

Chapter 3 Cell Structure and Function



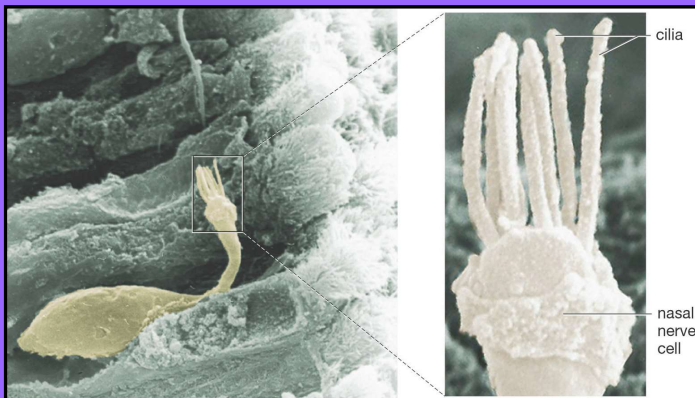
Ask yourself...

- If you were a scientist living in the 1500s, what kind of questions would you ask yourself if you were the one to discover cells?

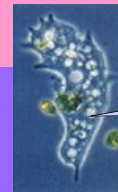
Let me think.



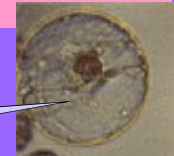
A cell is the smallest unit that is capable of performing life functions.



Examples of Cells



Amoeba Proteus



Plant Stem



Bacteria



Nerve Cell



Red Blood Cell

Section 3.1 Cell Theory

- The cell theory grew out of the work of many scientists and improvements in the microscope.

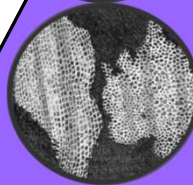
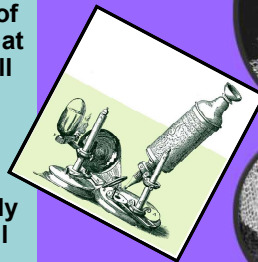


History of Cell Theory



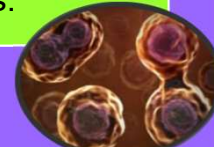
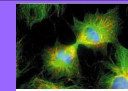
1665 Robert Hooke

- Observed cork under a microscope.
- Noticed it was made of tiny compartments that reminded him of small rooms found in monasteries so he gave them the same name- "cells"
- The cells were actually dead and only the cell walls remained.



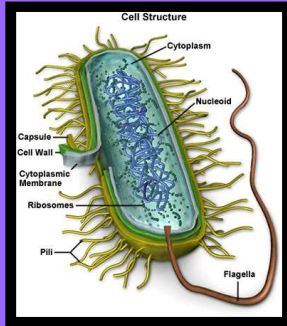
The Cell Theory

1. All organism are made of one or more cells.
2. The cell is the most basic unit of life.
3. All existing cells are produced by other living cells.



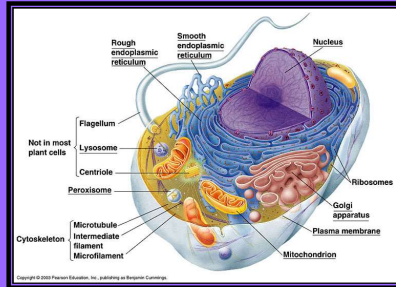
Two Types of Cells

Prokaryotic



Bacteria

Eukaryotic

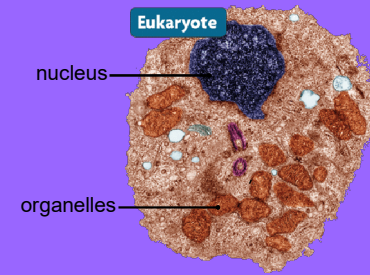


Plants and Animals

Two Types of Cells: Prokaryotic and Eukaryotic

True Eukaryotic cells

- Membrane bound organelles.
- Contain a nucleus
- Ex. plant and animal, fungi, protist



Prokaryotic cells

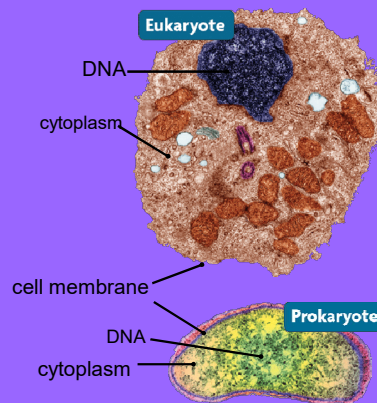
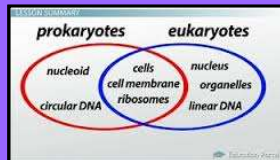
- No membrane-bound organelles.
- No Nucleus
- It has a cell wall
- Ex: All Bacteria



Two Types of Cells: Prokaryotic and Eukaryotic

Similarities

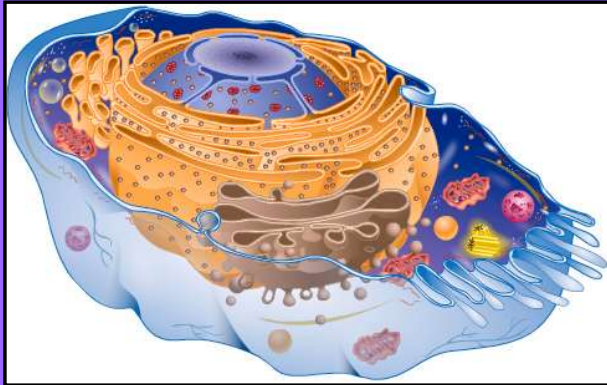
- Cell membrane
- Cytoplasm
- DNA
- Ribosomes



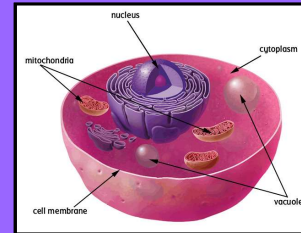
Differences Prokaryotic and Eukaryotic Cells

	Prokaryotes	Eukaryotes
DNA	in "nucleoid" region	within membrane-bound nucleus
Size	usually smaller	usually larger
Organization	usually single-celled	often multicellular
Organelles	no membrane-bound organelles	membrane-bound organelles
Metabolism	may not need oxygen	usually need oxygen to exist

Section 3.2 Cell Organelles



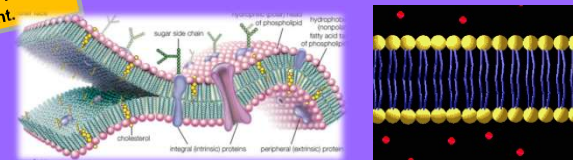
Cell Membrane



- Controls the movement of materials that enter and exit the cell.

- Made of a lipid bilayer and proteins.

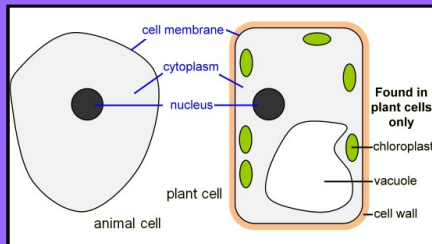
- Boundary between the cell and its environment.



Cytoplasm

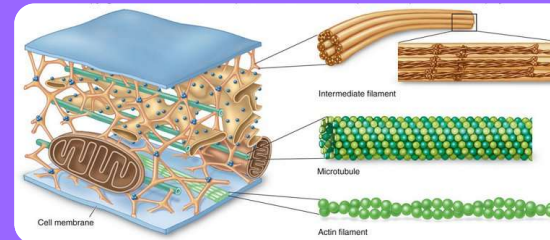
- Fluid portion of cell between the nucleus and cell membrane.

- Contains the other organelles.
- Chemical reactions occur in it.



Like fruit in jello.

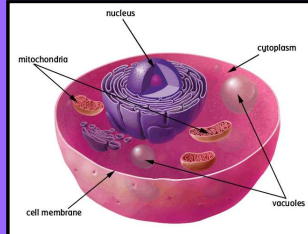
Cytoskeleton



- Support the cell
- Helps cell maintain its shape
- Involved in cell movement.
- Found throughout the cytoplasm.

- Network of protein filaments including microtubules and microfilaments.

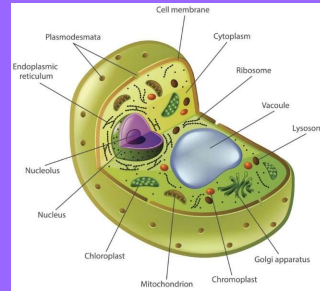
Nucleus



- Control center of the cell.

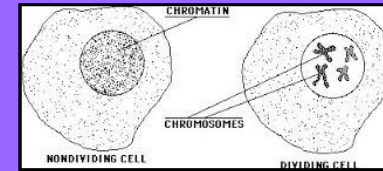
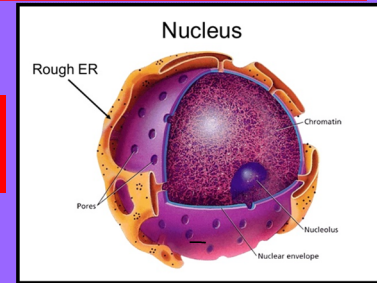
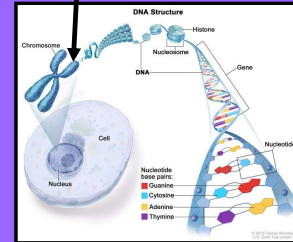
- Stores and protects genetic information

- Only in Eukaryotic cell

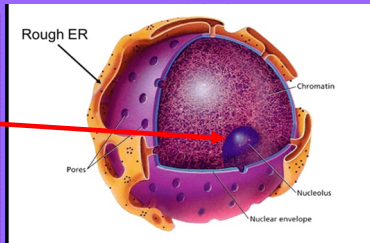
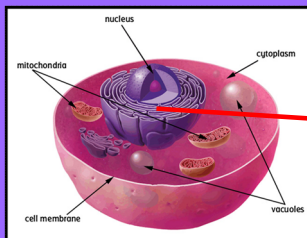


Chromatin and Chromosomes

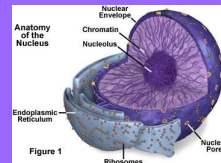
- Contains genetic information
- **Chromatin becomes chromosomes when the cell divides**



Nucleolus

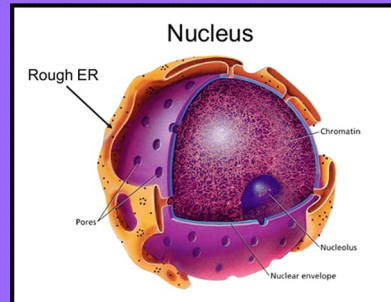


- The assembly of ribosomes begins here.
- Inside the nucleus

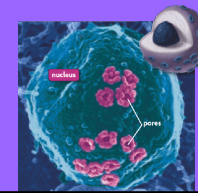


Nuclear Envelope

- Surrounds the nucleus.



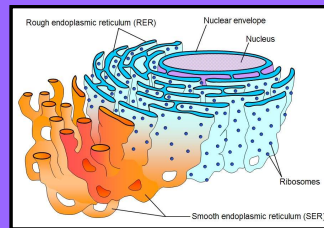
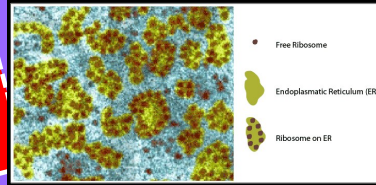
- Controls what move into and out of cell's nucleus.



Ribosomes

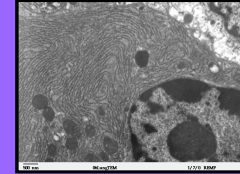
- Found free floating in cytoplasm or attached to ER
- Ribosomes build proteins using amino acids (cytoplasm).

- **Tiny organelles**

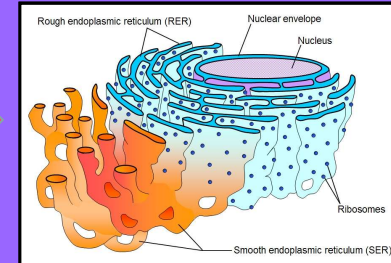


(ER) Endoplasmic Reticulum

- Acts as cellular “subway” or “canal system” that transports proteins within the cell.

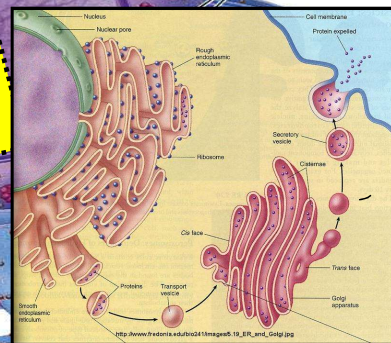


- **Two types:**
 1. Rough ER
 2. Smooth ER.



Rough Endoplasmic Reticulum

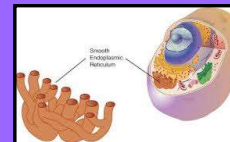
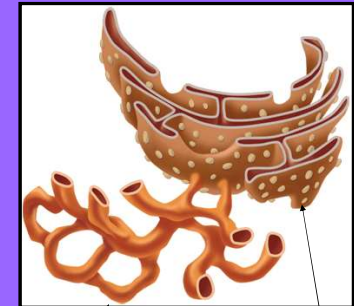
- Has ribosomes.
- Sends proteins to the Golgi.
- Connected to the nuclear envelope.



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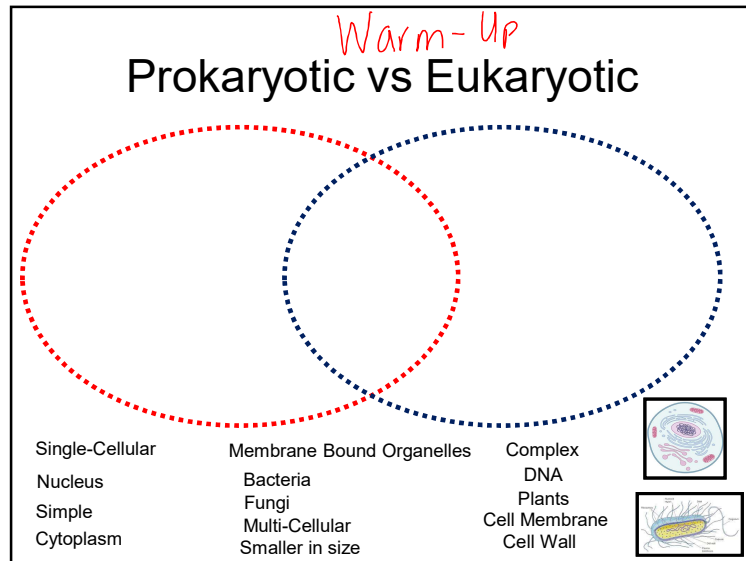
Smooth Endoplasmic Reticulum

- Produce lipids (phospholipids)
- **Has no ribosomes.**
- Detoxification of poison.
 - Breaks down drugs and alcohol.



Smooth ER

Rough ER



How much do you know?

- Prokaryotes lack
 - A. cytoplasm
 - B. a cell membrane
 - C. a nucleus
 - D. genetic material
- Who was the first person to identify and see cells?
 - A. Anton Van Leeuwenhoek
 - B. Robert Hooke
 - C. Matthias Schleiden
 - D. Rudolf Virchow
- What is the job of the cytoskeleton?

Structure and Support
- Name the two organelles shown in the image.
 - A. Smooth ER
 - B. Rough ER
- What organelle synthesizes proteins?

Ribosomes

Golgi Apparatus (body)

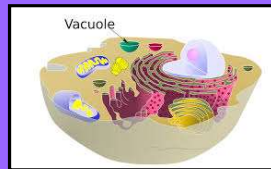
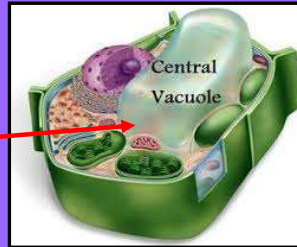
- Packages and transport cell products to where they are needed.
- Modifies proteins, lipids, and carbohydrates that they get from the ER.
- Stores and secretes chemicals from the cell.

Vesicles (*transport*)

- Transports materials through the cytoplasm
 - Includes cell products, nutrients and waste

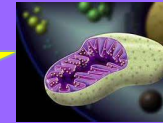
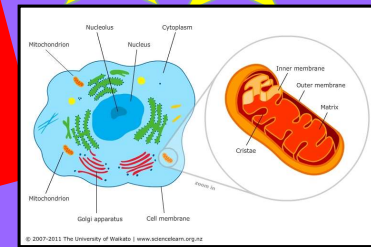
Vacuoles

- Sac that stores materials for the cell .
- Store water, nutrients, or waste.
- Very large in plant cells

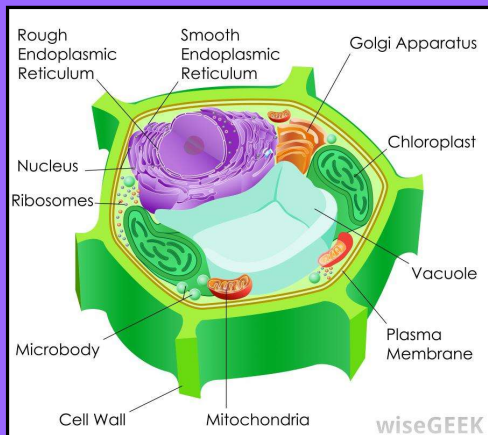


Mitochondria

- Transform energy for the cell.
- Site of cellular respiration
- They break down food molecules to release energy (ATP) from carbohydrates.

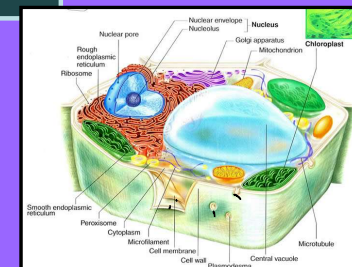
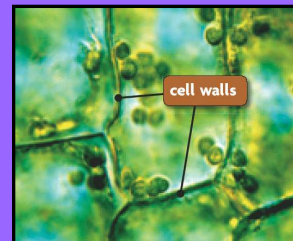
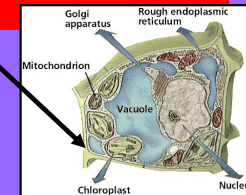


Plant Cell Structures



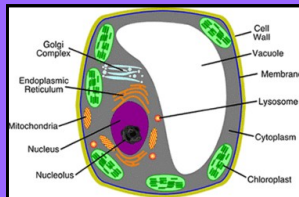
Cell Wall

- Surrounds the cell membrane.
- Composed of cellulose and gives shape, support, and protection of the cell.

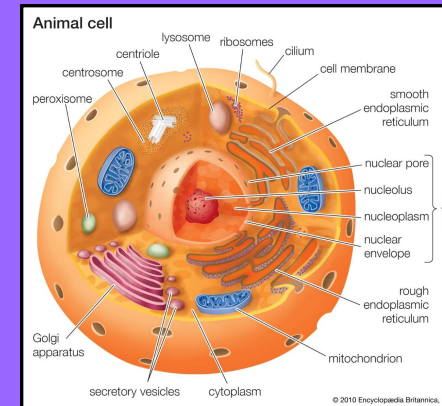


Chloroplasts

- Contain chlorophyll and carry out photosynthesis.
- In plants cells only

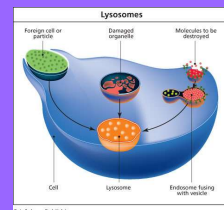


Animal Cell Structures



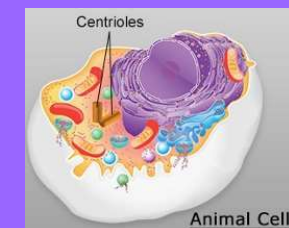
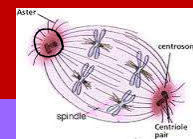
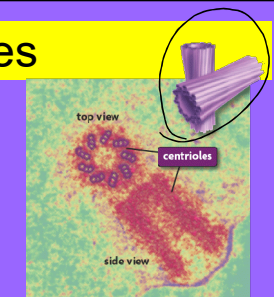
Lysosomes

- Contain digestive enzymes.
- They digest excess or worn out cell parts, food particles, and invading viruses or bacteria.
- If lysosomes break, the chemicals may destroy the cell itself.
- "Worn out" cells are removed this way.




Centrioles

- They exist in pairs outside the nucleus and are involved in cell division.
- They are composed of microtubules arranged in a circle.

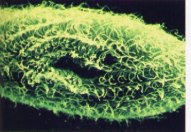
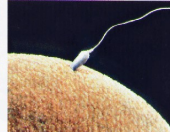


Cilia and Flagella



- Cilia are short, hair-like projections out of the plasma membrane.
- Used for locomotion in unicellular organisms.
- They are also found in multicellular organisms.
- Ex. protists and human windpipe

- Flagella are whiplike projections that aid in movement.
- Ex. bacteria and sperm cells

Cilia on a Protozoan. Flagella on a sperm cell.

Similarities between plant cells and animal cells

- Eukaryotic
- Cell membrane
- Cytoplasm
- Multicellular

Differences between plant cells and animal cells

Animal cells	Plant cells
Smaller in size	Larger in size
Irregular shape	Regular shape
No cell wall	Cell wall present

Differences between Plant Cells and Animal Cells

Animal cells	Plant cells
Vacuole small or absent	Large central vacuole
Lysosomes	Chloroplast
Centrioles Present	

