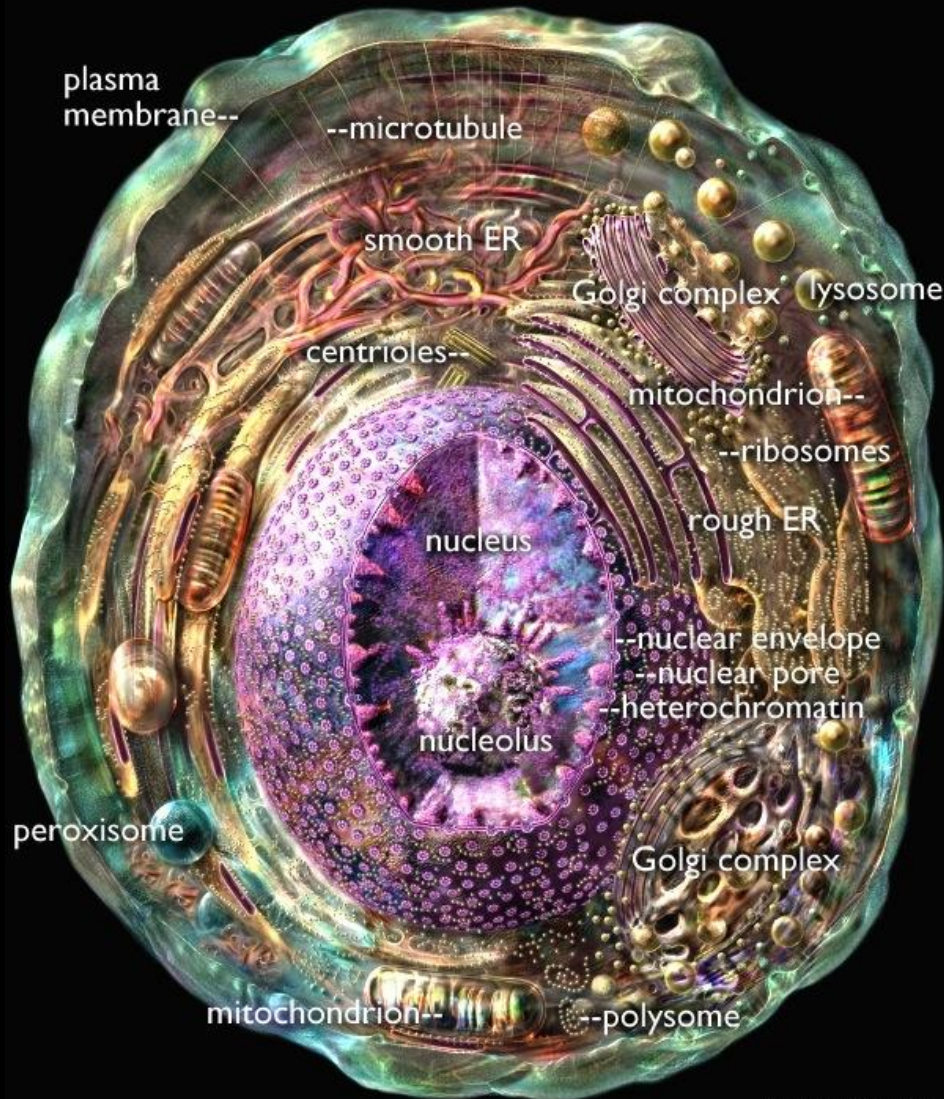


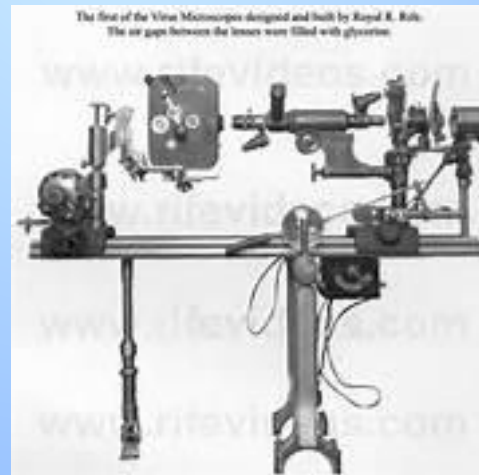
Cell Structure Introduction



- **Section -1**
 - * **Cell Scientist and Theory**
- **Section -2**
 - * **Plasma membrane**
- **Section -3**
 - * **Cell Organelles**

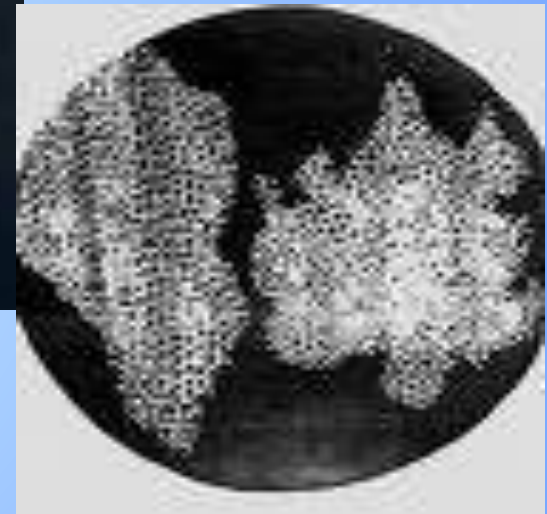
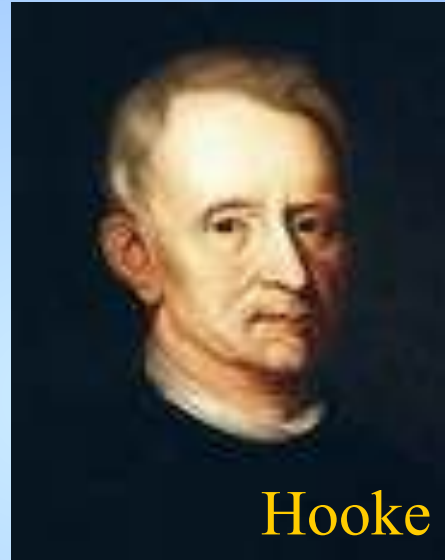
Cell Scientists

- The invention of the microscope led to the discovery of cells
- Why does this make sense?



Contribution of Scientists

- **Robert Hooke**



Anton Van Leeuwenhoek



Leeuwenhoek microscope

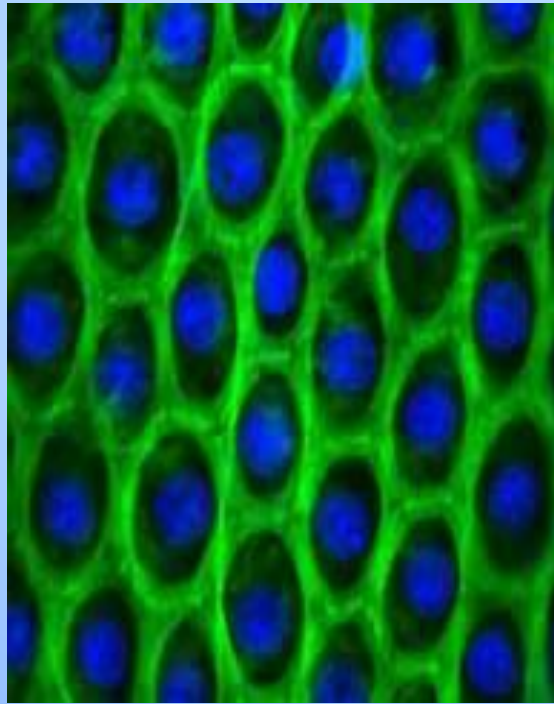
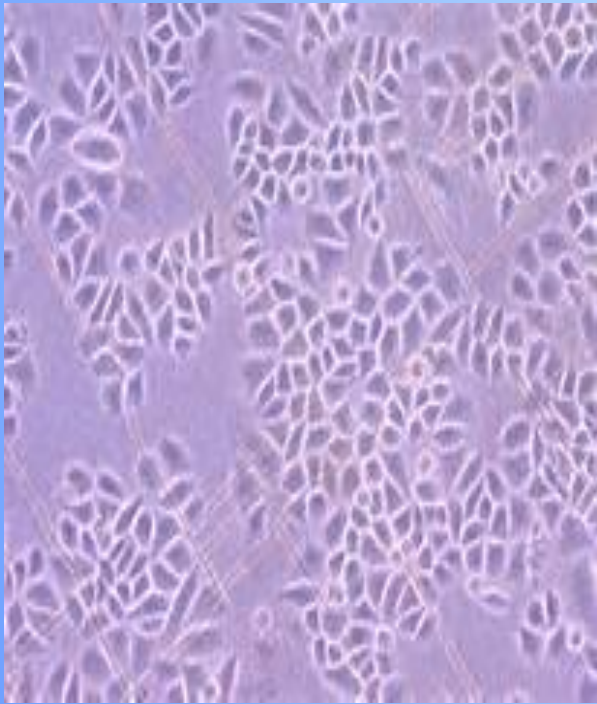


Milestones

Year	Scientist	Contribution
1500's	Galileo	Convex lenses with a magnification greater than 5x became available
1590	Janssen Janssen	They are credited with the first compound microscope
1665	Robert Hooke	Looked at cork cells under microscope.... Looked like cells that monks lived.... Coined the term "cell"
1683	Anton Van Leeuwenhoek	He produced over 500 single lens microscopes. He discovered bacteria, human blood cells, spermatozoa and protists
1830-1855	Schleiden Schwann Virchow	Cell theory developed
1881-90	Pasteur/Koch	Study of bacteria Pasteurization and Germ Theory

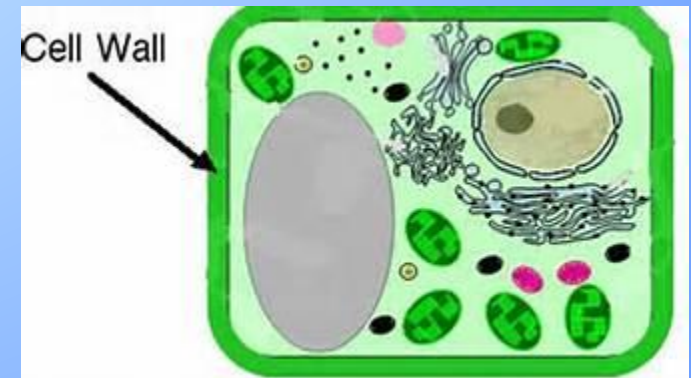
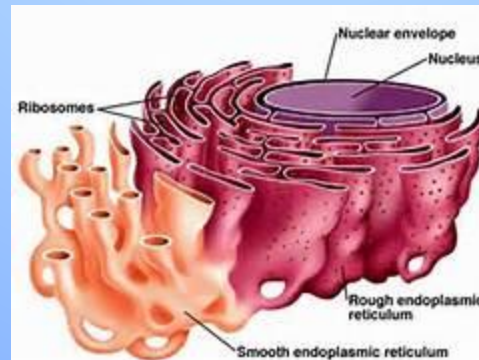
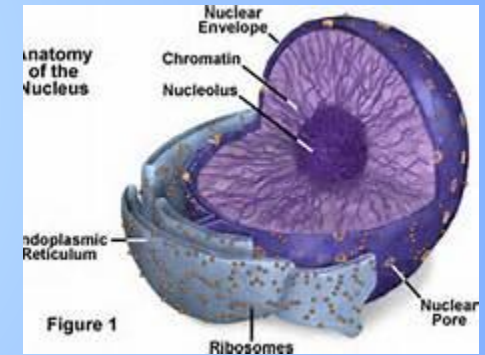
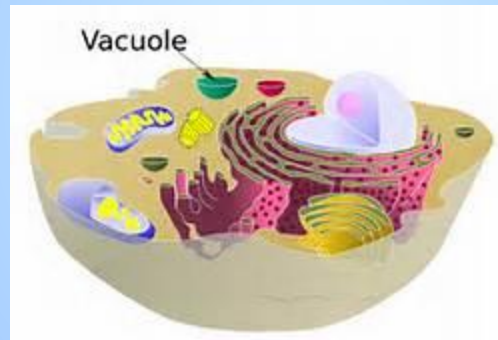
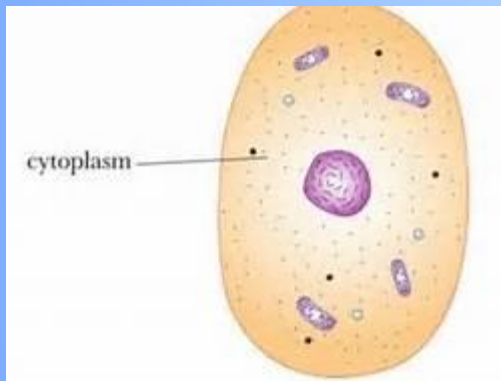
Cell

- The basic structural and functional unit of all living matter



What's an Organelle...

Specialized structures that carry out specific cell functions

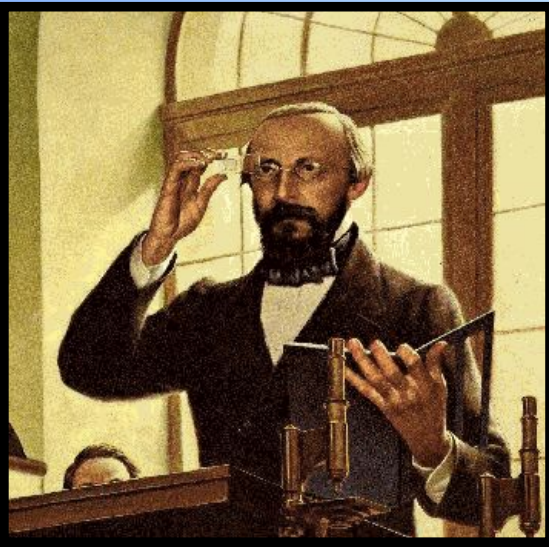


The Cell Theory Men...

- Matthias Schleiden
- Theodor Schwann
- Rudolph Virchow



Schleiden

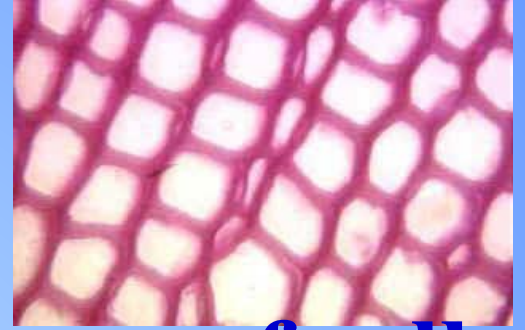


Virchow

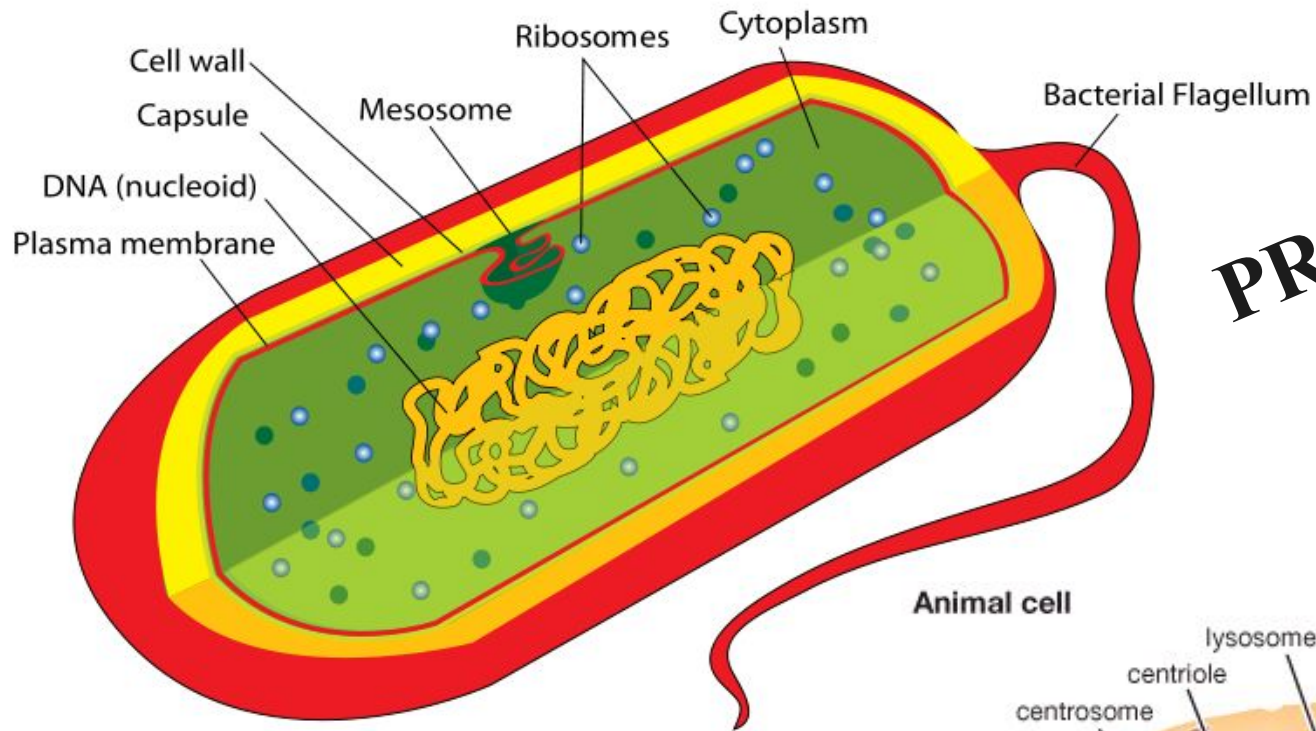


Schwann

The Cell Theory...

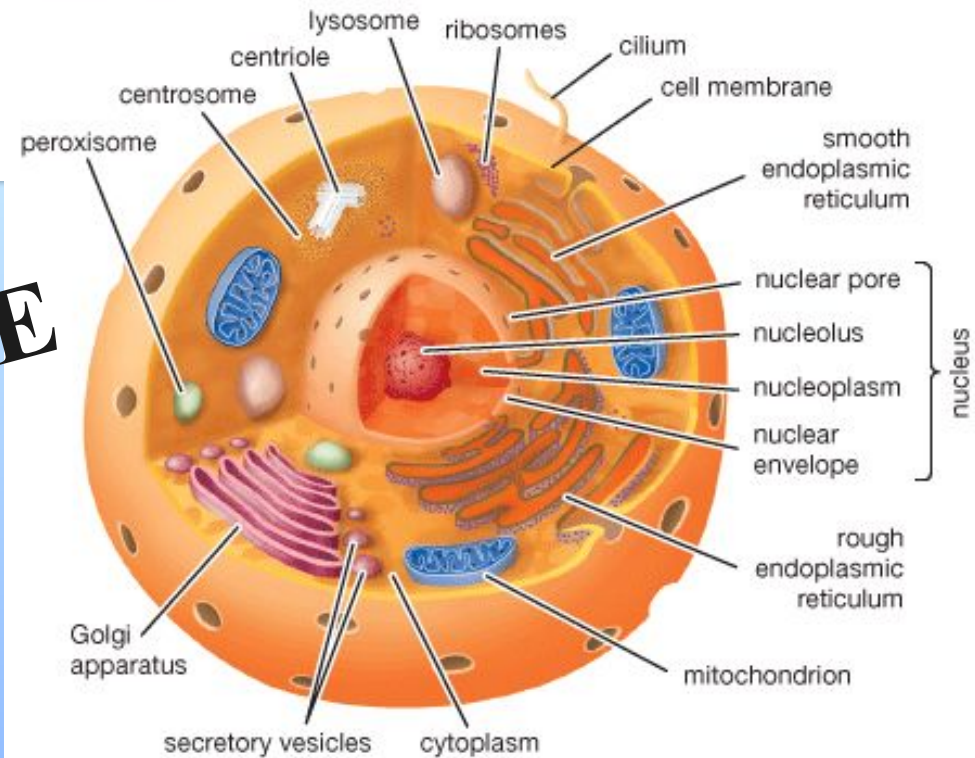


- **1) All living things are made up of cells**
(Schleiden)
- **2) Cells are the basic unit of structure and function in living organisms.**
(Schwann)
- **3) New cells are produced from existing cells.** (Virchow)



PROKARYOTE

Animal cell



EUKARYOTE

Prokaryotic vs. Eukaryotic cells

Prokaryote

- No nucleus
- No membrane bound organelles
- 1-10 um in size
- Evolved 3.5 billion years ago
- Only bacteria

Eukaryotes

- Nucleus (DNA enclosed in)
- Many organelles
- 2 – 1000 um in size
- Evolved 1.5 billion years ago
- Example:
 - * Plant cells
 - * Animal cells
 - * Fungi cells
 - * Protist cells

Plant —vs. Animal Cell

List 4
differences



Animal cell

Plant cell



Multicellular –Vs.- Unicellular



Multicellular
organisms will
be composed of
many cells



Unicellular
organisms will
be composed of
1 cell

Section 1 Essential Questions

- 1) How are the advances in microscope technology related to discoveries about cells?
- 2) What are the parts of the Cell Theory?
- 3) What are the differences between a prokaryotic cell and eukaryotic cell?
- 4) How does a microscope work?

Vocab:

<i>Cell</i>	<i>eukaryotic cell</i>	<i>Cell theory</i>
<i>organelle</i>	<i>prokaryotic cell</i>	<i>microscope</i>

Section #3 Cell Structure and Organelle Notes



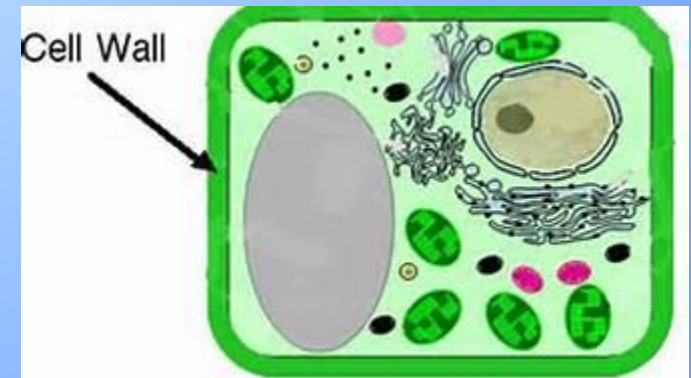
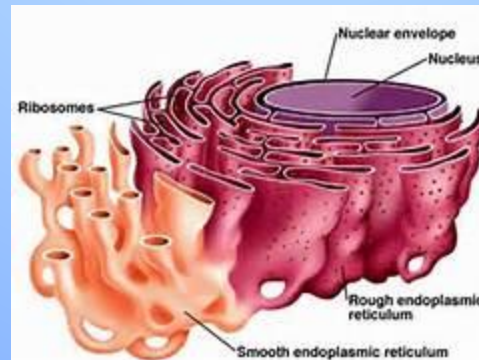
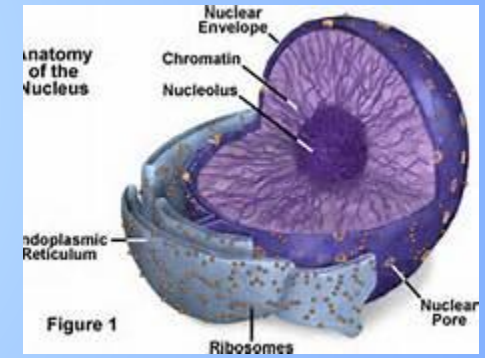
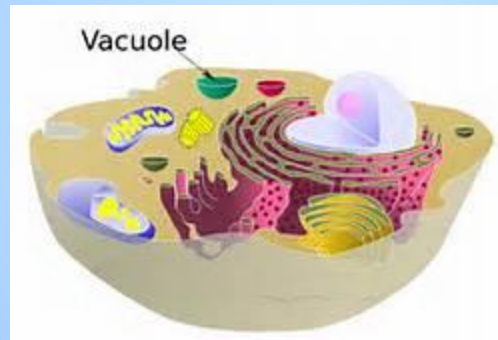
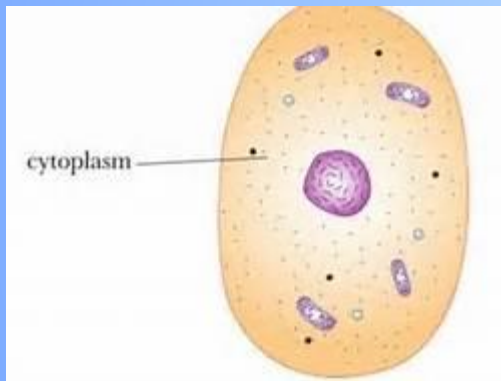
Animal cell

Plant cell



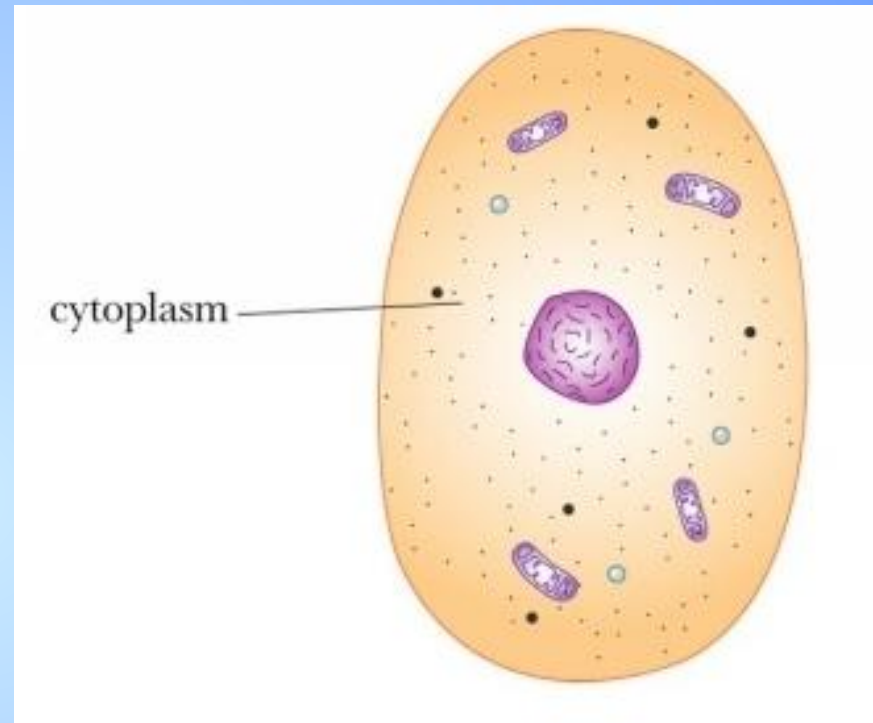
What's an Organelle...

Specialized structures that carry out specific cell functions



Cytoplasm (yellow)

- Anchor for all organelles
- Holds the cell and its organelles together
- Allows for fluidity of the cell
- Contains nutrients for cell

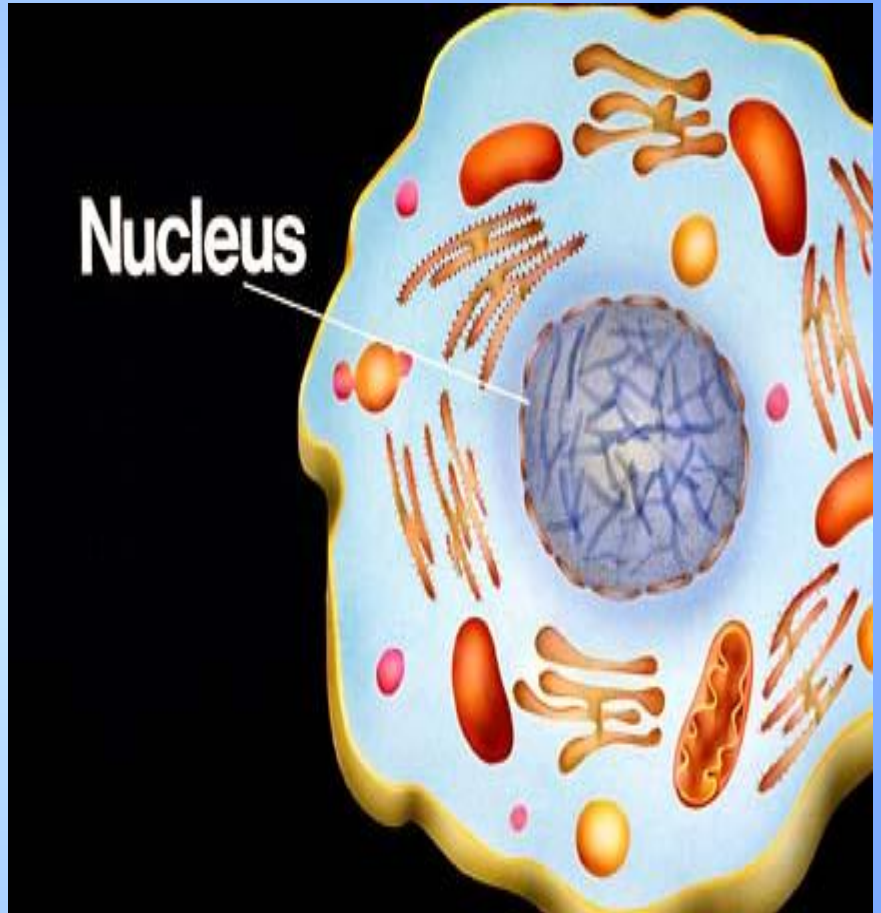


In animal, plant and prokaryote cells
Can see under microscope

Nucleus

orange

- In eukaryotes only
- Control center
- Contain chromosomes and other genetic material



In animal **and** plant cells only
Can see under microscope

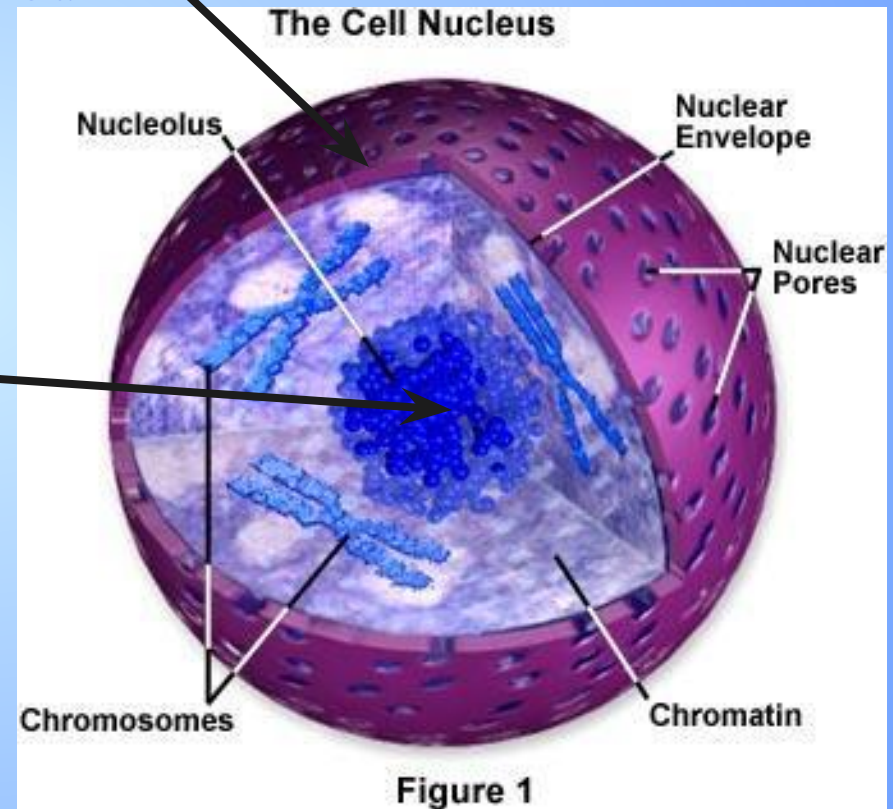
Nucleus parts (orange)

- Nuclear Membrane/envelope

- * Regulates the passage into and out of the nucleus
- * Surround the nucleus
- * Has nuclear pores

- Nucleolus

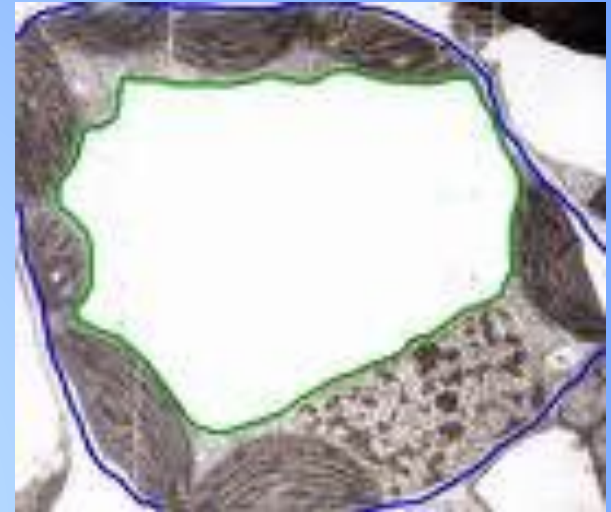
- * Holds DNA and chromosomes
- * Original maker of ribosomes
- * Location = Inside the nucleus



In animal and plant cells only
Cannot see

Vacuole (blue)

- Storage chamber for food and water
- Aids in support (shape) of plant
- Very big in plants
 - * What happens when you snap celery?
 - You broke the vacuole 😞



Found in plant
cells, sometimes in
animals

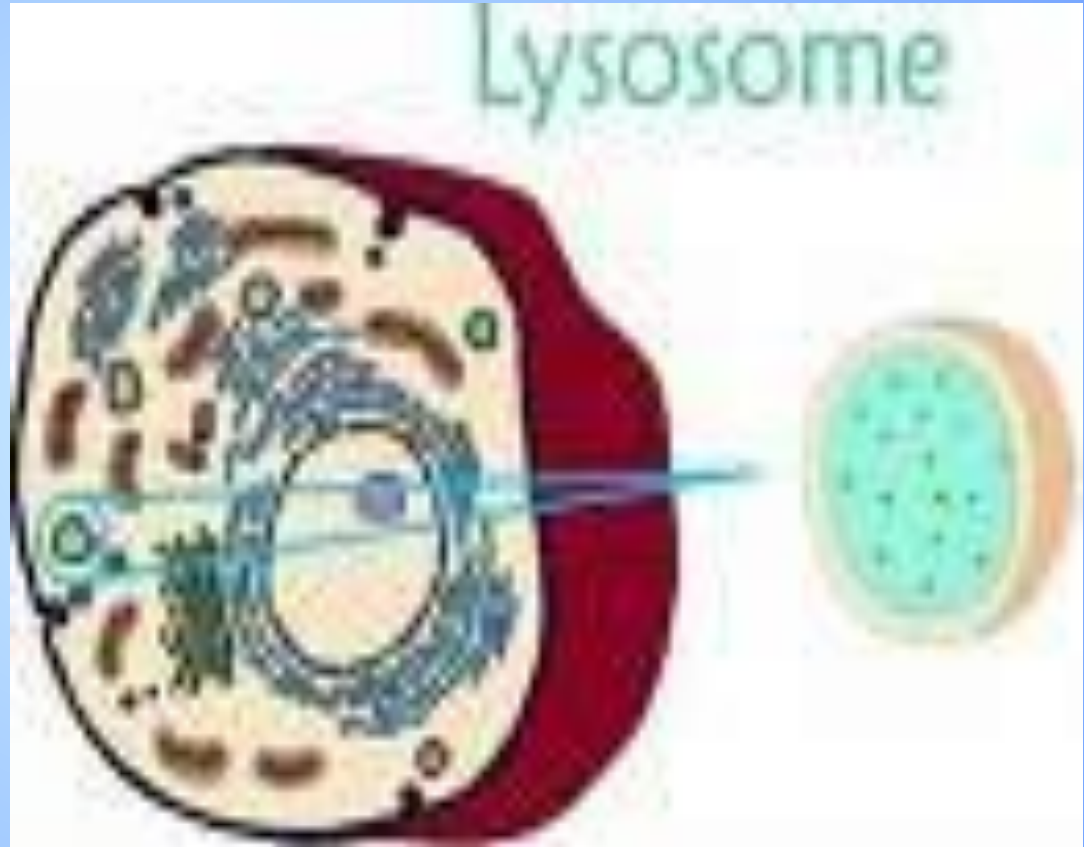
Can see it

Vesicles

- Store materials
- Not in prokaryotes
- In both animal and plant cells
- Can see under microscope

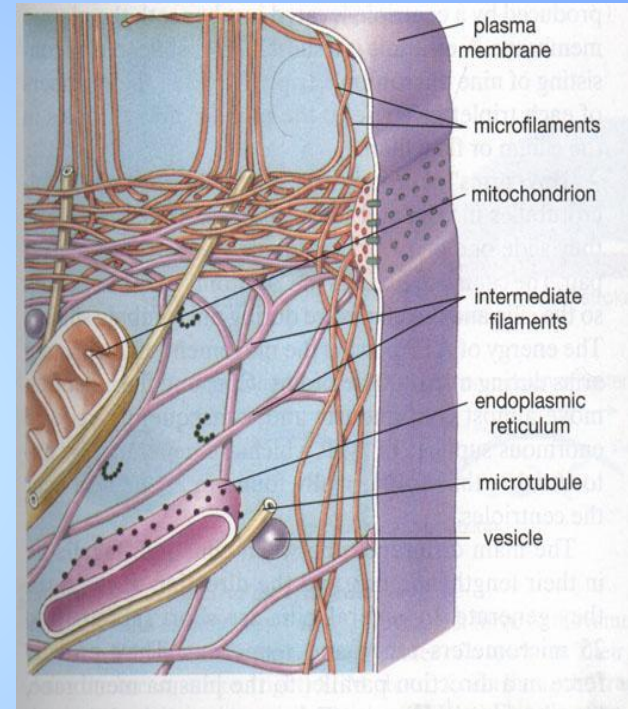
- * Breaks down and recycles macromolecules
- * “janitor” of cell
- * In animals and rarely in plants
- * Cannot see it

Lysosomes



Cytoskeleton

- Maintains cell shape
- Helps cell to move
- 2 parts to it
 - * Microtubules
 - * microfilaments



In animal and plant cells only
Cannot see under microscope

Cytoskeleton= the framework

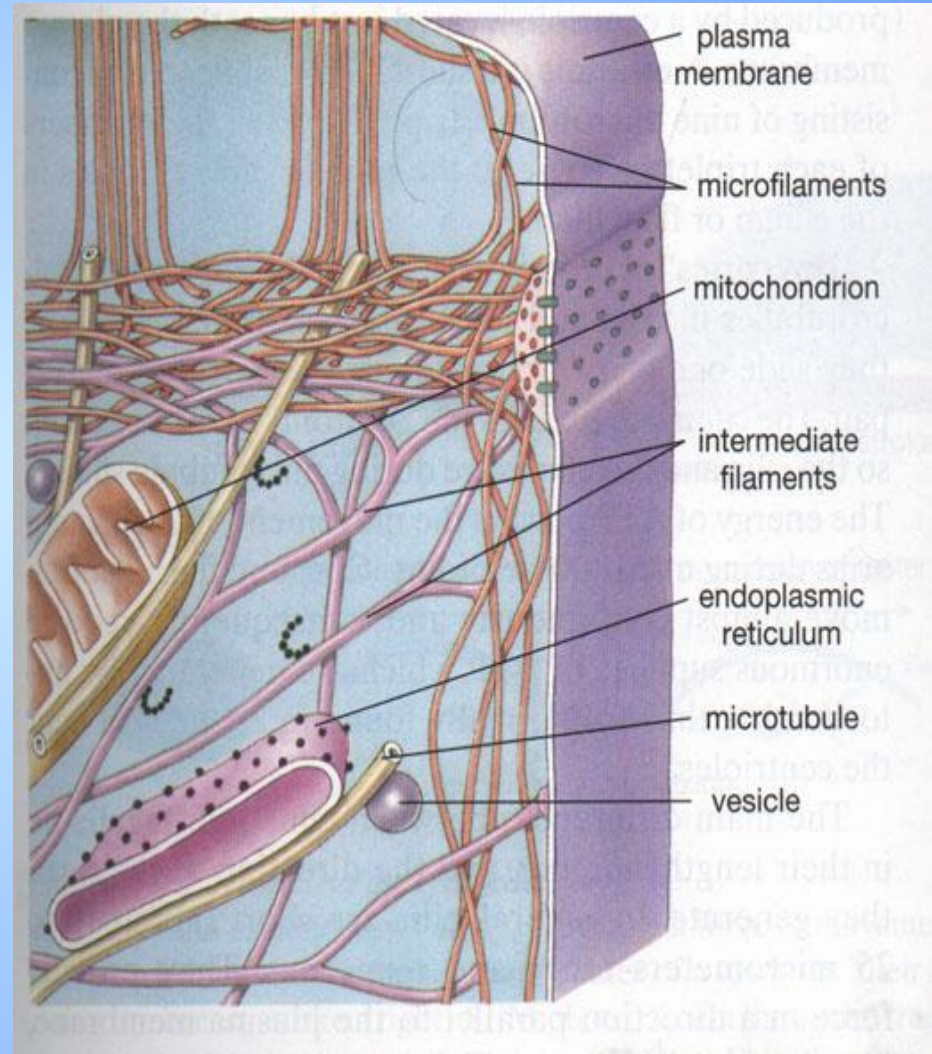
ADD to notes

•Microtubules

- * Gives support and shape to the cell
- * Like support beams
- * Long thin protein tubes
- * Makes the cell 3D

•Microfilaments

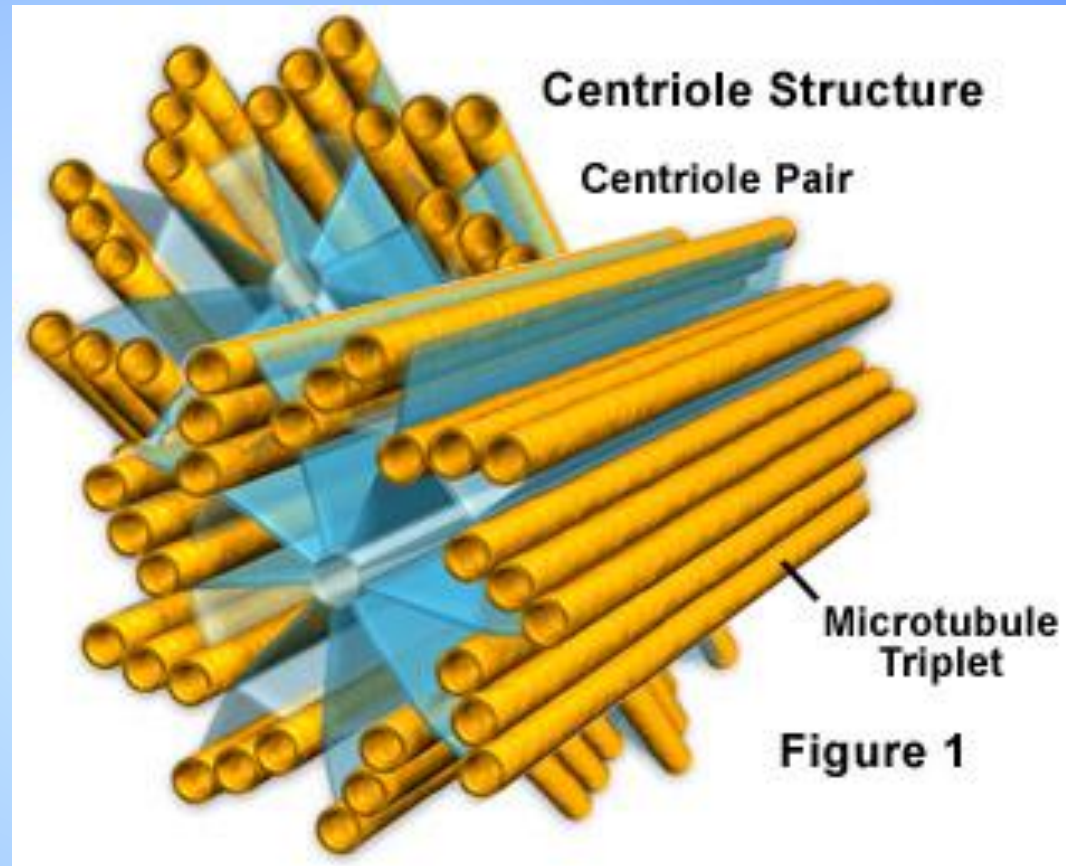
- * Gives support and shape to the cell
- * Like support beams
- * Long fine protein threads
- * Makes the cell 3D



In animal and plant cells only
Cannot see under microscope

Centriole

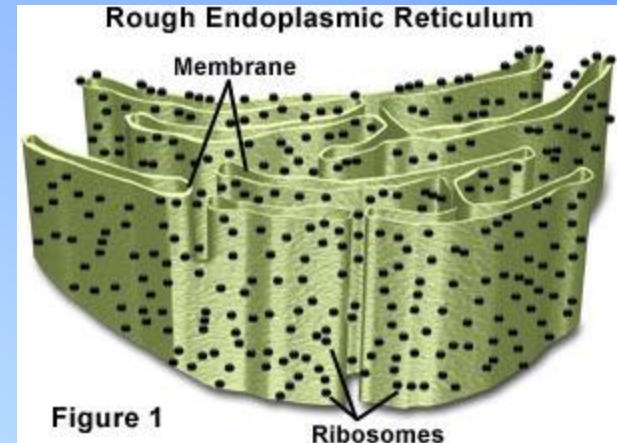
- **F=** Helps in cell division
 - * Moves the chromosomes during mitosis and meiosis
 - * Made of microtubules



In animal cells mostly
CAN see it

Ribosomes (black)

- F= Help to make proteins



In animal and plant and prokaryote cells
Cannot see it

Endoplasmic Reticulum (purple)

- Near the nucleus; Like a passageway from nucleus to rest of cell
- Assembles proteins and lipids
- Transports proteins and breaks down drugs in cell
- 2 types
 - * **SER** = smooth endoplasmic reticulum (no ribosomes)
 - * **RER** = rough endoplasmic reticulum (covered in ribosomes)

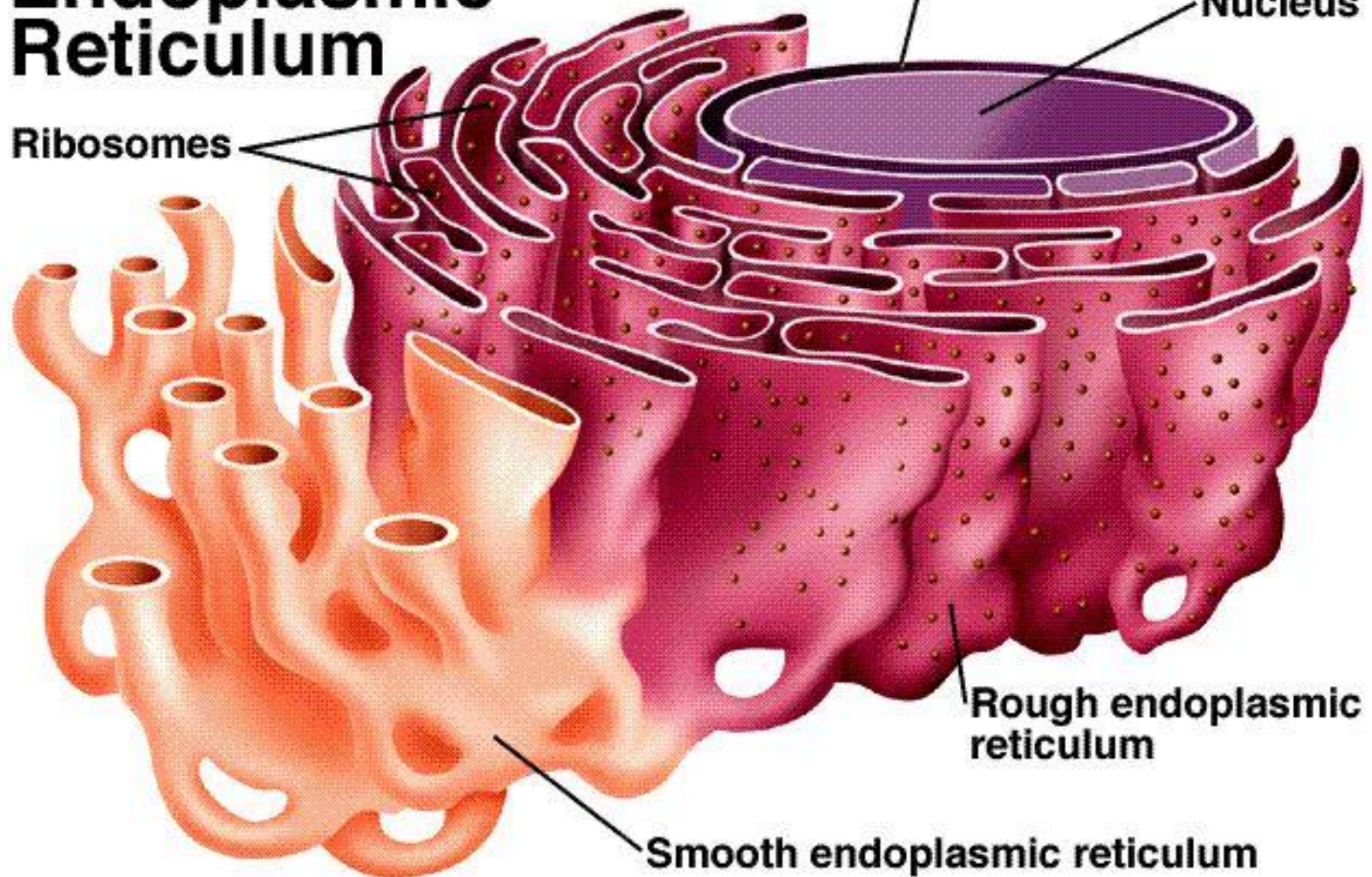
In animal and plant cells only
Cannot see it

Three-Dimensional Endoplasmic Reticulum

Ribosomes

Nuclear envelope

Nucleus



Rough endoplasmic
reticulum

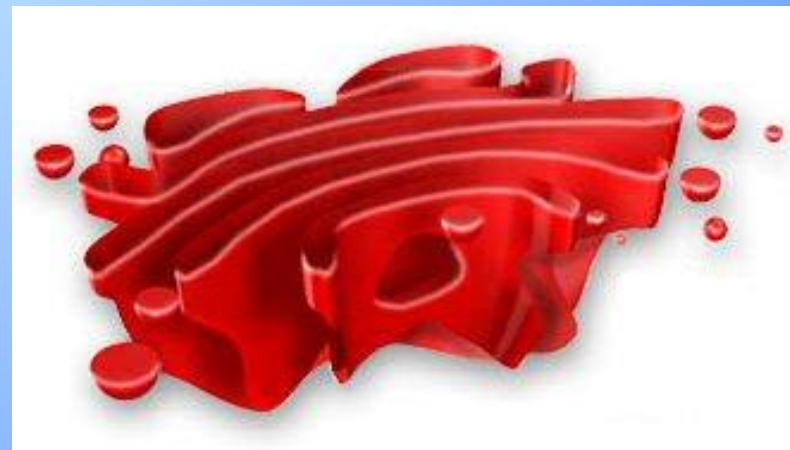
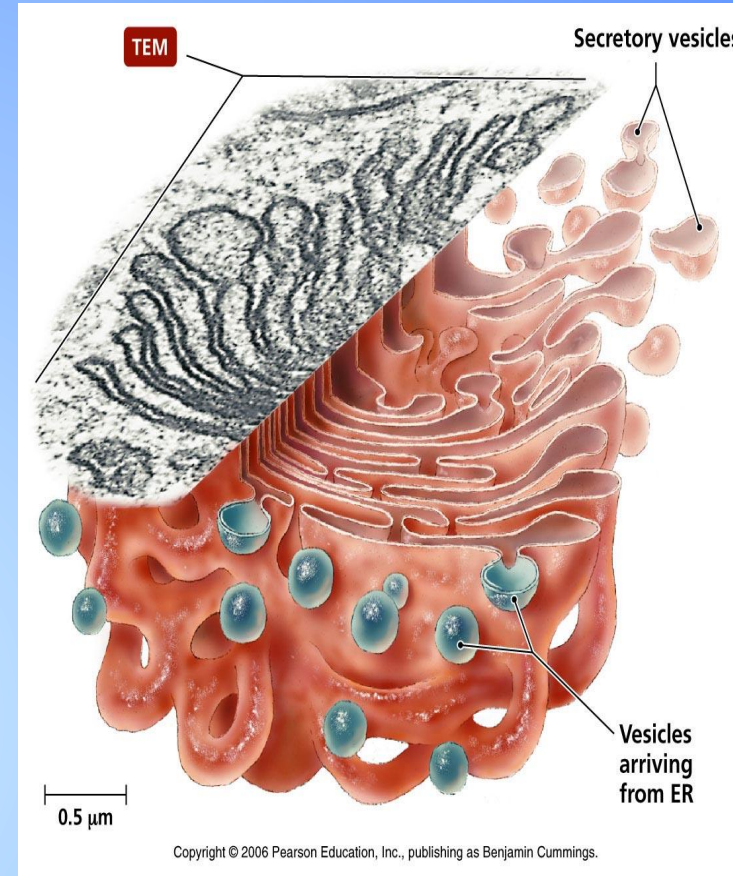
Smooth endoplasmic reticulum

Golgi Apparatus (red)

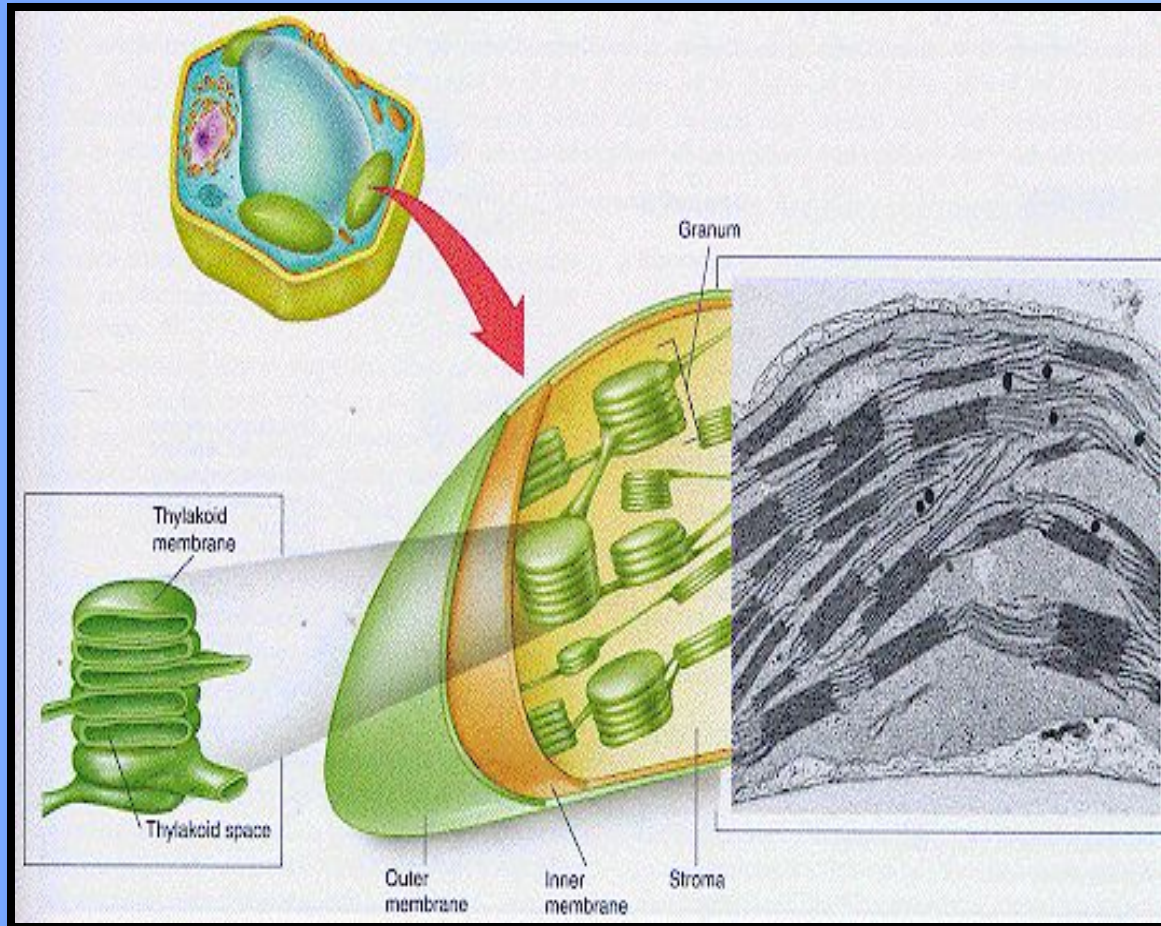
F= modifies, sorts and packages proteins and lipids for storage or transport out of cell

- * Works with the SER
- * Storage and release of chemicals

In animal and plant cells only
Cannot see



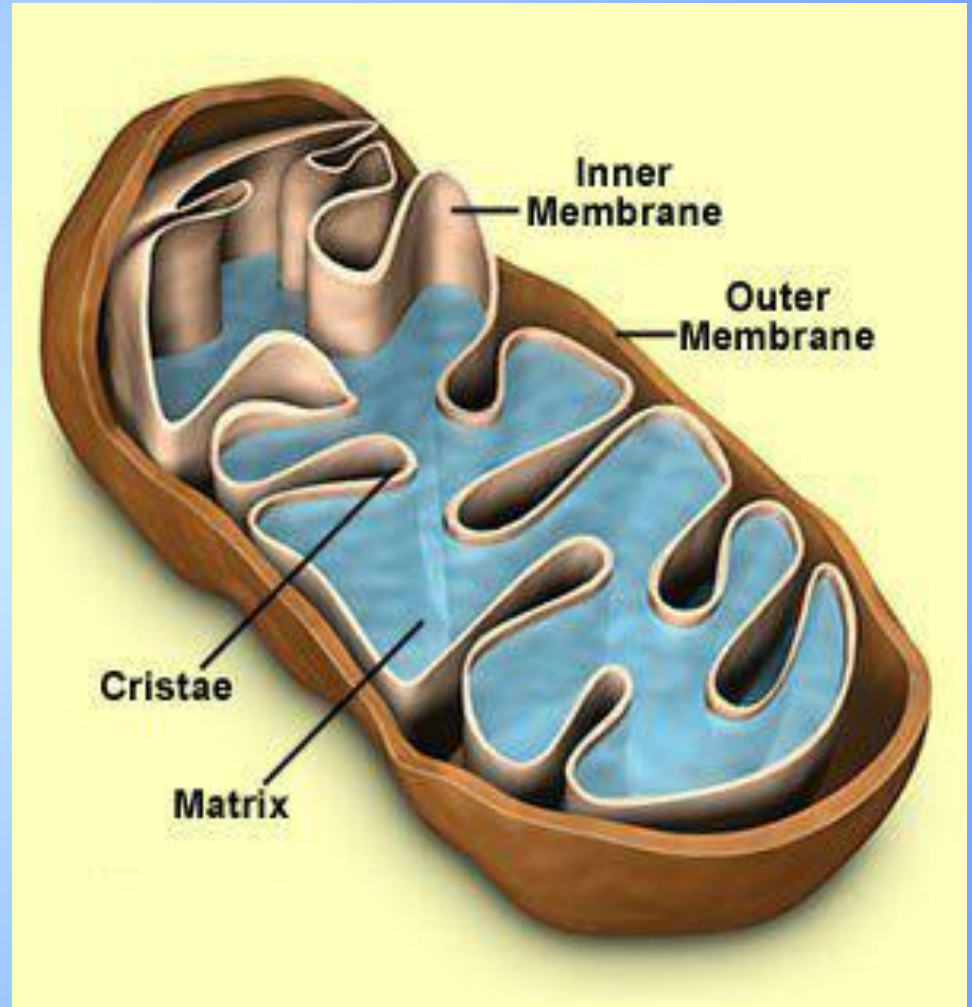
Chloroplast (green)



- Convert solar energy to chemical energy stored in food
 - Photosynthesis occurs here
- Only in plants
and
prokaryotes
Can see it

Mitochondria (brown)

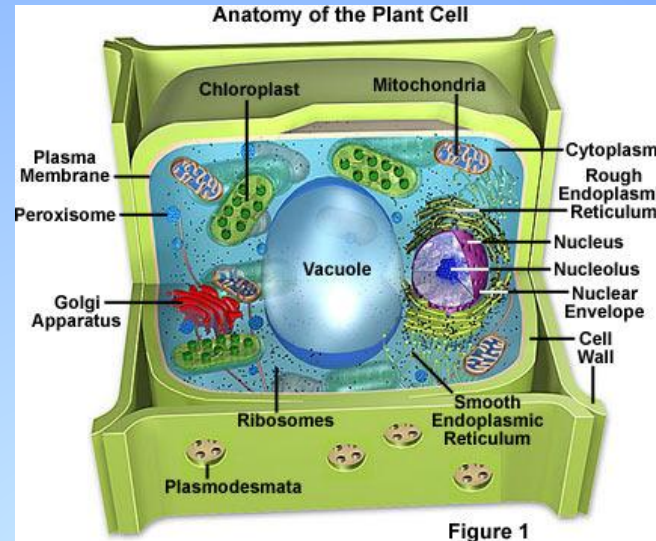
- **F**= converts chemical energy in food to usable compounds
 - * Makes ATP (energy)
 - * The Powerhouse of cell
- **L**= Found mostly in muscle cells in the cytoplasm
- Has their own nucleus



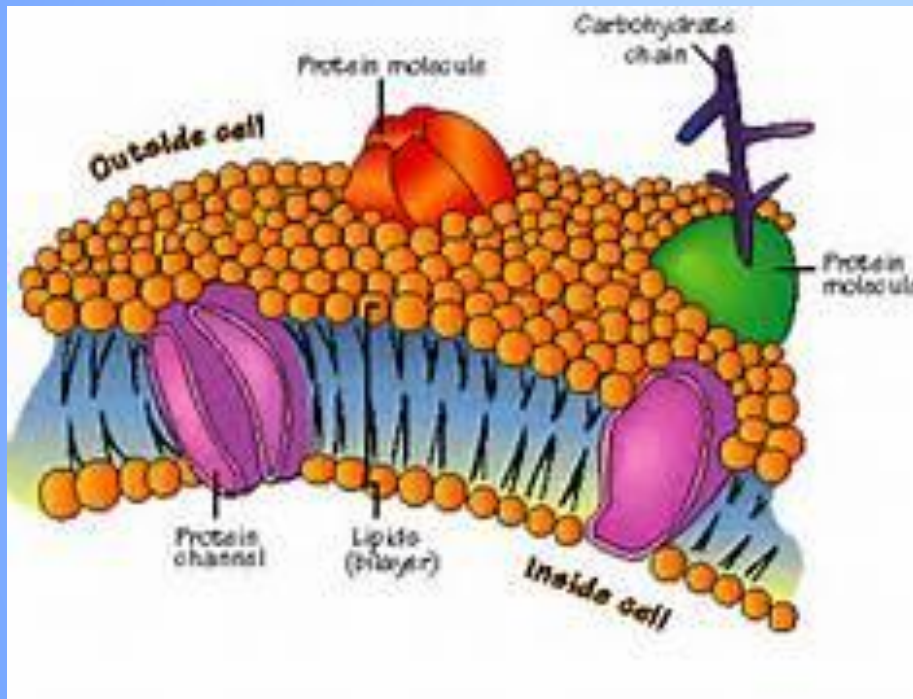
In animal and plant cells
Cannot see it

Cell Wall (gray)

- L= Found in
 - * Plant cells
 - * Bacteria cells
 - * Fungi cells
 - FUNCTION=
 - * Shapes, Supports and protects the cell
 - * inflexible
 - * Contains cellulose
- Only in plants & bacteria
Can see it



Cell Membrane (pink)



- Surrounds the cell
- Regulates the movement of substances in and out of cell
- Present in plants, animals and prokaryotes
- Can locate on microscope

Movement of a cell

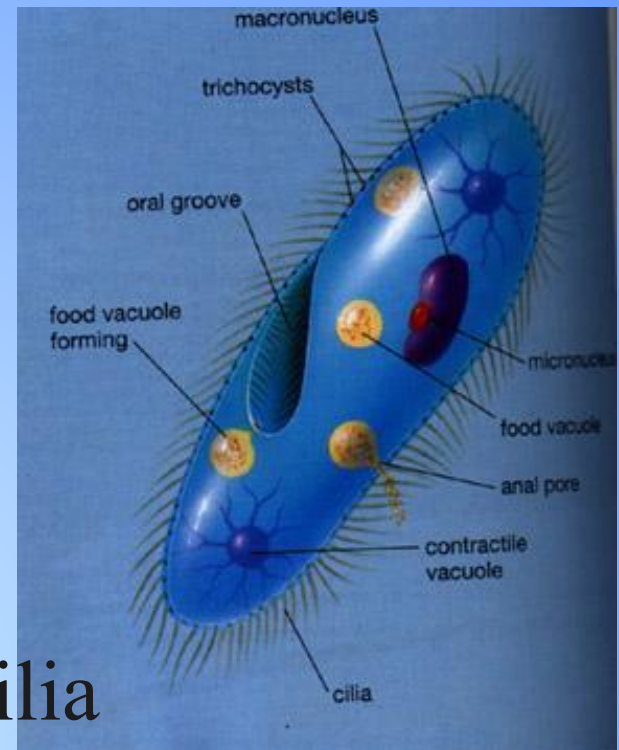
- Flagella

- * Long hair-like extension
- * Aids in movement
- * Whips
- * Located inside the cytoplasm but hangs outside of cell

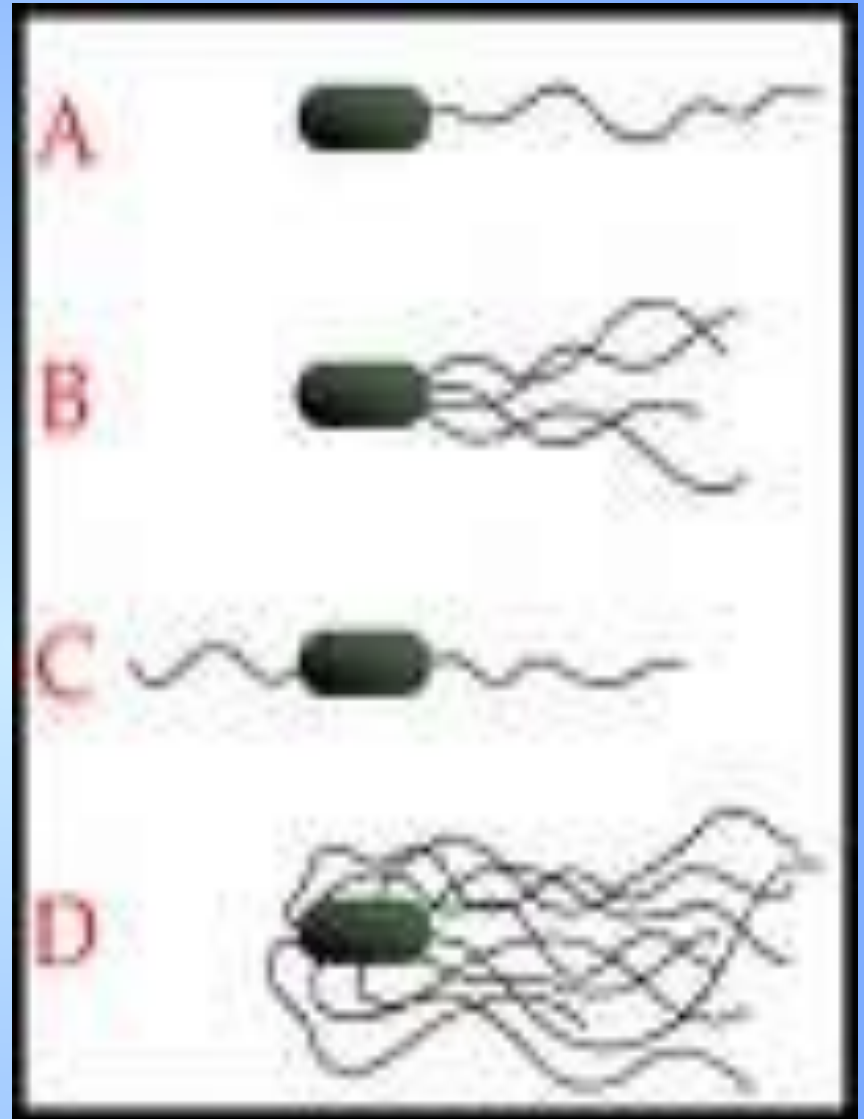
- Cilia

- * Short hair-like extensions
- * Help organisms to move
- * Located inside the cytoplasm but hangs outside of cell
- * Think Loogie

Cilia



Flagella

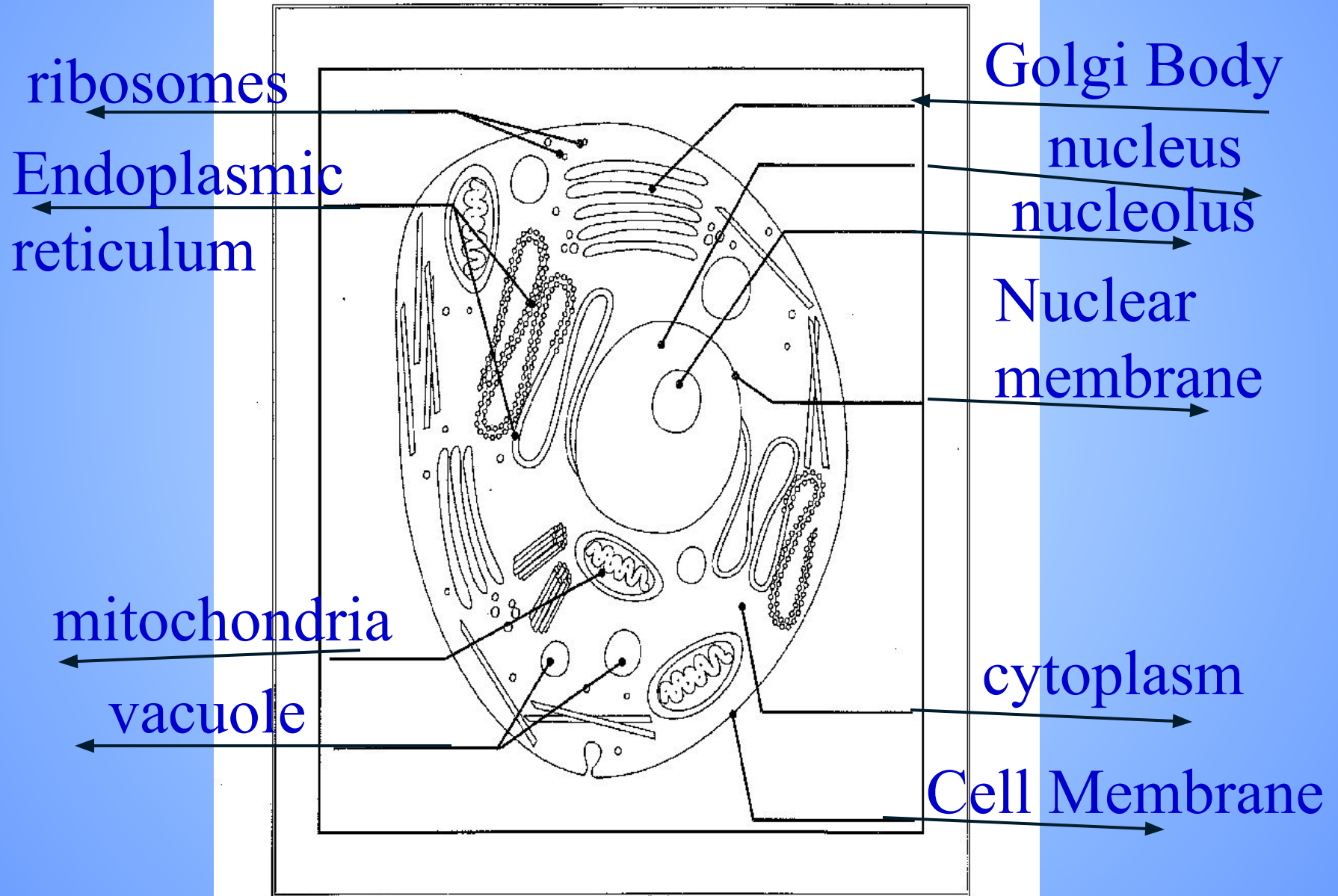


In animal and prokaryote cells

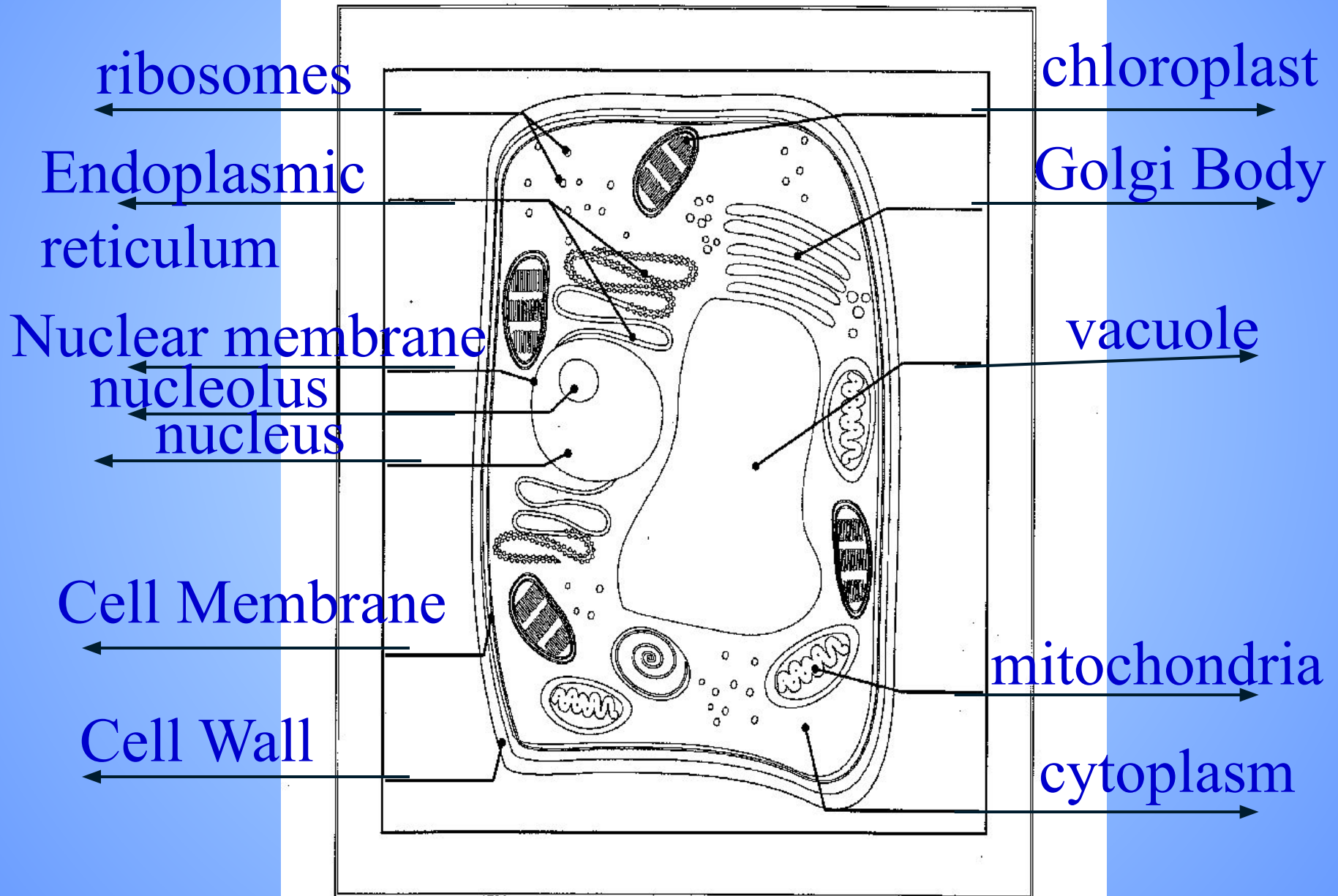
Questions to Ponder?

- Name the parts of the Cell Theory.
- What controls what enters and exists the cell?
How about the nucleus?
- Why are microscopes useful?
- Which came first the cell theory or microscopes?
- Distinguish between a prokaryotic and eukaryotic cell.
- What organelle(s) help to give a plant more rigidity?

Animal Cell



Plant Cell



Day 2

The organelle went on Vaca?



- The materials in/out of cell would be unfiltered;
lack of structure Cell membrane Nucleus
- Cell could not function; no direction for organelles
- Organelles would have no protection; nutrients
could not move thru the cell cytoplasm Vacuole
- No storage place for food/water ER
- Proteins would have no system of transport mitochondria
- No energy for cell to perform its functions

Vacation of Organelles

- Cells would not have building blocks to create organelles, repair cell, transport **ribosomes**
- Cells would fill up with waste **vacuole**
- Plants would not be able to make food **chloroplast**
- Plant and bacteria would lack support and protection **Cell wall**

BACTERIA

* Divided into 2 Domains

- **Domain Archaea**

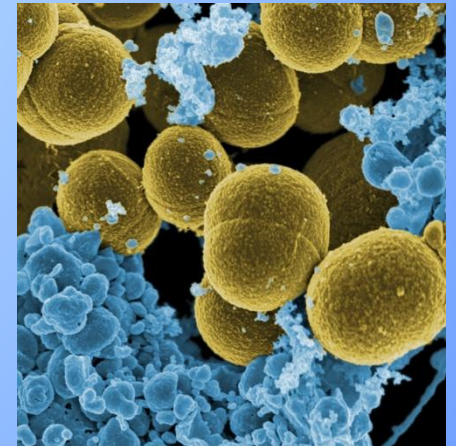
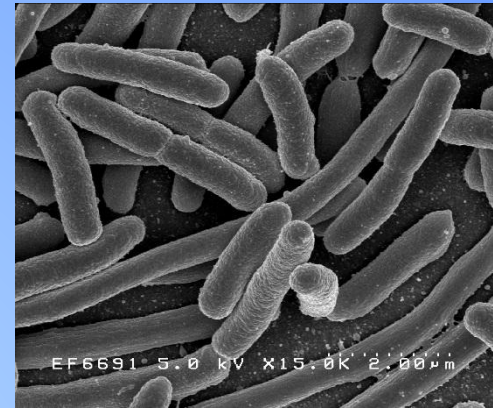
- **KINGDOM ARCHAEA**

- Bacteria that live in extreme habitats
 - Methanogens, thermopiles

- **Domain Bacteria**

- **KINGDOM BACTERIA**

- Bacteria that live everywhere else
 - *E. coli*
 - streptococcus

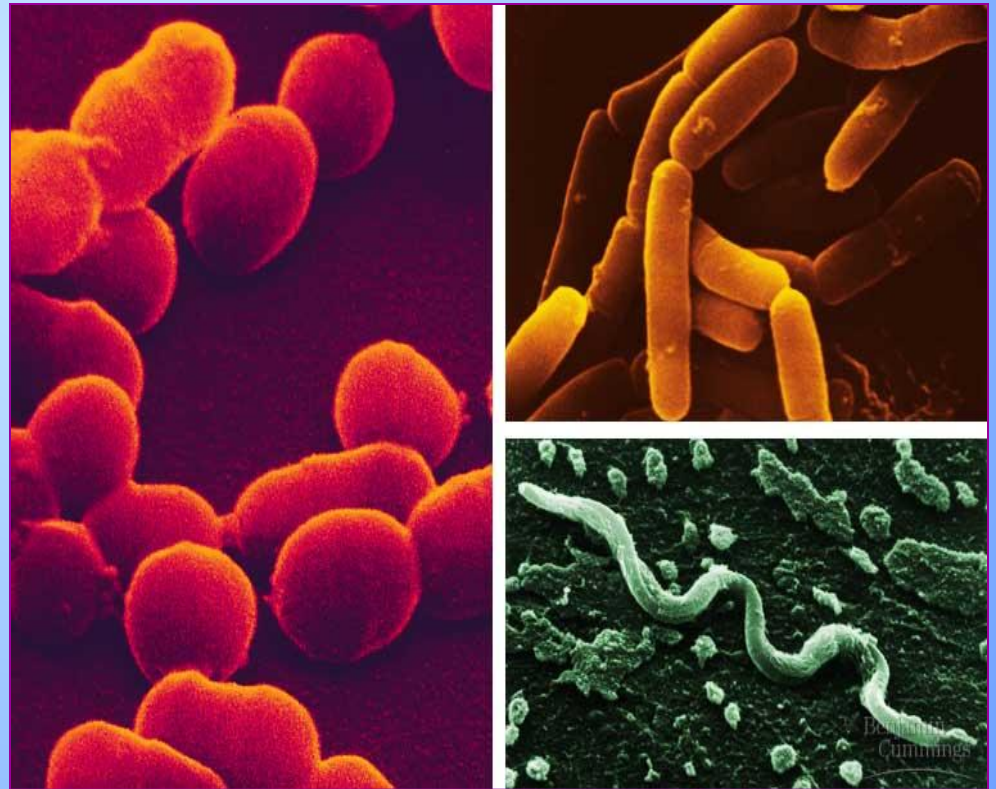


Oxygen or not?

- Most bacteria require oxygen for respiration
—thus they are called **aerobic bacteria**
- Others may be killed in the presence of oxygen — these are called **anaerobic bacteria**

How to classify bacteria? *Part 1*

- By using the Shape and Arrangement
- 3 main shapes
 - * **COCCUS**
 - * **SPIRILLUM**
 - * **BACILLILUS**



How to classify bacteria?

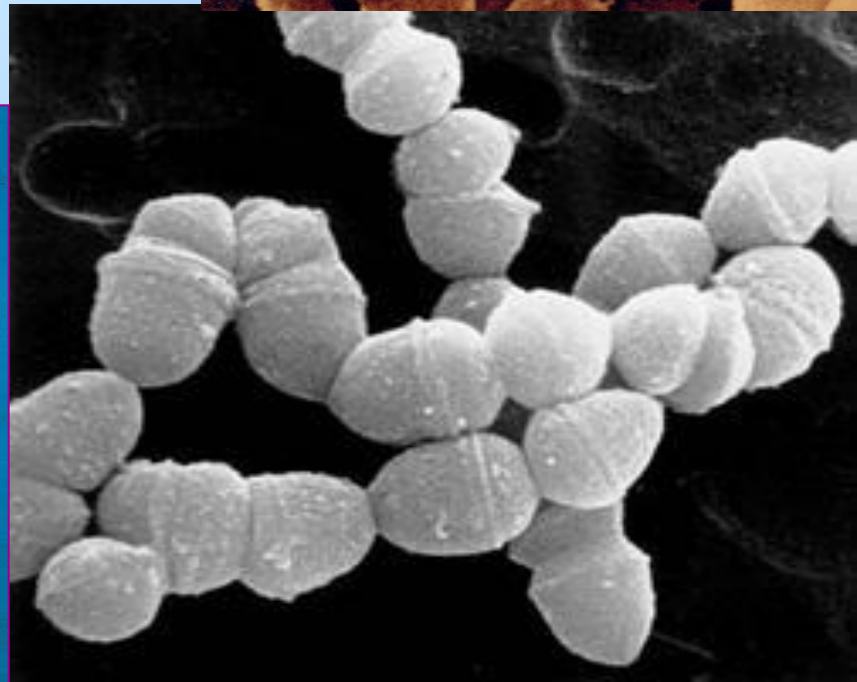
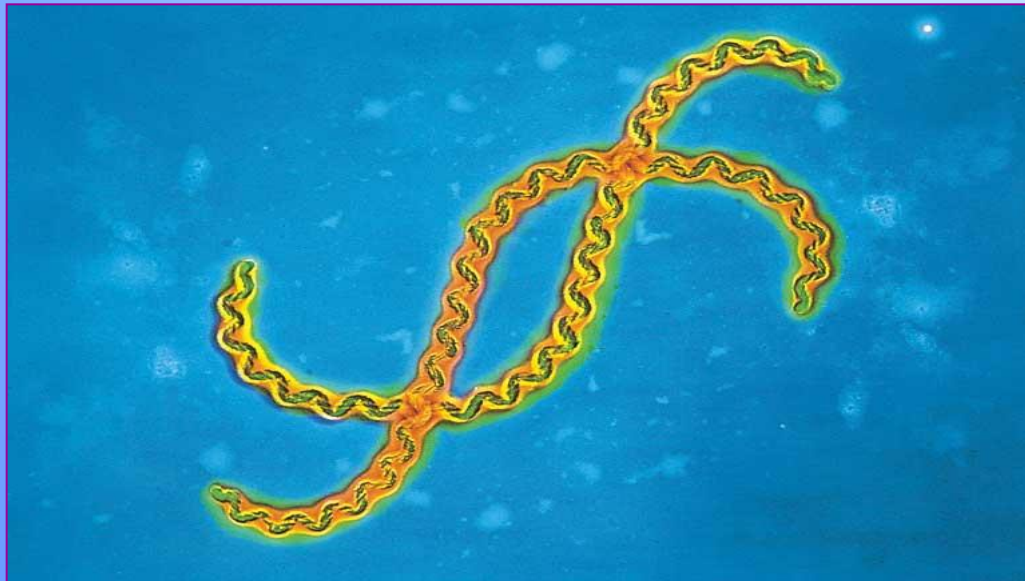
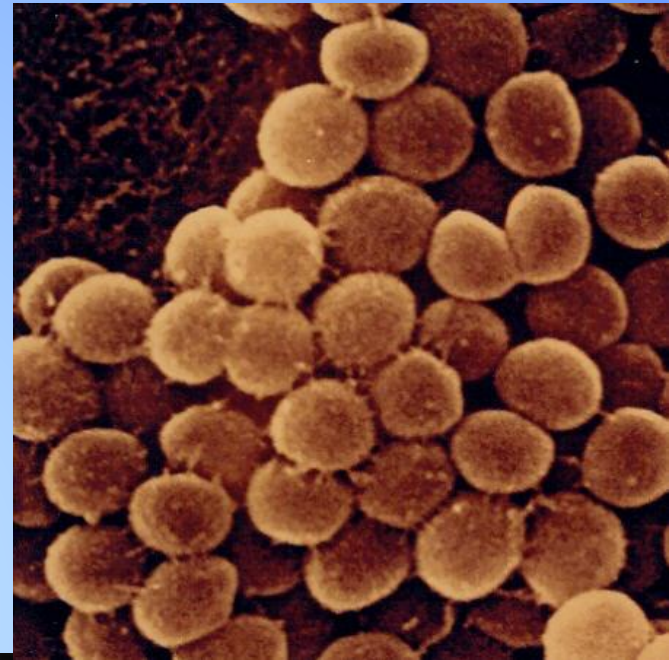
Part 2

- *ARRANGEMENT*

- * **DIPLO-**

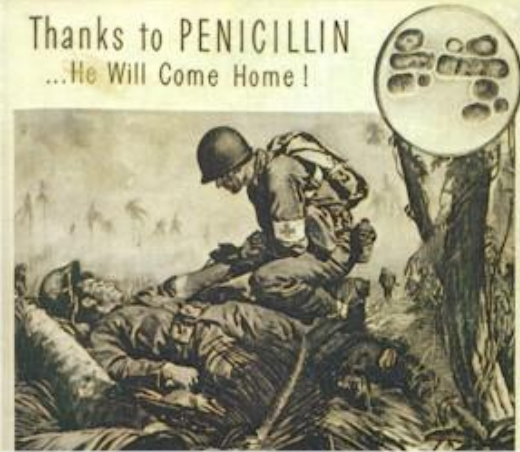
- * **STAPHYLO-**

- * **STREPTO-**



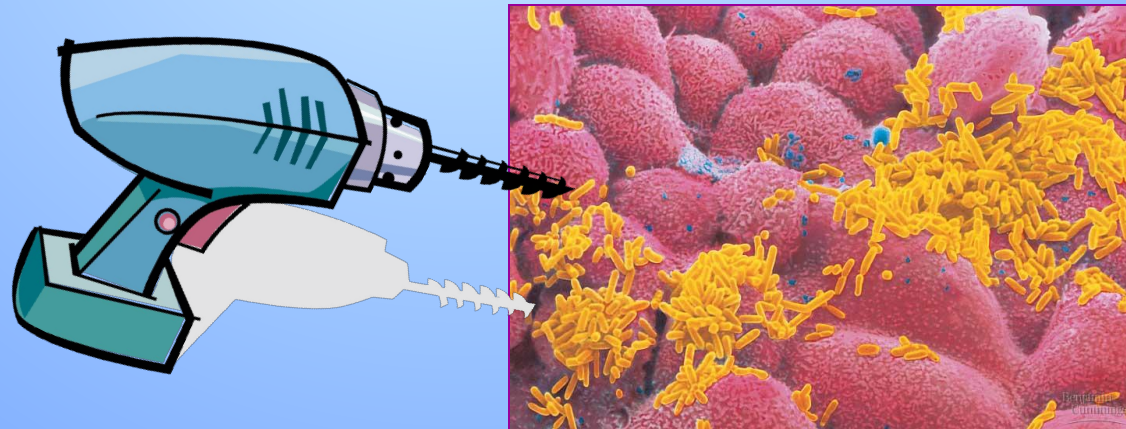
Naming Practice ☺

- 2 circles =
- Round but in a chain=
- Rods in a chain=
- Spirals in a cluster=
- Circles in a cluster=

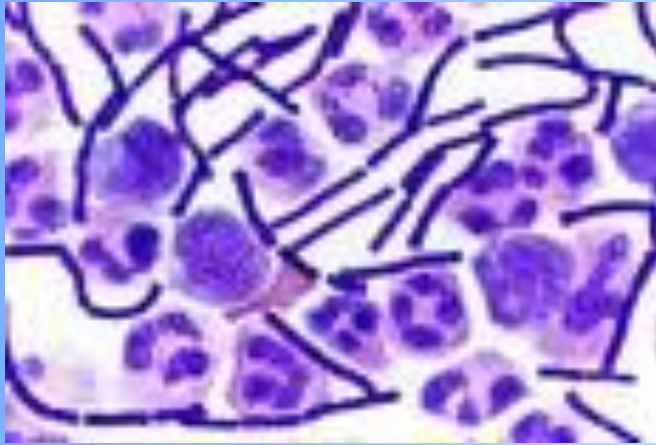


Bacteria's Cell Wall

- The cell wall is very strong to prevent ruptures (bursting)
- Antibiotics **KILL** bacteria (like penicillin)
 - * This is the only thing to kill bacteria
 - * It interferes with the cell wall
 - * It actually drills a hole in the cell wall



Types of cell wall determines antibiotic to be used



- **Gram-stain Positive**

- * Turns purple/blue
- * cell wall is layered
- * *staphylococcus and streptococcus*

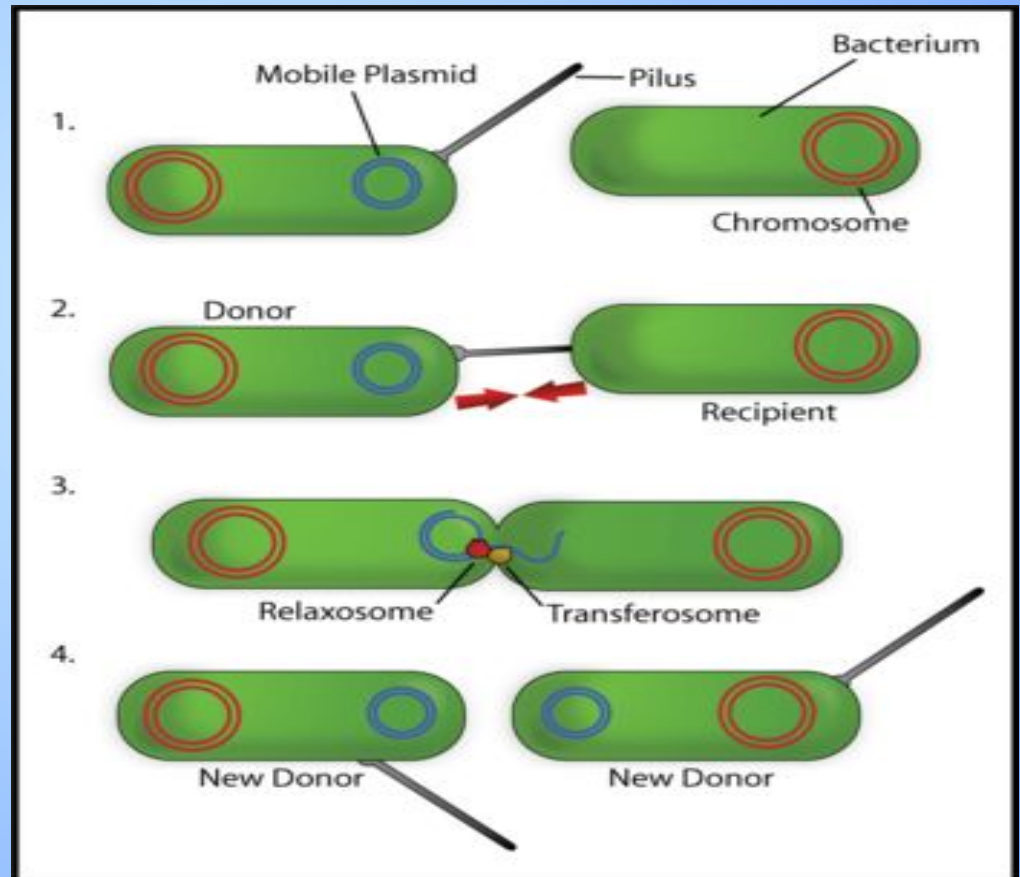


- **Gram-stain Negative**

- * Turns pink/red
- * cell wall is thick
- * Examples: *E.coli*, gonorrhea, salmonella and meningitis

How they reproduce

- **Asexually**
 - * Binary fission
 - * Conjugation



Types of Bacterial Diseases

Pick 4 and write them

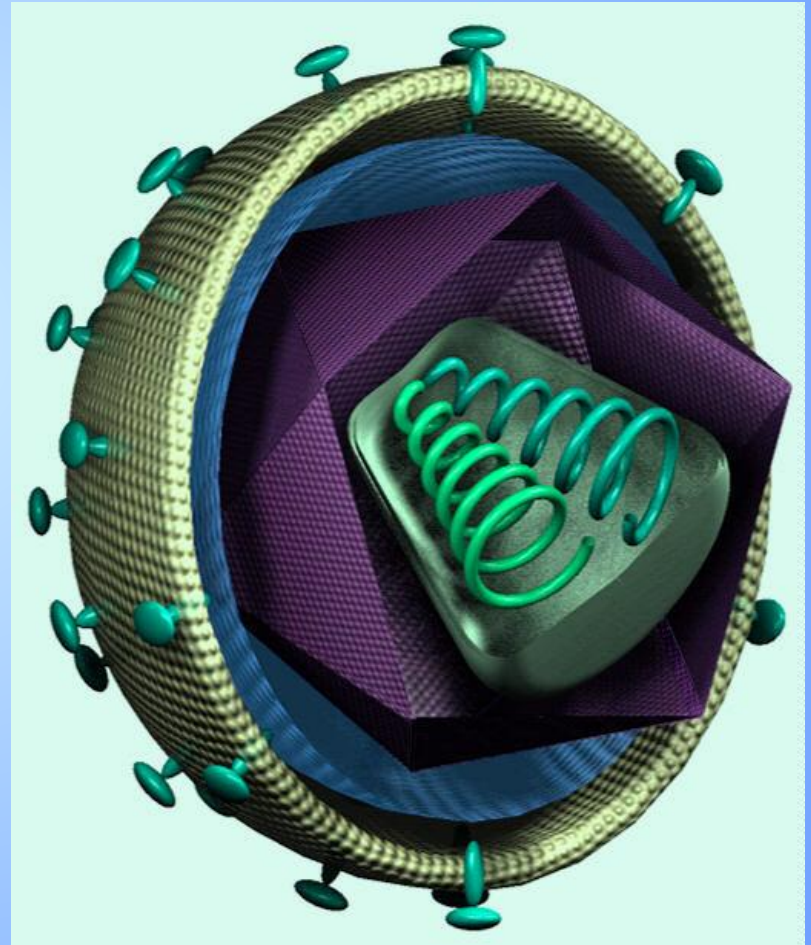
- Tuberculosis
- Diphtheria
- Scarlet fever
- Bubonic plague
- Typhus
- Tetanus
- Cholera
- Tooth cavities
- Lyme disease



A VIRUS is ...

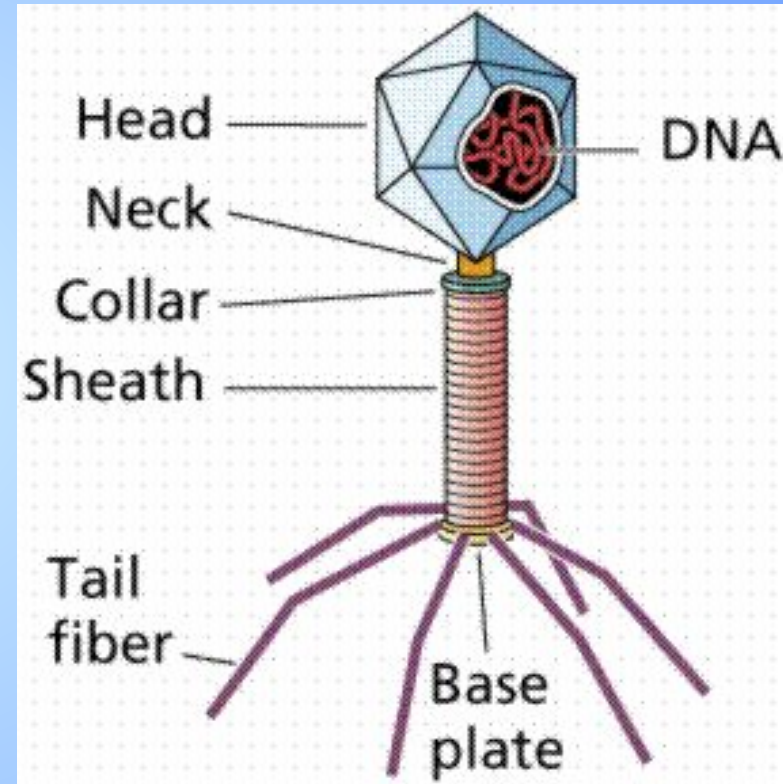
- A disease causing non-living particle
- Can only reproduce in living cells (a host)

<https://www.youtube.com/watch?v=Rpj0emEGShQ>



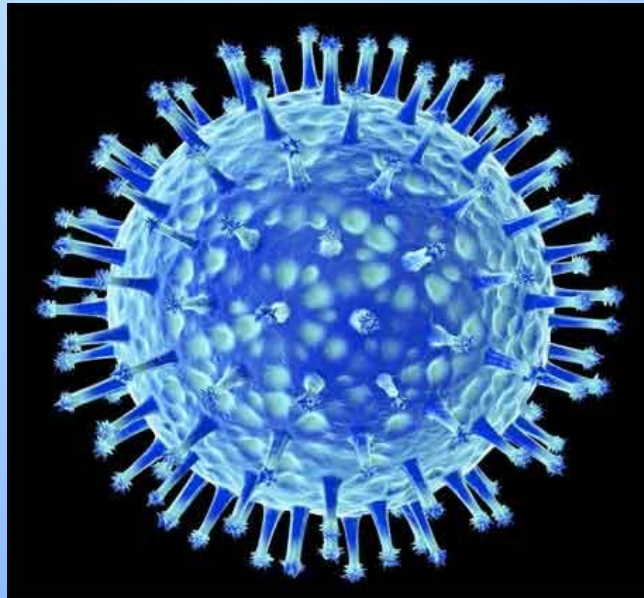
Considered **NON-LIVING**?

- Cannot **respire** on own
- Cannot **move** on own
- Cannot **grow** on own
- Cannot **reproduce** on own
- It needs a **HOST** for all of these things



How does it Reproduce?

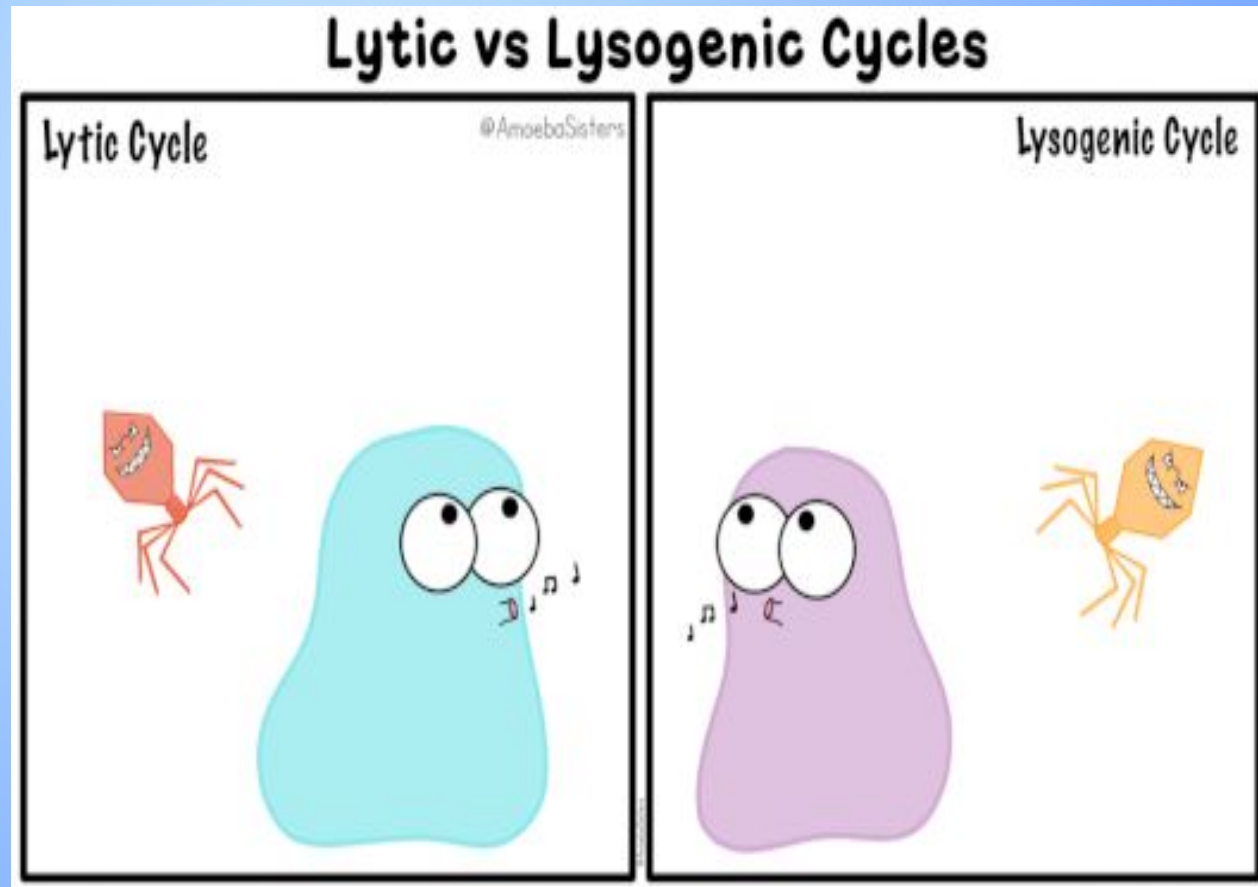
- Before a virus can enter and reproduce in a cell
 - * It must recognize and attach to a specific site
 - * can only enter and reproduce in **certain** cells
 - * Once inside a host a virus takes over THAT cell's metabolism

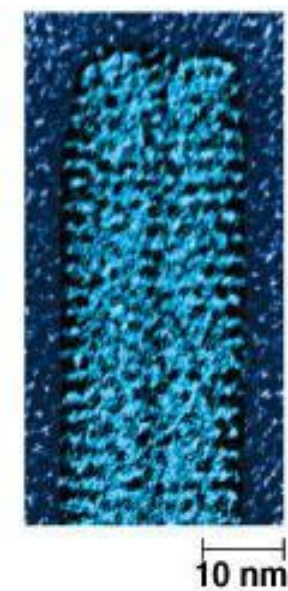
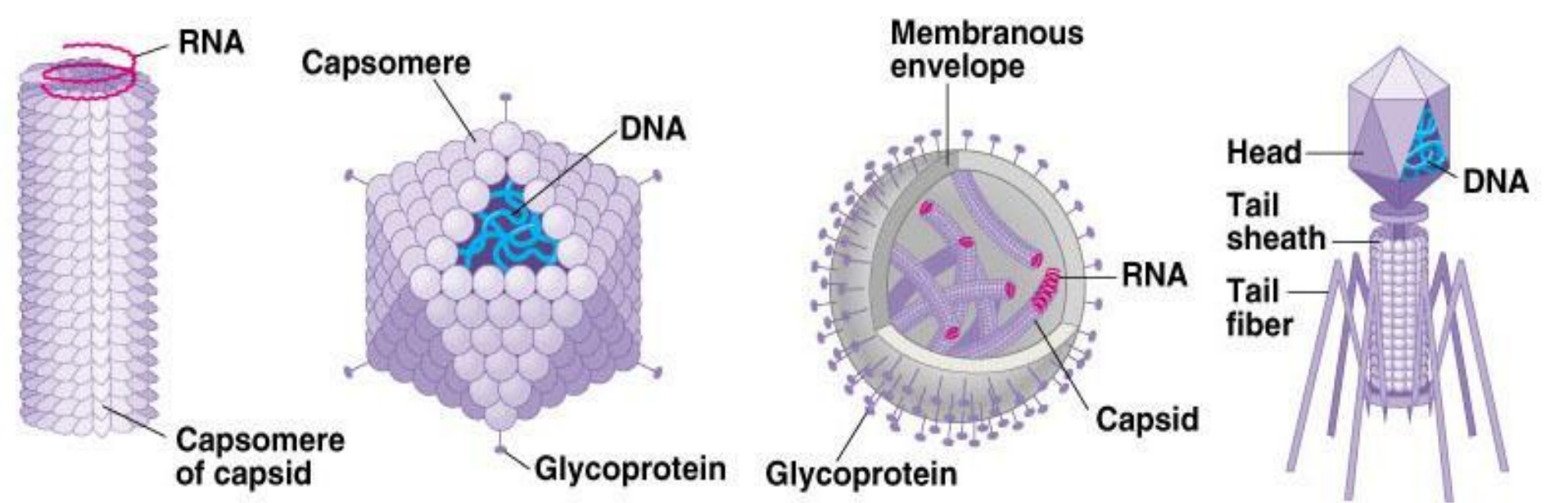


Reproduce (add to notes)

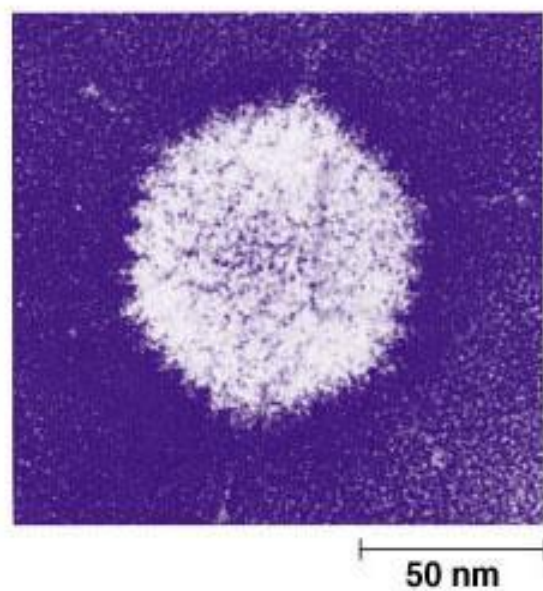
- ***LYSOGENIC CYCLE***
 - Virus stays dormant waiting for perfect conditions to come out

- ***LYTIC CYCLE***
 - Cell is destroyed

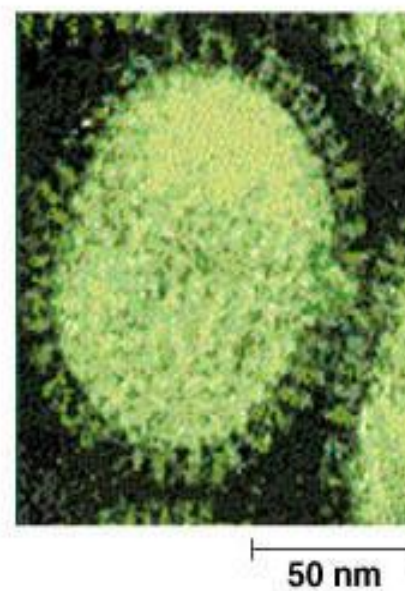




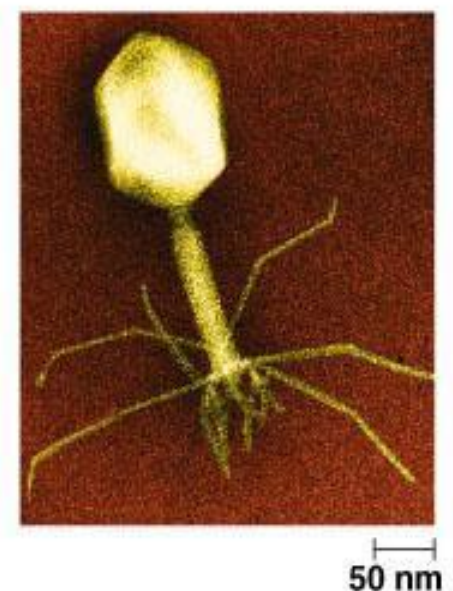
(a) Tobacco mosaic virus



(b) Adenoviruses



(c) Influenza viruses



(d) Bacteriophage T4

Virus

- **Capsid**: a protein coat that holds the genetic material
- **Envelope**: a membrane that surrounds the capsid for added protection

Genetic material

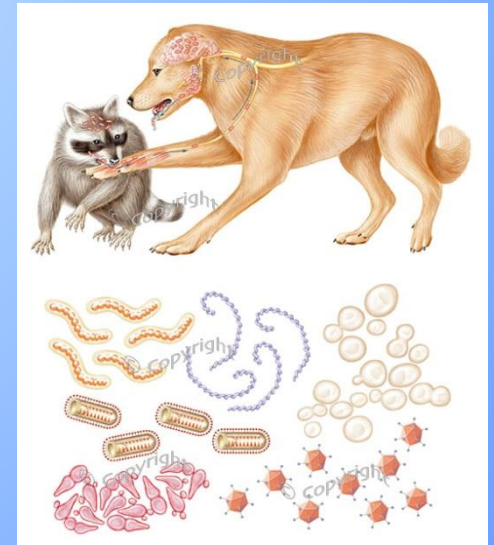
- Can be composed of DNA

- * Warts
- * Chicken pox
- * mono



- Can be composed of RNA

- * HIV
- * AIDS
- * Influenza
- * rabies



Journal book info



Page 40

Virus -vs.- Bacteria

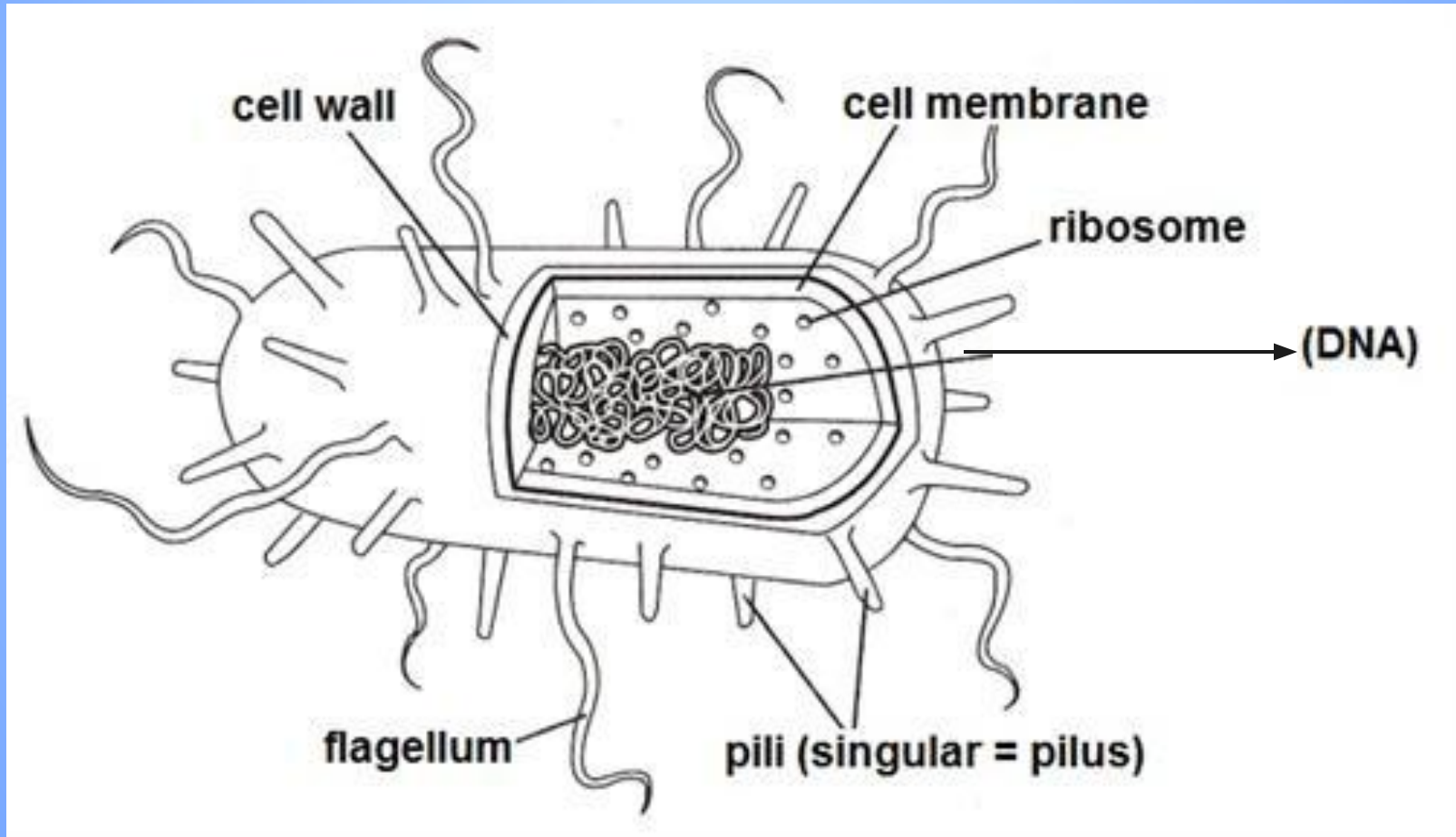
- **Virus**

1. Not alive
2. Can function in a host
3. Genetic material is DNA or RNA
4. Does not go thru metabolism
5. No cytoplasm thus it cannot go thru chemical reactions

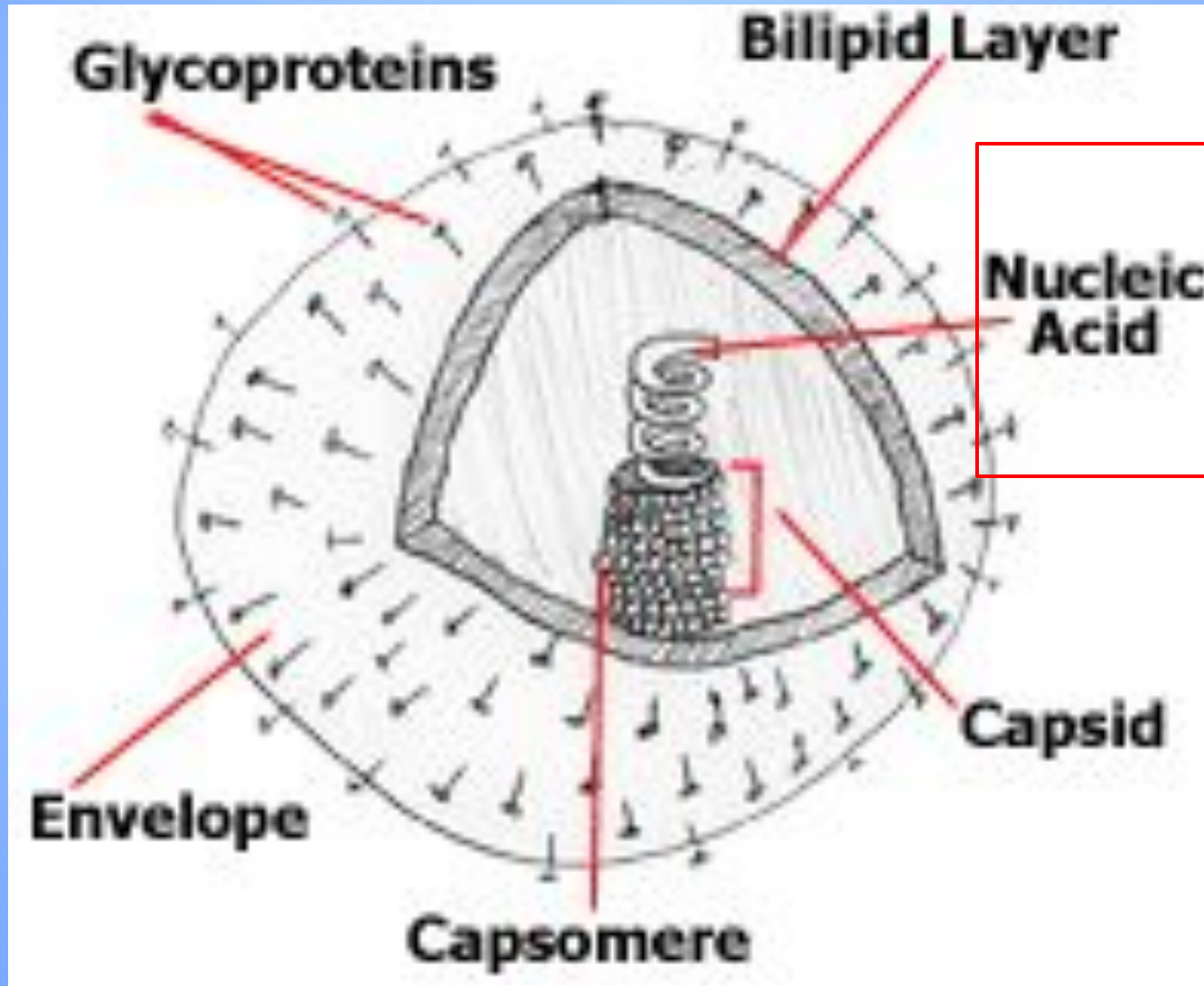
- **Bacteria**

1. Is alive
2. Contains some organelles such as cytoplasm, cell wall, and ribosomes
3. Genetic material is DNA
4. Does go thru metabolism
5. Has cytoplasm thus it can go thru chemical reactions
6. Mobile on own using flagella

Bacteria Cell Diagram



Virus diagram



DNA
or
RNA

Germ Theory of disease

- some diseases are caused by microorganisms.
- These small organisms, too small to see without magnification, invade humans, animals, and other living hosts.
- Their growth and reproduction within their hosts can cause a disease.
- "Germ" may refer to a virus, bacterium, protist, fungus, or prion.
- “Germs” are considered pathogens.

Figure out what these people did for the Germ Theory:

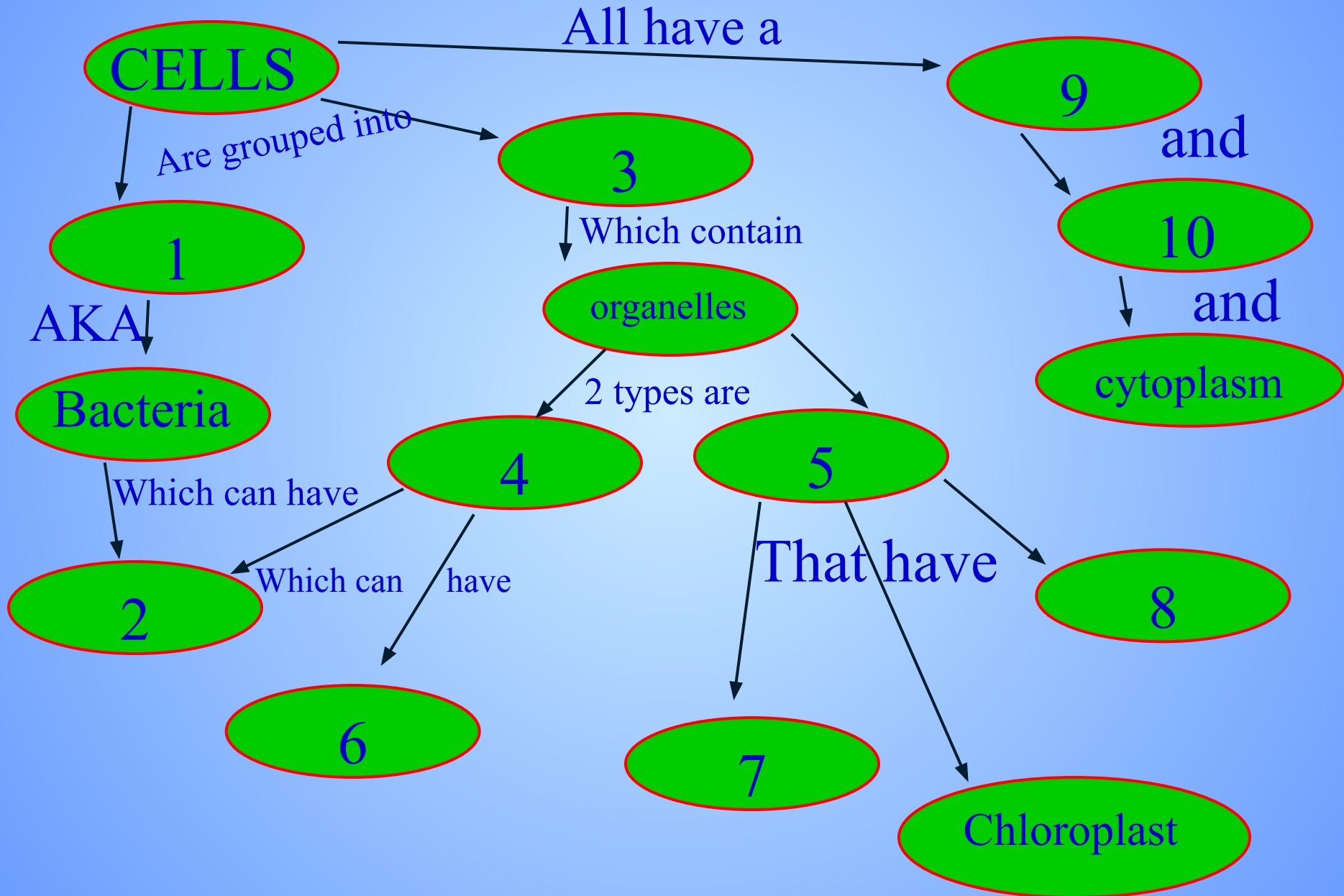
- * Ignaz Philipp Semmelweis
- * Louis Pasteur
- * Robert Koch
- * Florence Nightingale
- * Joseph Lister
- * William Stewart Halsted

Germ Theory

- Show other power point

Day 3

Graphic Organizer – Page 46



Lab Stations

• Station #1 – Compare and Contrast

- * Page 43-44
- * Complete all 5 compare/contrast cards
- * Write the question then answer it
 - Red
 - Orange
 - Yellow
 - Purple
 - Pink

Station #2 – Organelle Function Matching

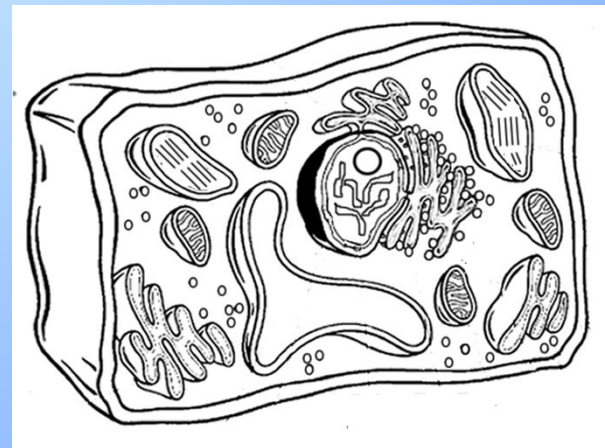
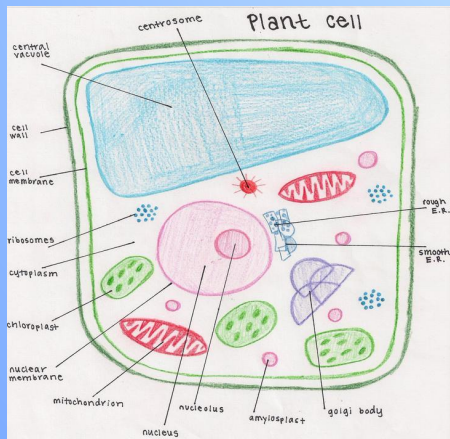
- Page 42 in journal
- List all 12 organelles from the envelope on the left side of the journal
- Then correctly match the function card to the name
- Write it down
- This must be 100% correct before you can move on to the next station

Station #3 – Organelle Identification

- Page 45 in journal books
- Label the page **A thru N** on the left side
- Correctly identify each diagram
- This must be 100% correct before you can move on

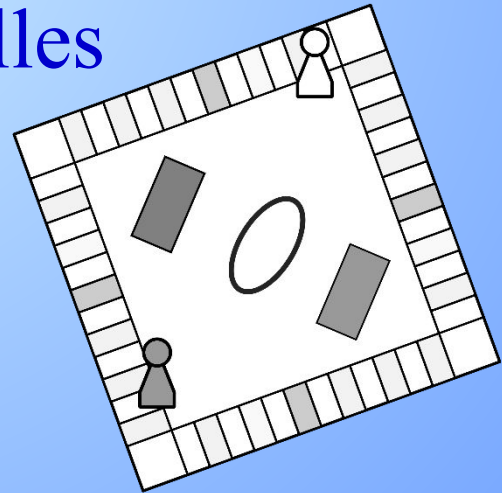
Station #4 – Cell Sketch

- By reading the directions, correctly make a cell sketch of your choice
- This can be completed individually or as a partnership



Station #5 – Cell Trek Game

- 4 people needed to play
- You will need your own playing piece (eraser, piece of paper, coin, ring, etc)
- Winner has the most organelles



HELPFUL WEBSITES

- **SOL REVIEW QUESTIONS**

- * Complete Review # 12

- * <http://solpass.org/hs.htm>