The Cell Theory

1. All things are made of cells

2. Cells are the basic units of structure and function in all living things

3. All cells come from preexisting cells

Cytoplasm

- Water with some chemicals and minerals that surrounds organelles
- Where messages pass through

Cell Membrane/Plasma Membrane

-Surrounds the cell
-Two identical layers (bilayers) made of lipids
-Proteins that act like doors are embedded in the membrane
-Carbohydrate patterns that are unique to every person are on the outside of the membrane; these allow their bodies to recognize which cells are their's and fight off the ones that are not

Ribosomes

- Small organelle that makes proteins
- Made of two sub units, one big, one small, the big one is on the top
- **Free Ribosomes:** Ribosomes floating in the cytoplasm, the proteins they make are used **inside** the cell
- **Bound Ribosomes** Ribosomes attached to the endoplasmic reticulm, the proteins they make are sent and used **outside** the cell
- Some cells have more ribosomes than other cells

Chloroplasts

- Found in plants, bacteria and protists
- Use light, carbon dioxide and water in photosynthesis to make glucose
- Also has cristae
- The cristae are in stacks called **thylakoid membranes**

* Thylakoid membranes look like stacked coins

- Holds pigments such as chlorophyll

Lysosomes

Contains enzymes to break down:
-Food (in **food vacuoles**)
-Old organelles
-Cellular debris

Diffusion

When molecules in a liquid or gas state move from a more concentrated place to a less concentrated place.

Facilitated Diffusion

Sometimes, the membrane will not let a molecule through so the cell will use facilitated diffusion which is when a protein helps move the molecule across the membrane. It also doesn't require energy.

Osmosis

Diffusion for water.

Five Kingdoms of Living Things

1. Plants

2. Animals

3. Fungi

4. Bacteria

5. Protists

Mitochondria

- Powerhouse of the cell
- Produces ATP using glucose
- Two layers for more surface area, the inner layer is the **cristae**
- Different cells can have more or less mitochondria than different cells
- Plants also have mitochondria

Endoplasmic Reticulum

- Highway where chemicals are transported around the cell
- Endoplasmic reticulum means intercellular network
- **Smooth ER:** Detoxifies things (breaks down bad chemicals)
- **Rough ER:** Has ribosomes, sends proteins to other places in the cell

Vacuoles

- Sacs used for storing anything (ie: food, water, salts, pigment, gases)
- Vacuoles in plant cells are huge (they are used when the plant has no other nutrition) and hold all other pigments except green, which is in the chloroplasts
- Vacuoles also provide support and store poison in poisonous plants

Vocab Words

Spontaneous Generation	The (false) idea that living things can come from nonliving things
Autotrophic Cells	Cells that use sunlight to make food
Heterotrophic Cells	Cells that cannot make their own food

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Vocab Words (cont)

Eukaryotic Cells	Cells that have a nucleus
Prokaryotic Cells	Cells that don't have nuclei
Homeostasis	The ability of an organism to keep it's internal environment suitable for living
Insulin	A hormone made in the pancreas that controls blood sugar
Channel Protein	A protein that moves molecules across the cell membrane

Cell Wall

- In plants, fungi and protists but not animals
- Porous to let things through
- Rigid (100x thicker than membrane)
- Maintains shape and protects cells
- Attaches to other cell walls to form strong structures (plants need to be strong but don't have skeletons)

Nucleus

- Brain of cell
- Holds DNA (23 pairs of chromosomes)
- Nuclear Membrane: Also porus
- Nucleolus: Densest part, makes ribosomes

*Bacteria have no nuclei so the DNA just floats around in the cytoplasm

Golgi Apparatus

- Puts molecules in **vesicles** and ships them around or out of cells
- Receives things from other cells
- Looks like flattened sacks that look like pita bread
- Has a receiving side (**cis face**) and a shipping side (**trans face**)
- Golgi apparatus "finishes" packaging things after the rough ER

Cytoskeleton

- Skeleton of cell (ie: microfilaments, microtubes)
- Some cells can move using:

Flagella: few, long, whip-like structures outside the cells

Cillia: hundreds of short, hairlike structures outside the cells

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Membranes

Permeable Membrane: A membrane that lets everything through.

Semipermeable Membrane: A membrane that lets some things through.

Impermeable Membrane: A membrane that doesn't let things through.

Active Transport

Using energy and a protein to force a molecule through the membrane against the concentration gradient.

Important Scientists

Robert Hooke: 1665 Looked at a cork an saw little chambers that he named *cells* because they looked like rooms in a monastery.

Antony Van Leeuwenhock: 1665 Saw living cells and called them *animalcules*.

Matthias Schleiden: 1839 Said plants were made of cells.

Theodor Schwann: 1839 Said animals were made of cells.

-Together, Schleiden and Schwann first proposed the Cell Theory.

Rudof Virchow: 1855 Said that cells always came from preexisting cells.