Cells

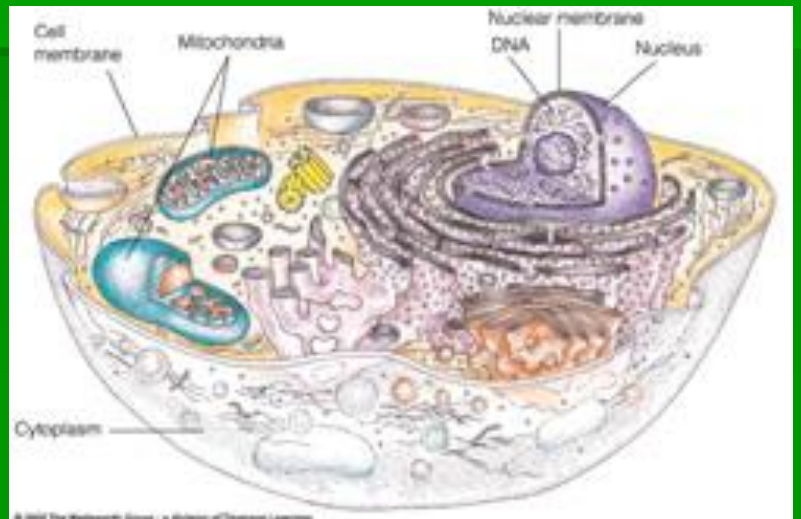
- The units of Life
  - Size of a cell

Cell Structure

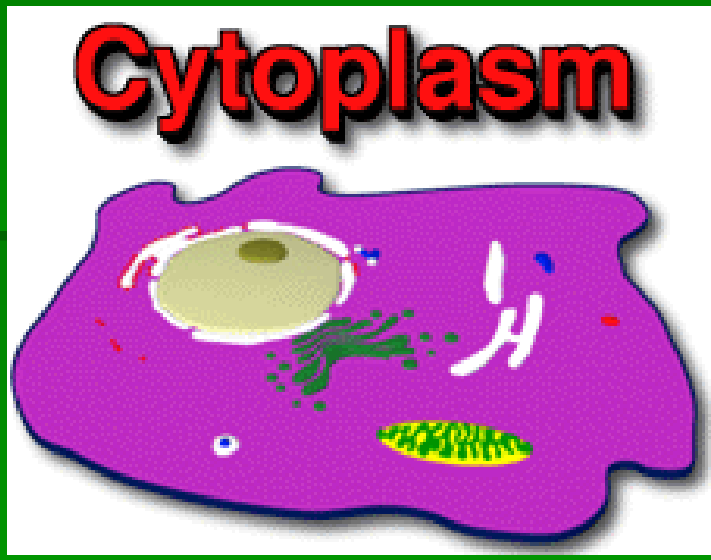
A. Common cell structures-outer covering called cell membrane and internal gelatin like cytoplasm
   1. Comparing cells-size and shape relate to function.

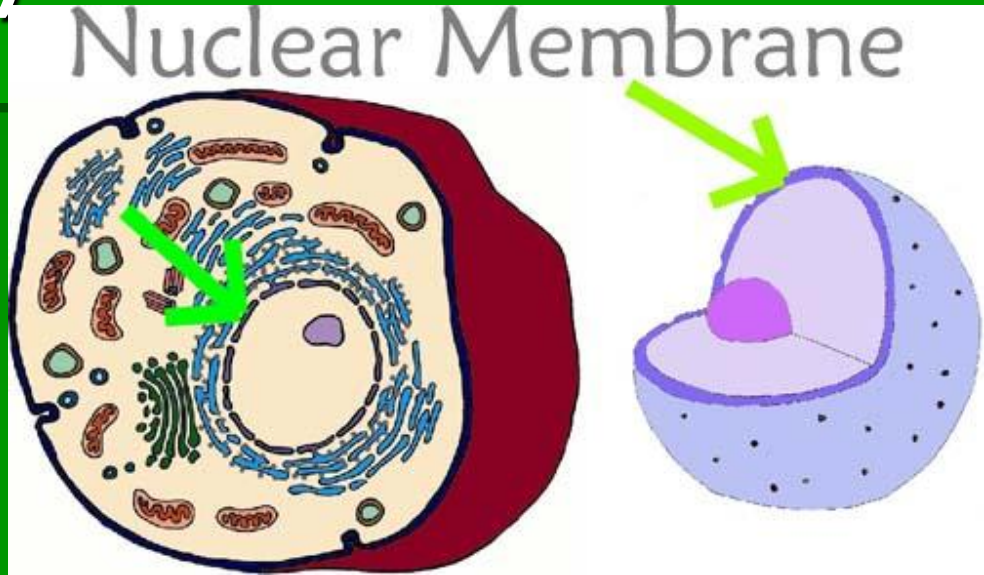
Cell Structure

- Cell membrane surrounds and protects the cell
  - Made of fats with proteins embedded in it
  - Semi permeable – allows certain materials and out



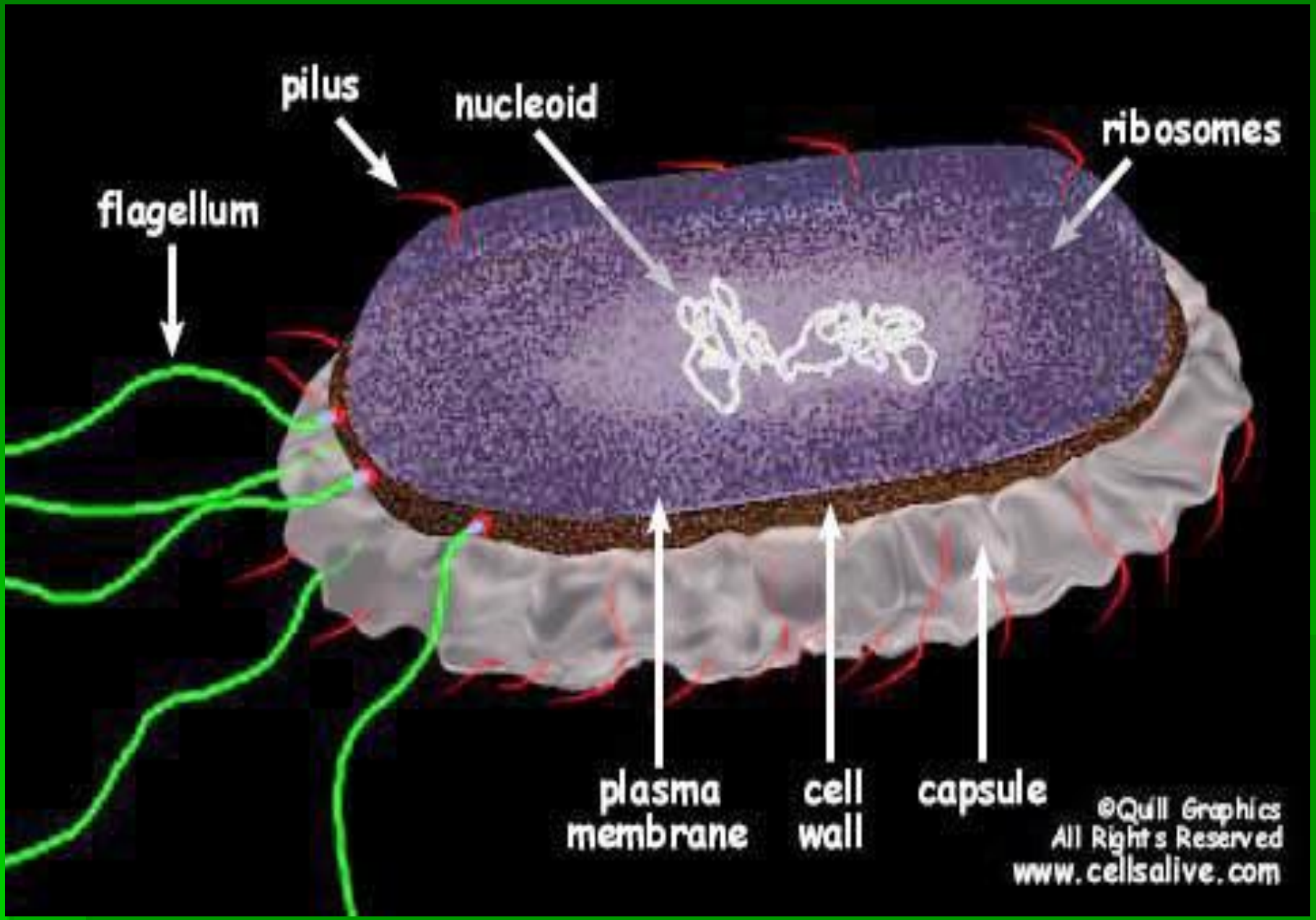
- Cytoplasm – living gel like material in the cell
- Nucleus – material that controls the functions and reproduction of the cell (where DNA is found)





Two types of cells

- Prokaryotic – no membrane around organelles or nuclear materials (no nucleus)
  Example: bacteria & blue-green algae


pilus
nucleoid
ribosomes
flagellum
plasma membrane
cell wall
capsule
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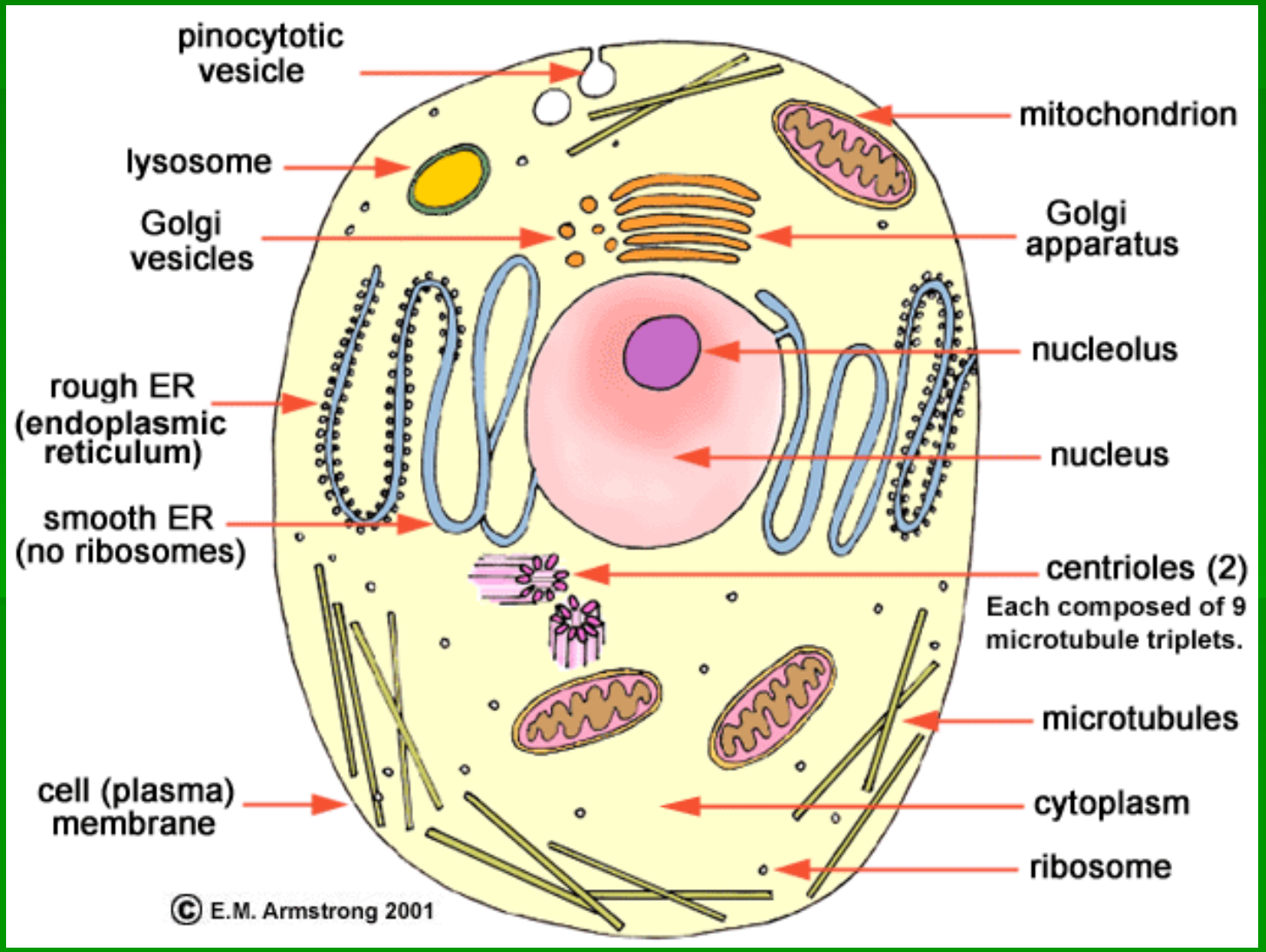
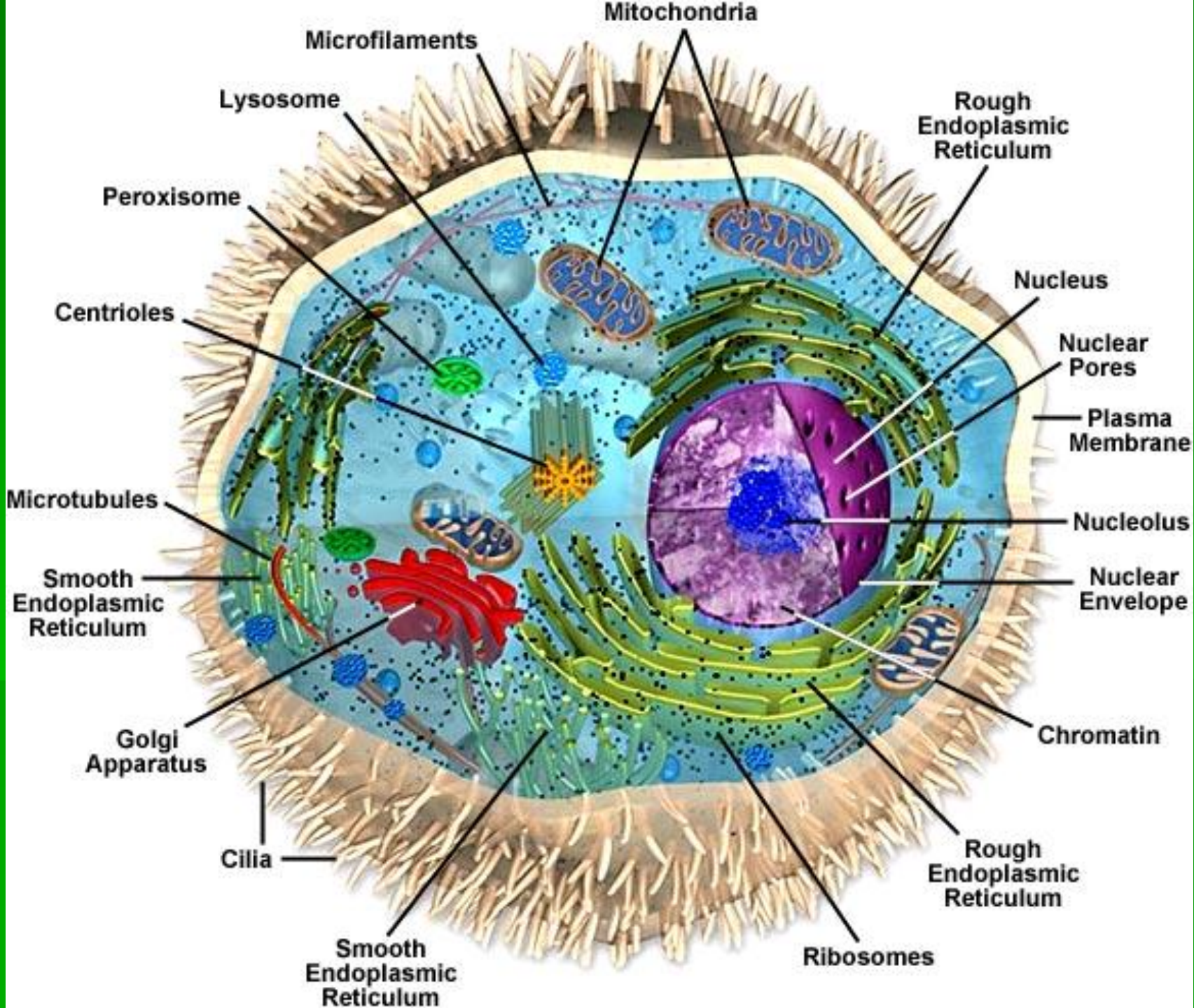
- **Eukaryotic – have membrane around organelles and nucleus (have a nucleus) Example: Plants and Animals**

Eukaryotic

Animal Cell




Mitochondria
Microfilaments
Lysosome
Rough Endoplasmic Reticulum
Peroxisome
Nucleus
Centrioles
Nuclear Pores
Plasma Membrane
Microtubules
Nucleolus
Smooth Endoplasmic Reticulum
Nuclear Envelope
Golgi Apparatus
Chromatin
Cilia
Rough Endoplasmic Reticulum
Smooth Endoplasmic Reticulum
Ribosomes

Structure of the Eukaryotic Cell

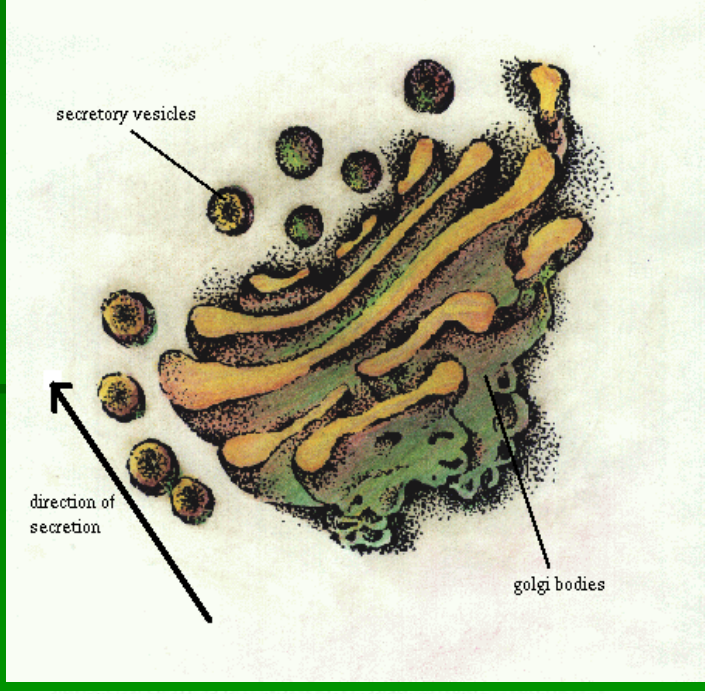
- Nucleus – Chromosomes surrounded by a nuclear membrane.
  - Directs the activities of the cell
  - Chromatin – contains chromosomes and chromosomes contain DNA
  - Nucleolus – in the nucleus and involved in making proteins

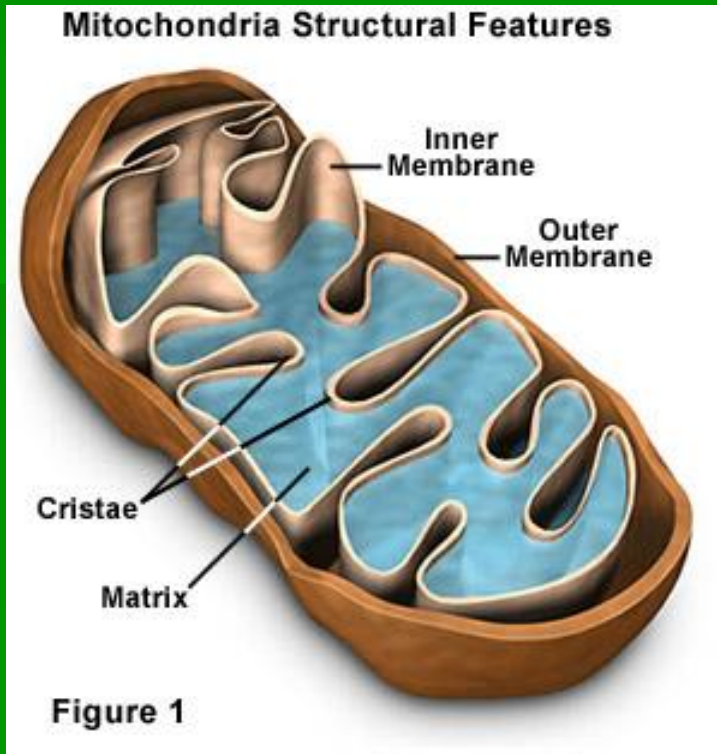
Cell organization

1. Composed of cellulose, a cell wall grows, gives shape to, and protects the cells of plants, algae, fungi, and most bacteria.
2. Cell membrane-protective layer around all cells
   a. For cells with cell walls, the cell membrane is inside the cell wall
   b. A cell membrane allows food and oxygen into the cell and waste products out of the cell
3. Cytoplasm-gelatinlike substance inside cell membrane
   a. Cytoskeleton-scaffolding-like structure in cytoplasm which helps cell keep its shape
   b. In the cytoplasm, eukaryotic cells have organelles which help with cell life processes.

- Cytoplasm – contains organelles (structures that carry on the function and purpose of the cell) and fluid of cell
- Endoplasmic reticulum – ER – extend from the nucleus and carries nuclear messages out from nucleus and carries nuclear messages out from the nucleus
- Ribosomes are on the ER and is where proteins are made
- Vacuole – where food and liquids are stored in the cell

- Lysosome – where enzymes are stored to break down foods or other worn out cell parts
- Golgi apparatus – Stores proteins and secretions.
- Mitochondria – power house of the cell (place of cellular respiration)





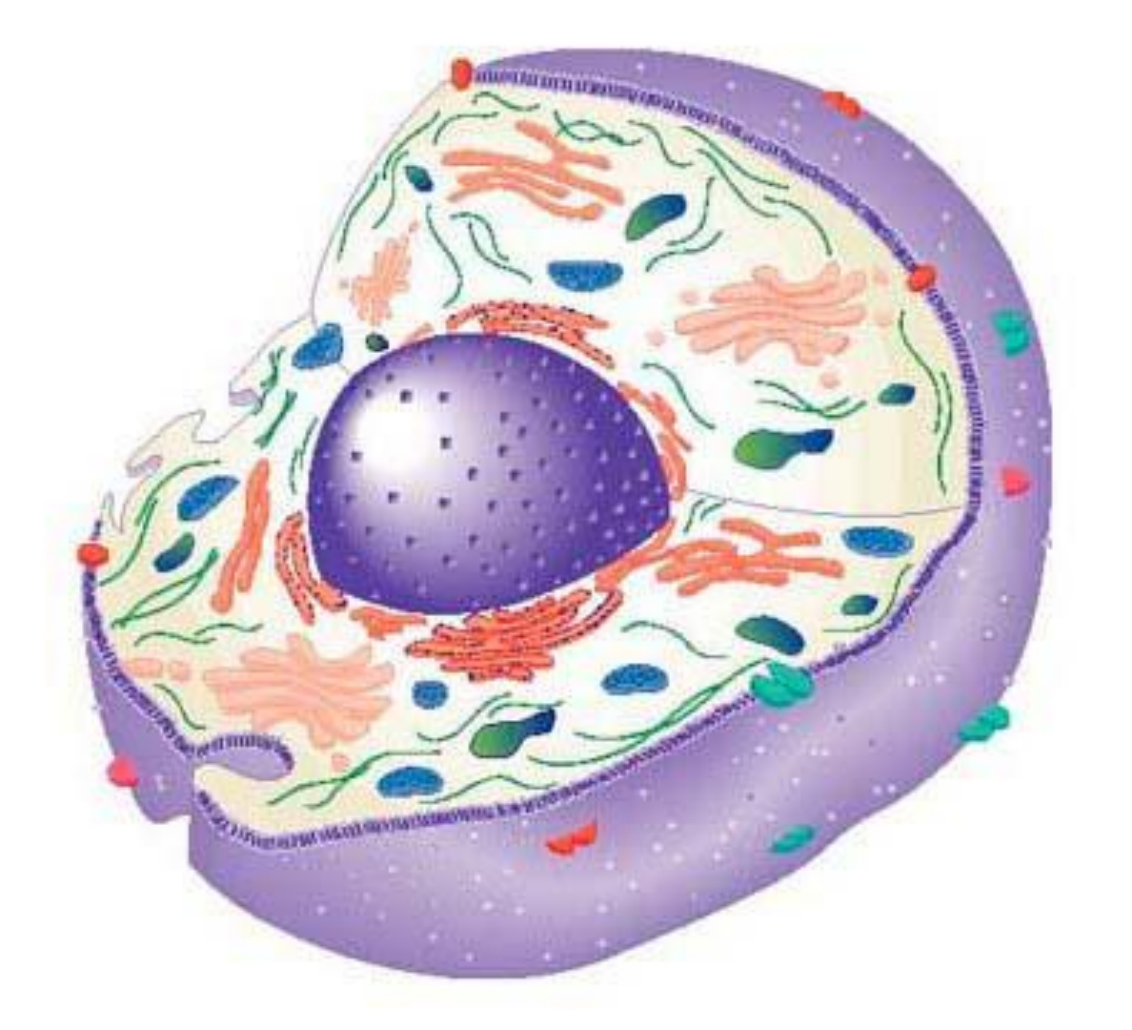
Nucleus-

- contains instructions for everything cell does;
- includes DNA

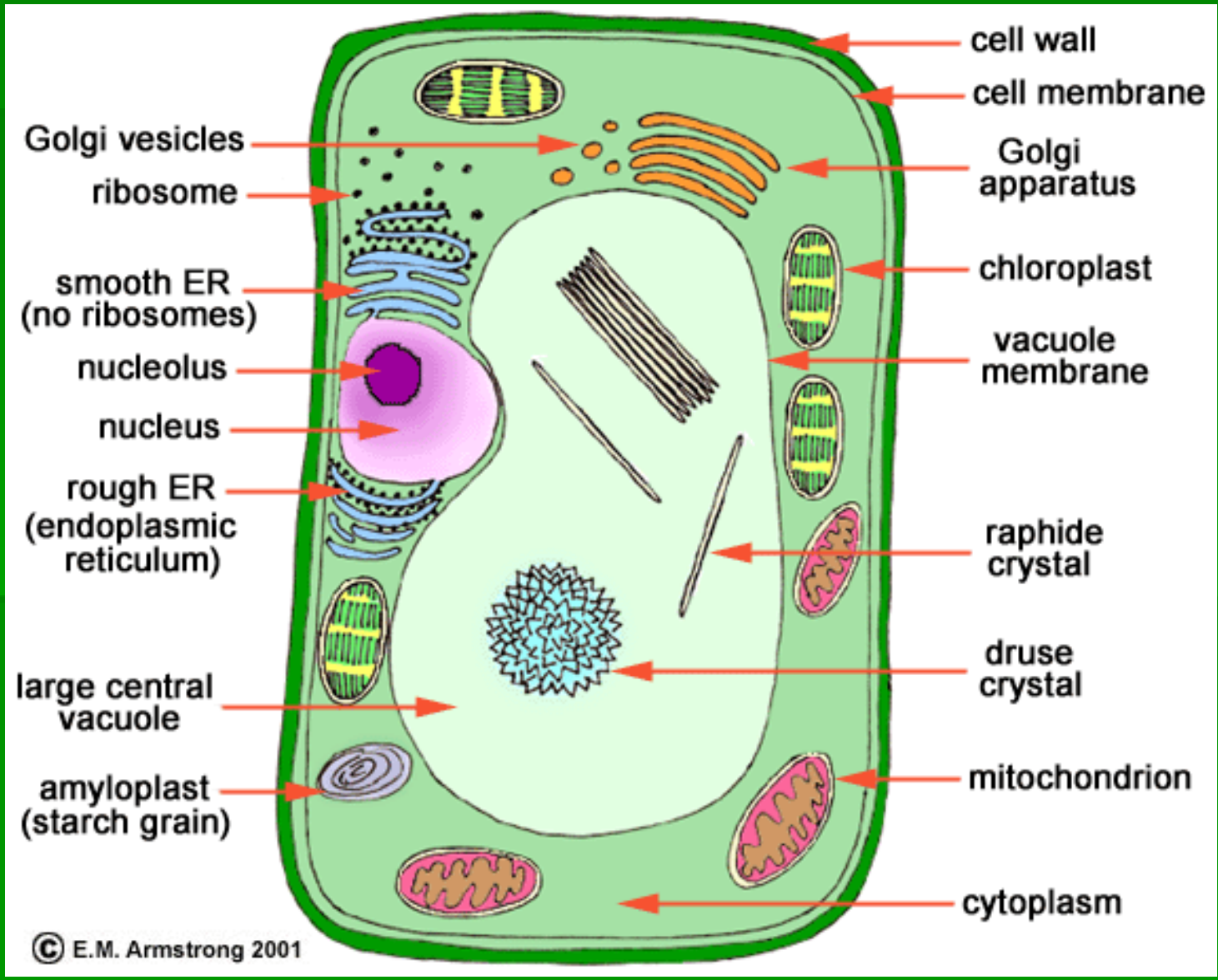
Plant Cells

- have in addition to the above a cell wall and chloroplasts.
- Cell wall gives extra support and structure to the cell
- Made of cellulose
- Chloroplasts are where photosynthesis takes place

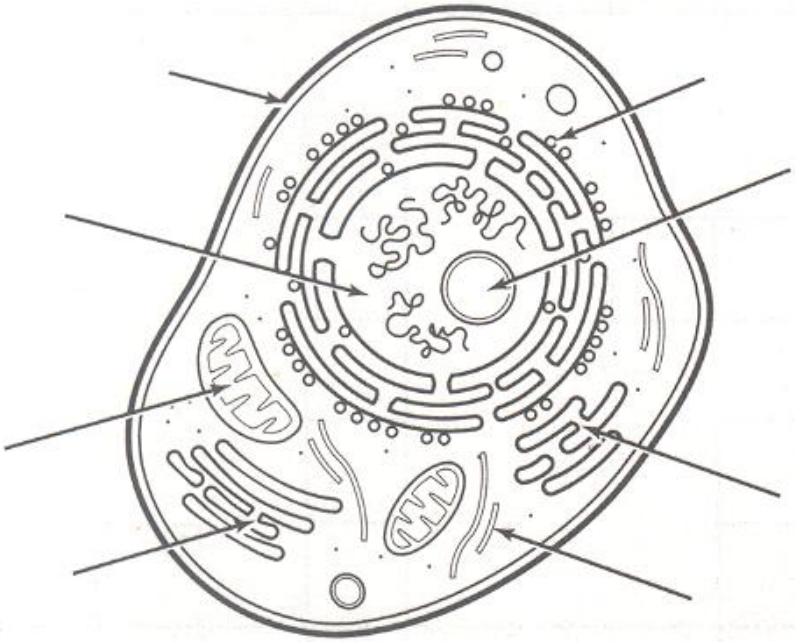
Three dimensional cell



Plant Cell


cell wall
cell membrane
Golgi vesicles
Golgi apparatus
ribosome
chloroplast
smooth ER (no ribosomes)
vacuole membrane
nucleolus
nucleus
rough ER (endoplasmic reticulum)
raphide crystal
druse crystal
large central vacuole
mitochondrion
amyloplast (starch grain)
cytoplasm
© E.M. Armstrong 2001

1. _____



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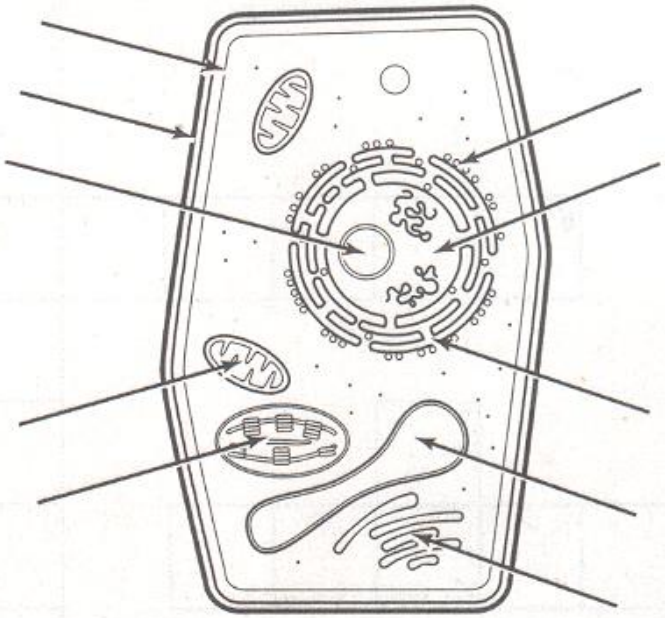
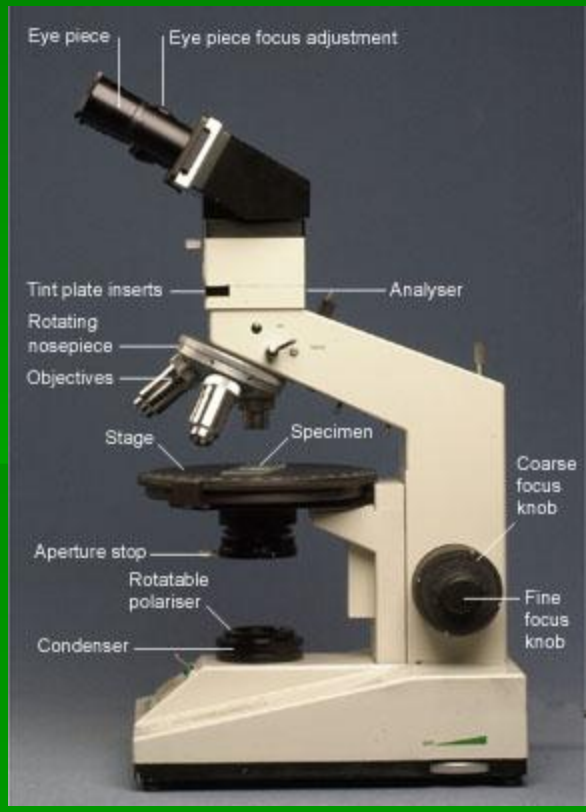


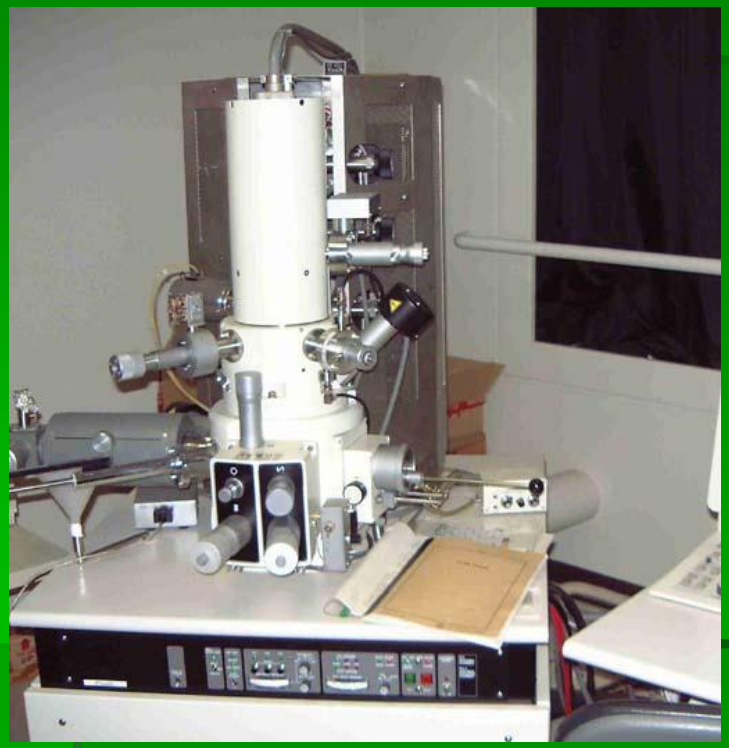
Cells energy

- Energy-processing organelles-help cells do their work
  - Green organelles in plant cells contain chloroplasts to make food.
  - Organelles which release energy from food are called mitochondria.

Microscopes

- allow us to view cells
- Compound light Microscope – Allows small object to be seen up to about 1000 times magnification.
- Electron Microscopes – magnify up to 1,000,000 times magnification
  - TEM
  - SEM Figure2- 9 p. 42





Siemens Elmiskop IA
Transmission
Electron Microscope
(circa 1964)

Developing the Cell theory

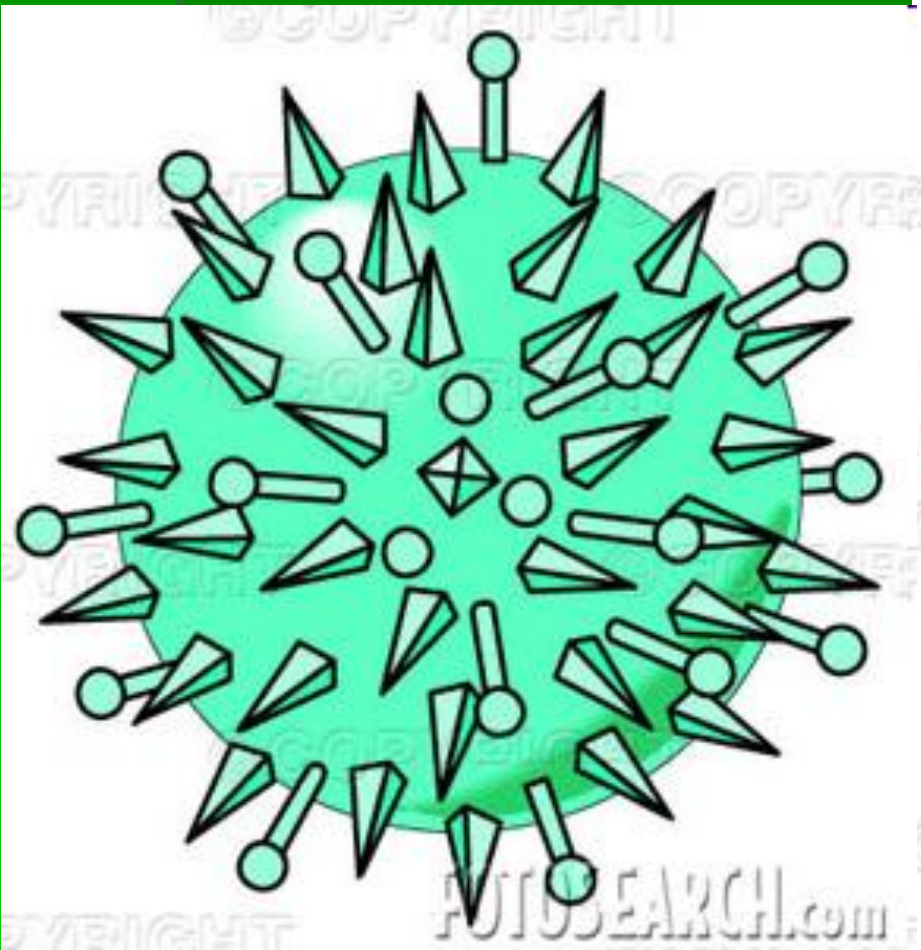
- 1665 Robert Hooke – little empty spaces called cells in cork
- 1838 Mathias Schleiden - Plants are made of cells
- Theodore Schwan – Animals are made of cells
- 1850 Rudolf Virchow – Cells divide to form new cells

- 1860 Louis Pasteur – proved the theory of biogenesis that life comes from life

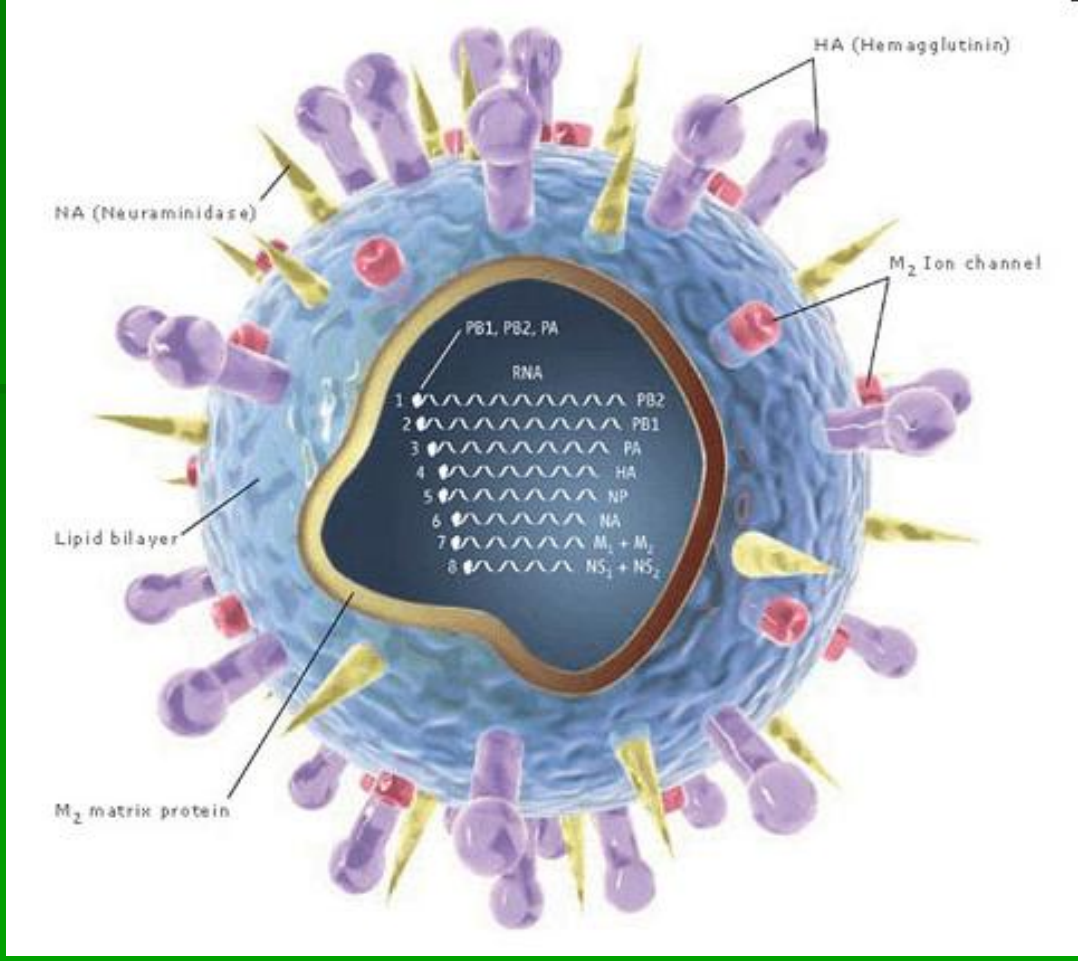
Cell theory

- All living things are made of cells
- All cells come from other cells
- Cells are the basic unit of structure and function of all organisms

Viruses

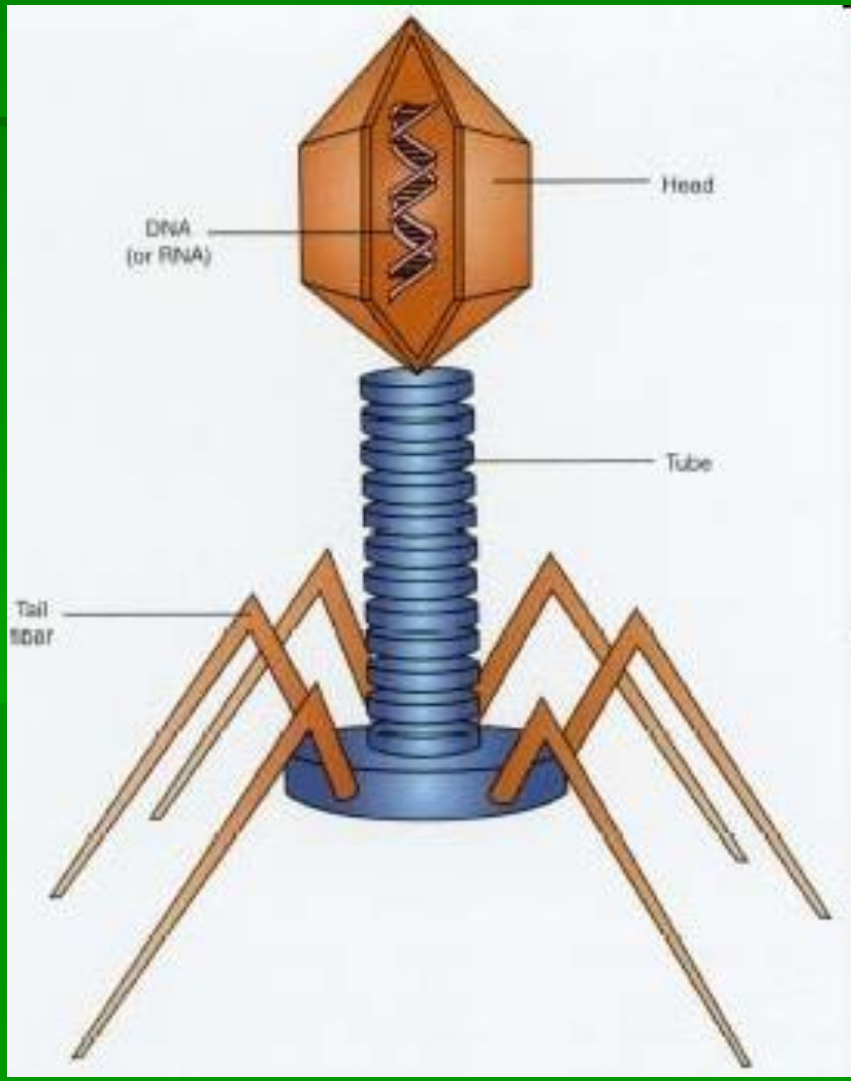


- Most are many times smaller than a cell
- Are considered non living
- Inside is hereditary material (DNA or RNA) outside is a protein coat
- Virus Classification (the groups they are put into to help identify them)



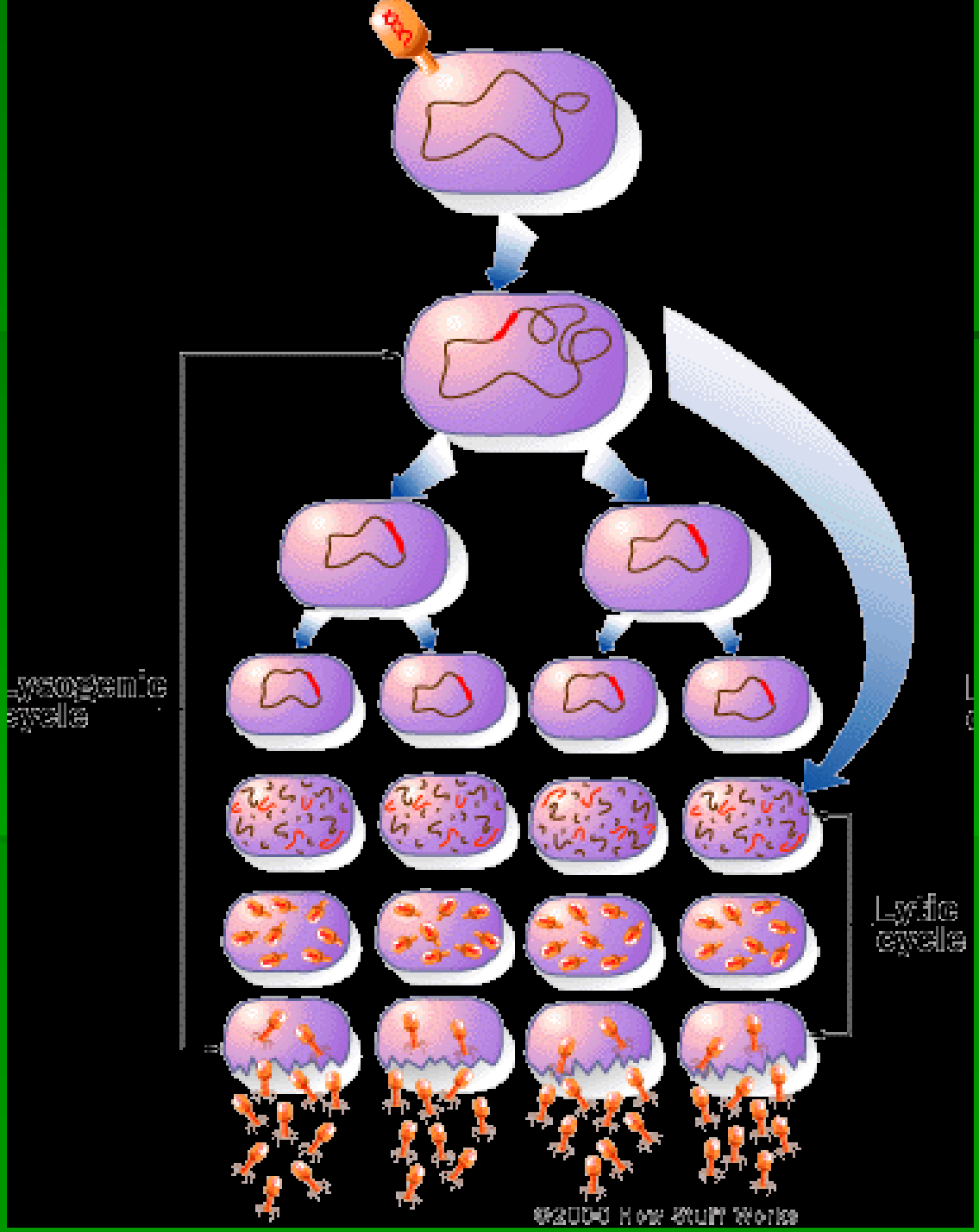
Virus Identification

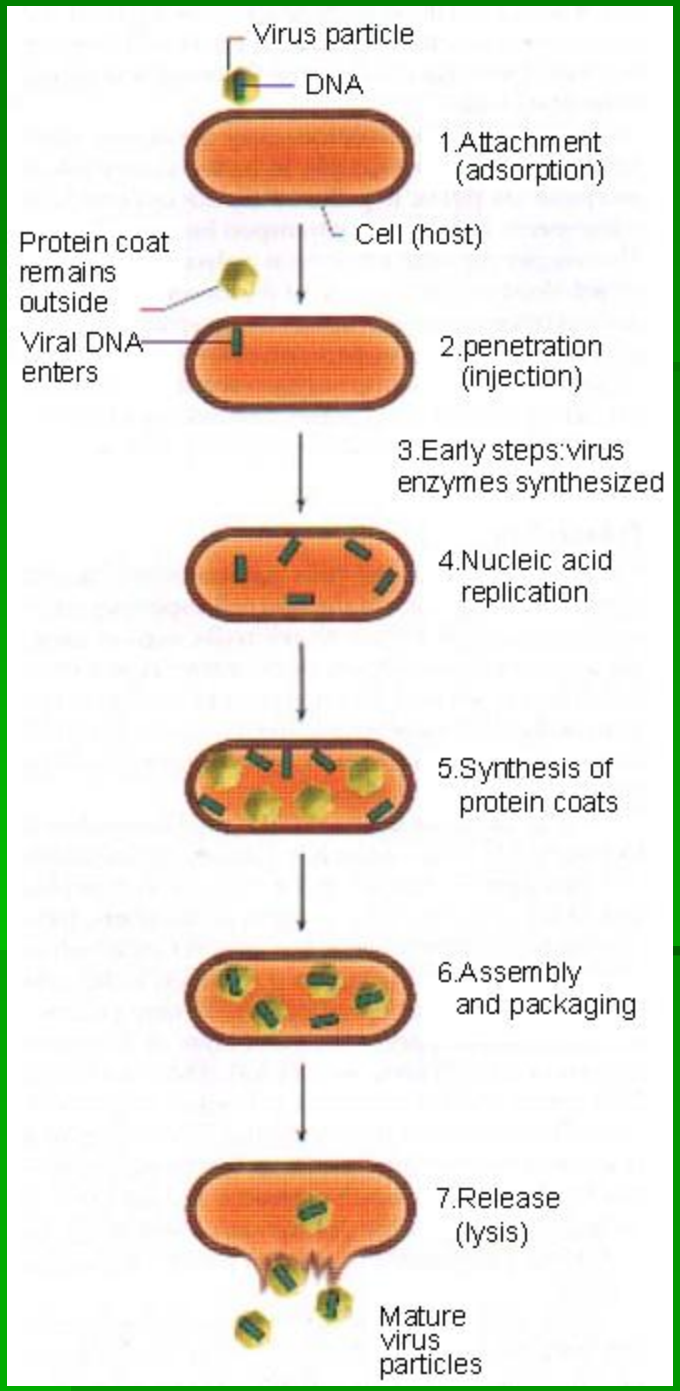
- **Shape**
- Type of hereditary material (DNA or RNA)
- Kind of organisms that they infect
- Method of reproduction
- By the disease caused

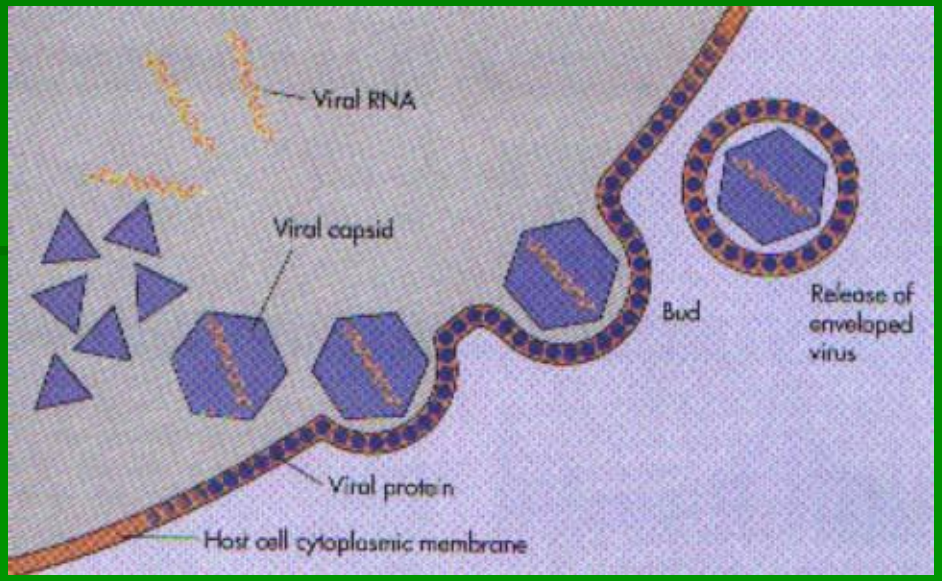


Virus Reproduction

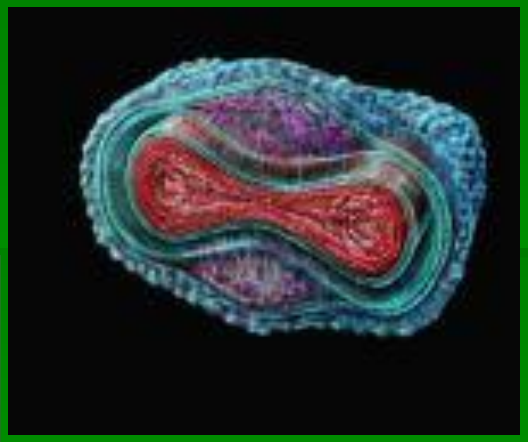
- Require a cell in order to reproduce
- Two types of reproduction
  - Active – immediately take over the cell and use the cells energy to reproduce
  - Latent – Inactive, it is a while before it becomes active and takes over the cell and begins to reproduce


Lysogenic cycle
Lytic cycle

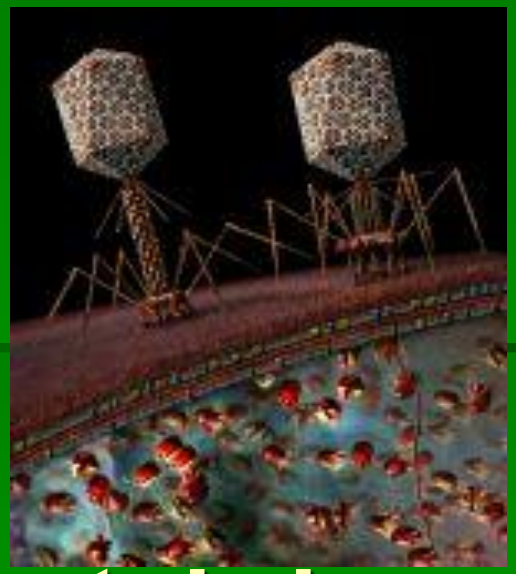

Virus particle
DNA
1.Attachment (adsorption)
Cell (host)
Protein coat remains outside
Viral DNA enters
2.penetration (injection)
3.Early steps:virus enzymes synthesized
4.Nucleic acid replication
5.Synthesis of protein coats
6.Assembly and packaging
7.Release (lysis)
Mature virus particles


Viral RNA
Viral capsid
Bud
Release of enveloped virus
Viral protein
Host cell cytoplasmic membrane

- Viruses take over the activities of the cell and requires the cell to produce viruses which in turn destroys the host cell
- When viruses fill the cell it explodes and spreads more viruses around

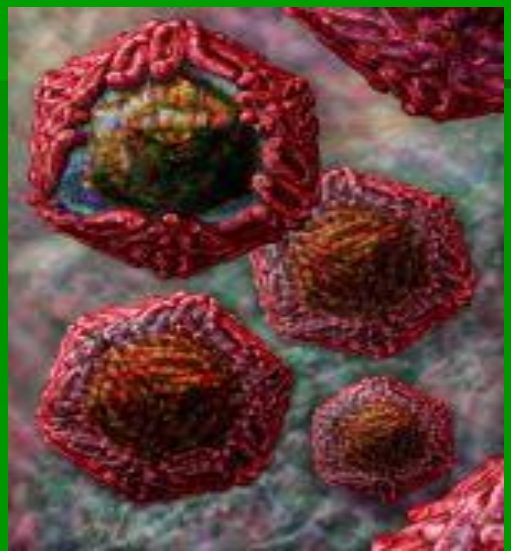


Small pox



Bacteriaphage

West Nile



Aids

- Only the organisms can code against a virus to destroy it
- There is very little in the way of medicine to bring a virus under control
  - So why do doctors give antibiotics for the common cold

Vaccines

- A vaccine prepares our bodies to fight off viral diseases by introducing a dead or weakened virus into the body

Gene therapy

- Gene therapy uses viruses to introduce correct genetic material

AIDS

- Acquired Immune Deficiency Syndrome