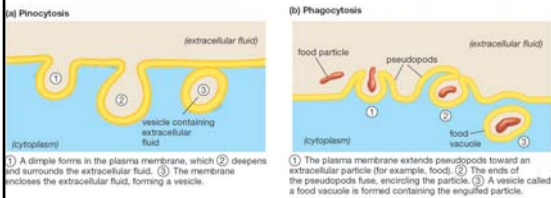
**Active Transport**  
**Mol** - Specific ions  
 - specific hydrophilic mol  
**Mech** - Protein Pumps  
**Direction** - Against Conc Grad  
**Cell Energy** - ATP

- Electrochemical Gradient  
**Regulation** - Yes  
**Special** - Specificity

## Endocytosis

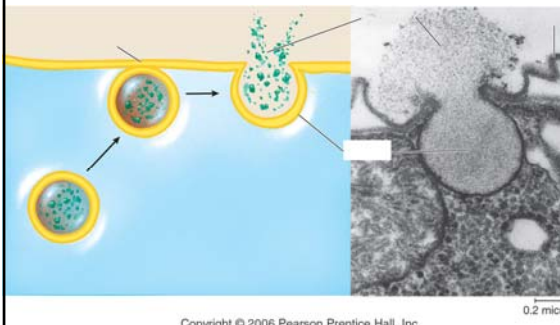


## Endocytosis



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## Exocytosis



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