Cells – The Building Bricks of Life

Robert Hooke – 1665

- Used a "microscope" / magnifying glass to look at cork
- From England
- Discovered what a cell was by looking at a piece of cork

Anot Van Leeuwenhook – 1673

- Dutch inventor who created the **microscope** that we recognize today
- First person to discover a single celled protozoa
  - Protozoa is like pond scum
- He also looked at blood cells

Cell:

The smallest unit of life that can perform all life processes.

Cell Theory (Really important - Know This!)

- All organisms are made of one or more cells
- The cell is the basic unit of all living things
- All cells come from existing cells

Spontaneous Generation:

- The idea that things or organisms just appear.
  - AKA – The idea that worms were created out of rain hitting the ground or the idea that flies came from dirty rags and filth.

Protoplasm:

All the living material found in a cell capable of carrying on all the life processes.

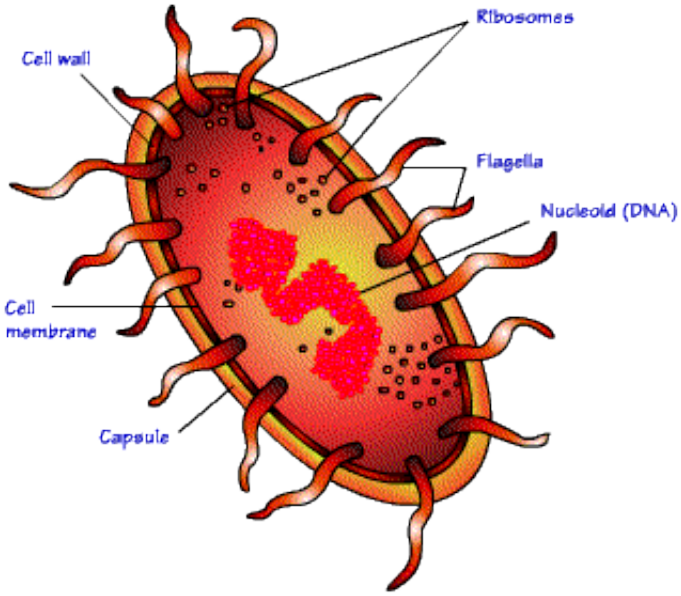
The Two Major Kinds of Cells:

Prokaryote Cell: (1st Major Kind of Cell)

Cells that DO NOT have a cell membrane around their nucleus.
Example – Bacteria

- Prokaryotes are molecules surrounded by a membrane and cell wall. Prokaryotic cells lack characteristic Eukaryotic sub cellular membrane enclosed

"organelles", but may contain membrane systems inside a cell wall.



Second kind of Prokaryotes:
Archaebacteria

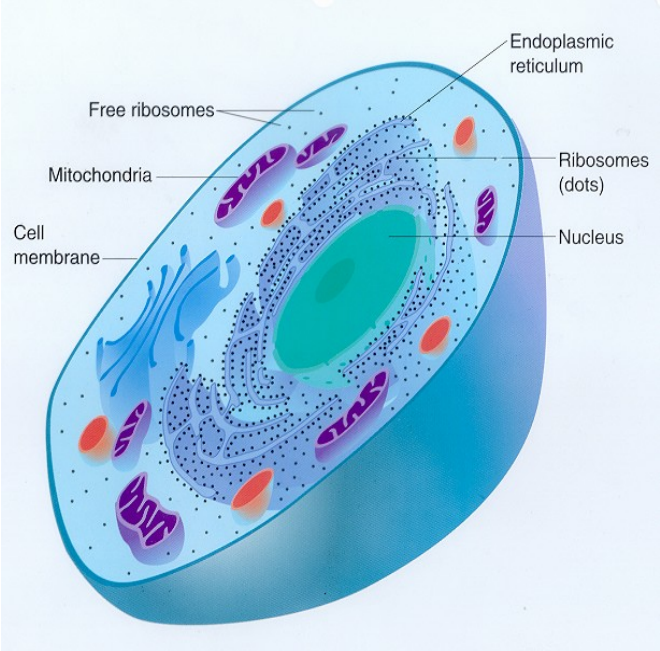
- SAME As bacteria since they lack a nucleus and don't have membrane bound organelles.
- DIFFERENT in that they have ribosomes that are more like a Eukaryotic cell.

Eukaryotic Cell (2nd Major Kind of Cell)

Cells that have a membrane around their nucleus.

Example – Plant and Animal Cells Eukaryotic

Cells usually are 10 times larger than Prokaryote cells.



The basic Eukaryotic cell contains the following:

1. Plasma membrane around their nucleus
2. Cytoplasm (the semi fluid substance inside the membrane.
3. Has a cytoskeleton – the microfilaments and microtubules that suspend organelles, this gives it shape, and allow for the cells motion.
4. Has membrane enclosed subsellular organelles.

Parts of the Cell:

Organelles:

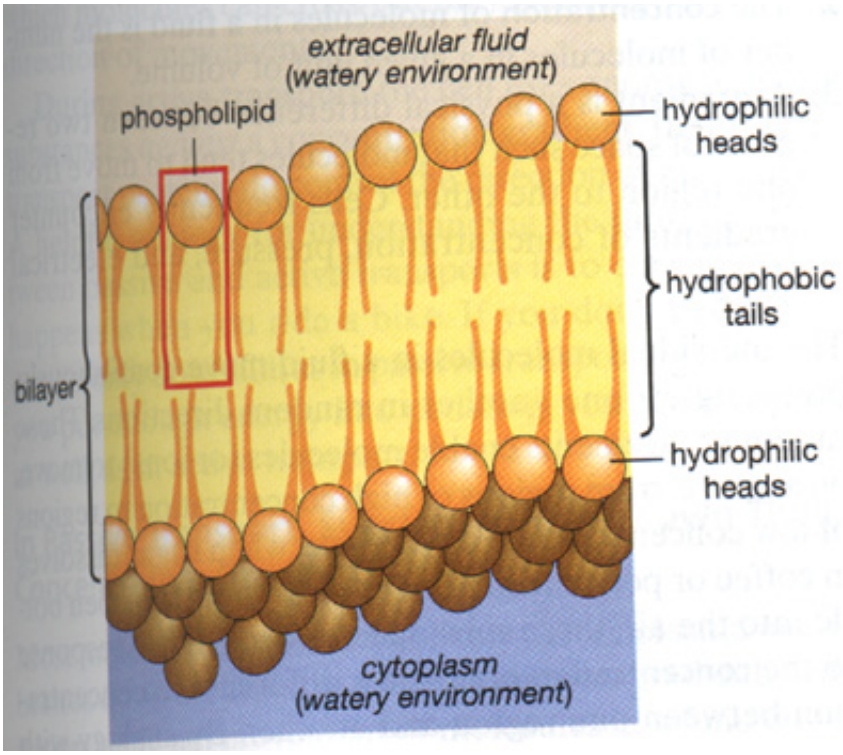
The things or structures (PARTS) inside of a cell that perform the functions necessary for the cell to survive.

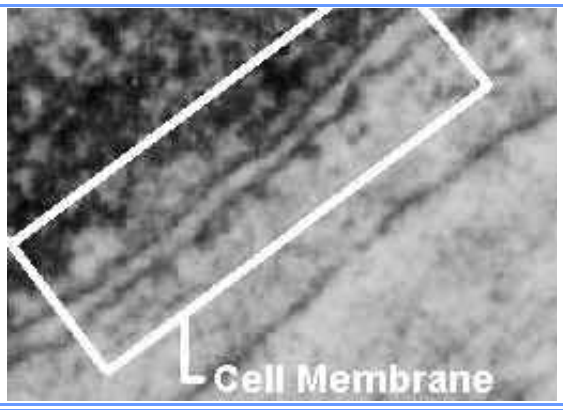
- Example: Think about your heart, lungs and liver… They are all organs or organelles inside of your body. The cell has parts like this inside of its cell.

Cell Membrane:

Is the protective layer that covers the cell's surface.

it acts like the fence around a yard. It is like the skin on your body. It keeps some things out and lets some thing in.

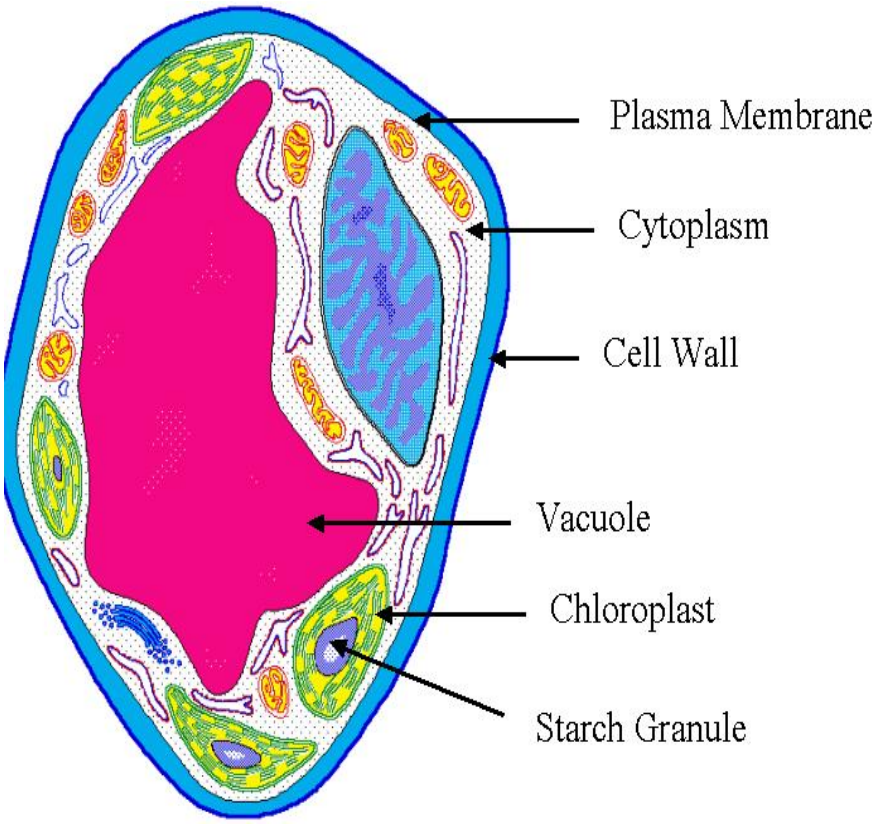


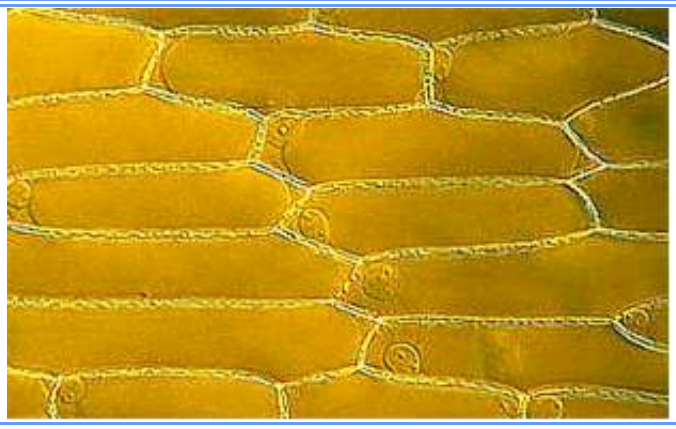


Location:	• Found in all cells
Description	• Plant - inside cell wall • Animal - outer layer; cholesterol • Double layer of phospholipids with proteins • Selectively permeable
Function	• Support • Protection • Controls movement of materials in/out of cell • Barrier between cell and its environment • Maintains homeostasis

Cell Wall:

- Found only in PLANT cells
- Gives support to the cell
- Is a second layer or "fence" like the cell membrane.

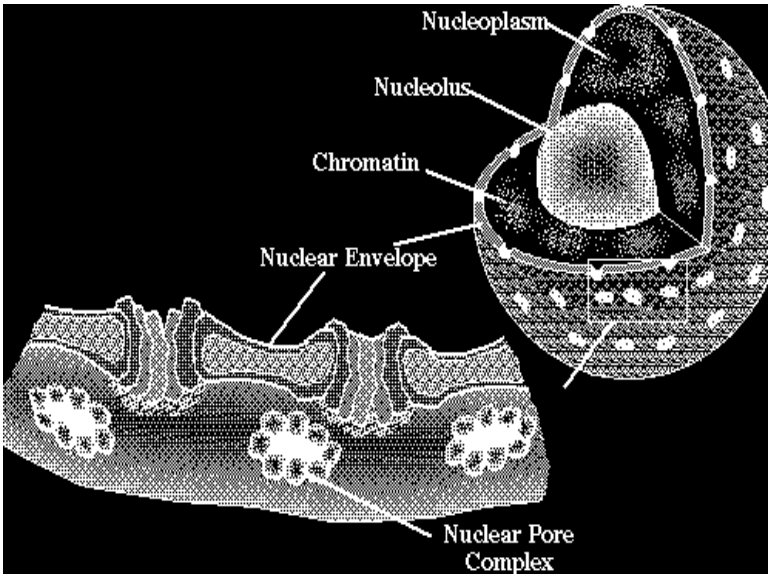


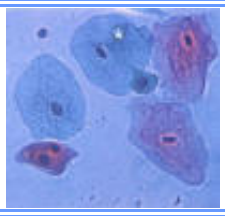


Location:	• Plant, Fungi, & Bacteria, but not animal cells
Description	• Outer layer • Rigid & strong • Made of cellulose
Function	• Support (grow tall) • Protection • allows H_2O, O_2, CO_2 to diffuse in & out of cell

Nucleus:

- An organelle inside of the cell that directs the activity in the cell.
- It holds the DNA (Deoxyribonucleic acid)
  - This is the blue print material (directions) for the cell.
  - It tells how to reproduce and perform all of the cells jobs.



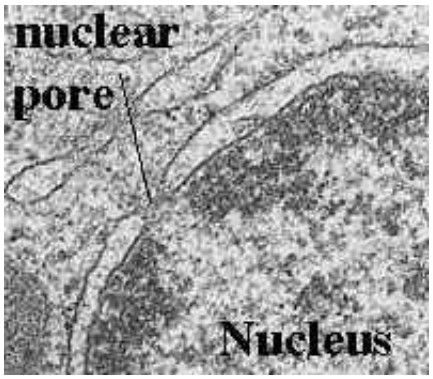


Location:	• All cells except prokaryotes
Description	• Large, oval • May contain 1 or more nucleoli • Holds DNA
Function	• Controls cell activities • Contains the hereditary material of the cell

nucleolus

Location:	• All cells except prokaryotes
Description	• Found inside the cell's nucleus • May have more than one • Disappear during cell division
Function	• Make ribosomes

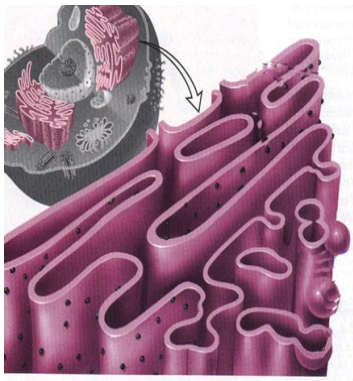
Nuclear Membrane

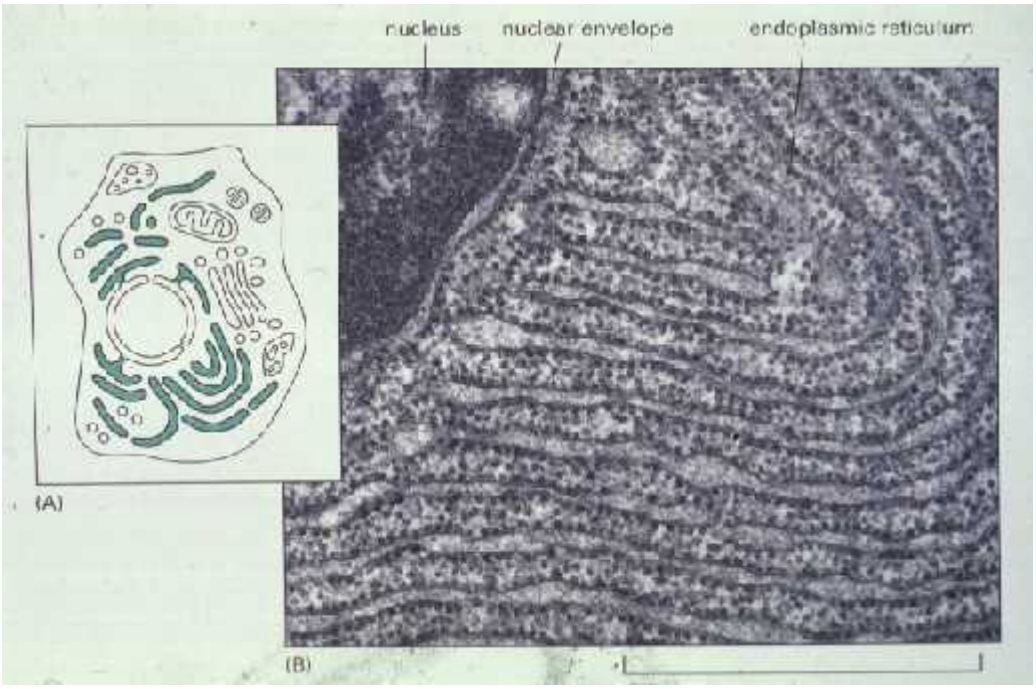


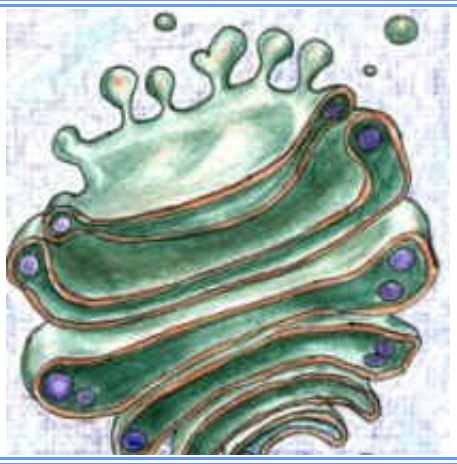
Location:	• All cells except prokaryotes
Description	• Surrounds nucleus • Double membrane • Selectively permeable
Function	• Controls movement of materials in/out of nucleus

Endoplasmic Reticulum: (ER)

- A folded membrane that moves material in the cell
- ER (Endoplasmic Reticulum) is part of the internal delivery system and uses tubes for passageways.
- ER is additionally responsible for moving proteins and other carbohydrates to the Golgi Body.



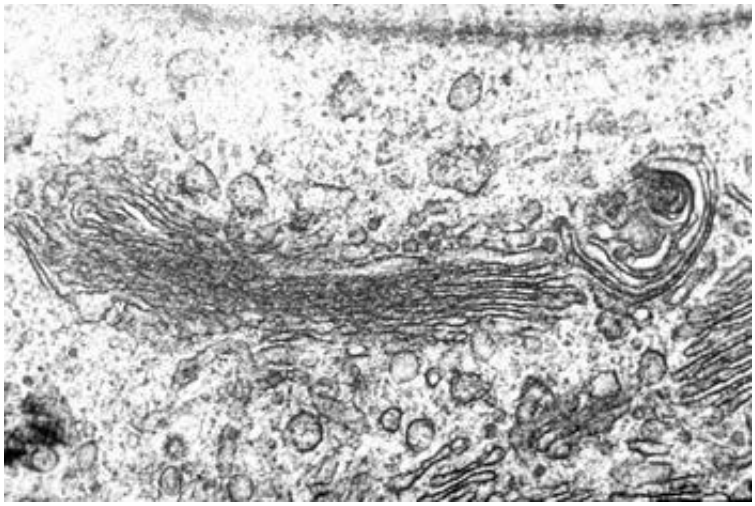


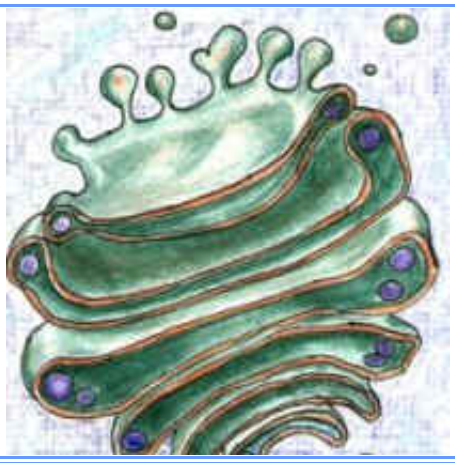


Location:	• All cells except prokaryotes
Description	• Network of tubes or membranes • Smooth w/o ribosomes • Rough with embedded ribosomes • Connects to nuclear envelope & cell membra
Function	• Carries materials through cell • Aids in making proteins

Golgi Body (Apparatus)

- consisting of flat, disk-shaped sacs, tubules, and vesicles
- Stacks of sacs that package and move proteins around in the cell.

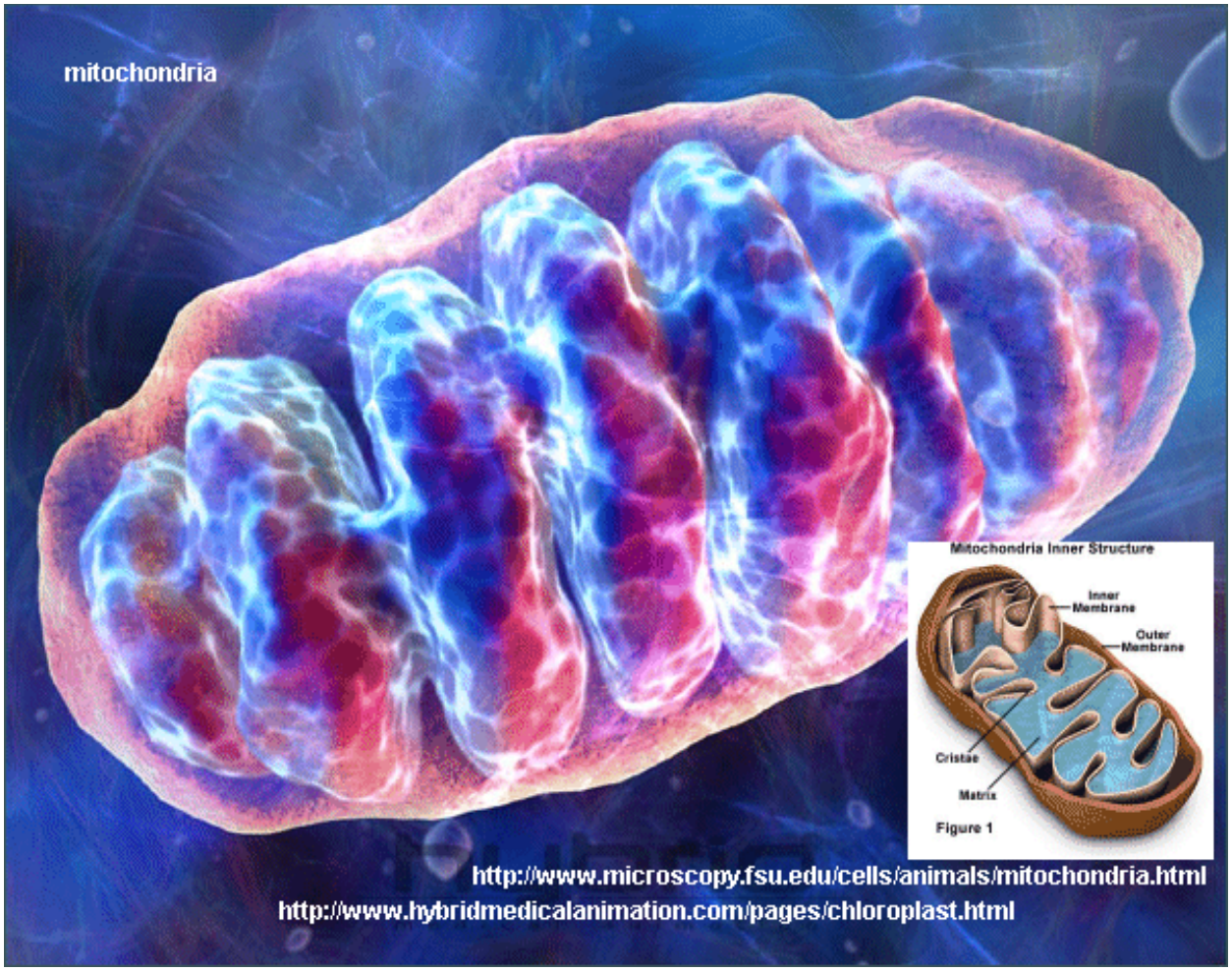




Location:	• All cells except prokaryotes
Description	• Stacks of flattened sacs
Function	• Modify proteins made by the cells • Package & export proteins

Mitochondria

- The organelle that releases energy in the cell. (The powerhouse of the cell)
- Found in both animal and plant cells.
- Mitochondria produce ATP using energy stored in food molecules.

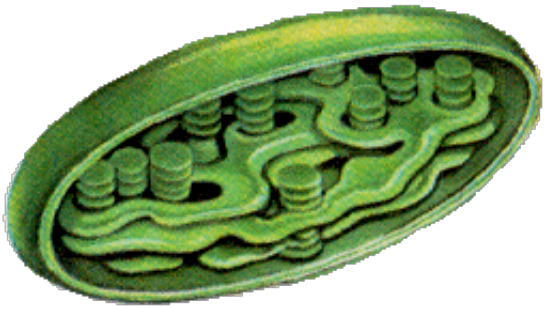


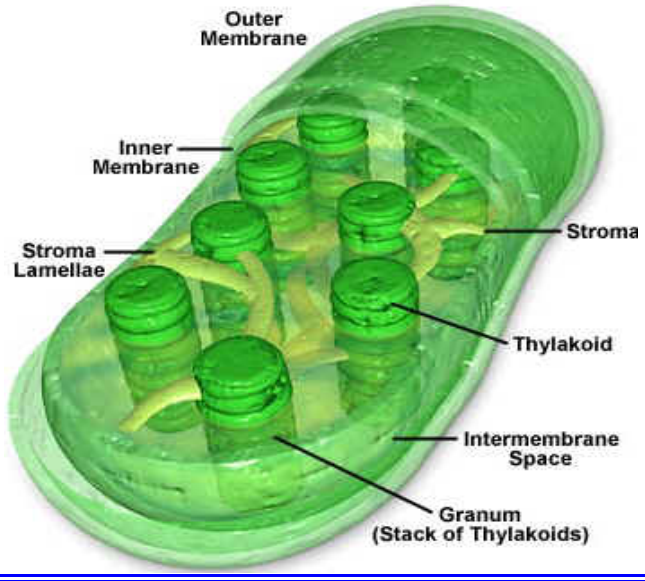
Location:	• All cells except prokaryotes
Description	• Peanut shaped • Double membrane • Outer membrane smooth • Inner membrane folded into cristae

Function	• Breaks down sugar (glucose) molecules to release energy • Site of aerobic cellular respiration

Chloroplasts

- Organelle that produces chlorophyll. (The chemical of photosynthesis) to power the plant cell.
  - Chlorophyll traps the energy of sunlight, which is then used by the plant cell to make sugar for energy.
- Only found in PLANT cells.



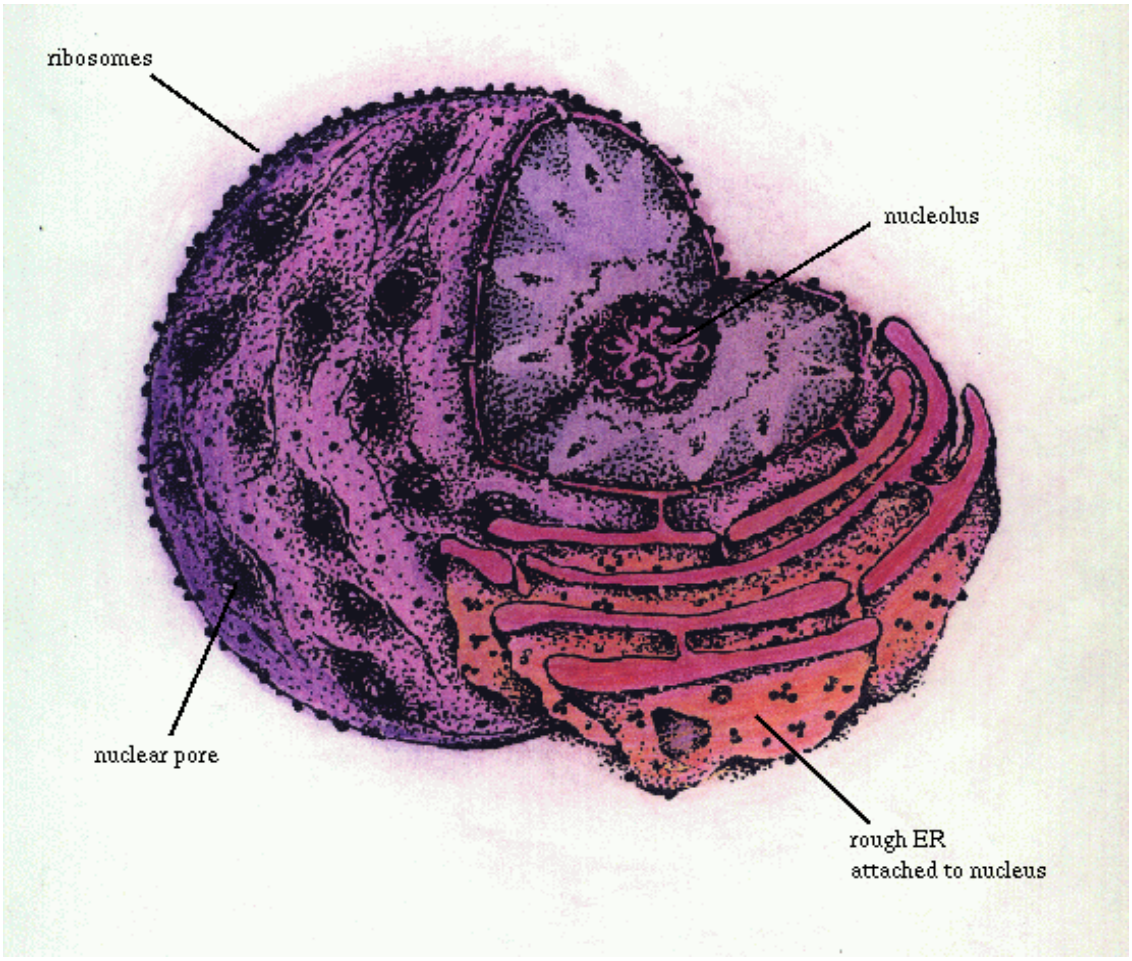


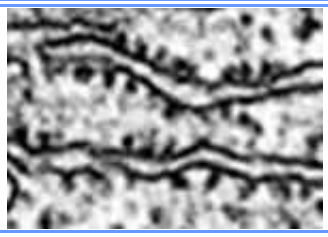
Location:	• Plants and algae
Description	• Green, oval containing chlorophyll (green pigment) • Double membrane with inner membrane modified into sacs called thylakoids

Description	• Stacks of thylakoids called grana & interconnected • Gel like innermost substance called stroma
Function	• Uses energy from sun to make food (glucose) for the plant • Process called photosynthesis • Release oxygen

Ribosome:

Organelle that makes protein for the cell.



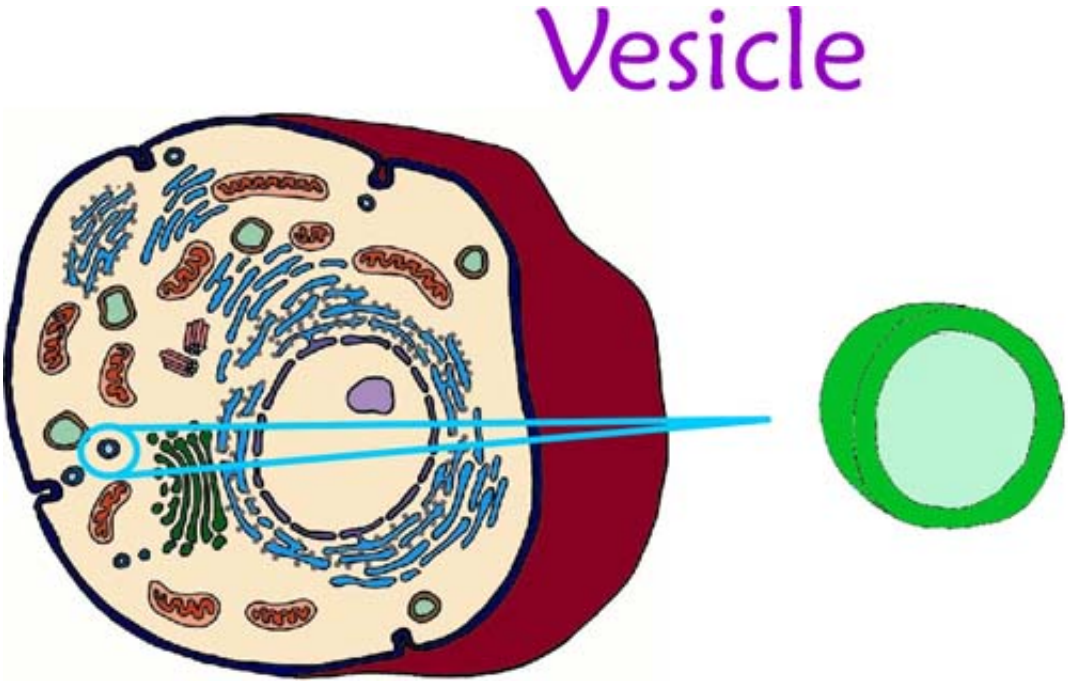


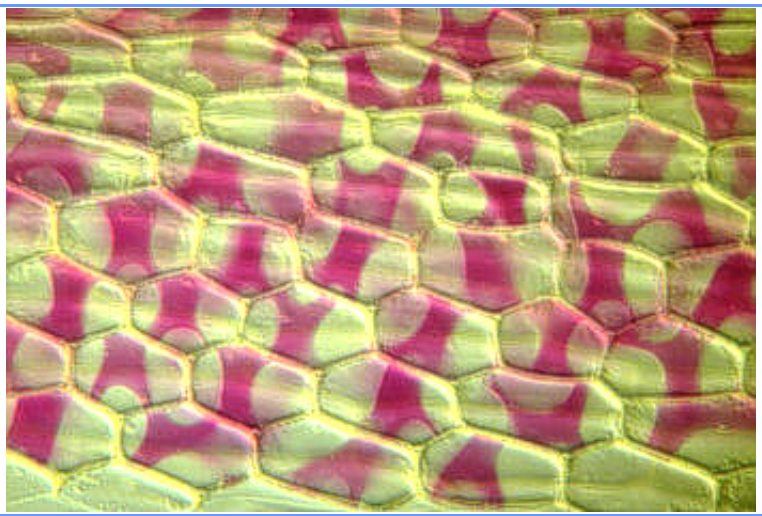
Location:	• All cells
Description	• Small bodies free or attached to ER

Description	• Made of rRNA & protein
Function	• Synthesizes proteins

Vesicle / Vacuole

Small sack that moves material in and out of the cell.





Location:	• Plant cells have a single, large vacuole • Animal cells have small vacuoles
Description	• Fluid-filled sacs • Largest organelle in plant cells

Function	• Store food, water, metabolic & toxic wastes • Store large amounts of food or sugars in plants

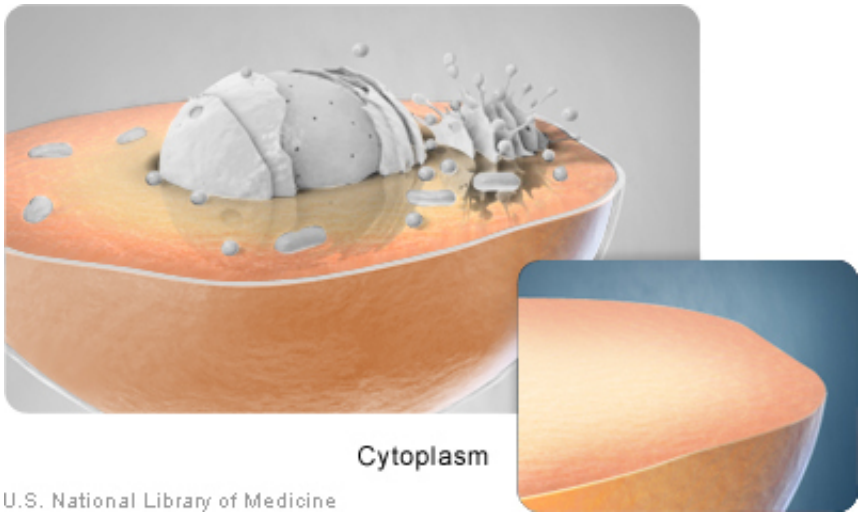
Lysosome:

- Organelle that eats worn out cell parts.
- It contains digestive enzymes.
- Lysosomes are round membrane surrounded structures that can be found anywhere in the cytoplasm.
- Sometimes they are called suicide bags because they encase the worn out part that is to be digested.

Location:	• Animal as well as plant cells
Description	• Small and round with a single membrane
Function	• Breaks down larger food molecules into smaller molecules • Digests old cell parts

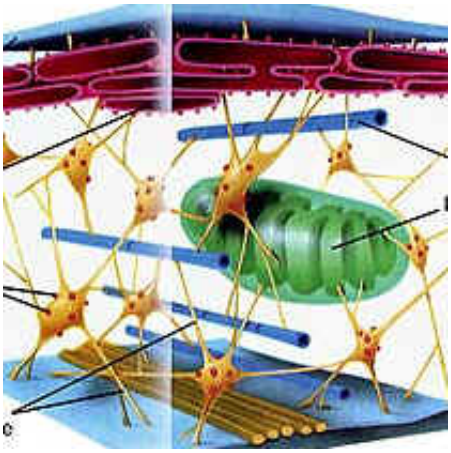
Cytoplasm

- The gel-like material inside of the cell membrane.
- Keeps organelles in place



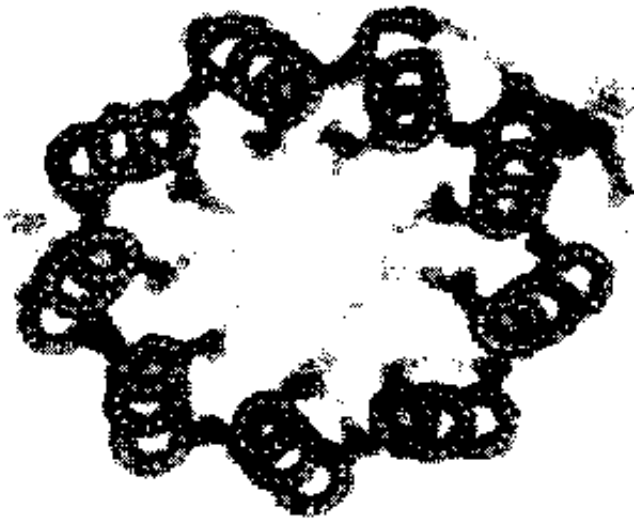
Location:	• All cells
Description	• Clear, thick, jellylike material (cytosol) • Organelles found inside cell membrane • Contains the cytoskeleton fibers
Function	• Supports and protects cell organelles

Cytoskeleton:

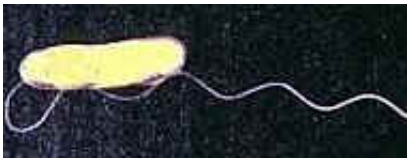


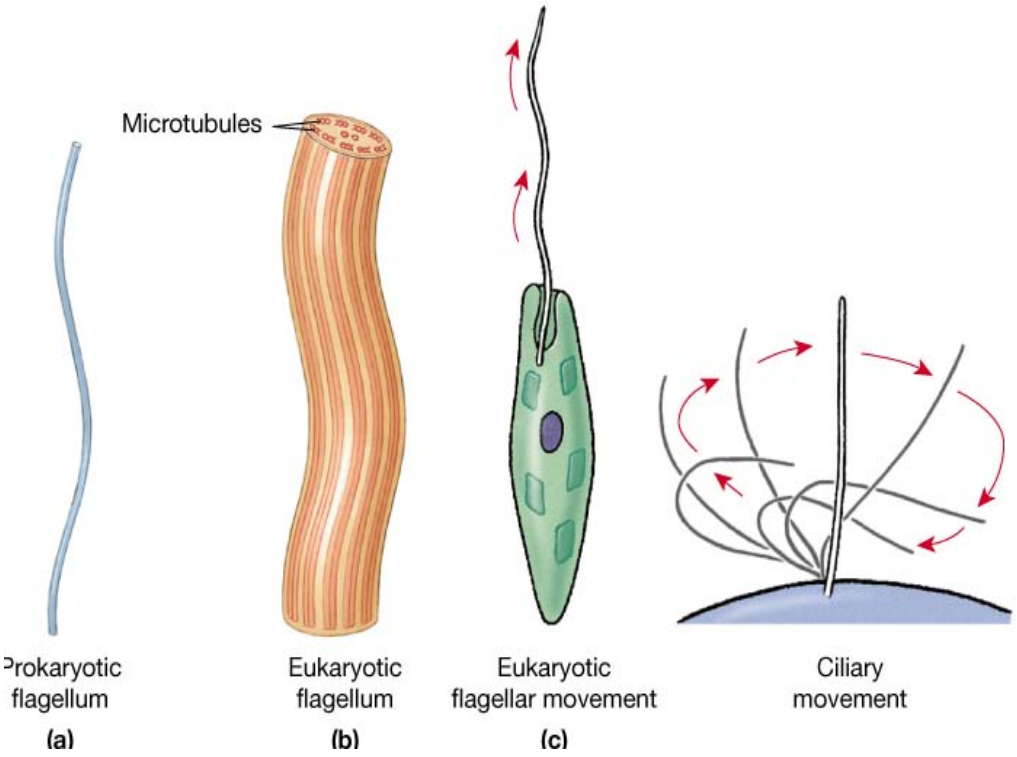
Location:	• All cells
Description	• Made of microtubules - microfilaments
Function	• Strengthen cell & maintains the shape • Moves organelles within the cell

Centrioles



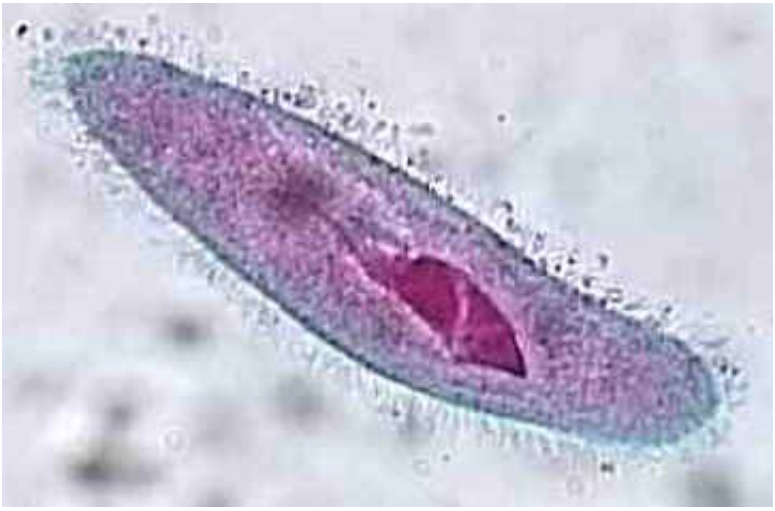
Description	• Paired structures near the nucleus • Made of a cylinder of microtubule pairs
Function	• Separate chromosome pairs during mitosis

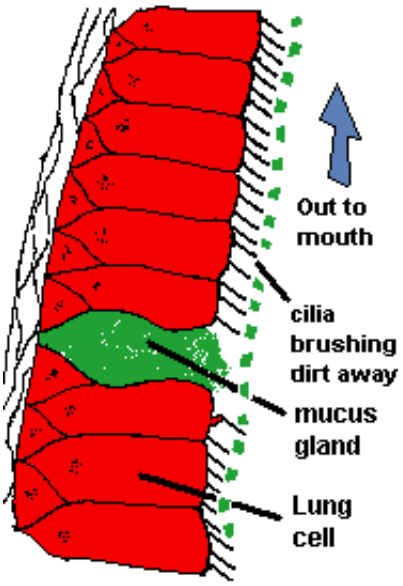




Location:	• Bacterial cells & Protozoans
Description	• Arrangement of microtubules • Long, but few in number
Function	• Movement

Cilia





Location:	• Animal cells, Protozoans
Description	• Arrangement of microtubules • Short, but numerous
Function	• Movement • Cells lining the human upper respiratory tract are ciliated (have cilia). The cilia move mucous and debris upward to the mouth where it is swallowed

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