INFECTIOUS BIOFE

Name:_____

(Infectious Disease and Cells)

DO NOT LOSE!

- Infectious Diseases will include
  - Viruses
  - Bacteria
  - Parasites

- A virus a nucleic acid (DNA or RNA) enclosed in a protein shell or coat.

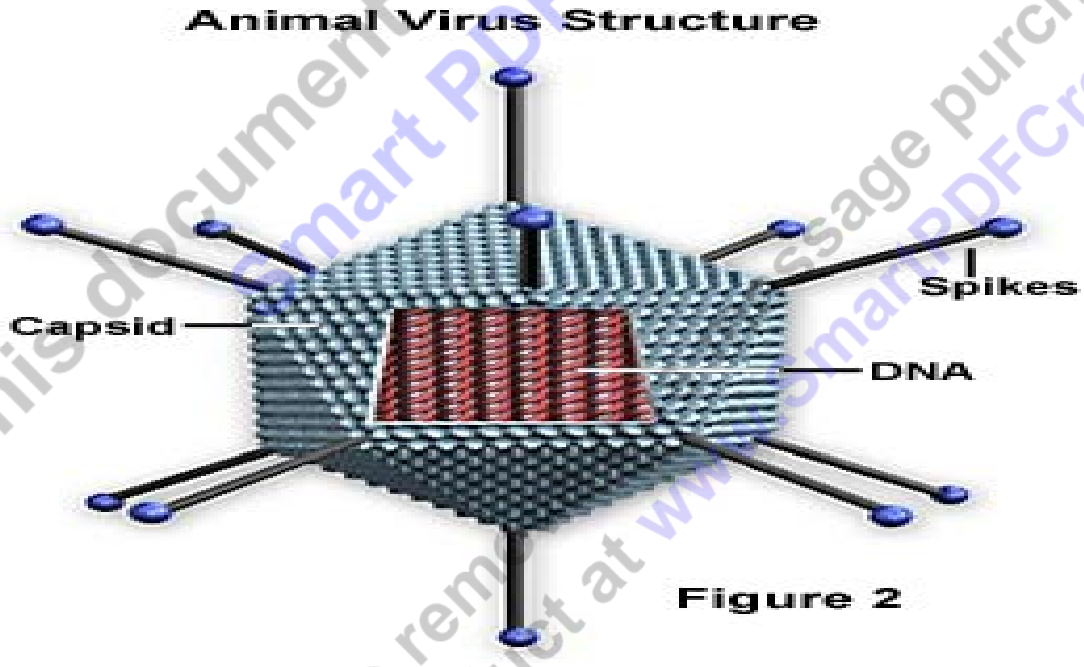
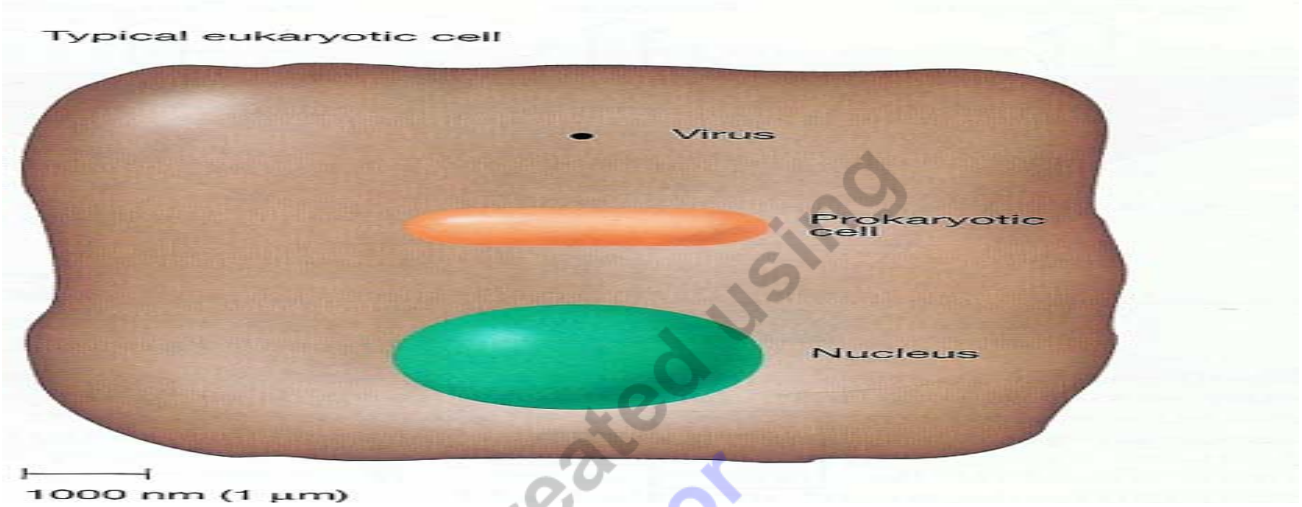


Figure 2

Viruses are extremely small, approximately 15 - 25 nanometers in diameter



- They can reproduce only by invading and taking over other cells as they lack the cellular machinery for self reproduction.

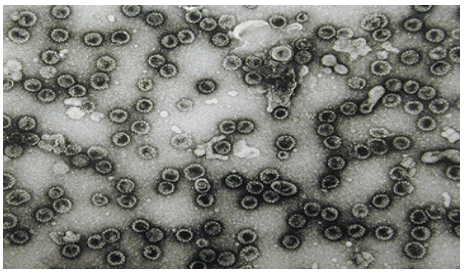
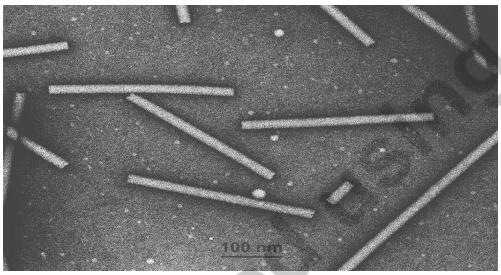
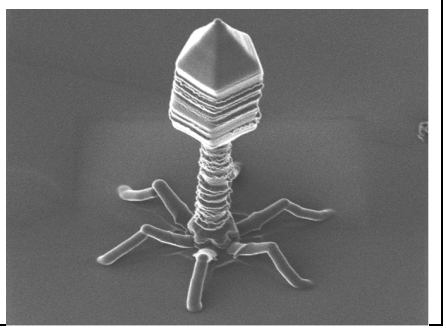
Why Viruses are not living?

- Viruses are not made of cells.
- They have no cell parts.
- They do not grow and develop
- They do not respond to environment

Why Viruses are kind of living but not really.

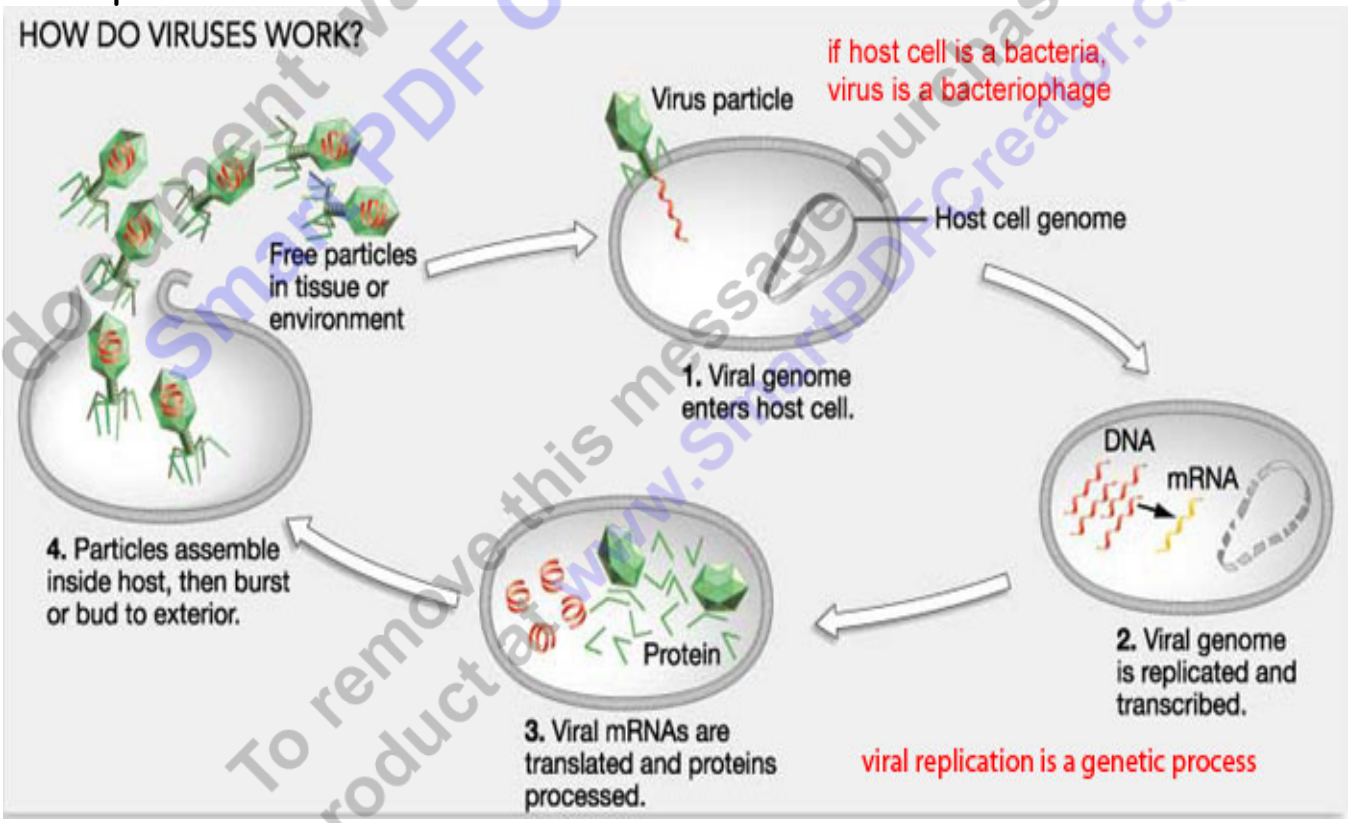
- Viruses Reproduce, but only by invading living cells, not by themselves
- They Evolve / Mutate
- Limited movement
- Viruses are not considered living by most scientists.

Types of Virus

• Round	• Rod	• Multi-sided
		

Lytic viruses – Causes host cell to split / die as virus reproduces.

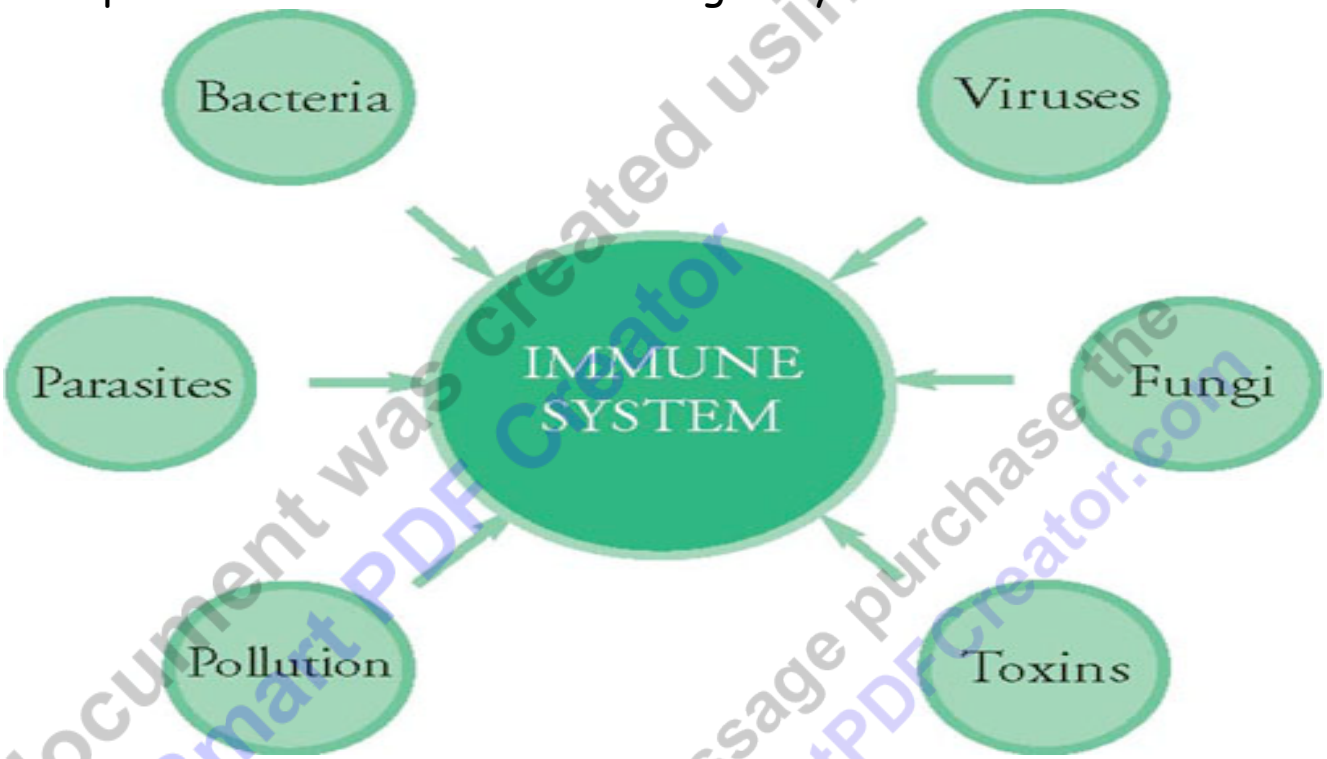
Viral Reproduction



- Viral DNA/RNA infected into cell
- DNA/RNA replicates.
- New Virus are constructed.
- Viruses assemble.
- Viruses break free to find new host.

- Immune system - A system that protects the body from diseases.

- Skin prevents disease from entering body



- Skin prevents disease from entering body
- Interleukins – Tell body it's under attack

- Leukocytes – White blood cells (made in bone marrow)
  - -**Phagocytes**, cells that engulf invading organisms.
  - **Lymphocytes** - cells that remember the invaders and help the body destroy them if they come back.
    - B cells – Don't visit battle, send out antibodies to cling to virus.
    - T cells - Precise Removal
- Antigens – Recognize invader and tell B Cells to form and get the target.

Diseases can be spread by

- Insects
- Air
- Water
- Food
- Person to person
- Animal to person

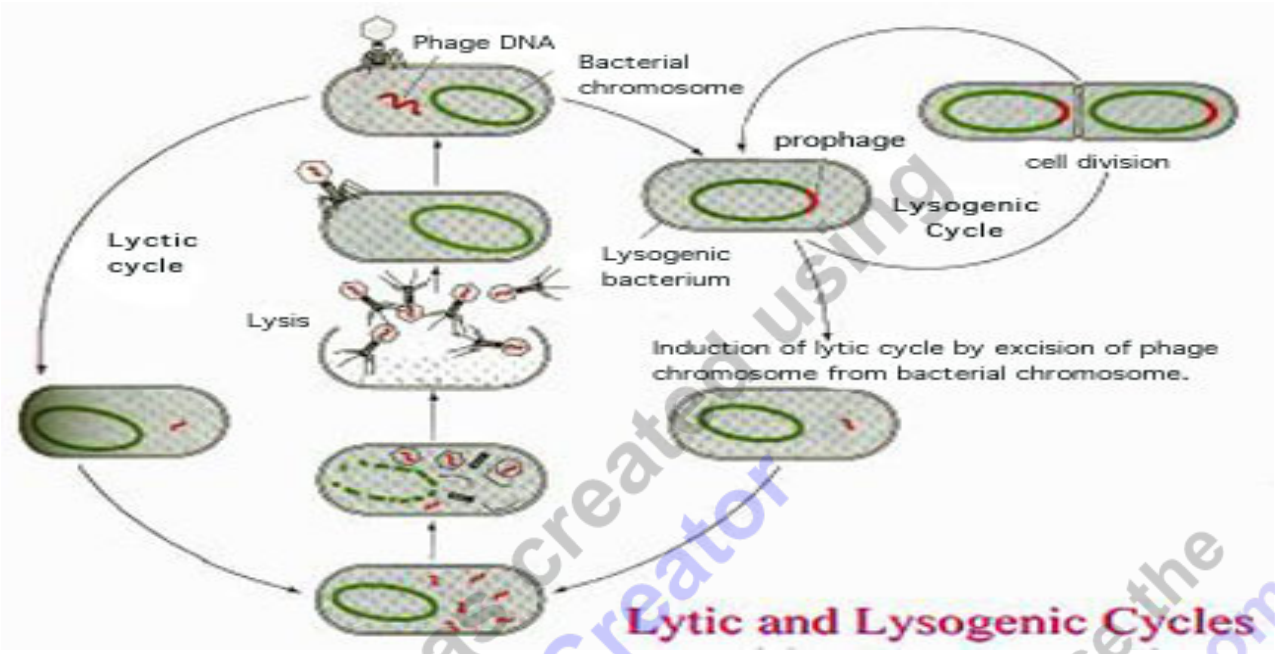
Treatment for a virus

- Immunization / Vaccine – infect person with a lesser but similar virus (cloned sometimes) Body creates immunity
- There is no cure for a virus

Virus prevention

- Minimize contact with reservoir animal (birds, mice, etc.)
- Minimize person to person contact

Lysogenic Virus – A virus that can hide inside your cells DNA until it breaks out and then hides again. With you forever.



New Area of Focus: HIV/AIDS

- HIV=Human Immunodeficiency Virus
  - The virus attacks the cells of our immune system.
  - This makes the host susceptible to disease.

Please record the ways in which you can be infected with HIV as a class.

- Unprotected sexual intercourse with an infected person.
  - That is all types of sex, where bodily fluid is released for either gender.
- -
- -
- -Use of infected blood-Most blood banks are tested but always a risk
- - Injecting drugs (needles are often shared between users)

AIDS -Acquired Immune Deficiency Syndrome

The disease AIDS occurs when the immune system cells left in the body drop below a particular point.

STD's - The types of sexual activity that can transmit a disease are

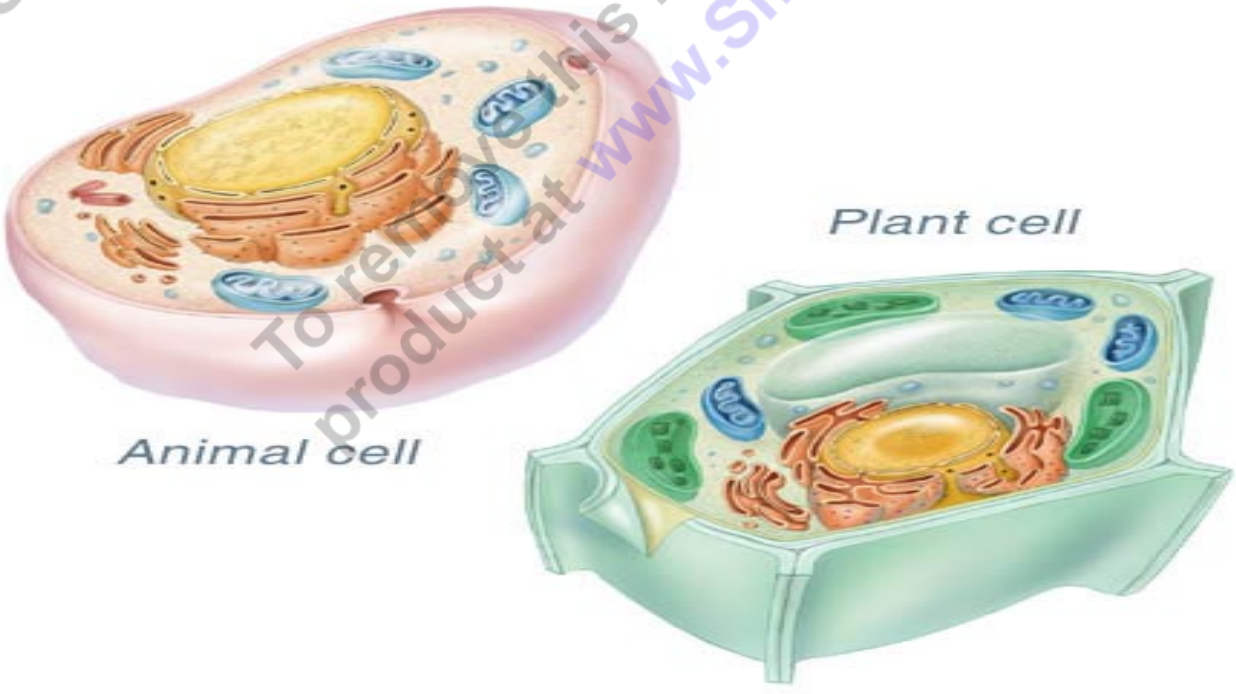
- penetrative sex (vaginal, anal or oral)
- genital foreplay.

Some diseases are transmitted through -

- skin to skin contact
- Fluids such as sperm, blood or saliva
- some are passed from mother to baby

Review! Abstinence is best, (Means no contact!) if you can't abstain, than use a condom. Condom use doesn't prevent the skin to skin, and only helps against the others.

NEW AREA OF FOCUS: CELLULAR BIOLOGY



- **Cells** are the structural and functional units of all living organisms
  - Humans have 50-75 Trillion - Multicellular
  - Some Protista have 1 – Unicellular

- Modern Cell Theory
  - -The cell is basic unit of structure and function
  - -Living things are made of cells
  - -All cells come from pre-existing cells.
  - -Cells contain genetic information
  - -All cells are similar in composition
  - -Energy flow of life occurs in cells

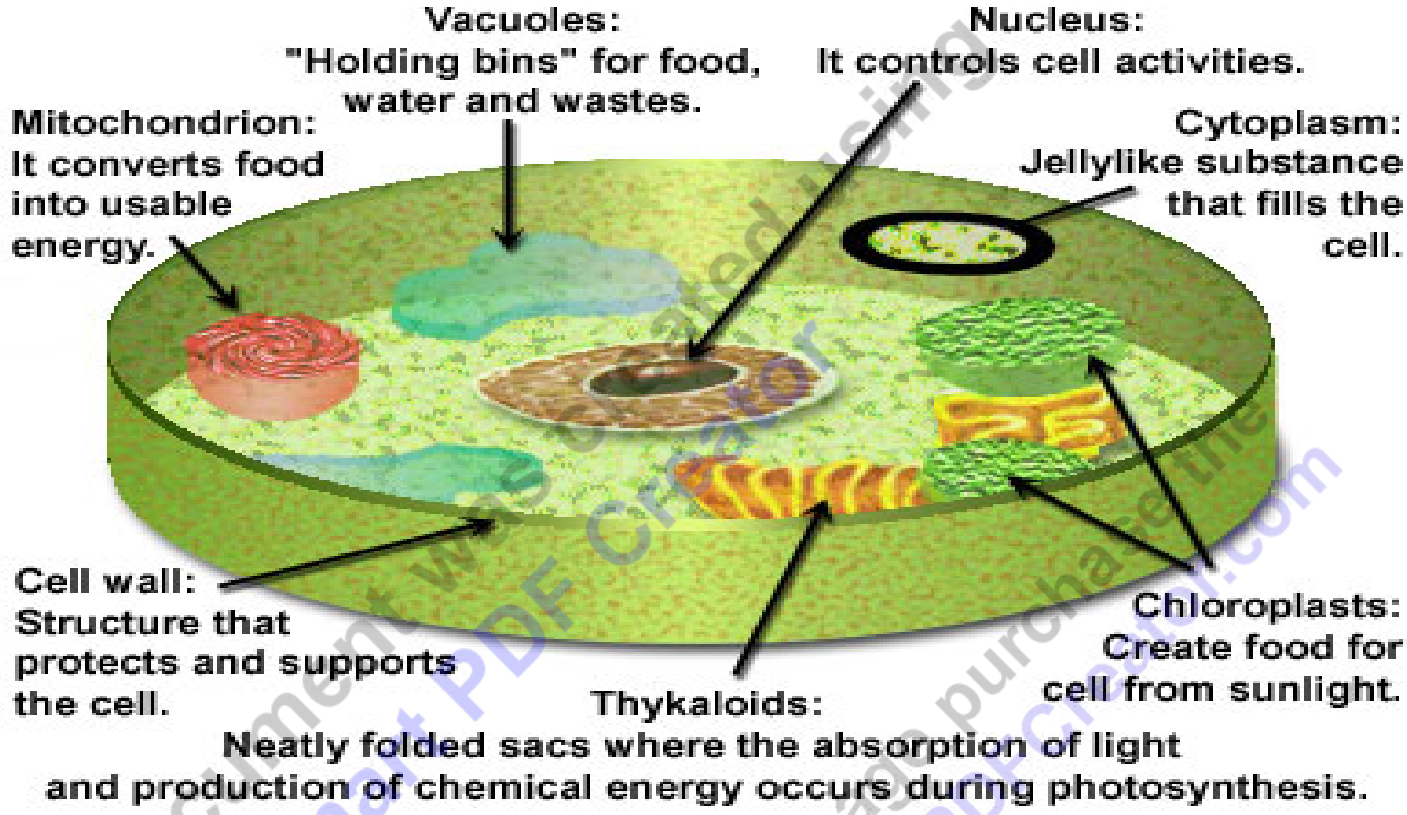
- There are two types of cells.
  - Prokaryotic
  - Eukaryotic

- Prokaryotic cells
  - - No nuclear membrane
  - - Genetic materials is free in cytoplasm
  - - No membrane-bound organelles
  - - Most primitive type of cell (appeared about 3.8 billion years ago)

- Eukaryotic Cells
  - - Nuclear membrane surrounding genetic material
  - - Numerous membrane-bound organelles
  - - Appeared approximately one billion years ago
  - - Complex internal structure

ORGANELLES IN A CELL

Aid for Cell City Project



Protoplasm – All contents of the cell

CELL WALL

- Found in plants and bacteria
- Made of cellulose (permeable)
- Supports plant

Plasma Membrane

- - Made of a phosolipid bilayer
- - The cell membrane is selectively permeable. Some things can enter some can't.
- - Cell Membrane controls movement (cellular traffic) in and out the cell.

Passive transport - movement of molecules from a more crowded to a less crowded area WITHOUT the use of energy.

Diffusion: Random movement of molecules.

- From high to low concentrations
- Molecules are trying to reach equilibrium.

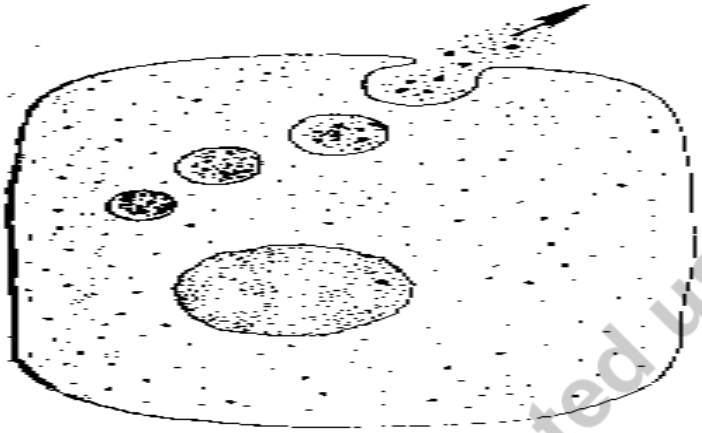
Osmosis: the movement of water through a semi-permeable membrane.

- **Permeable: Has large holes in it to let molecules pass through.**
  - Semi-permeable – Some things can enter
  - Impermeable – Nothing can enter

- **Hypertonic cells:** Contain a high concentration of solute relative to the outside solution (cell shrinks).
- **Hypotonic:** Contain a low concentration of solute relative to another solution (cell swells)
- **Isotonic:** contain the same concentration

- **Active transport** –
  - - Movement of molecules from a less crowded to a more crowded area
  - -Requires the use of energy
  - - Proteins can do this
  - - Also called reverse osmosis

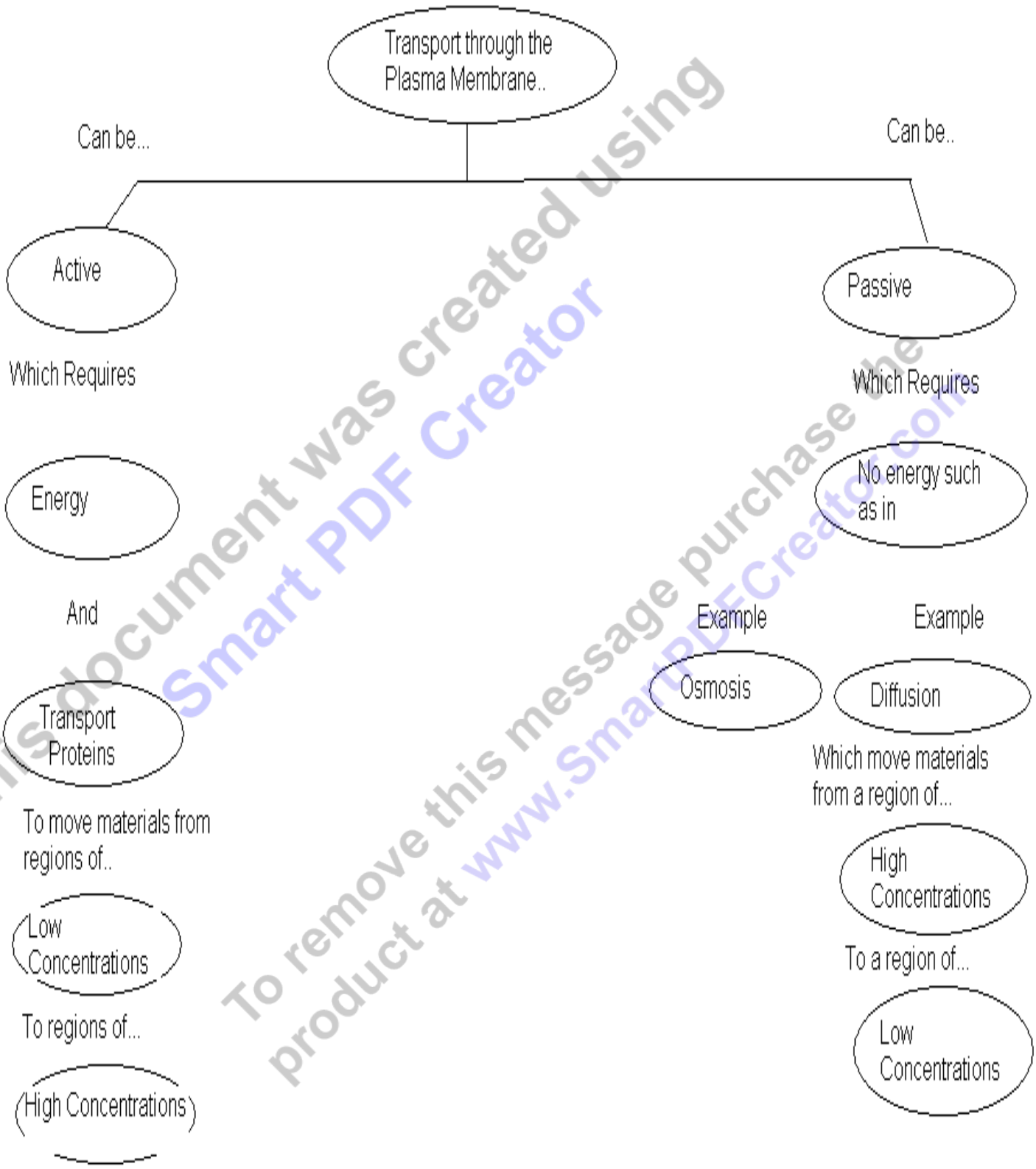
- **Endocytosis: (Endo - means to bring in) Energy requiring process where cell engulfs particle.**



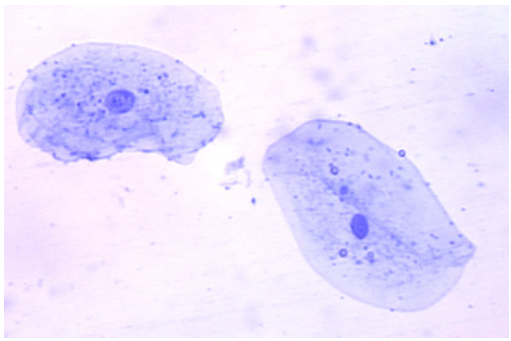
- **Phagocytosis: Type of endocytosis. Membrane surrounds large particles (solids)**
- **Pinocytosis: Membrane surrounds a liquid**

- **Transmembrane Protein Receptor Mediated Endocytosis: Proteins receptors facilitate endocytosis.**

- **Exocytosis: (Exo - means to take out) Cell releases particle. Uses energy.**



The Nucleus



- **- Largest organelle in cell (dark spot)**
- **- Contains genetic information (DNA)**
- **- DNA makes RNA which makes proteins**
- **- Proteins are important for cell.**

Chromatin / Chromosomes

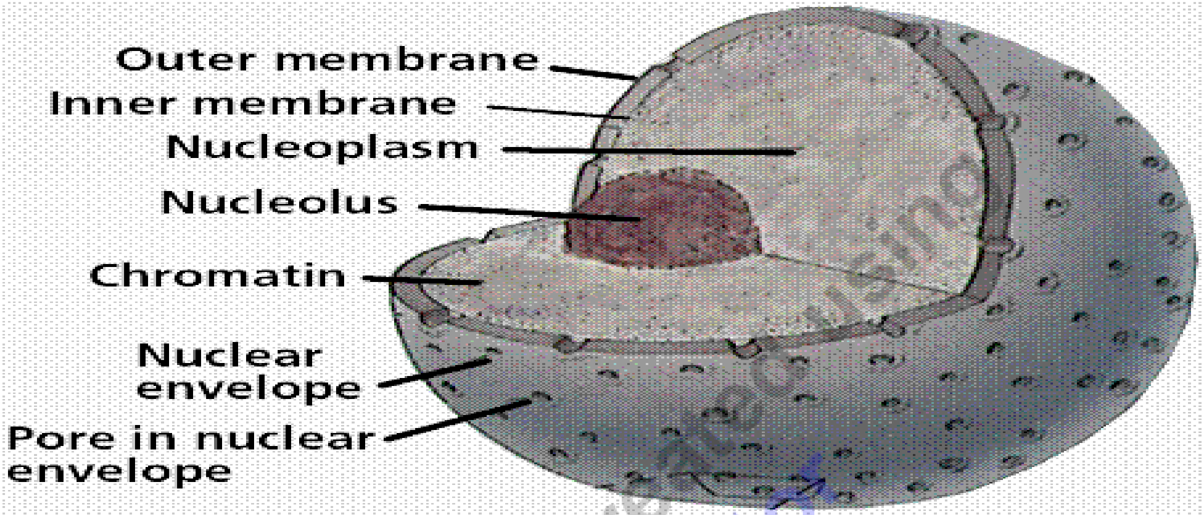
- Contains genetic information
- Composed of DNA
- Thicken into chromosomes when cell divides
- Set number per species (i.e. 23 pairs for human)

Nucleolus

- Round dark spot in center of nucleus
- Only visible when cell is not dividing
- Contains RNA for protein manufacturing
- Makes ribosomes that travel out of nucleus.

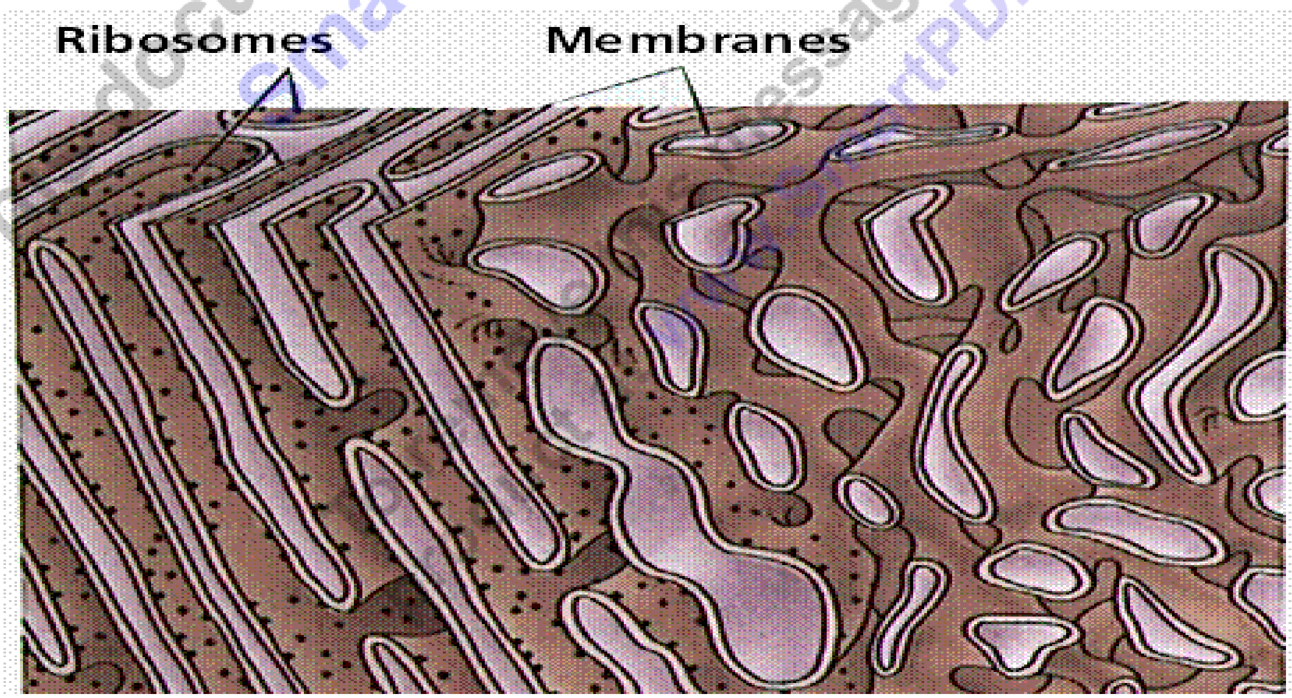
Nuclear Membrane

- Surrounds Nucleus
- Made of two layers
- Lets things in and out



Rough Endoplasmic reticulum (E.R. for short)

- - Maze-like network fused to nuclear membrane.
- - Goes from nucleus to cell membrane.
- - Stores, separates, and serves as cell's transport system
- - Ribosomes attach to and make proteins.
-



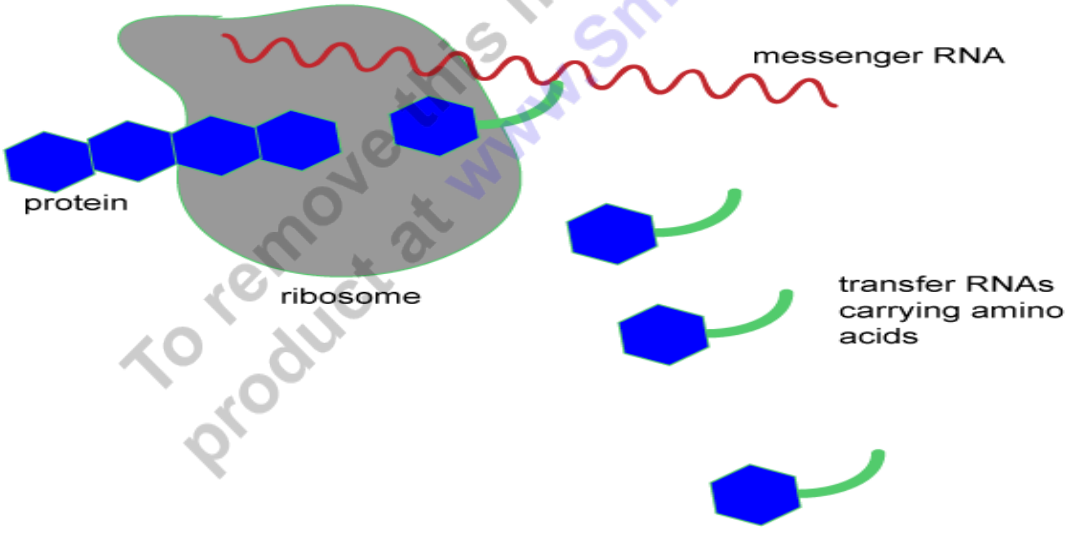
Rough E.R. Smooth E.R.

Smooth E.R.

- - Makes lipids (fats) and steriods.
- - Regulates Calcium production.
- - Synthesizes sugars "Gluconeogenesis"
- - Detoxifies drugs
- -Stores important enzymes

Ribosomes

- - Each cell contains thousands
- - Amino Acids: The building blocks of proteins. 20 variations
- - Composes 25% of cell's mass
- - Most are embedded in rough endoplasmic reticulum. Some free in cytoplasm.
- - Site of Protein Synthesis
- - Mini protein making factories
- - Proteins (ONCH) are very important to our cells and body.
- - DNA makes RNA, RNA has informatin to make proteins.
- - Ribosomes and mRNA



Protein Synthesis: The process in which the genetic code carried by messenger RNA directs cellular organelles called ribosomes to produce proteins from amino acids.

Proteins Synthesis Animation

- To make proteins
- Ribosomes are units that help read RNA
- RNA is the information code that tells the type of proteins to be made.
- Protein synthesis is the process of making

Golgi Apparatus

- Protein packaging plant and other macromolecules.
- Sends vesicles of macromolecules to destination in cell.
- Composed of numerous layers forming a sac.
- Enzymes and contents of lysosomes are made here.

Lysosomes

- Has Digestive acids / enzymes in a sac
- Digestive organelle, recycles old cell parts.
- Breaks down proteins, lipids, and carbohydrates, and bacteria.
- Transports undigested material to cell membrane for removal.
- Cell breaks down if lysosome explodes

Cytoskeleton, microtubules, microfilaments

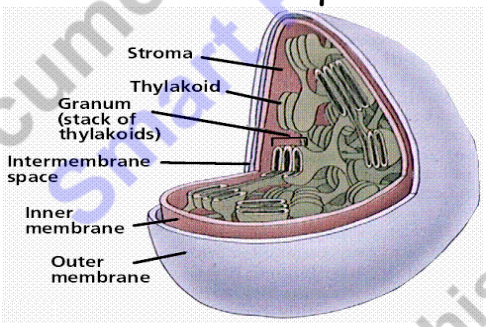
- Composed of microtubules
- Supports cell and provides shape

- Aids movement of materials in and out of cells
- Flagellum is made of microtubules

Centrioles

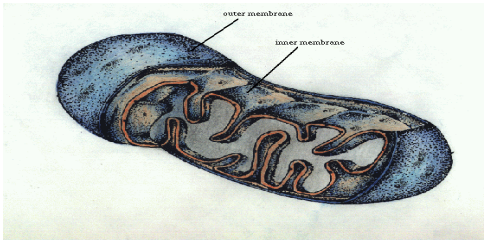
- Look like golden nuggets (Paired)
- Made of nine tubes
- Aid in cell division (Mitosis)

Plastids (AKA Chloroplast)

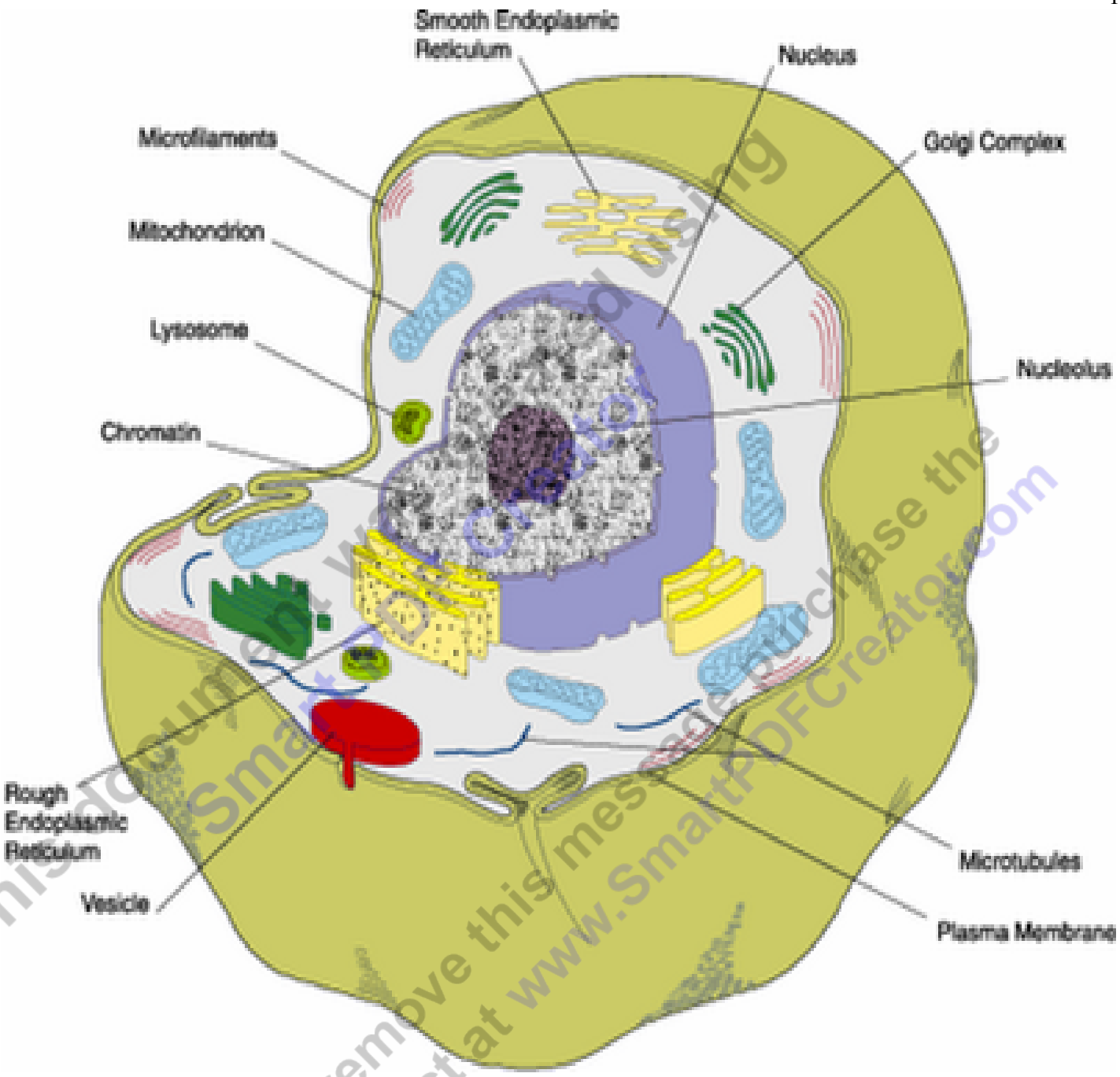
- Organelle in plants
- Contain the green pigment chlorophyll
- Has stacks called Thylakoids
- Do photosynthesis (Make the sugar)
- Has it's own unique DNA.
- 

Mitochondria

- Large organelle that makes energy for the cell. (ATP)
- Has folds (surface area) called cristae
- Two membranes
- Recycles wastes, produces urea
- Has its own DNA. Reproduce independently from cell.



- Vacuoles
  - Membrane-bound sacs for storage, digestion, and waste removal
  - Very large in plant cell
  - Create turgid pressure in plants
  - Contains food and water solution
  - Contractile vacuoles for water removal (in unicellular organisms) + locomotion.



SAVE THESE NOTES FOR THE INFECTIOUS BIOFE WHICH IS DUE SHORTLY!