6 Kingdoms of Life

SOL BIO: 5 a-f

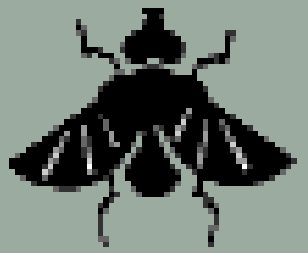
The student will investigate and understand life functions of archaebacteria, monerans (eubacteria), protists, fungi, plants, and animals including humans.

Key concepts include:

- how their structures and functions vary between and within the kingdoms;
- comparison of their metabolic activities;
- analyses of their responses to the environment;
- maintenance of homeostasis;
- human health issues, human anatomy, body systems, and life functions; and
- how viruses compare with organisms.

- As living things are constantly being investigated, new attributes are revealed that affect how organisms are placed in a standard classification system.

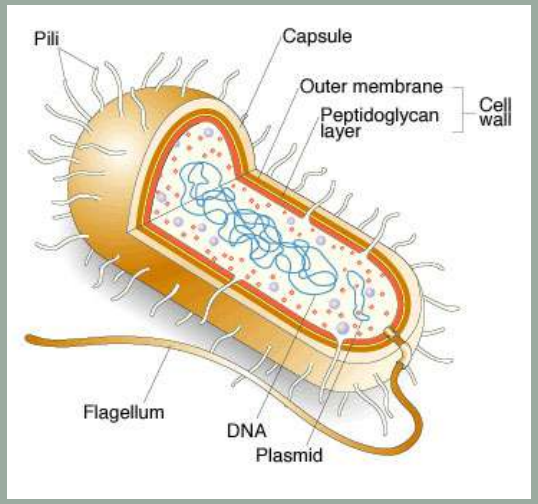
- The grouping of organisms into KINGDOMS is based on 3 factors:

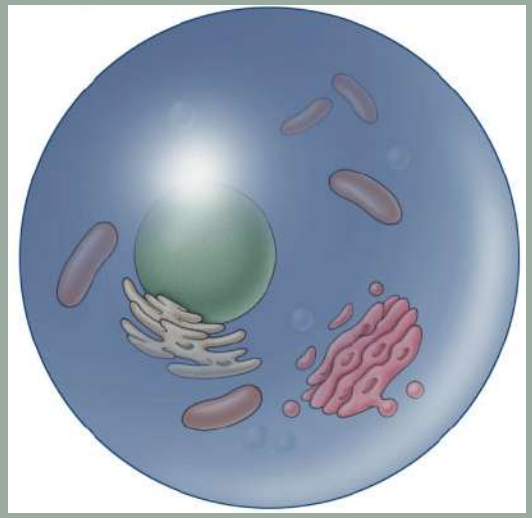


  - 1. Cell Type (prokyotic or eukaryotic)
  - 2. Cell Number (unicellular or multicellular)
  - 3. Feeding Type (autotroph or heterotroph)

1. Cell Type- The presence or absence of cellular structures such as the nucleus, mitochondria, or a cell wall

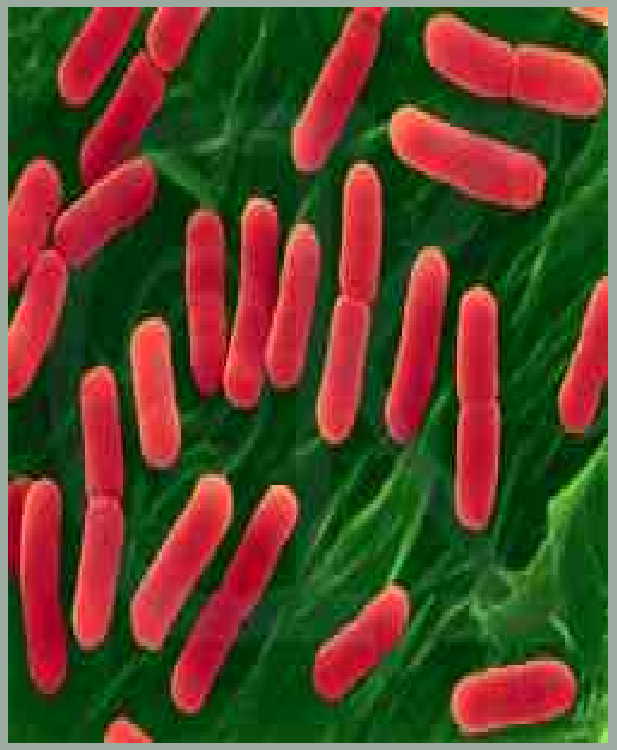
Prokaryotes or Eukaryotes





Prokaryotes – Bacteria!

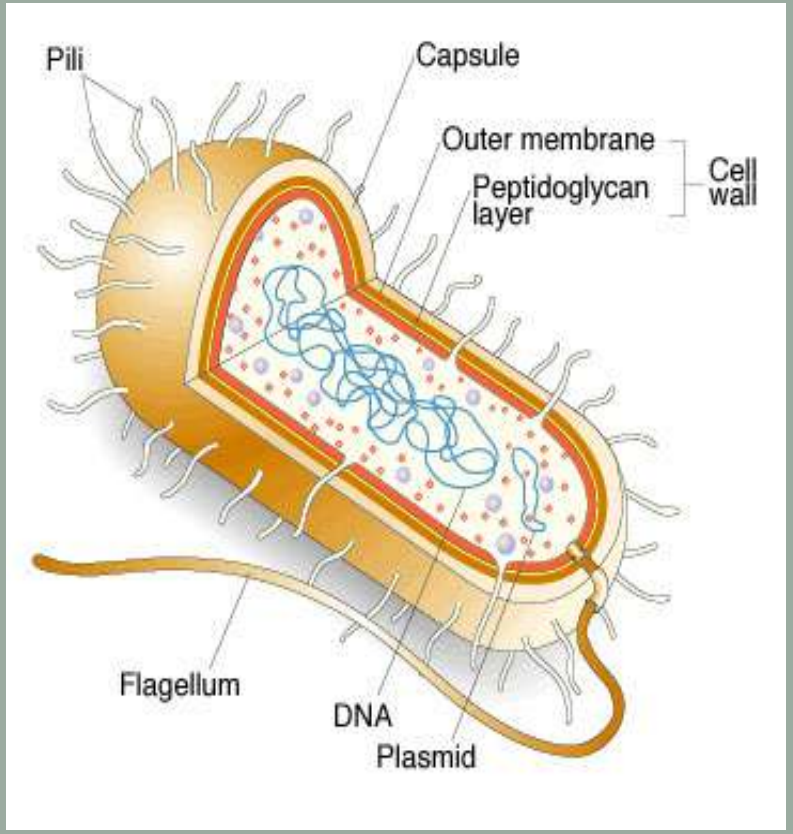
- **DO *NOT* HAVE:**
  - An organized nucleus
  - Structured organelles



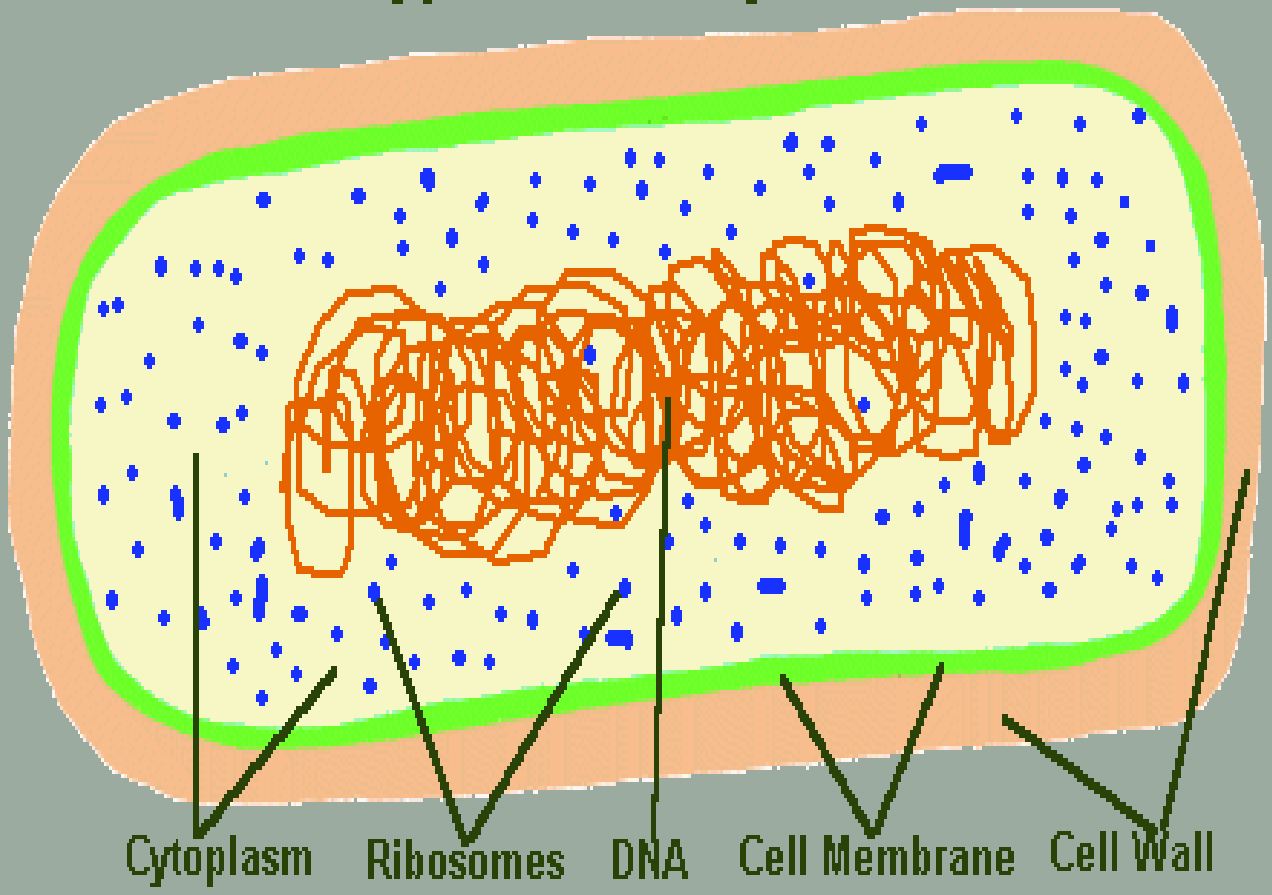
Prokaryotes – Typical Bacteria

Basic Structure

- DNA – strands floating in cytoplasm/small rings called plasmids
- Ribosomes- RNA/protein synthesis sites
- Cytoplasm-water based
- Cell membrane & Wall



A Typical Prokaryote Cell



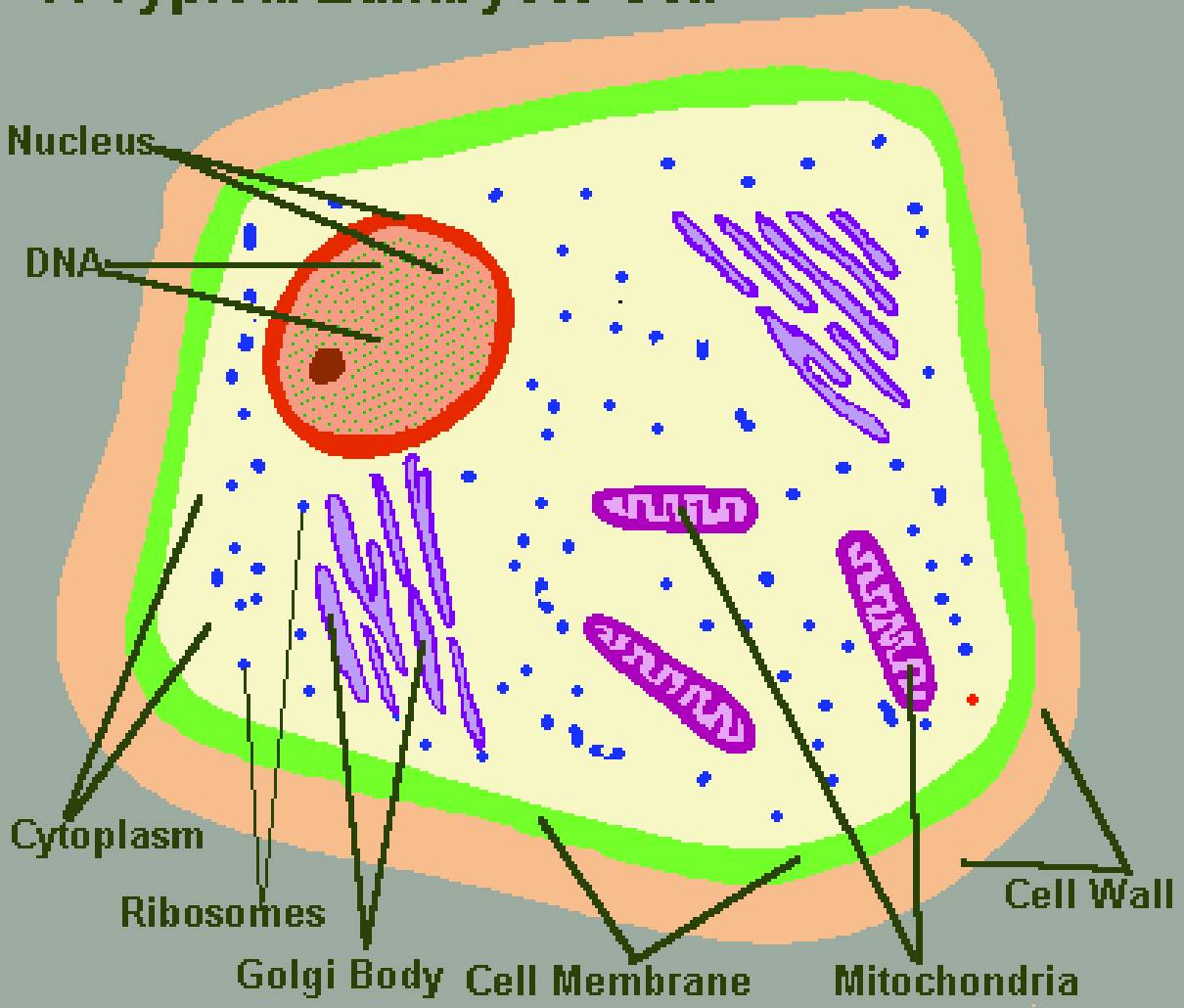
Eukaryotes

- DO HAVE:

  Nucleus organized with a membrane

  other organelles

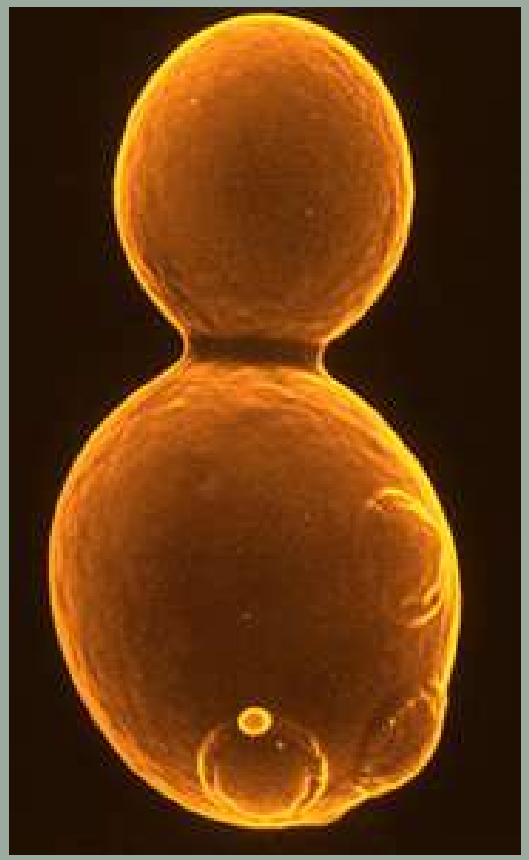
A Typical Eukaryote Cell



2nd criteria for Kingdom Divisions:
Cell Number

- Unicellular- single celled organism – protozoans, bacteria, some algae
- Multicellular- many celled organism – cells start to specialize/differentiate

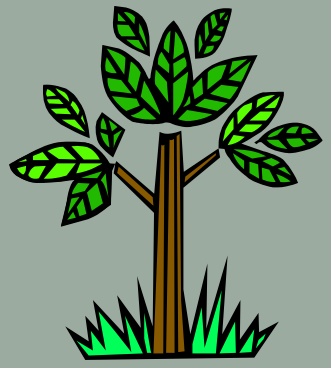
- Unicellular



Multicellular

3rd Criteria for Kingdom Divisions

Feeding Type - How the organisms get their food



-Autotroph or Producer

Make their own food

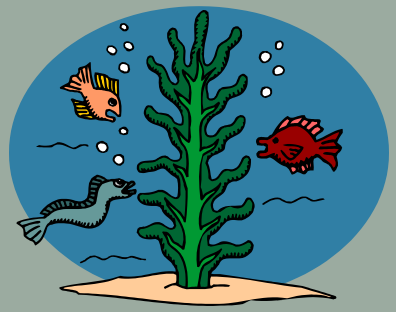
-Heterotroph or Consumer

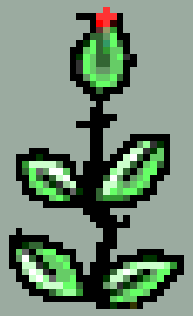
Must eat other organisms to survive

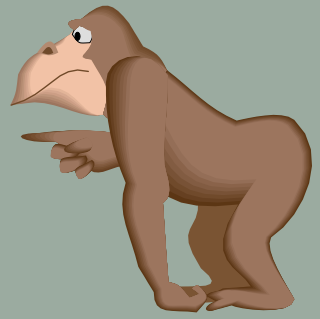
Includes decomposers – those that eat dead matter!

There used to be only 5 kingdoms

1. Moneran ← This kingdom has now been divided into 2 – archaebacteria & eubacteria
2. Protista
3. Fungi
4. Plantae
5. Animalia








6 Kingdoms

- Archaebacteria
- Eubacteria

} Prokaryotes

- Protista
- Fungi
- Plantae
- Animalia

} Eukaryotes

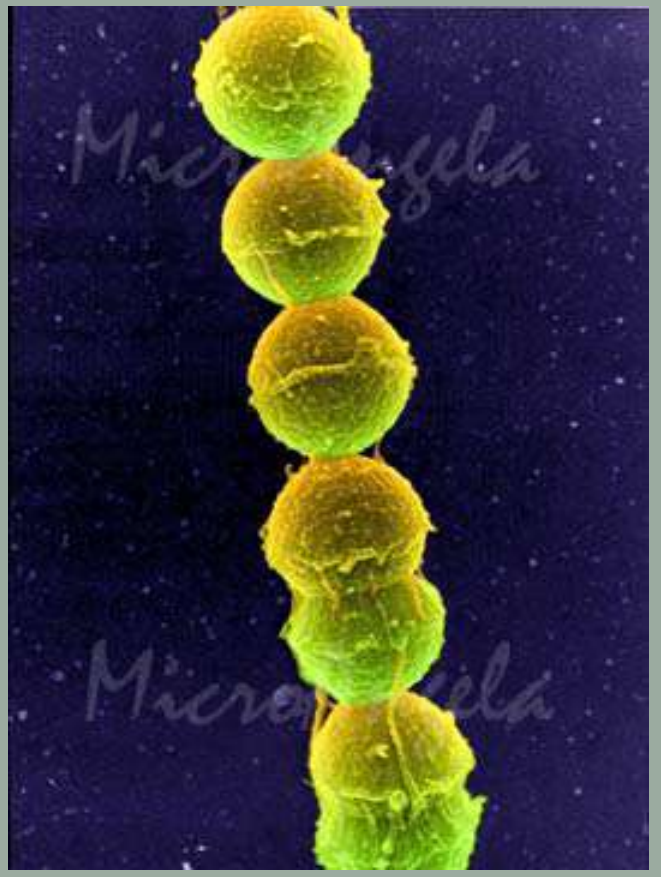
Kingdom	Cell Type	Cell #	Feeding Type	Cell Wall
Archaebacteria	Prokaryote	Unicellular	Autotroph	Yes
Eubacteria	Prokaryote	Unicellular	Both	Yes
Protista	Eukaryote	Most Unicellular	Both	Yes & NO
Fungi	Eukaryote	both	Heterotroph	Yes
Plantae	Eukaryote	Multicellular	Autotroph	Yes
Animalia	Eukaryote	Multicellular	Heterotroph	NO

Archaebacteria

- Ancient bacteria-
  - Live in very harsh environments
  - extremophiles

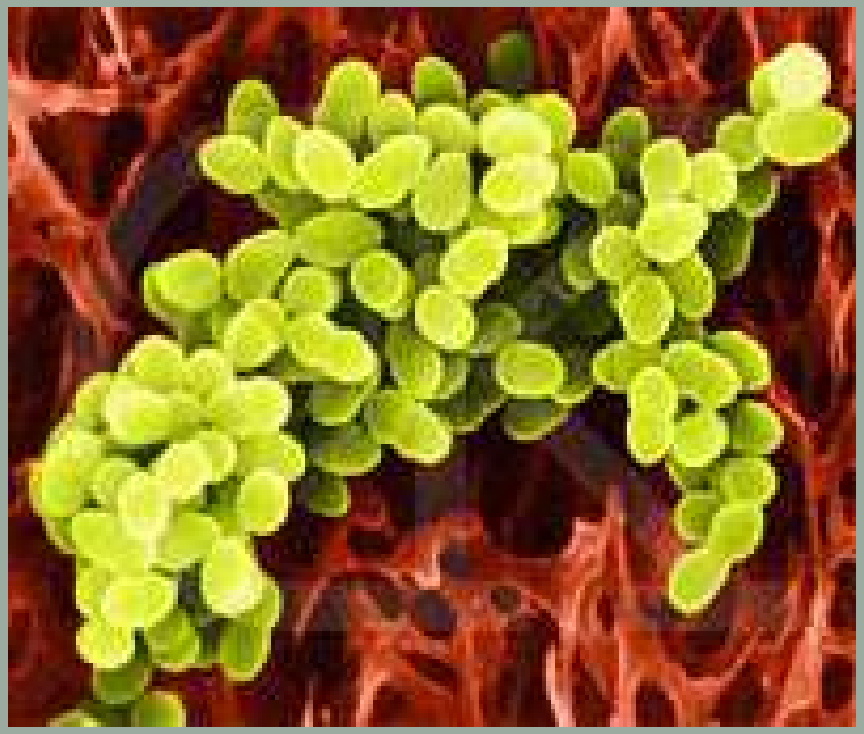
Eubacteria

- It is the eubacteria that most people are talking about when they say bacteria, because they live in more neutral conditions.



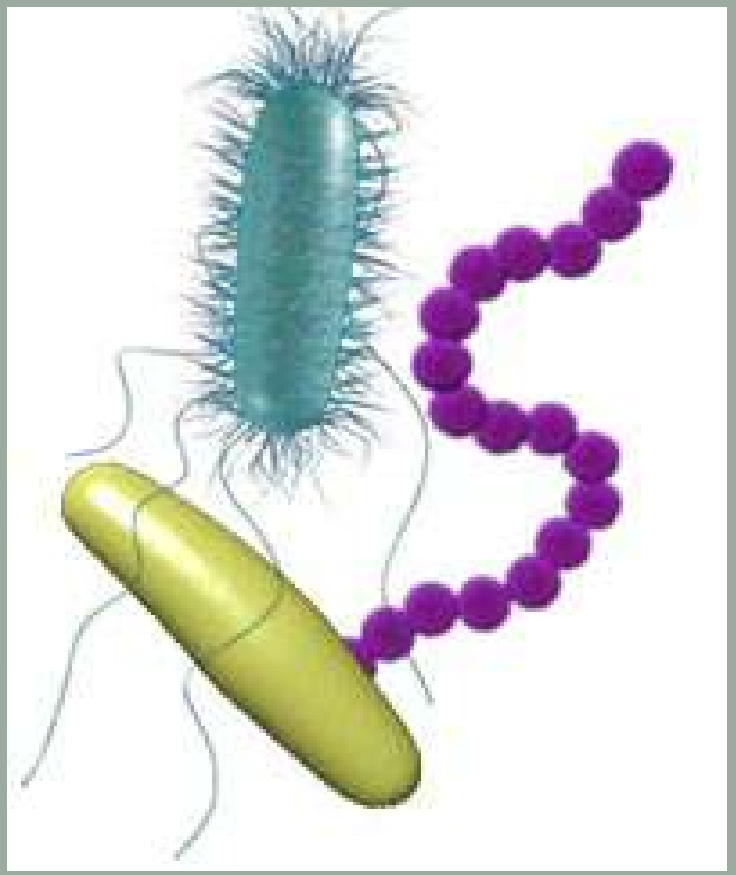
Bacteria

- Bacteria are unicellular prokaryotes



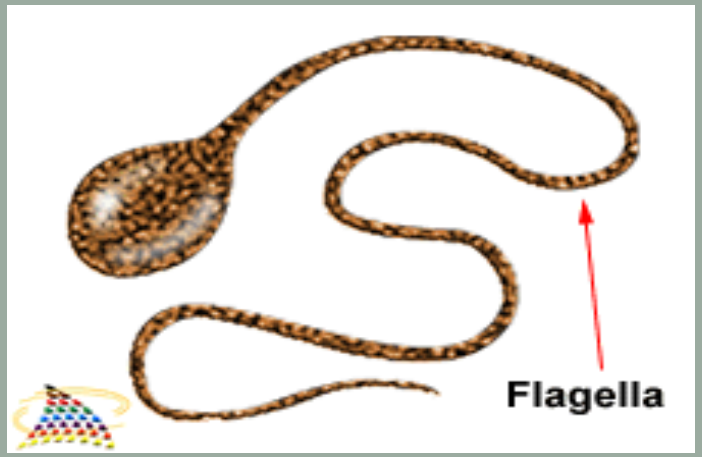
Bacterial Shapes

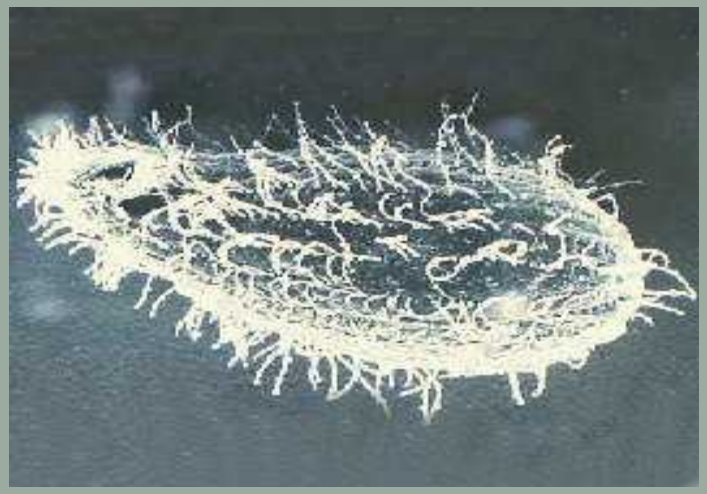
- Bacteria come in 3 main shapes
  - Rod or Stick (bacilli)
  - Sphere (cocci)
  - Helical or spiral (borrelia)



Bacterial Locomotion

- Some bacteria have flagella or cilia for movement
- Some secrete a slime layer and ooze over surfaces like slugs

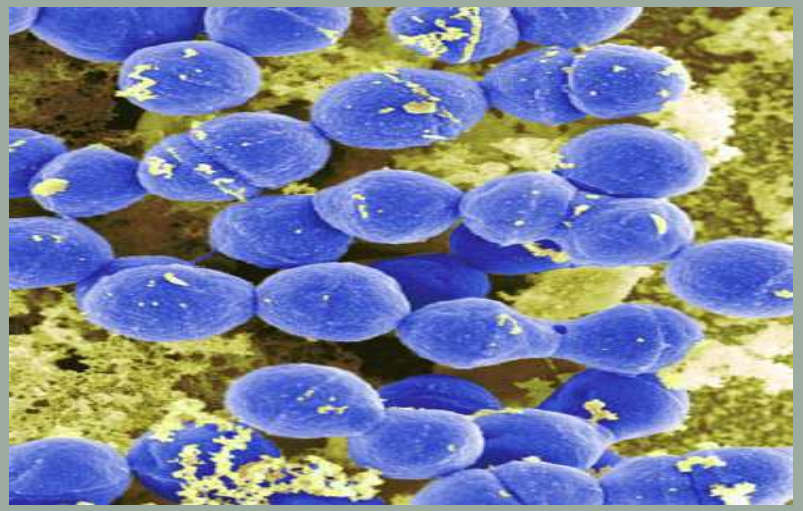




Bacterial Nutrition

- Some bacteria are autotrophs and can photosynthesize

- Some bacteria are heterotrophs



Protists

- Protists include many widely ranging microbes, including slime molds, protozoa and primitive algae.

Odds & Ends Kingdom

Protista Kingdom

- There are animal-like, fungus-like, and plant-like protists
- Some are beneficial
- Some protists can cause diseases in humans, such as:

Disease	Protist	Vector (carrier)	Symptoms	Details
Amebic dysentery	*Ameba histolytica*	water	diarrhea	can get from tap water in some places
Giardaisis (beaver fever)	*Giardia*	water	diarrhea, vomiting	don't drink water from streams
African Sleeping Sickness	*Trypanosoma*	Tse tse fly	uncontrolled sleepiness, confusion	Only found in isolated areas lives in blood
Malaria	*Plasmodium*	*Anopheles* mosquito	fever, chills, death	can be treated with quinine lives in blood results in millions deaths per year
Toxoplasmosis	*Toxoplasma*	cats	fetal death or brain damage	pregnant women should avoid cat litter

Protists Disease

- Amebic dysentery

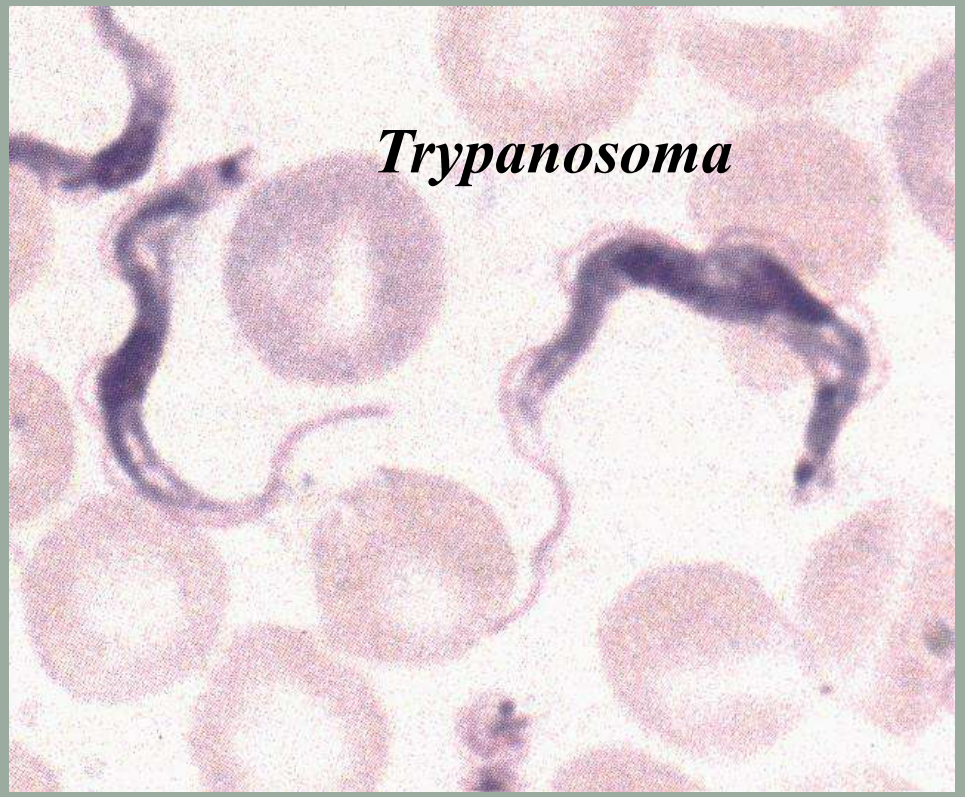
Protists Disease

- Giardiasis

(beaver fever)

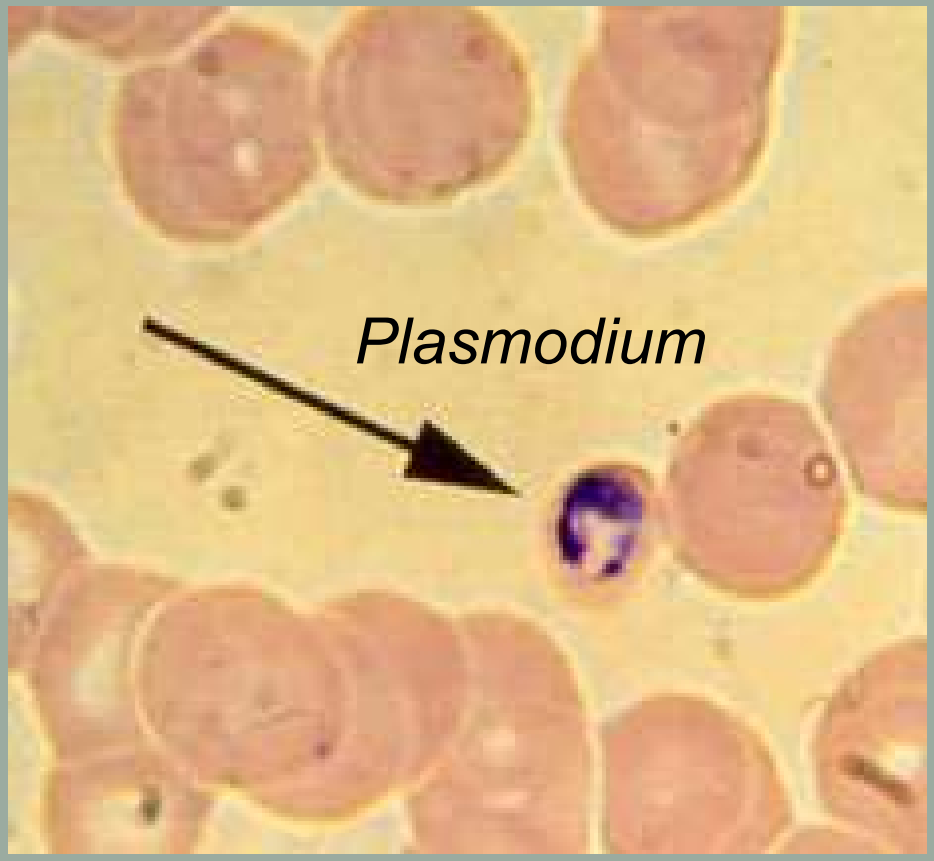
Protists Disease

- African Sleeping Sickness



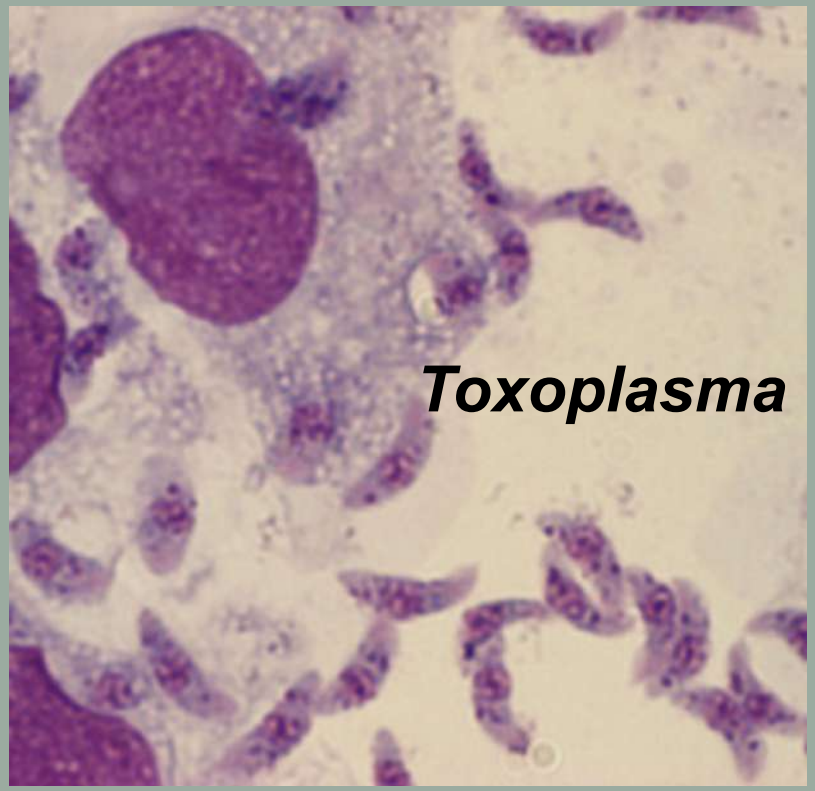
Protists Disease

- Malaria



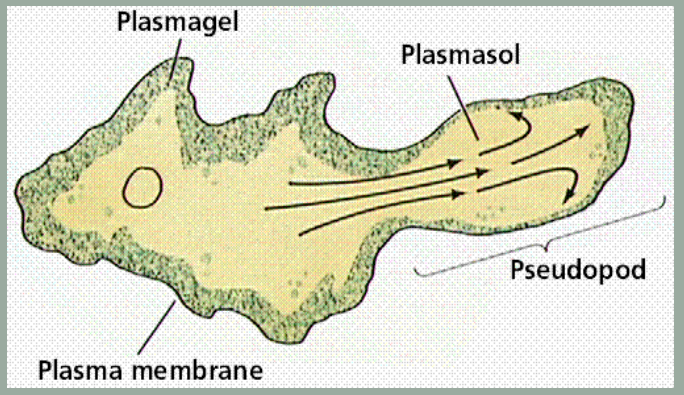
Protists Disease

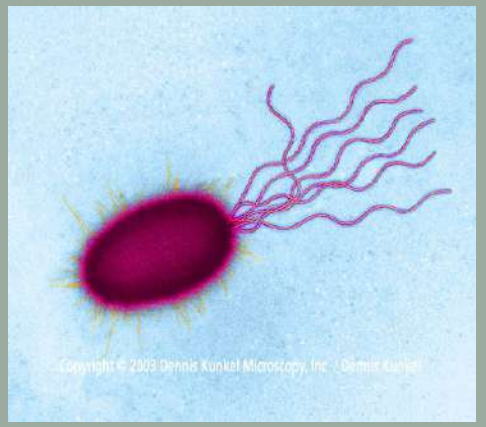
- Toxoplasmosis

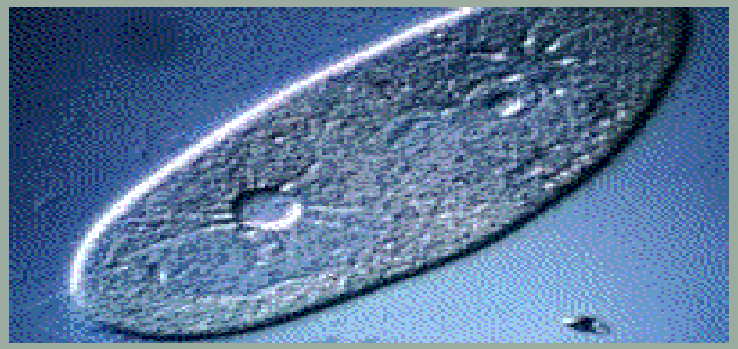


Protists Locomotion

- 3 types of movement:
  - Pseudopod (false foot)
  - Flagella/cilia
  - Contractile vacuoles

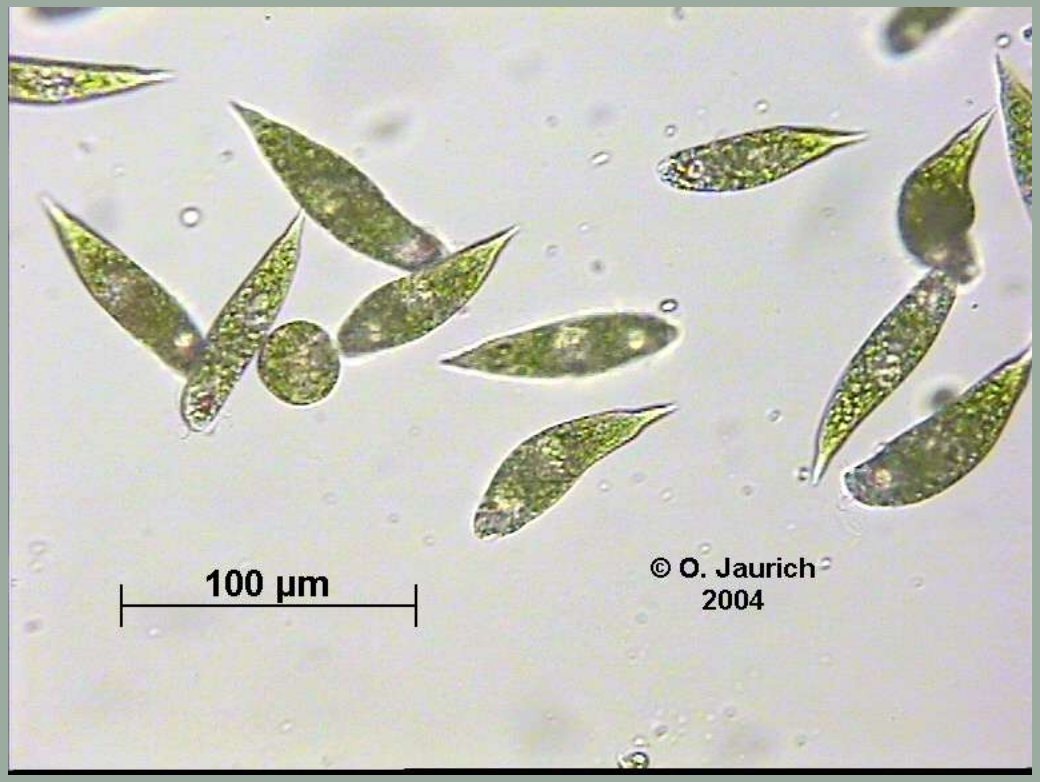






Protists Nutrition

- Protists can be autotrophs or heterotrophs



Fungi Kingdom

- The Kingdom Fungi includes some of the most important organisms.
- By breaking down dead organic material, they continue the cycle of nutrients through ecosystems.

Fungi

- All fungi are eukaryotic
- They may be unicellular or multicellular
- All fungi have a cell wall

Unicellular (yeast)

Multicellular

Fungi

- Fungi can be very helpful and delicious

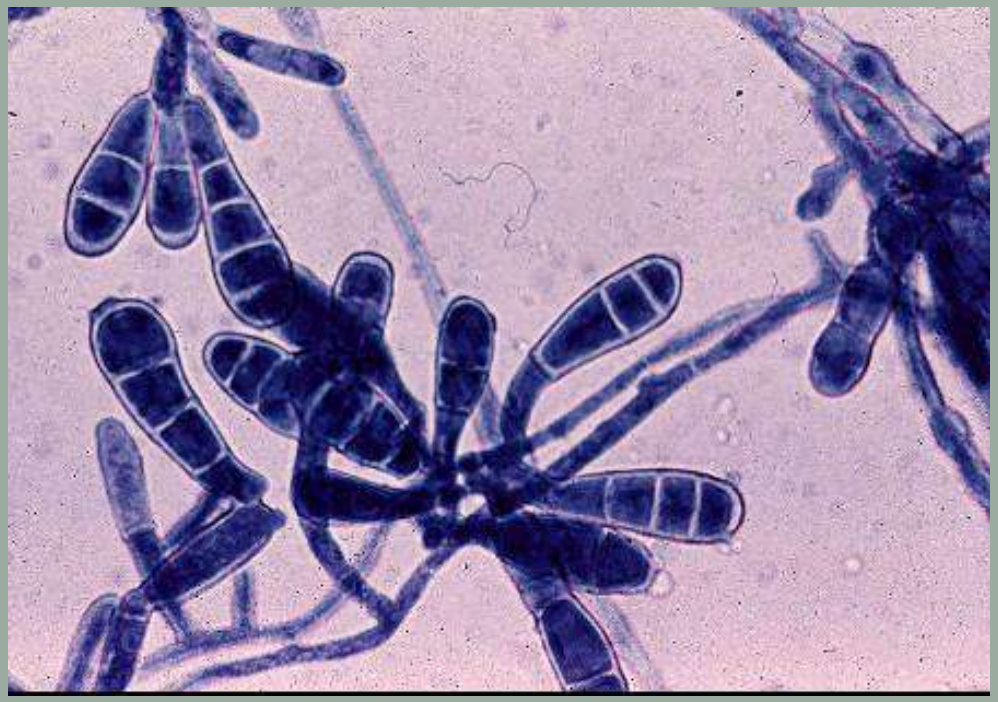
- Many antibacterial drugs are derived from fungi

Penicillin

Fungi

- Fungi also causes a number of plant and animal diseases:

◇Athlete's Foot

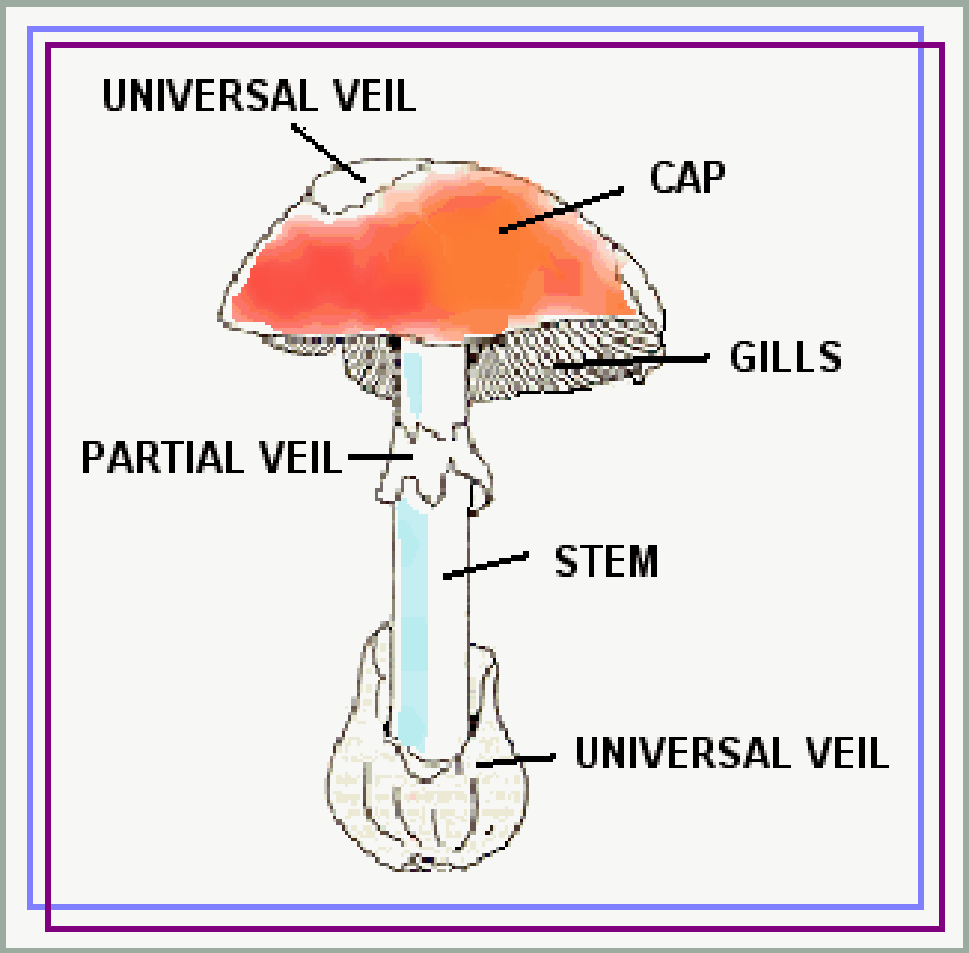


Fungi

- Ringworm

Fungi Locomotion

- Fungi are stationary
- They have root-like structures that they use for attachment



Fungi Nutrition

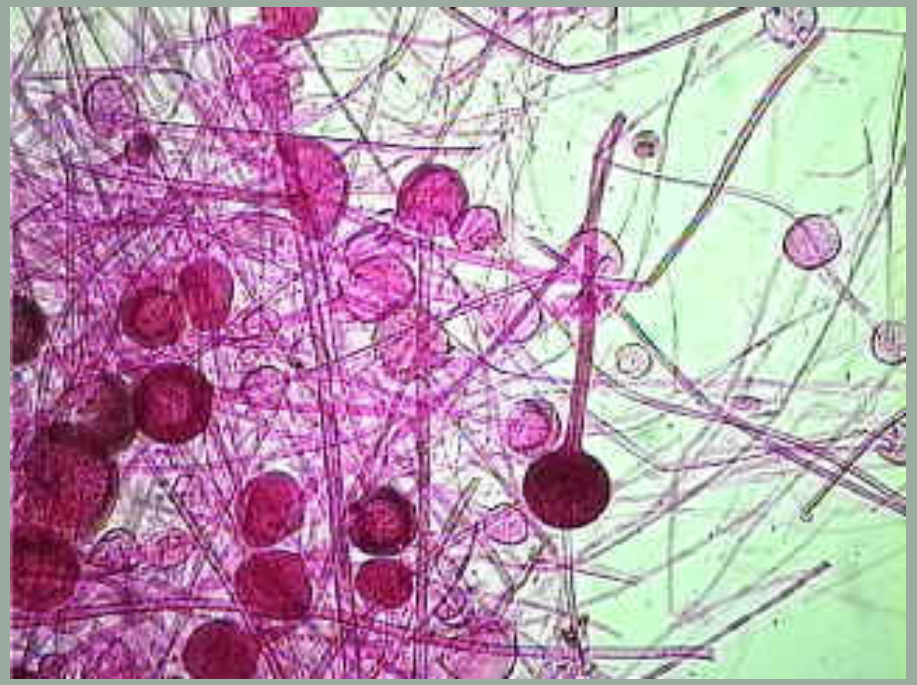
- All fungi are heterotrophs
  - Saprophytes–get their nutrients from dead organic matter
- Mutualists – live symbiotically
- Parasites – absorb from a host, eventually killing the host

There are 4 main types of Fungi (classified by how they reproduce)

1. Zygospore (Zygosporangia)

common bread molds

reproduce by "spores"- asexual reproduction!



There are 4 main types of Fungi

2. Club Fungi (Basidiomycetes)
   Mushrooms & puffballs

- Reproduce by spores, some spores are asexual (coming from mitosis) and some are sex spores (coming from meiosis)

There are 4 main types of Fungi

3.Sac Fungi (Ascomycetes)

Yeast – reproduce by

"budding" = asexual method

There are 4 main types of Fungi

4.Imperfect Fungi (Deuteromycetes)

<u>Pharmaceutically important!</u>

-Fungi on oranges from which penicillin is extracted

<u>COMMERCIALLY important!</u>

-Fungi accounts for the blue vein in blue cheese!

-Used to make soy sauce. Yum!

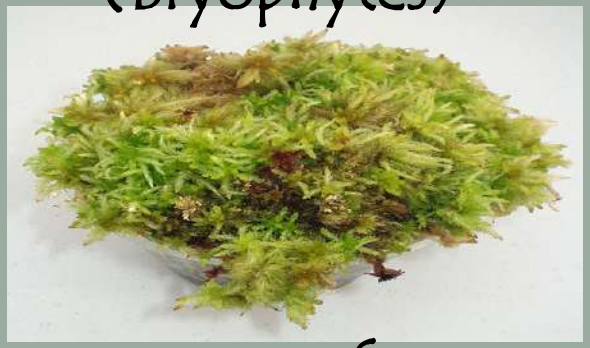
Plant Kingdom

- All plants are multicellular, their cells having a cell wall, and…
- they are autotrophs

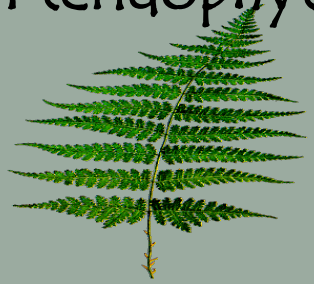
- 4 important plant groups are the:

Non-vascular

Mosses
(Bryophytes)



Ferns
(Pteridophytes)



Vascular

Conifers
(Gymnosperms)

Flowering Plants
(Angiosperms)

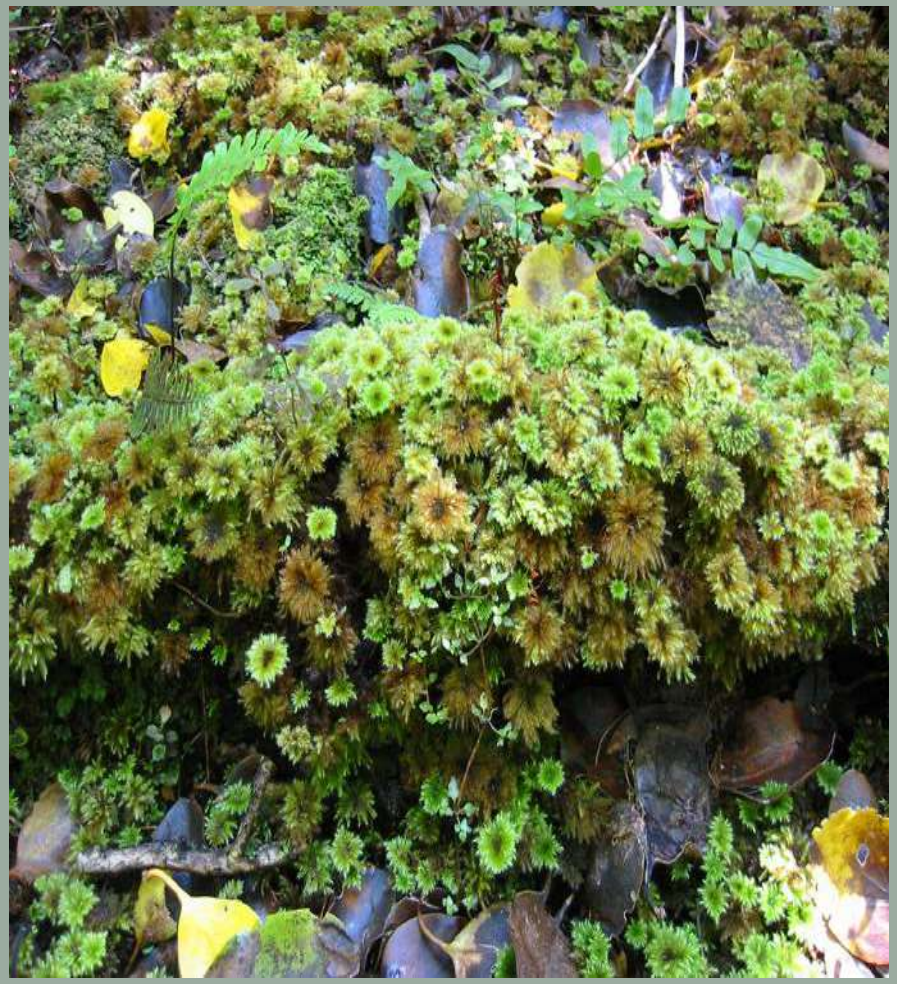
- **Nonvascular Plants - Mosses**

- the simplest of all land dwelling plants
- lack an internal means for water transportation
- do not produce seeds or flowers

-fertilization depends on water medium to get the sperm to the egg.

- lack a woody tissue necessary for support around their "stems" and so are usually relatively short

- Mosses



- Liverworts & Hornworts

- **Vascular Plants**

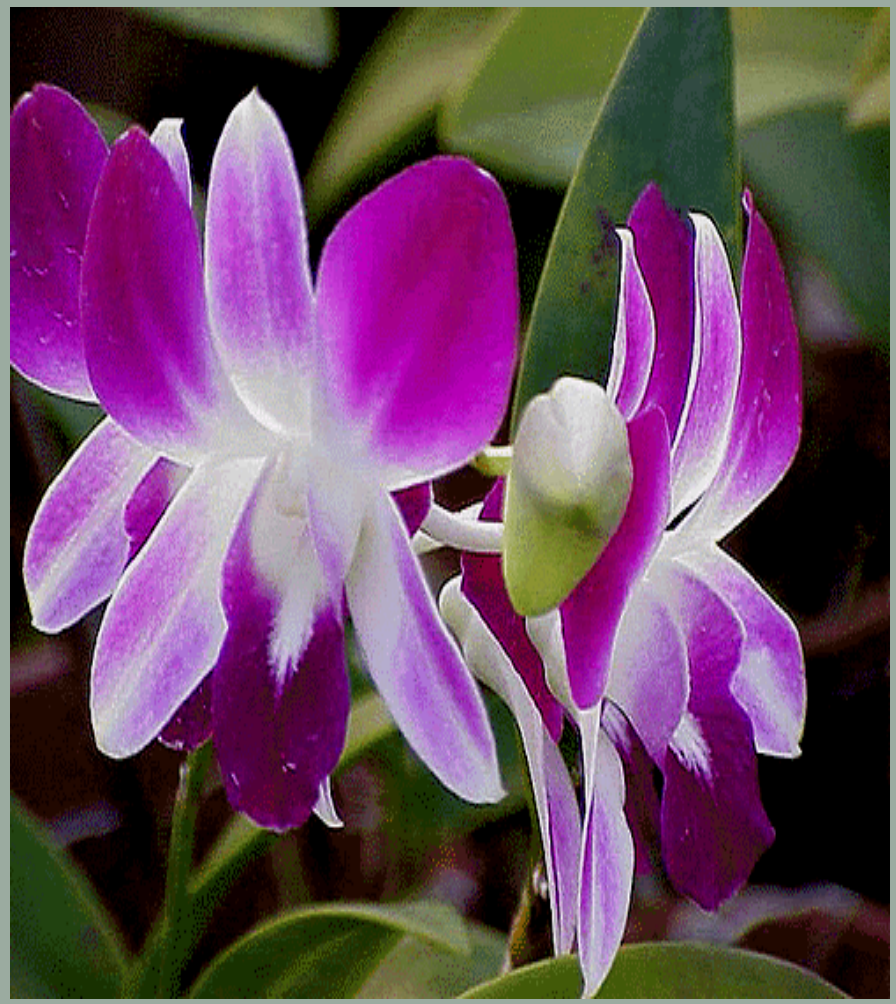
◇Internal transportation System
◇ Xylem – water carrying tubes
◇ Phloem – sugar carrying tissues
◇ enables plants to evolve into larger specimens.

◇Produce Seeds – protects and nourishes an Embryo of the new plant

Gymnosperms

- Conifers (pine cones)
- Oldest vascular plants

Angiosperms
- flowering plants



Animalia Kingdom

All animals are:

-Multicellular: cells lacking a cell wall
-Heterotrophs

-Capable of movement at some point in their lives.

Criteria for Classification within the Animal Kgdm

Body Symmetry

1. **Asymmetrical**

Asymmetrical animals (sponges) have no general body plan or axis of symmetry that divides the body into mirror-image halves.

2. Radial Symmetry

Animals (such as coral and jelly fish) have body parts organized about a central axis and tend to be cylindrical in shape.

3. Bilateral Symmetry

Bilaterally symmetrical animals (such as humans and fish)

have only a single plane of symmetry that produces mirror halves.

2nd Criteria for Animal Classification

- **Skeletal Characteristics**
  - **Invertebrates**

    have a hard external skeleton made of chitin known as an exoskeleton
  - **Vertebrates**

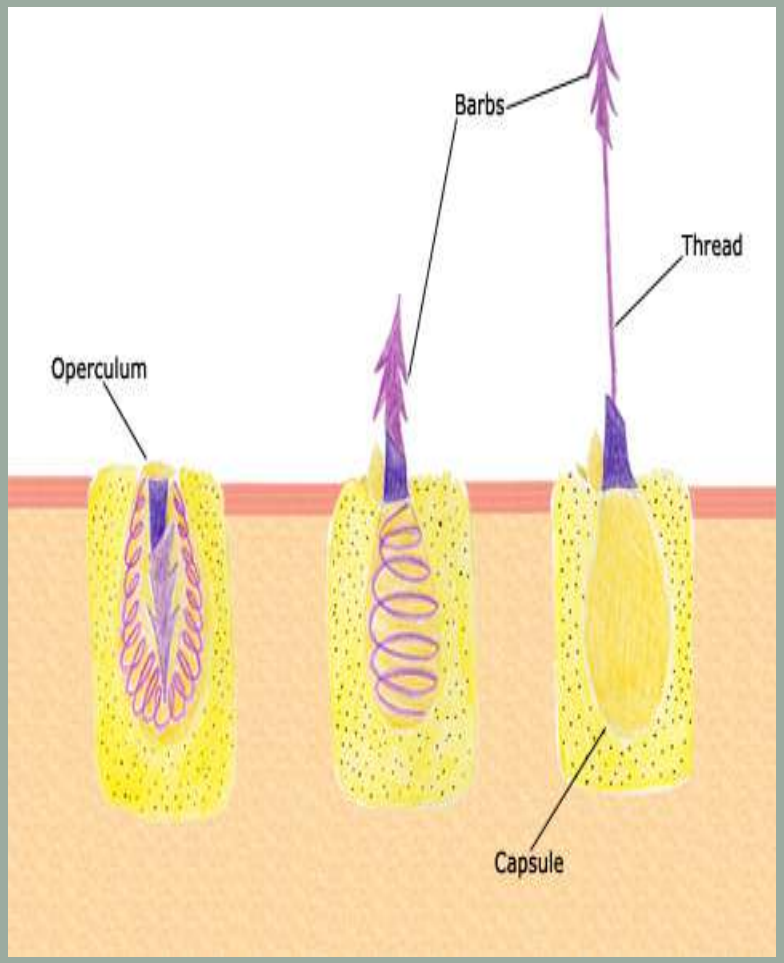
    have a hard internal skeleton made of bone or cartilage

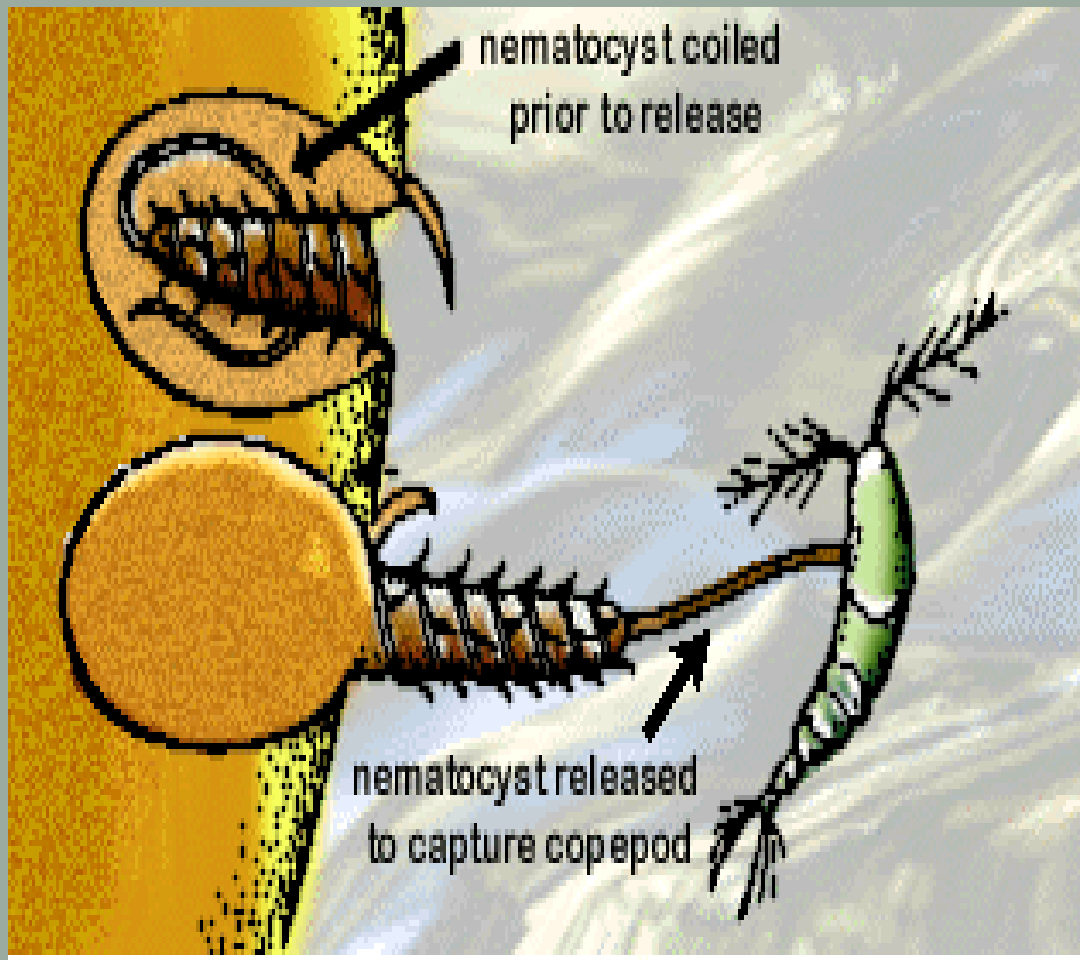
- Kingdom
  - PhylumMajor phylums of animals are…
    - Subphylum
      - Class
        - » Order
        - » Family
        - » Genus
        - » species

- Porifera: sponges

- Cnidarians: Jellyfish, corals, and other stingers. . . Their stinger is called a nematocyst

- Nematocyst





The stinging cells (nematocyst) found in coral tentacles in coiled and released positions.

Another Cnidarian – the Hydra

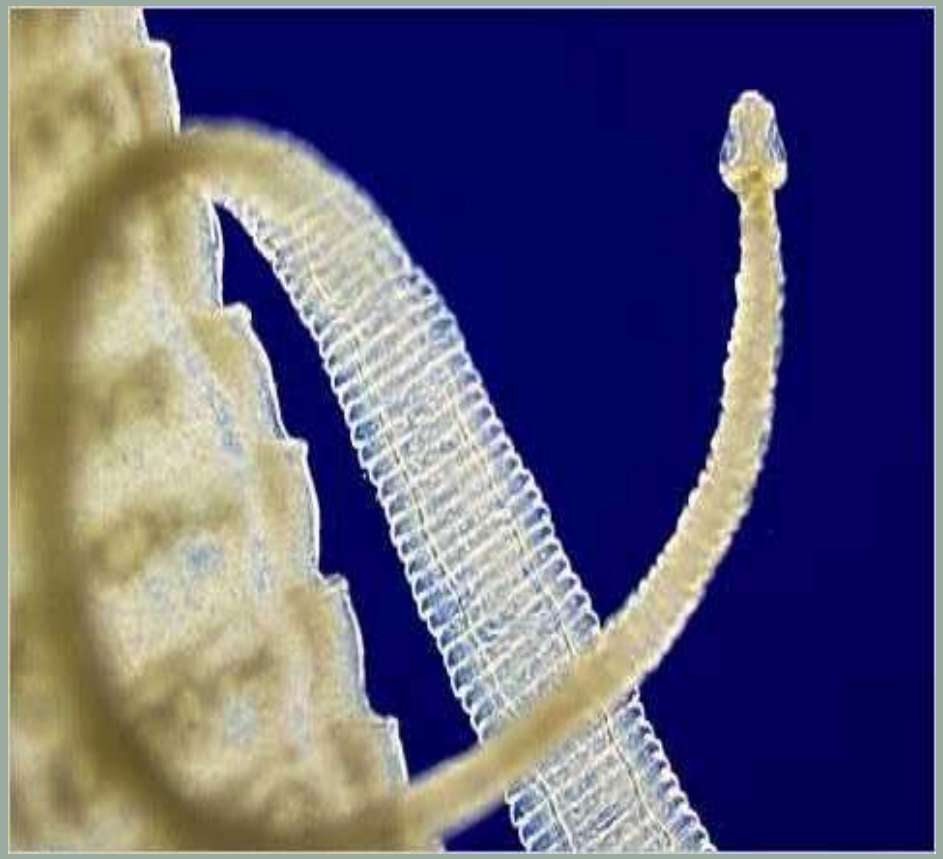
- Hydra can reproduce asexually by “budding”
- A “bud” is a CLONE of its parent

- Mollusks
  - Octopi, squid

- Mollusks
  - Clams, oysters

- Mollusks
  - Snails, slugs

- Platyhelminthes (flat worms)
  - Tapeworms & Liver Fluke & Planaria



Human liver fluke

Flatworms – PLANARIA

- **Hermaphrodites**
  - fertilize their own sex cells internally
  - zygotes are released into water to hatch

  - **Planaria – capable of <u>regeneration</u>**

    being studied to understand stem cells ability to differentiate.

- Annelids (segmented worms)
  - Worms & leeches

- Echinoderms
  - Starfish, sea urchins, sea cucumbers

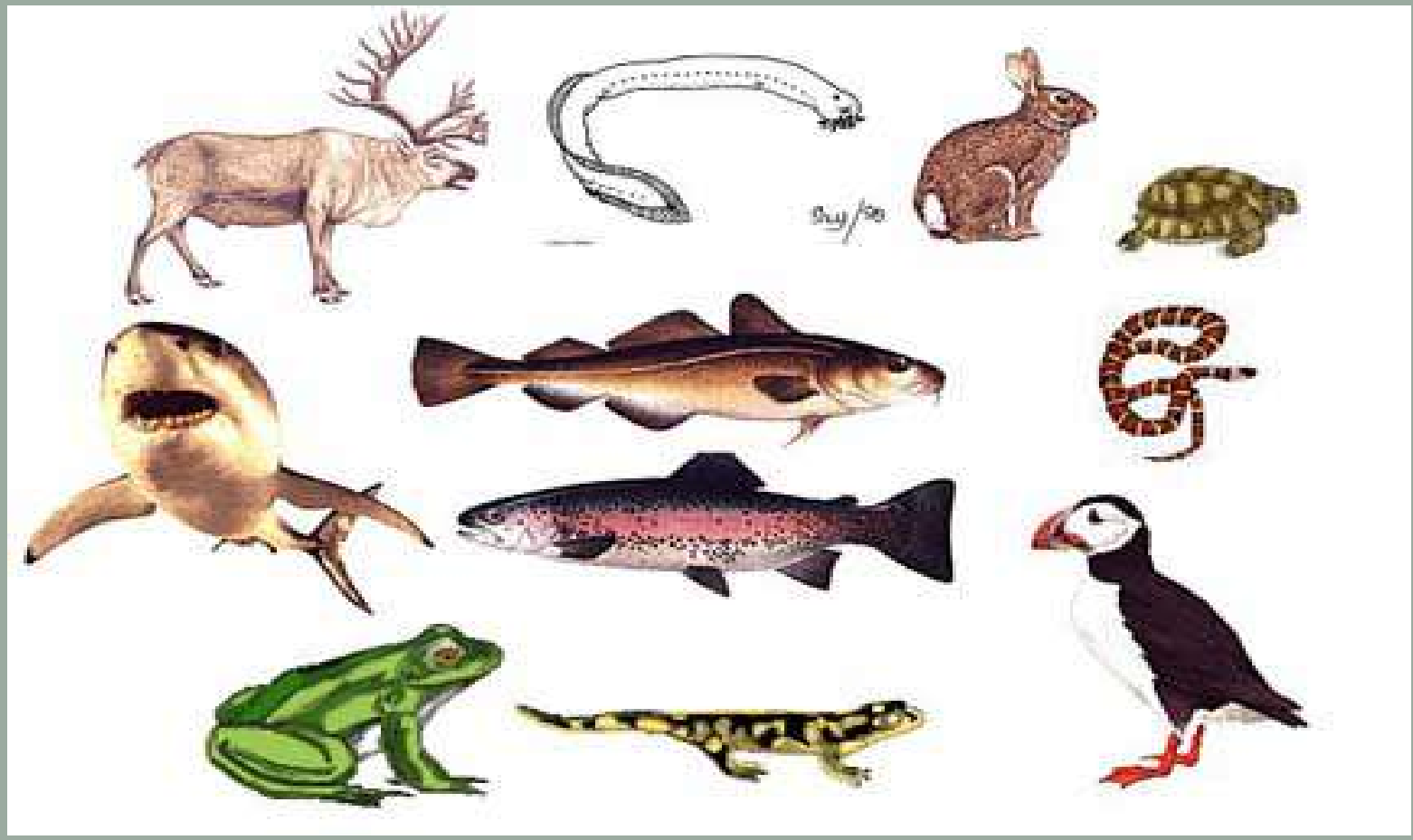
- Arthropods
  - Shell fish, arachnids & BUGS!

- **Phylum: Chordates**
  - The Chordata is the animal phylum with which everyone is most familiar

<u>Subphylum:</u> Vertebrates (backbone)

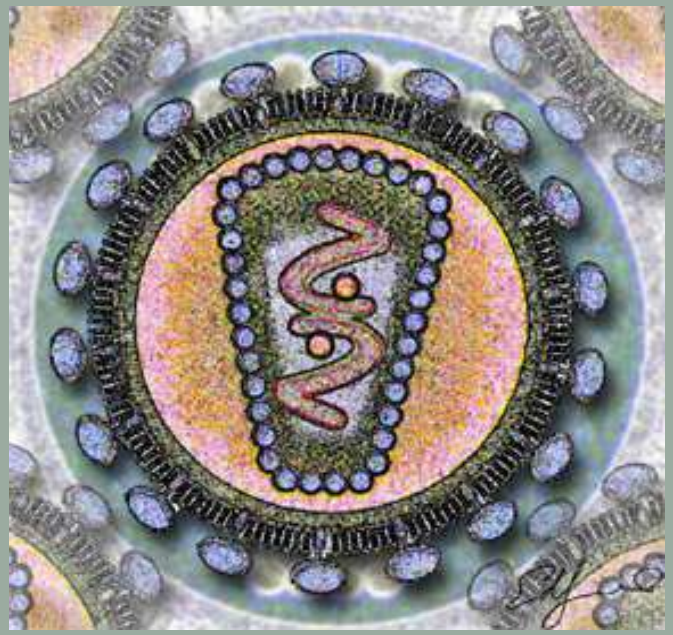
- **Bilateral symmetry**
- **Endoskeletons**
- **Closed circulatory systems**
- **Nervous systems with complex brains**
- **Efficient respiratory systems**

- Phylum: Chordates



Viruses

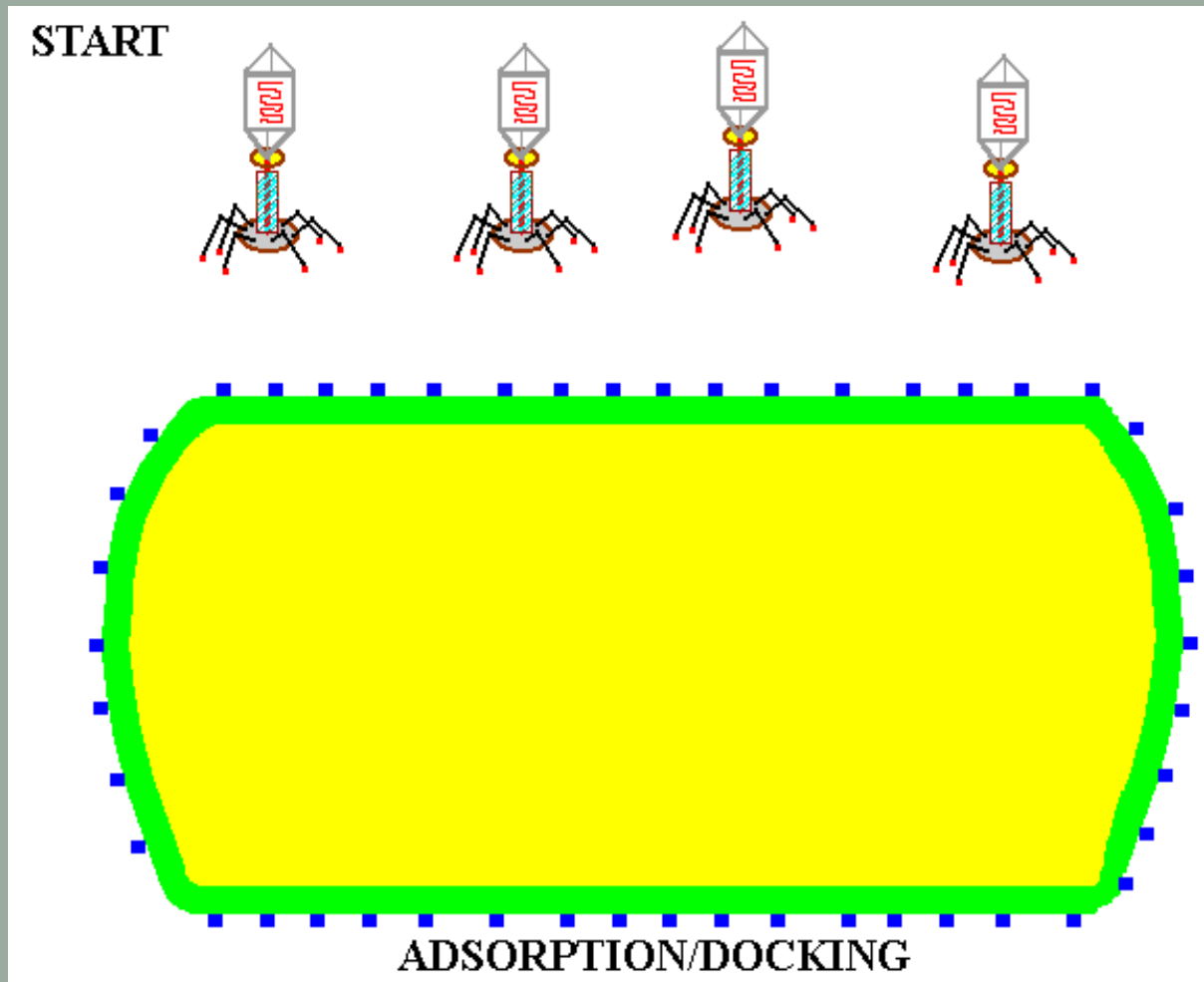
- Viruses do not share many of the characteristics of living organisms.



HIV Virus

Viruses

- Viruses can reproduce only inside a living cell, the host cell.



Viruses

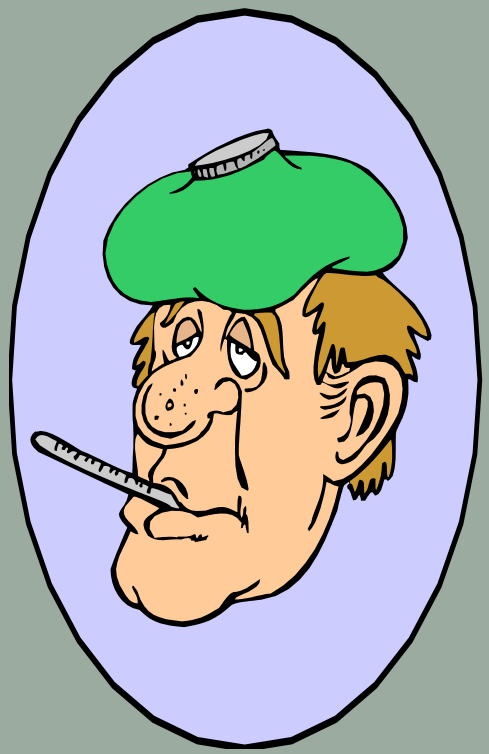
- The viral reproductive process includes the following steps:

1. A virus must insert its genetic material into the host cell.
2. The viral genetic material takes control of the host cell and uses it to produce viruses.
3. The newly formed viruses are released from the host cell.

Virus Vectors

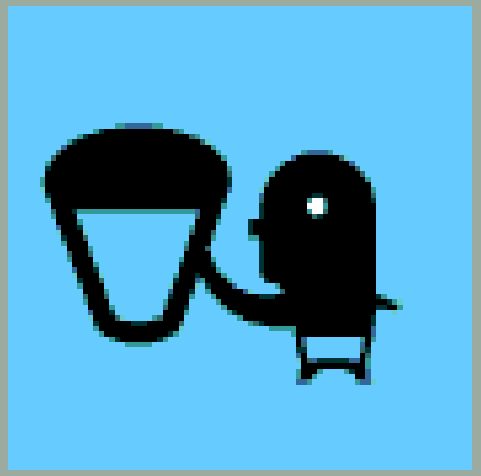
Viruses are transmitted through vectors, such as:

- Airborne
  - Influenza
  - Common cold



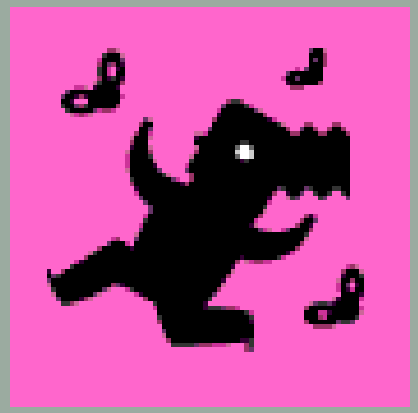
Virus Vectors

- Contaminated food or water
  - Hepatitis



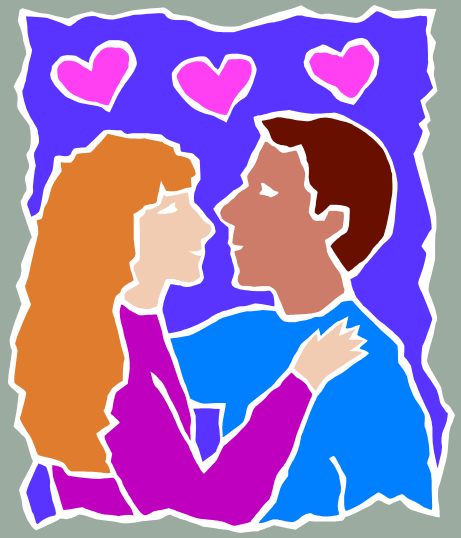
Virus Vectors

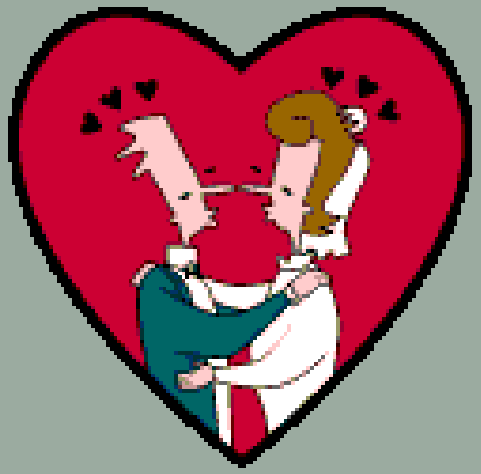
- Infected animal bite
  - West Nile
  - Rabies
  - Avian influenza (bird flu)
  - Ebola



Virus Vectors

- Sexual contact
  - HIV
  - Herpes





Virus Vectors

- Contaminated blood products or needles
  - HIV
  - Hepatitis

Virus Treatment

- Viruses cannot be treated with antibiotics.
- There are some anti-viral drugs available.
- You generally have to wait for the virus to run its course and let your immune system fight it off.