

### Types of Cells

Prokaryotes	"Before nucleus", doesn't contain a membrane bound nucleus
Eubacteria	Prokaryote; True bacteria
Archaea	Prokaryote; Missing link between prokaryotic and Eukaryota cells
Eukaryotes	"True nucleus", contains a membrane bound nucleus
Eukarya	Eukaryotic; domain containing eukaryotes

### Eubacteria

- Small (650 nm)
- Contains cell wall, can be gram stained
- Organelles:
- Nucleoid = Ring of DNA; plasmids
- Cytosol = Jelly-like material
- Ribosome = None-membrane bound, synthesizes proteins (rRNA)
- Gram stain is purple = positive, thick cell wall
- Gram stain is pink = negative, thin cell wall

### Archaea

- Discovered in 1977
- Cannot be gram stained
- Similar organelles as eubacteria, but the cell wall is different
- Contains histones (packaging molecules, what chromosomes wrap around)
- Contains chromosomes, a eukaryotic characteristic

### Eukarya

- Eukaryotic cells
- Organelles:
- Nucleus
- Nucleolus
- Membrane bound organelles
- Ribosomes

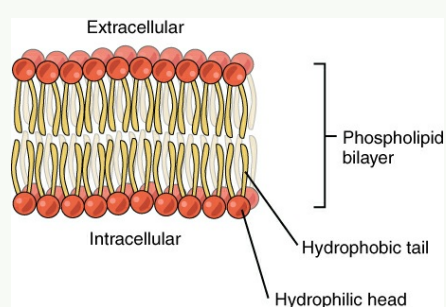
### History of Cells

1665;	Named cells
Robert Hooke	
1830s; T. Schwann	Stated that cells make up all living things
1850s; Mettius Schleiden	Stated "...the vital process of individual cells must form first and is the basis of life"
Late 1850s; Rudolf Virchow	Established the cell theory with other scientists

### Cell Theory

- 1) All living things are made of cells, cells are the unit of life for all living things
- 2) Cells arise from preexisting cells

### Plasma Membrane

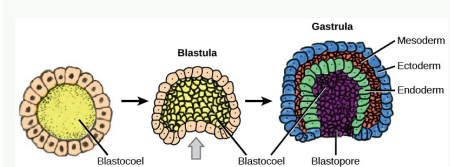


Phospholipid bilayer formed by the presence of water due to hydrophobic interaction  
Function = control what goes in and out of the cell

### Proteins in Cell Membrane

Integral Protein	Proteins that go completely through the protein
Peripheral Protein	Surface of the membrane, trigger/receptor proteins = transports/responds
Glycoprotein/Glycolipid	used for cell recognition
Cholesterol	Keeps the fluid-like characteristics of the membrane

### Gastrula



Zygote - Fertilized egg

Blastula - Hollow sphere of germ/stem cells

### Homeostasis

Homeostasis	Ability for a cell/organism to maintain its internal environment
Apoptosis	Programmed cell death, based on genetics
Poikilothermic	Body temperature fluctuates
Homothermic	Constant body temperature



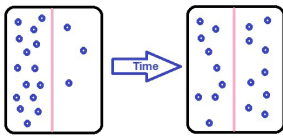
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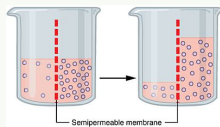
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### Diffusion



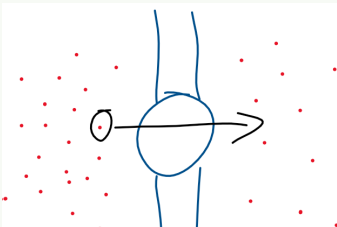
Movement of a particle/atom/molecule using a concentration gradient, move from an area of high concentration to an area of low concentration

### Osmosis



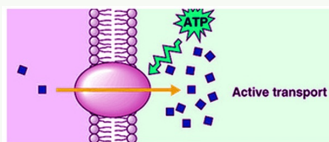
Movement of water using a concentration of water, moving from an area of high water potential to an area of low water potential

### Facilitated Diffusion/Passive Transport



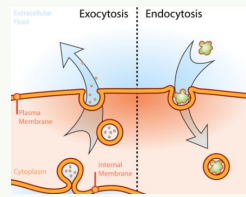
Diffusion of a large particle (ex. starch), requires an integral protein but no energy

### Active Transport



Also called "pumps", pumps material against concentration gradient (low to high), requires a protein and energy

### Endocytosis and Exocytosis



Other transport mechanisms

### Other Transport Mechanisms

Phagocytosis Used for large materials

Pinocytosis Used for small materials

Forms of exocytosis and endocytosis

### Transport Terms

Hypertonic High concentration

Hypotonic Low concentration

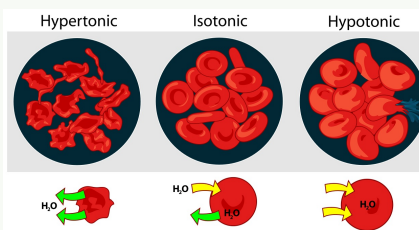
Isotonic Equal concentration

Crenate Cell shrinks

Lysis Cell Explodes

If a cell is hypertonic, the solution is hypotonic and vice versa

### Hypertonic/Isotonic/Hypotonic



### Methods of Nutritional Feeding

Heterotrophs Organisms consumes other organisms

Autotrophs Organisms makes its own foods (photosynthesis)

Chemoautotrophs Uses sulfur as a food source

### Methods of Nutritional Feeding (cont)

Organotrophs Uses organic compounds for food

Lithotrophs Uses inorganic compounds for food

### Genetic Material

Nuclear Membrane

- Composed of phospholipids

- Has pores, allows mRNA to pass through

Nucleus

- Contains 2 types of DNA:

1) Chromosomes (present during cell division)

2) Chromatin (uncondensed DNA)

Nucleolus

- Not membrane-bound (= no phospholipids)

- Just condensed DNA

- Function: synthesize rRNA (ribosomes)

### Organelles

Organelle Organ of the cell

Cytosol Jelly-like material, cytosol + organelles = cytoplasm

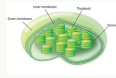
Golgi Apparatus Membrane bound; Function: Synthesize carbs, modify proteins & lipids

Ribosome Not membrane bound; Function: Synthesize protein, composed of rRNA

### Organelles (cont)

Endoplasmic Reticulum (ER)	Membrane bound; Has two types: 1) Rough - Contains ribosomes, synthesizes proteins and lipids 2) Smooth - No ribosomes, synthesizes lipids
Mitochondria	Double membrane bound; Function: Provides 95% of the cell's energy
Peroxisome	Membrane bound; Function: Break down toxins
Vacuoles	Membrane bound; Function: Stores water, minerals, etc
Lysosome	Membrane bound; Function: Breakdown organelles and produce digestive enzymes, ONLY IN ANIMAL CELLS
Cell Wall (Plants)	Composed of cellulose & pectin (protein fiber)
Chloroplast	Double membrane; Function: Photosynthesis, ONLY IN PLANT CELLS
Plastids	Double membrane; Function: Store starch, ONLY IN PLANT CELLS
Tonoplasts	Membrane for large central vacuole (which is ~90% of of plant cells, holds water, ions, salts, and buffers)

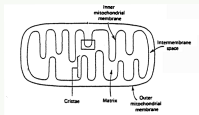
### Chloroplast



Two reactions:

- 1) Light reaction (Thylakoid)
- 2) Dark reaction (Calvin cycle, stroma)

### Mitochondria



- Provides 95% of a cell's energy
- Matrix: Krebs cycle
- Cristae: Electron transport chain (ETC)

### Cytoskeleton

Found in all cells, Function: Support and hold shape of the cell, organelle placement, move things

Microfilament	7 nm thick, deals with muscle contractions (actin)
Intermediate Filaments	8-10 nm thick, holds cell shape
Microtubules	25 nm thick, moves chromosomes in cell division

### Other

Root Hairs	Cytoplasm projections, Function: water absorption
Alveoli	Air sacs in the lungs, needs water for gas exchange between blood and the air sac
Villi	In small intestine, 1,500 microvilli on villi increases surface area

### What Happens Under These Conditions?

Animal cell is in a hypertonic solution

Cell crenates (gets smaller)

Animal cell is in a hypotonic solution

Cell lyse (lysis -> cell expands and explodes)

Animal cell is under UV light

Cell death, causes thymine dimers (thymine bonds with thymine in DNA)

Radiation

Cause ionization

Growth hormones as a food additive

Hormones are estrogen based, possibly causes delayed or early puberty

Pesticide

Also estrogen based, alligators don't develop sexual organs



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