Surface Area

outside area of an object

the area around the outside of a cell

unit: m^2

Application in Living Things

increased surface area = increased diffusion

microvilli: increases absorption in intestines

root hairs: increases water/nutrient absorption in plants

endomembrane system: increased folds in organelles allow for more surface area to do cellular work

cristae of the mitochondria: folds in the inner mitochondria increase amounts of ETC (more ATP)

Structure of Phospholipid

hydrophilic head:	hydrophobic tail:
phosphate	saturated fatty acid
glycerol	unsaturated fatty acid

cholesterol

at warm temperatures:	at cool temperature:
restrains the movement of phospholipids and reduces fluidity	maintains fluidity by preventing tight packing

Passive Transport

no energy

high to low concentration

diffusion

osmosis

facilitated diffusion

ion channels

Diffusion

passive transport

molecules spread out to available spaces

move down concentration gradient (high to low concentration)

work to reach equilibrium

Active Transport

no energy

low to high concentration

sodium potassium pump: 3 sodium leave and 2 potassium enter cell against the concentration gradient

proton pump: hydrogen atoms pumped against concentration gradient

cotransport: H+ gradient helps to bring other molecules into cell

endocytosis and exocytosis

Prokaryotic vs. Eukaryotic Cells

similarities: cell membrane, DNA, ribosomes, cytoplasm

	Prokaryotes:	Eukaryotes:
organelles:	no nucleus	nucleus
	no membrane bound organelles	membrane bound organelles
reproduction:	binary fission	mitosis and meiosis
average size:	smaller	larger
DNA:	DNA is circular	DNA is linear
	single chromosome	paired chromosomes

Plant Cells in Pure Water

pure water (hypotonic solution) will initially move into the cells

after a period of time the cells will become turgid (swollen)

as turgor pressure increases, water will diffuse out of the cell... eventually equilibrium will be reached

Osmoregulation

organisms without cell walls that live in hypertonic or hypotonic environment must have adaptations for osmoregulation

the control of water balance

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Volume

amount of space inside of the object

the space inside of the cell

unit: cm^3

Fluid Mosaic Model

phospholipids: provides fluidity and elasticity

proteins and other molecules embedded in membrane

Phospholipid Bilayer

amphipathic

hydrophilic heads

hydrophobic tails

Proteins

integral proteins:	peripheral proteins:
imbedded through the membrane (inside)	on hydrophilic portion of the cell membrane (outside)

Carbohydrates

cell to cell recognition:	membrane carbohydrates:
cell's ability to distinguish one type of neighboring cell from another	interact with the surface molecules of other cells, facilitating cell to cell recognition

Passive Transport (diffusion)

the tendency for molecules of any substance to spread out into available space

substances will move down a concentration gradient

high to low concentration

Passive Transport (osmosis)

the diffusion of water

water moves from hypotonic to hypertonic

isotonic: equal solute across a membrane

hypotonic: less solute, more water

hypertonic: more solute, less water

low to high concentration

Active Transport (endocytosis)

cell takes in macromolecules by forming vesicles from plasma membrane

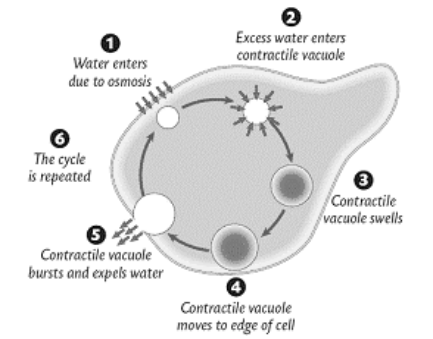
phagocytosis: "cellular eating," engulfing solids

pincytosis: "cellular drinking," engulfing solutes

Active Transport (exocytosis)

transport vesicles migrate to the membrane, fuse with it and release their contents

Osmoregulation (paramecium)



The Endosymbiotic Theory

an evolutionary theory of the origin of eukaryotic cells from prokaryotic organisms

endosymbiosis: one organism living inside another

evidence 1) chloroplasts and mitochondria multiply in the same way as ancient bacteria

evidence 2) chloroplasts and mitochondria both control their own DNA and ribosomes

evidence 3) chloroplasts and mitochondria both have two membranes (inner membrane contains different proteins than the outer membrane)

Surface Area to Volume Ratio

a comparison between the size of the outside of an object and the amount inside

smaller cells have an increase SA:V

as the cell gets bigger, the SA:V decreases

small cells are more efficient at diffusion as they have a high ratio

Structure of Cellular Membrane

two main components:	other important molecules:
phospholipids	cholesterol
proteins	carbohydrates

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Functions of Membrane Proteins

intercellular joinings
enzymatic activity
transport (active/passive)
cell to cell recognition
anchorage/attachment
signal transduction

Cell Membranes are Semipermeable

properties of molecules that can get through the phospholipid bilayer:	properties of molecules that can not get through the phospholipid bilayer:
small	large
nonpolar	polar
nonionic	ionic
hydrophobic	hydrophilic
O2 and CO2	

Passive Transport (facilitated diffusion)

transport proteins allow molecules to flow from high to low concentration

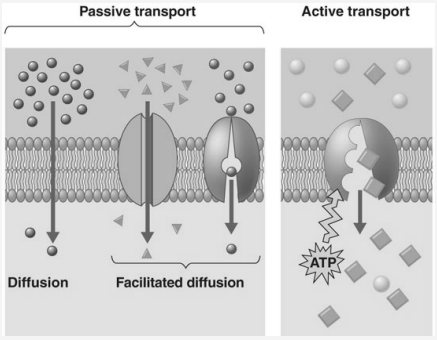
aquaporins: tunnel that allows water to go through the membrane

glut: glucose transporter

Passive Transport (ion channels)

transport proteins allow ion to flow from a high to low concentration

Passive and Active Transport



Water Potential

the force responsible for movement of water in a system

solute potential: determined by solute concentration

pressure potential: results from exertion of pressure on membranes/walls as water moves in or out; can be positive or negative

Plant vs. Animal Cell

Plant Cell:	Animal Cell:
chloroplast	cilia and flagella
central vacuole	centrioles
cell wall	lysosomes

The Endomembrane System

a system of synthesizing proteins for export

1) Nucleus: transcription (DNA -> RNA) make ribosomes

2) Rough ER: translation (RNA -> proteins) proteins for export

3) Vesicle: transports proteins in cells

4) Golgi Apparatus: process and package proteins

5) Vesicle: transports proteins in cells

6) Cell Membrane: exocytosis

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