

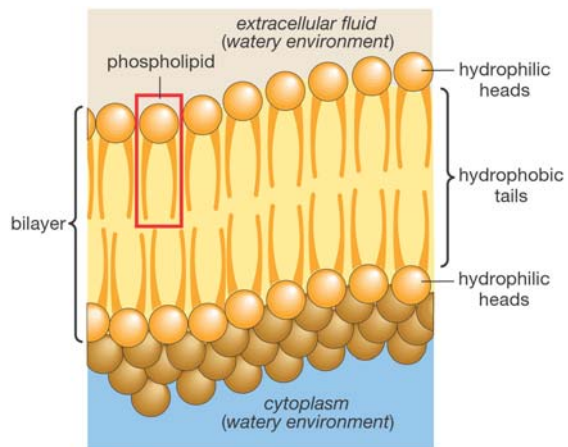
Biological Membranes

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

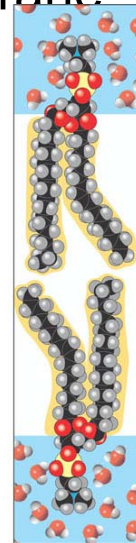


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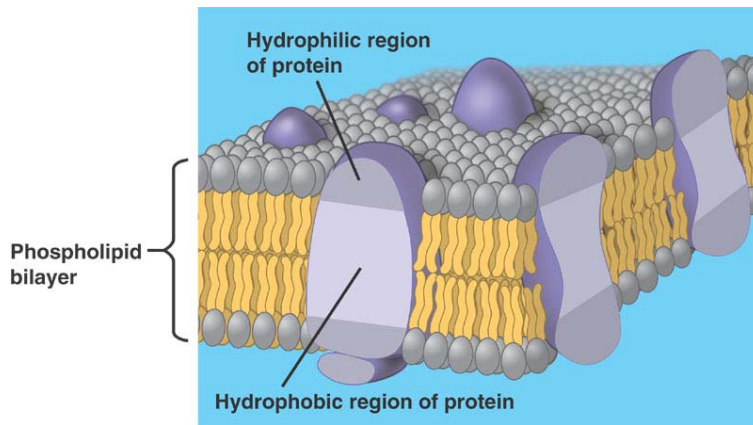
Phospholipid Bilayer Backbone of the Membrane



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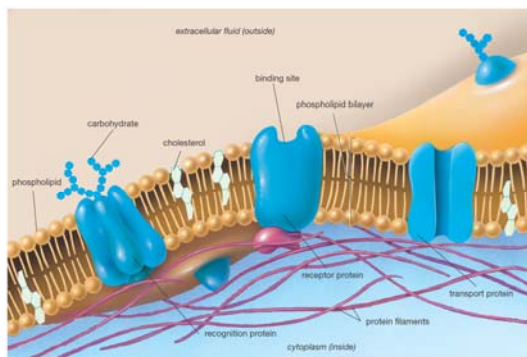


Membrane Proteins



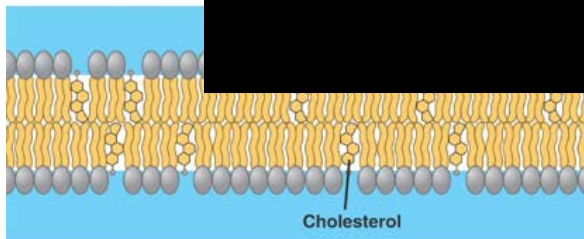
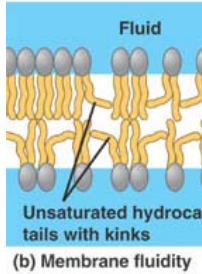
Fluid Mosaic Model of Membrane Structure

3 Types of Membrane Proteins



- Transport Proteins
- Receptor Proteins
- Recognition Proteins

Maintaining Membrane Fluidity



Cholesterol – a fluidity buffer

Caribou Plasma membranes



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Cells of lower leg are typically near freezing temperatures in winter

Cells of the upper leg are near 37°C

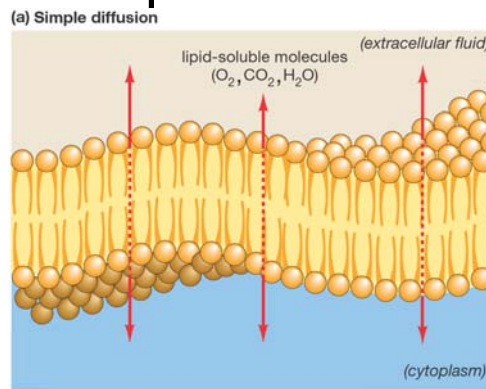
Predict how caribou might alter saturation levels in phospholipids of different cells to keep the cells functioning across this range of temperatures.

Semi-Permeable Membranes

-Only some molecules can move across the membrane

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

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

Osmosis

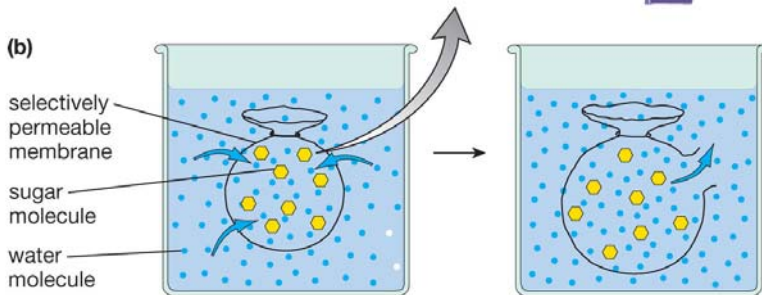
- Movement of water across membranes

Types of Molecules – Water

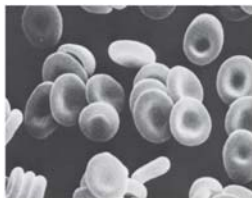
Membrane proteins – non required

Direction of movement – From area of low solute concentration to high solute concentrations

Energy – passive – no cellular energy required



Osmosis

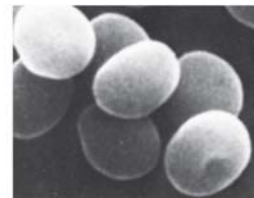


10 micrometers

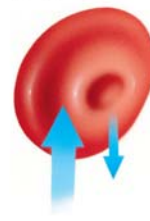
(a) Isotonic solution



(b) Hypertonic solution

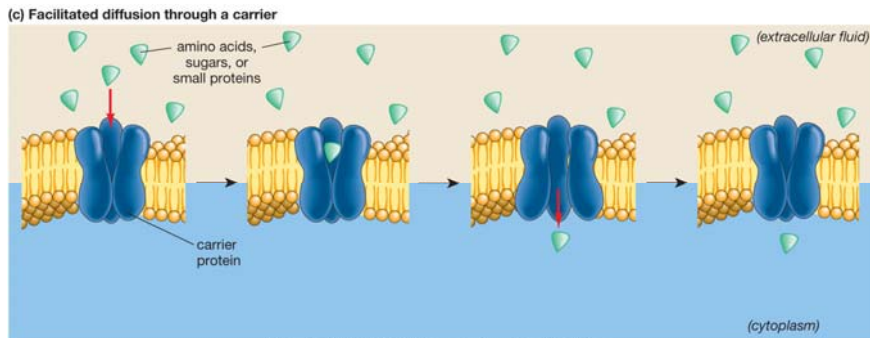


(c) Hypotonic solution



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Facilitated Diffusion

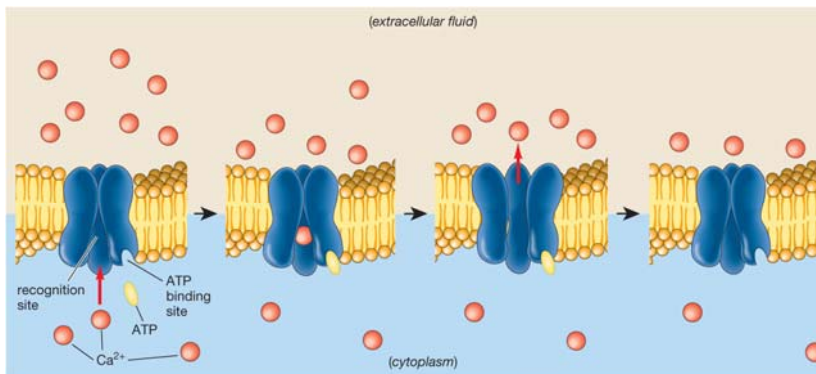


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Types of Molecules – **Specific** ions, monomer, dimer ect
Membrane Protein – Carrier Protein (or Channels)
Direction of movement – with the concentration gradient
Energy – passive – no cellular energy required

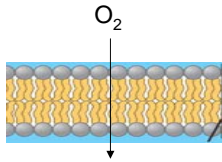
Active Transport

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

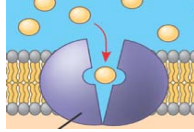


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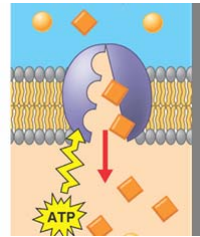
Overview of membrane Transport



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



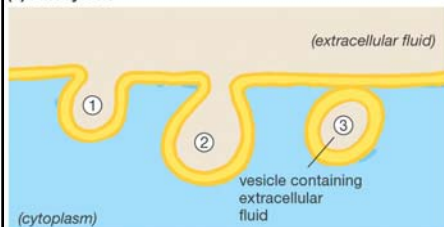
Facilitated Diffusion
Mol - Specific ions
 - specific hydrophilic mol
Mech - Carrier Protein
 (Channels)
Direction - With Conc Grad
Cell Energy - none
Regulation - Gated Channels
Special - Specificity



Active Transport
Mol - Specific ions
 - specific hydrophilic mol
Mech - Protein Pumps
Direction - Against Conc Grad
Cell Energy
 - ATP
 - Electrochemical Gradient
Regulation - Yes
Special - Specificity

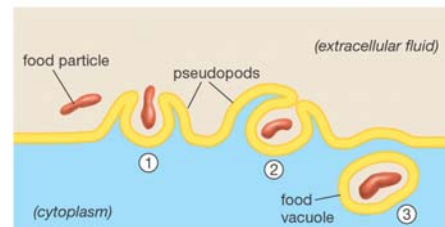
Endocytosis

(a) Pinocytosis



① A dimple forms in the plasma membrane, which ② deepens and surrounds the extracellular fluid. ③ The membrane encloses the extracellular fluid, forming a vesicle.

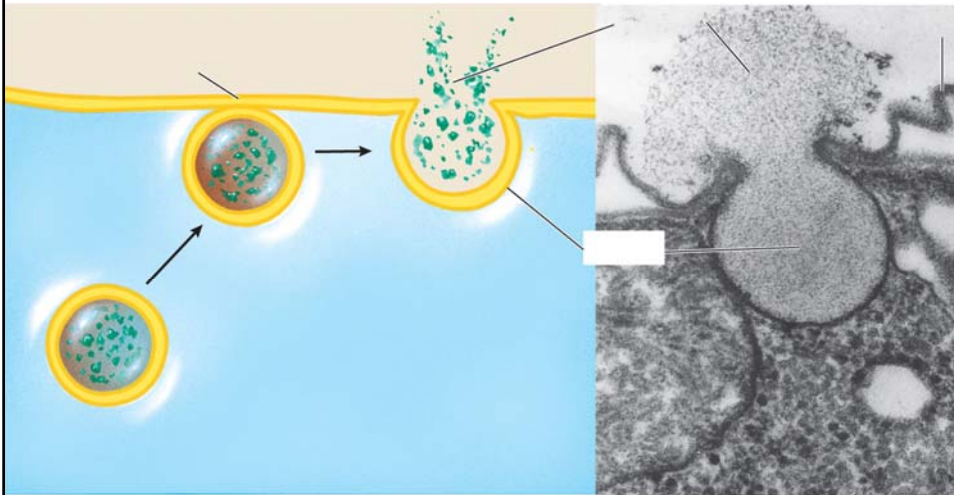
(b) Phagocytosis



① The plasma membrane extends pseudopods toward an extracellular particle (for example, food). ② The ends of the pseudopods fuse, encircling the particle. ③ A vesicle called a food vacuole is formed containing the engulfed particle.

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Exocytosis



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Endocytosis

