Major Eukaryotic Organelles

Cells can either be prokaryotes or eukaryotes depending on whether they have a nucleus

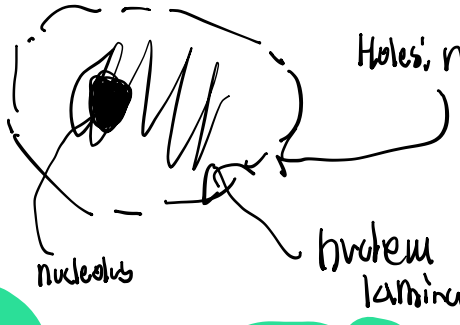
Prokaryotes hold DNA in a region called the **nucleoid**

#1) - The Nucleus

: Cell's information center, contains DNA

↳ contains a double membrane and nuclear pores

nuclear lamina: set of intermediate filaments that maintain the shape of the nucleus



Nucleolus: A region that contains specific DNA coding for rRNA
- rRNA plays a major role in ribosomes

#2) Endomembrane System

: Regulates protein transport and metabolism within the cell

includes:
- endoplasmic reticulum (ER)
- Golgi Apparatus (GI)
- Lysosomes
- Vesicles

Endoplasmic Reticulum: Contains a vast amount of membranes, a smooth ER and rough ER

- Contains many **cisternae** sacs
- Stores proteins / lipids for transport
- Interior is referred to as a **lumen**

After the ER synthesizes a molecule, it leaves through the ER

Smooth Endoplasmic Reticulum: Synthesizes lipids, detoxifies poisons, stores calcium

Rough ER: Studded w/ ribosomes, makes proteins

Golgi Apparatus: Directs newly synthesized molecules to necessary location

- **cis:** side of Golgi where molecules from ER enter the Golgi

cis and trans sides

in the Golgi: molecules move through sacs and **cisternae**

- **trans:** Molecules leave the Golgi through the trans side

Two models on how vesicle transport works in the Golgi

#a): Cisternae Maturation Model:

- Cisternae are dynamic structures
- Vesicles fuse w/ cisternae on "cis side"
- constantly being manufactured

#b): Vesicular Transport Model:

- Cisternae are more stable and distinct
- Stay in place

The cell has three types of vesicles needed to move contents around

- **COP I:** moves stuff retrograde, Golgi → ER
- **COP II:** moves stuff normally, ER → Golgi
- **Clathrin:** moves stuff outside, Golgi → Cell Membrane

Lysosomes: Digests old organelles and waste for their parts

↳ pH = 4.5, animal cells only

Peroxisomes: Uses the enzyme **catalase** to break down H_2O_2 into $H_2 + O_2$

↳ Plant seeds contain **glyoxysomes:** Lipid → Starch

↳ type of peroxisome

#3) Vacuoles → Larger Vesicles

3 types:

#1) **Food Vacuole:** Responsible for storing food, usually merges w/ lysosome to digest food in the compartment

#2) **Contractile Vacuole:** Found primarily in freshwater protists
↳ Expel water out of the cell

#3) **Central Vacuole:** They are much larger than other vacuoles, main storage center for water) inorganic molecules
↳ used by plant cells to maintain **turgor pressure**

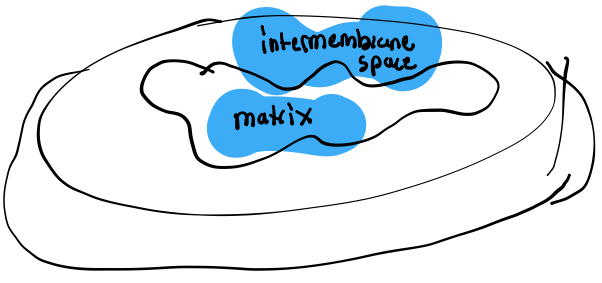
Vesicle Fusion

- V-snare proteins help facilitate membrane fusion, later called R-snare due to presence of arginine
  ↳ T-snare proteins on plasma membrane (later called Q-snare due to glutamine)
- Membranes that fuse together, T/V Snares combine to make cis-snare

Energy Providing Organelles

Organisms need to efficiently gain energy in order to survive
↳ Mitochondria
↳ Chloroplasts

Mitochondria: Powerhouse of the cell. Breaks down molecules into usable energy



- made of a double membrane
- Folds in the membrane are called **cristae**

Chloroplasts: Found in plants and protists but not animals

↳ Sites of photosynthesis

→ Converts solar energy into chemical energy

Additional types of plastids:

#1) - Gerontoplast: Formed in aging plant cells that dismantle their plant cells

#2) - Chromoplasts: Only contains carotenoids

↳ Formed during chlorophyll deficiency

#3) - Leucoplasts: Lacks pigments entirely, just stores food

Stores lipids = elaioplast

Stores starch = amyloplast

#4) - Proplastids: colorless plastids