

Science Study Guide #3

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PLEASE, DO NOT LOSE THIS STUDY GUIDE AND REMEMBER TO STILL STUDY YOUR NOTES! I DO NOT KNOW WHAT IS ON THE TEST AND ALL INFORMATION INSIDE IS INCLUDED BASED ON PURE SPECULATION. I AM NOT RESPONSIBLE FOR ANY INCORRECT OR MISINTERPRETED INFORMATION!

Cell Theory

- Everything inside a cell is called protoplasm
- No single person designed the cell theory
 - 1838 - Matthew Schneiden - **All Plants are made of cells**
 - 1839 - Theodor Schwann - **All animals are made of cells**
 - 1855 - Rudolf Virchow - **Cells Reproduce**
 - 1883 - Robert Brown - **Plant cells have a nucleus**
- All organisms feature one or more cells
- The cell is the basic unit of life
- Single Celled Organism = 1 cell
- Multicellular Organism = 2+ cells
- 1600 - Galileo created the first compound microscope
 - Looked at small insects

Characteristics of Life

- Homeostasis - Maintains internal conditions
- Complexity - Features many components
- Response - Responds to and senses external stimuli
- Growth - Grows and changes
- Death - All living things eventually die
- Reproduction - All living things reproduce
- DNA - All living things contain genetic material
- Cellular Organization - All living things are made of 1 or more cells
- Metabolism - All living things use energy
- Movement - Living things can move

	Prokaryote	Eukaryote
DNA	Yes	Yes
Nucleus	No	Yes
Membrane Bound Org.	No	Yes
Ribosomes	Yes	Yes
Cell wall	Most	Some
Size	Smaller	Larger

9 Biological Processes

1. Response - Reaction to stimuli
2. Nutrition - The intake of nutrients
3. Digestion - The breakdown of matter to get nutrients
4. Absorption - Outside materials are absorbed by the cell
5. Excretion- Waste is removed from the cell
6. Secretion - Substances are produced and moved from one place to another (often discharged)
7. Biosynthesis - Combining simple molecules into more complex ones with enzymes
8. Reproduction - Creating another member of the species (Can be sexual or asexual)

Cell Organelles

Cytoskeleton

- Not an organelle, but gives the cell structural support
- Network of strands criss-crossing the cell's interior
- Allows things to move inside the cell
 - "Movers" - Microfilaments, intermediate fibers & microtubules
- 3 main fibers are...
 - Microfilaments
 - Give the cell shape, move DNA during mitosis
 - Intermediate fibers
 - Strengthen the cell
 - Microtubules
 - Tiny threads used during cell division

Endoplasmic Reticulum

- Network of interconnected flat membranes
- Produce lipids, proteins etc. on lumen & outside surface
- Rough ER has ribosomes on surface, makes proteins
 - RER Ribosomes secrete into the lumen
- Smooth ER has no ribosomes, makes lipids

Ribosomes

- Assemble amino acids to make proteins
- Ribosomes attached to the RER secrete proteins into the lumen
- Free-floating ribosomes secrete proteins into the cytoplasm

Golgi Apparatus/Complex

- Discovered by Camillo Golgi while experimenting with cell division
 - Spelled with a capital “G”
- Series of flat membrane sacs, sorts and delivers proteins, etc.
- Makes changes to and packages proteins

Vesicles

- Small membrane bound sacs filled with material
- Pinch off the ER, head to Golgi for modification and secretion

Mitochondria

- Inner membranes generate energy (ATP)
- **Generates** energy, doesn't create it
- Converts food into chemical energy
- Has own ribosomes and DNA
 - Suggests that they may have been free-living prokaryotes

Vacuoles

- Membrane bound organelles used for storage of materials such as...
 - Water
 - Inorganic Ions
 - Food Molecules
 - Enzymes
- Plant cells have a large central vacuole full of water

Lysosome

- Lyso = dissolving
- Some = body
- Membrane bound organelles filled with enzymes which...
 - Defend the cell from pathogens
 - Break down damaged/worn cell parts
- Come from the Golgi Apparatus
 - Then fuse with their target

Chloroplasts

- Chloro = Green
- Plast = Body
- Converts solar energy to chemical energy
- Also have own own ribosomes & DNA
 - May have also been free-living prokaryotes
- Only in plant cells

Plasmodesma/ta

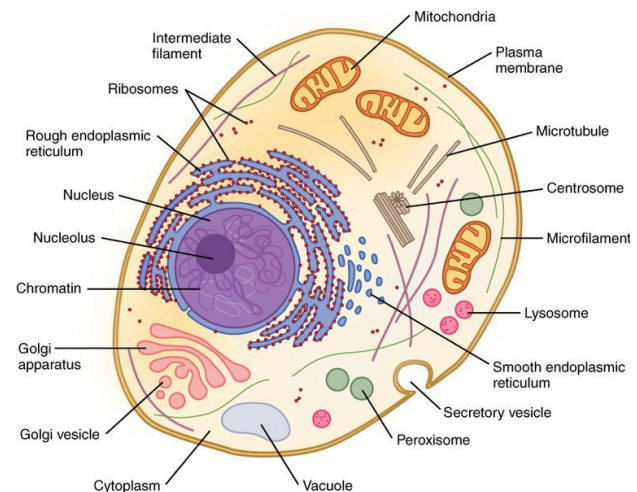
- Not an organelle
 - Is actually a structure
- Holes in the cell wall which allow materials to pass through
- Only in plant cells

Cell Wall

- Not an organelle
- Gives a cell structure and shape
- Only in plant cells

Fluid Mosaic Model

- We use models to make complex concepts easier to explain
 - Lock & Key
 - Cell Model
 - Crackhead Model

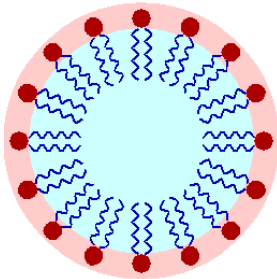


Phospholipids

- Compose the cell membrane
- Polar head
 - Likes water - **Hydrophilic**
- Nonpolar CHO tails
 - Do not like water - **Hydrophobic** - Need oxygen to like water

Soap - How it's made and used

- Traditionally made from two materials
 - Ash - **Hydrophilic**
 - Fat - **Hydrophobic**



Phospholipids form sphere around debris
 Heads point towards water, tails grasp onto material on hands
 Sphere = Best way to decrease surface area

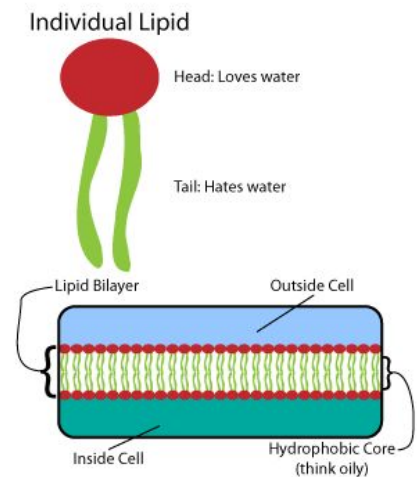
Micelle

Lipid Bilayer

- Made of CHO
- All organelles have a lipid bilayer

Movement in/out of the bilayer

- Movement depends on **size**, [] (**concentration**), and **polarity**
 - Concentration of solute = [solute]
- Small non-polar molecules easily pass through cell membrane
- Small polar molecules are transported by protein tunnels
- Large molecules are moved by vesicles



Diffusion vs Osmosis

- Diffusion doesn't need energy
 - Think the scent of perfume filling a room

- Is affected by temperature
- Osmosis also doesn't require energy
 - Does require a membrane
- Both are types of passive transport
 - Neither need energy, while active transport does

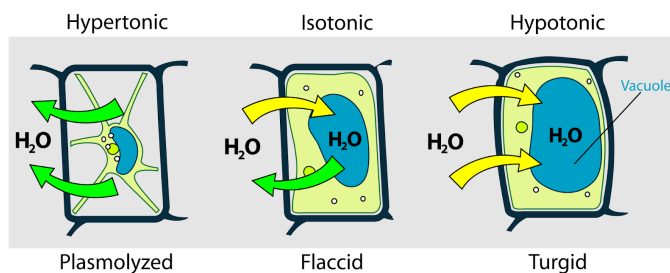
Diffusion

- Movement of molecules from an area of higher concentration to one of a lower
 - The molecules move *down* a **concentration gradient**
 - Keeps moving until it reaches a dynamic equilibrium
- Many factors which influence diffusion include...
 - Temperature (T)
 - Agitation
 - Difference in concentration
 - The bigger the difference, the faster the diffusion
- Examples include...
 - Sugar cube in Pepsi
 - Pizza/Burnt Tortilla/Skunk/Perfume/Gas/Corpse scent filling a room

Solutions

- Solute + Solvent = Solution
 - High-Fructose Corn Syrup + Carbonated water = Pepsi
 - Lactose + Water = Milk
 - Oxygen + Nitrogen = Air
- Isotonic Solution = Same concentration of solute in & out of cell
- Hypertonic Solution = Higher concentration of a solute in the solution
- Hypotonic Solution = Lower concentration of a solute in the solution

Plant Cells in Solutions



- Plasmolysis
 - Membrane separates from the cell wall, not the other way around
- Molecules that move down a concentration gradient require no energy and are passive

Osmosis

- Similar to diffusion, but needs a semipermeable membrane
 - Membrane which only allows certain molecules/ions to pass
- Examples include...
 - Nicotine patches
 - LSD
 - Hikers & NASA
 - Desert soldier training
 - Desalination plant
- Examples in your body include
 - Your digestive system
 - Nutrients are absorbed by the small intestine and water is absorbed by the large intestine
 - Alcohol passes from one side of the stomach lining to the other
 - Kidneys make urine
 - Urea passes through membrane
 - Dialysis, *ysis* = separation
 - Lungs remove oxygen from the air