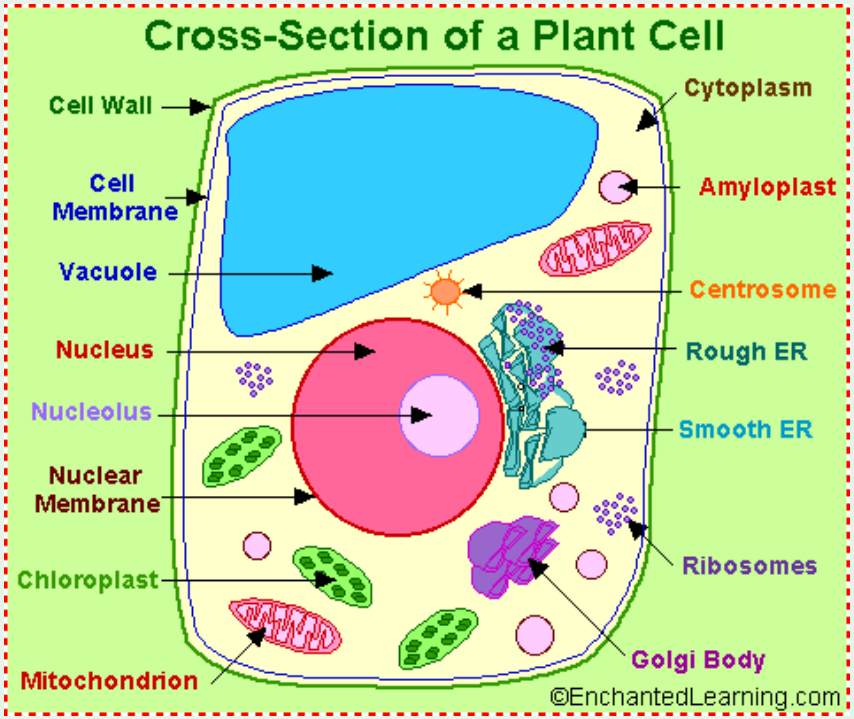
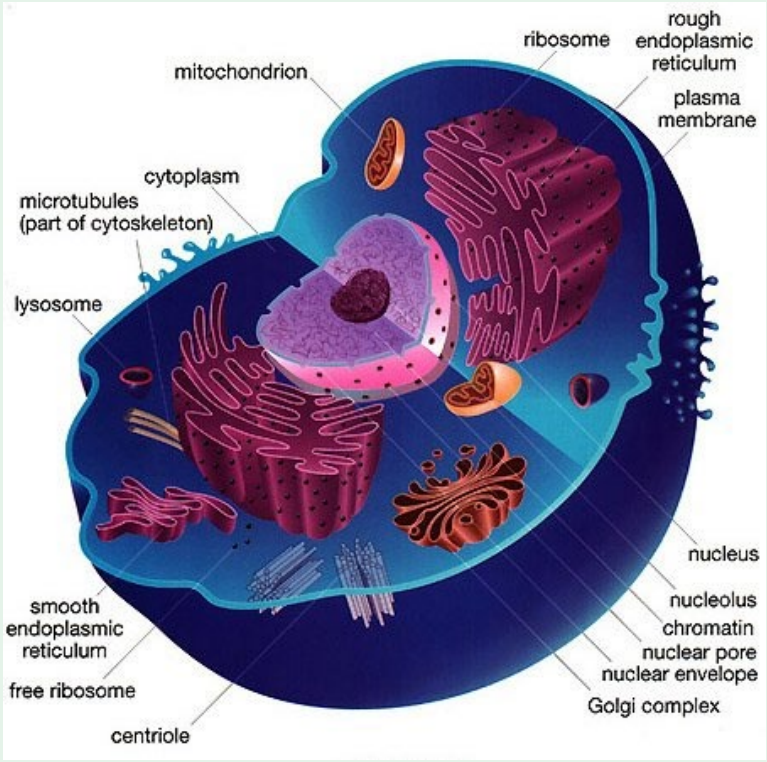
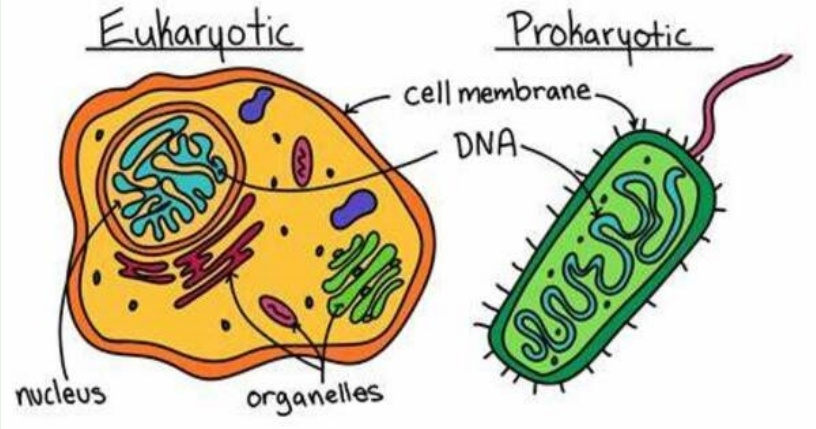




SCIENCE 10 UNIT C: BIOLOGY
THE CELL

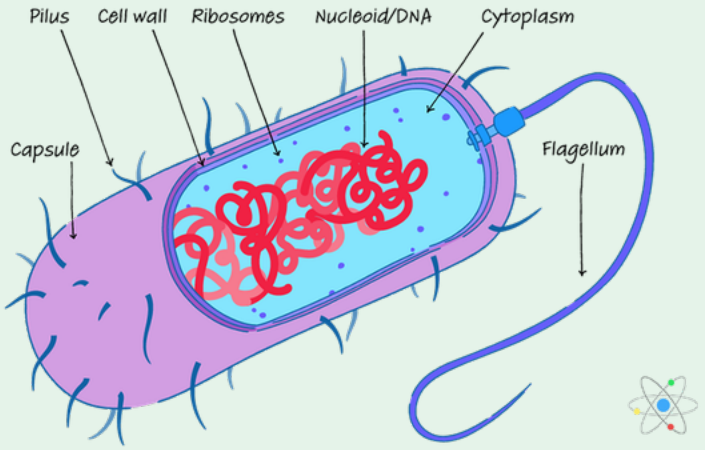
CELLS

- The cell is the smallest living unit of life
- The cell is an **open system** meaning it exchanges **matter and energy** with its surroundings
- There are two basic kinds of cell: **Prokaryotic** and **Eukaryotic**



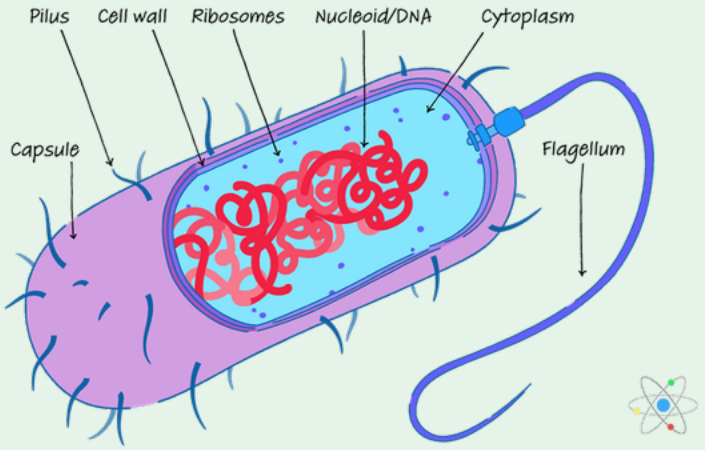
PROKARYOTE

- Means “before nucleus”
- No membrane-bound **organelles**
- Has a concentration of genetic material (**DNA**) known as the **nucleoid region**
- Single-celled organisms only, like bacteria and algae



EUKARYOTE

- Means “true nucleus”
- Has membrane-bound **organelles**, including a **nucleus**
- Much larger than prokaryotes
- Can be single-celled (like fungi) or multicellular

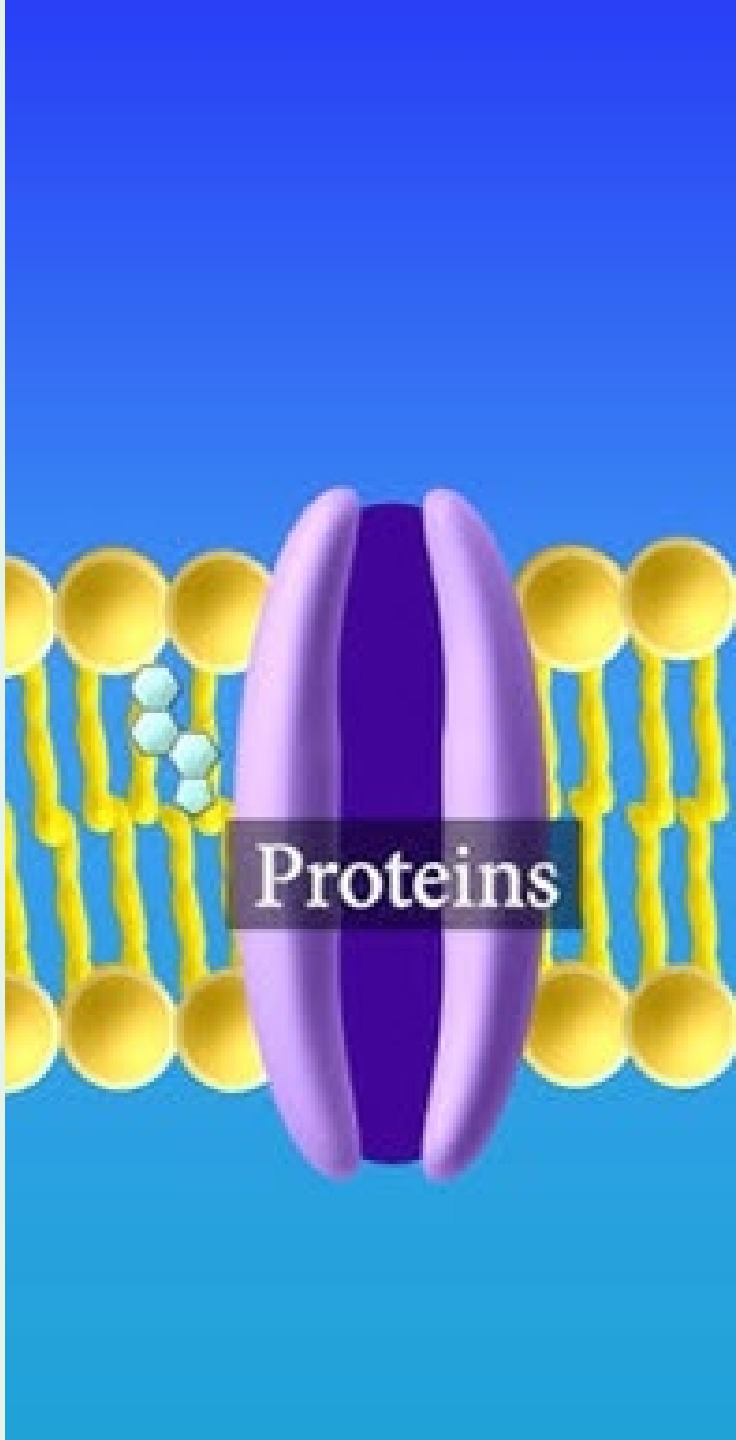


Now let’s talk about all the organelles we can find in our cells.

I’m not sorry for subjecting you to this.
https://www.youtube.com/watch?v=-zafJKbMPA8

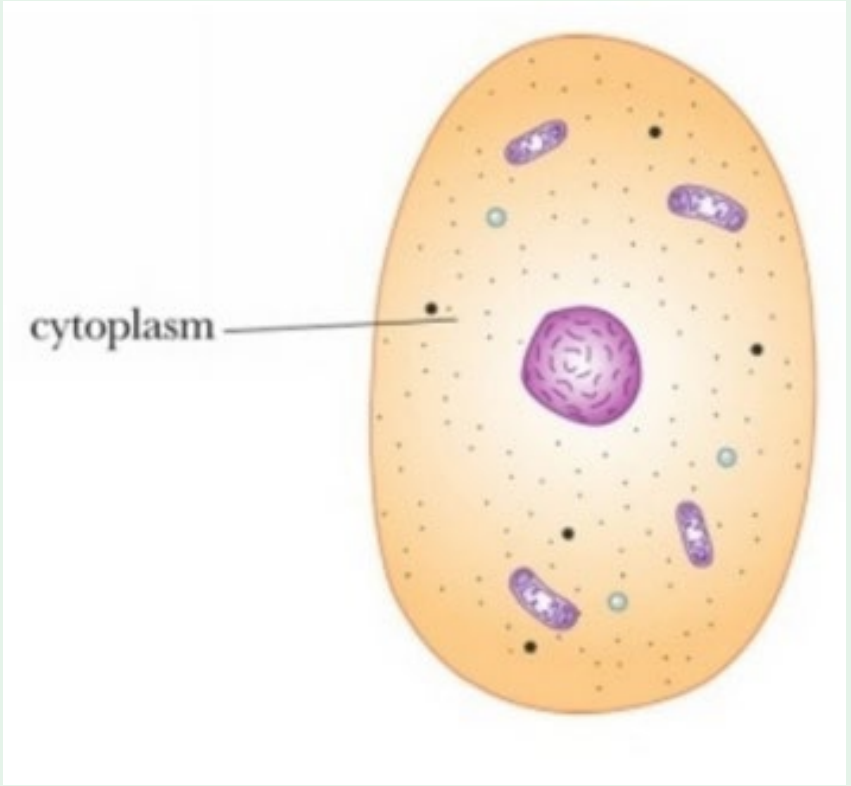
CELL MEMBRANE

- Flexible structure surrounding the cell
- Holds it together, and acts as a protective barrier
- Made of proteins floating in a fat (lipid) sea
- Controls what passes in and out of the cell
- Analogy: border security



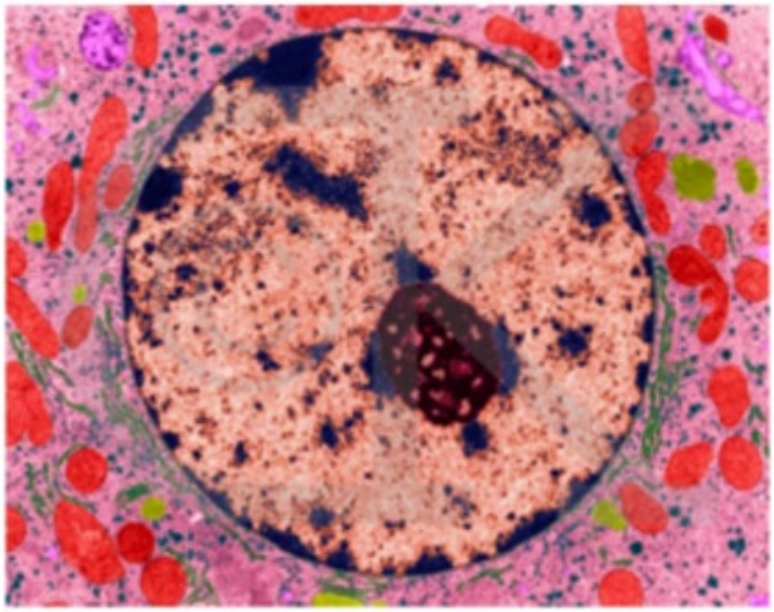
CYTOPLASM

- Fluid that fills the cell, 70% water
- All other organelles are found “floating” in the cytoplasm



NUCLEUS

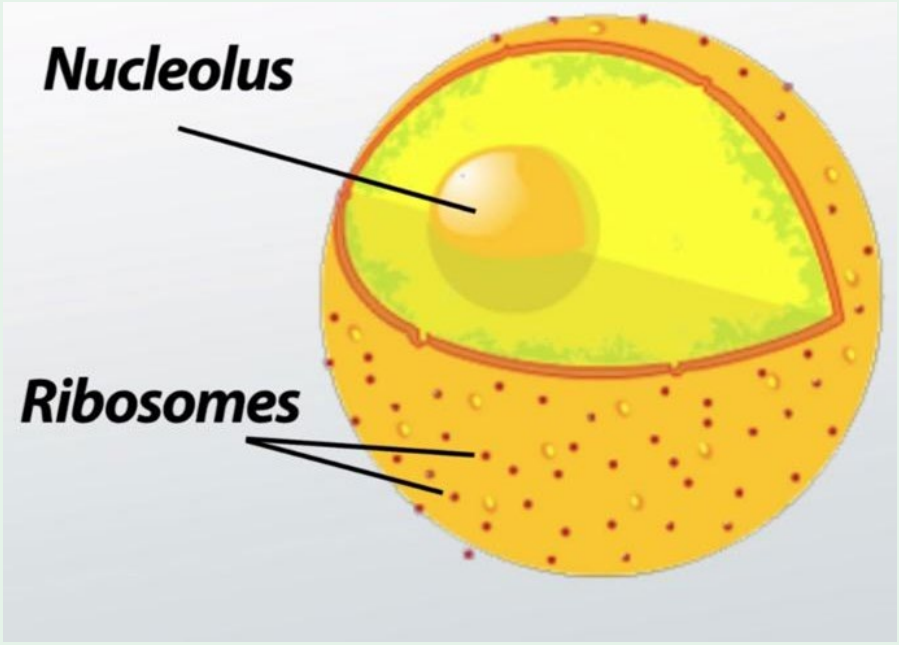
- The “brain” of the cell, directs all activities
- Contains the genetic code (**DNA**)
- Initiates and controls **cell division**
- Surrounded by a **nuclear membrane** that has pores to allow movement



Liver cell nucleus TEM 20,740 x

NUCLEOLUS

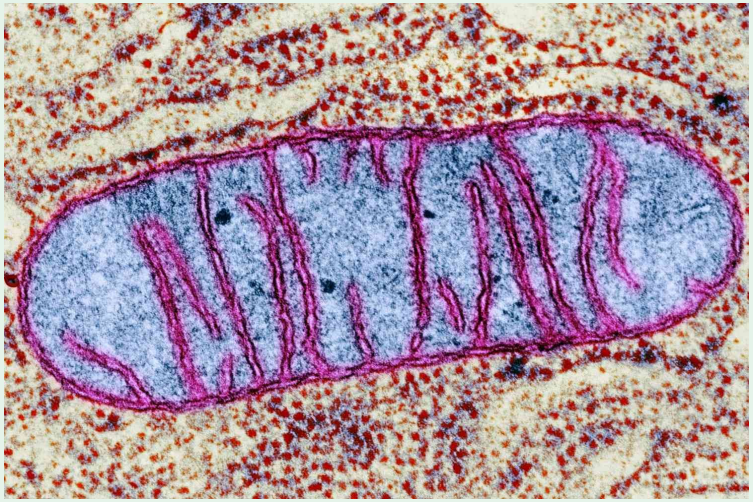
- Found **inside** the nucleus
- Produces **ribosomes** that are involved in protein synthesis



- If you're curious how that works, you'll love Bio 30

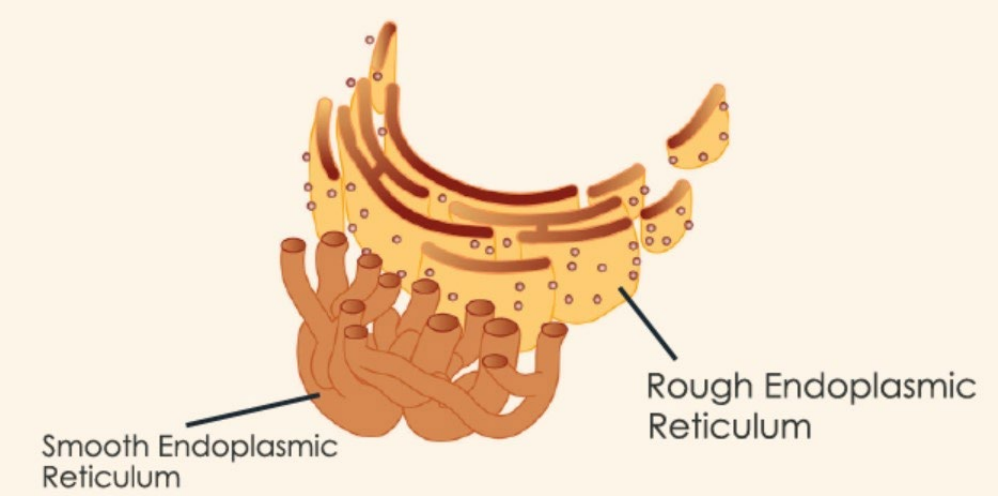
MITOCHONDRIA

- "The mitochondria is the powerhouse of the cell"
  - Should be "are" or "mitochondrion"
- Produces energy by converting **glucose** into **ATP**, the molecule our body uses as energy
- This process is called **cellular respiration**



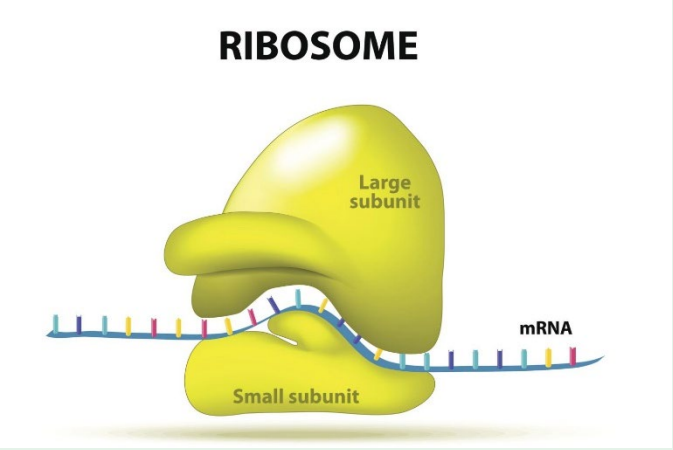
ENDOPLASMIC RETICULUM

- Series of tubes that runs through the **cytoplasm**, connecting organelles together
- Transports and stores material, like a highway
- Can be **smooth** (no ribosomes) or **rough** (ribosomes)



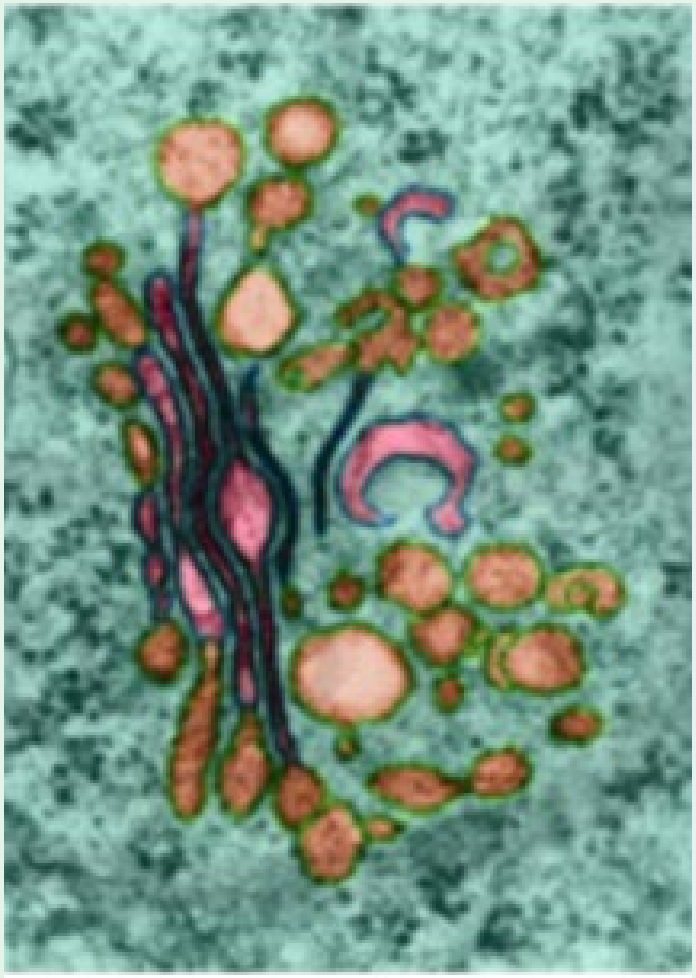
RIBOSOMES

- Sites where **proteins** are made, like **factories**
- Often attached to the **endoplasmic reticulum**, or free floating in the **cytoplasm**
- Does anyone remember where they were made?



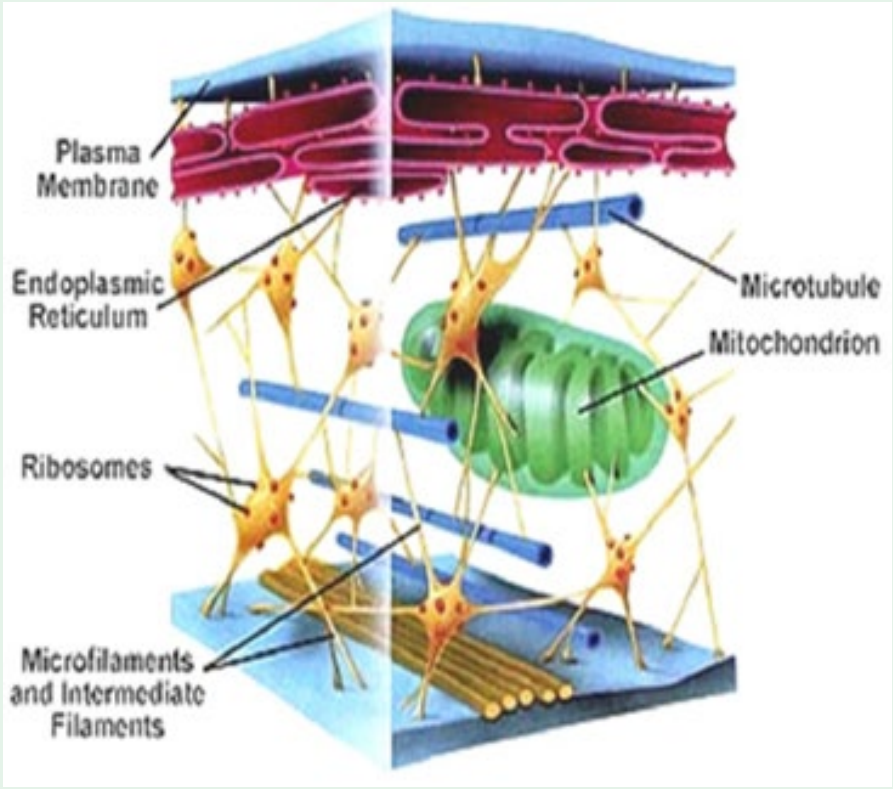
GOLGI APPARATUS

- Folded stacks of membrane
- Receives substances from the **endoplasmic reticulum**
- Stores, modifies, and transports these substances in packages called **vesicles**
- Like a post office



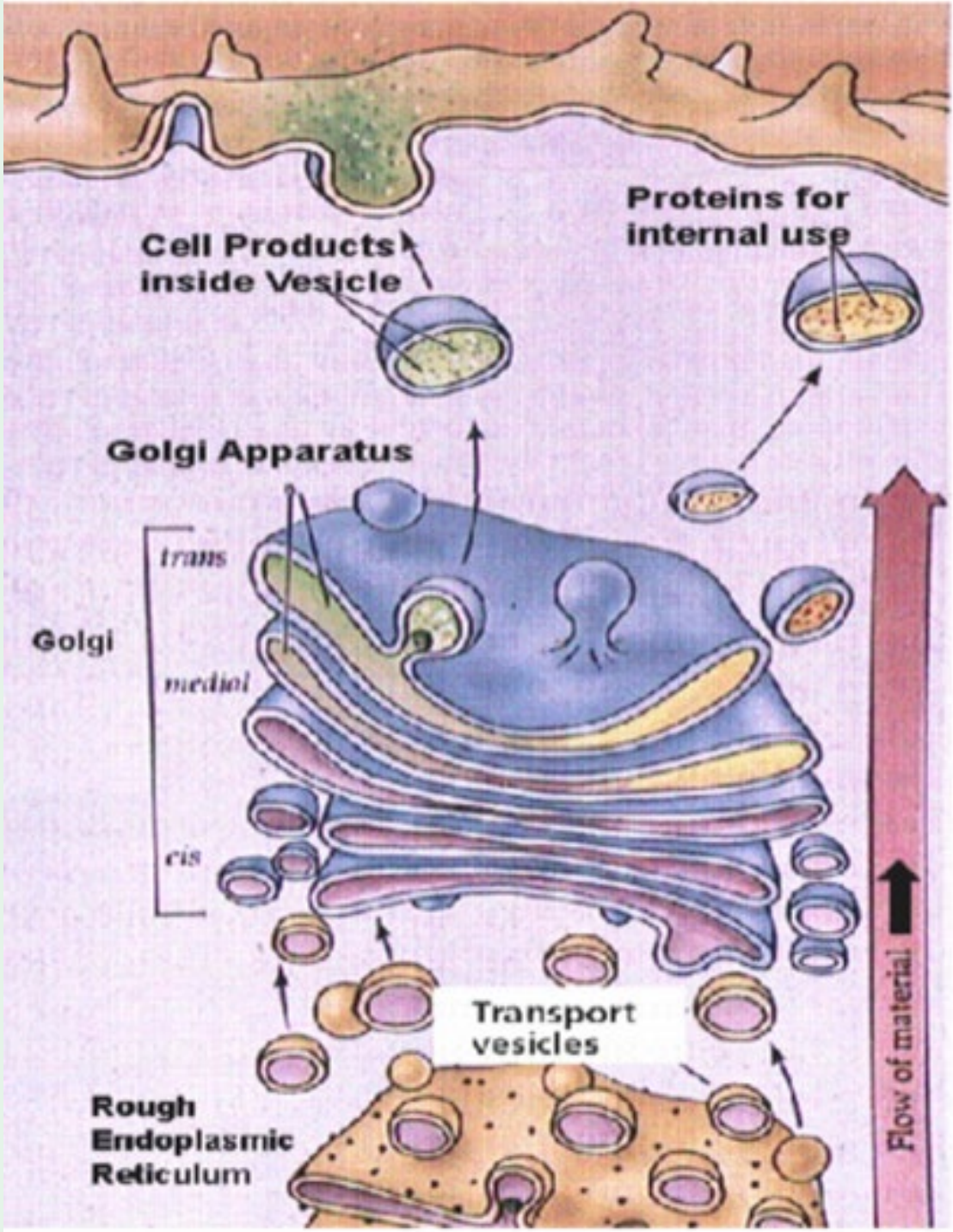
CYTOSKELETON

- Intricate network of fibre-like structures called **filaments**
- Maintains the shape of the cell and provides pathways for transport



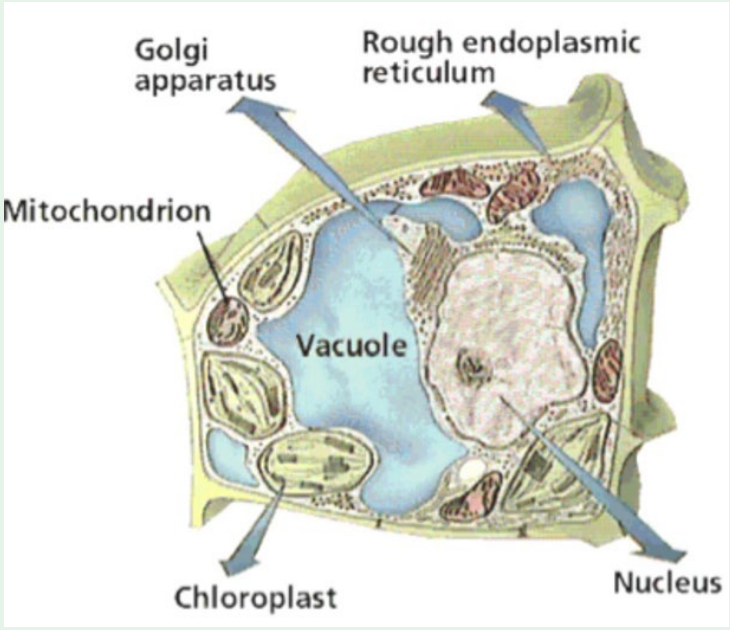
ORGANELLES IN ACTION

- Let's explain this diagram



Now let’s talk about organelles that differ between plants and animals.

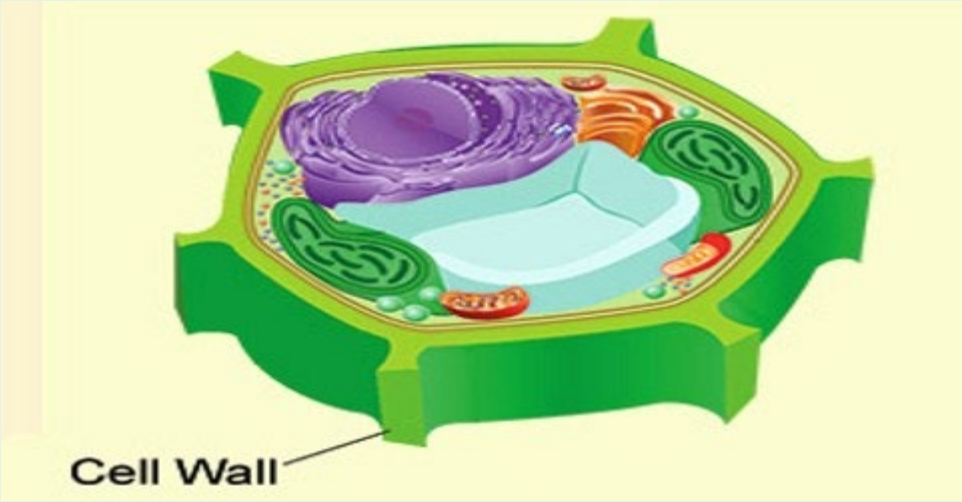
VACUOLES



- Round structure encased in a membrane
- **Animal** cells have **many** small ones
  - Used to store food, cell products, and excess fluids
- **Plant** cells have **one** large one
  - Stores water to maintain cell shape

CELL WALL (PLANTS ONLY)

- **Rigid** structure to protect cell and provide structural support
- Made of **cellulose** (fiber)
- Protects the inner cell and connects neighboring cells

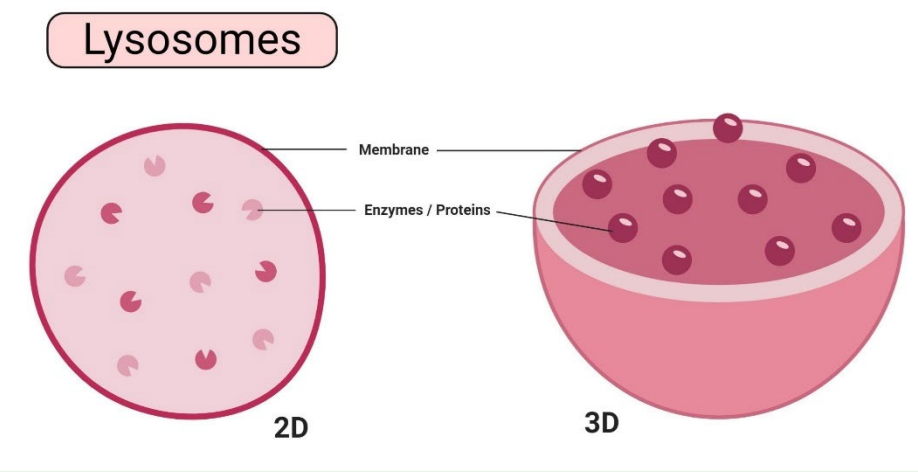


CHLOROPLAST (PLANTS ONLY)

- Uses energy from the sun to carry out **photosynthesis**
- Contains **chlorophyll**, which makes plants green and lets them absorb sunlight

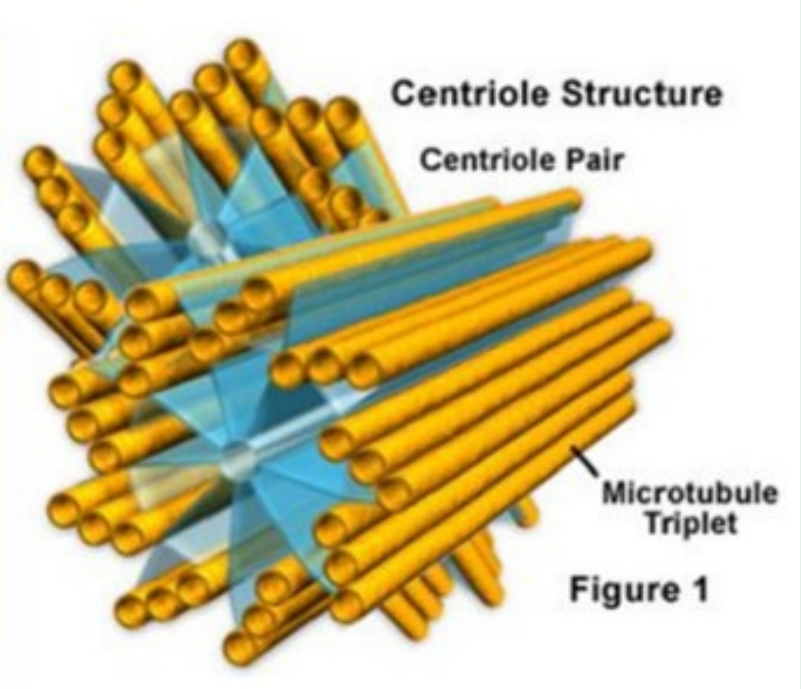
LYSOSOME (ANIMALS ONLY)

- Membrane sac of digestive **enzymes**
- Breaks down food products or foreign bodies
- Also breaks down worn out organelles
- Cells can detonate these to commit **apoptosis**



CENTRIOLES (ANIMALS ONLY)

- Made of small clusters of tubes
- Involved in **cell division**



SUMMARY OF PLANTS VS ANIMALS