

# GENERAL BIOLOGY II LAB PRACTICAL I

REVIEW

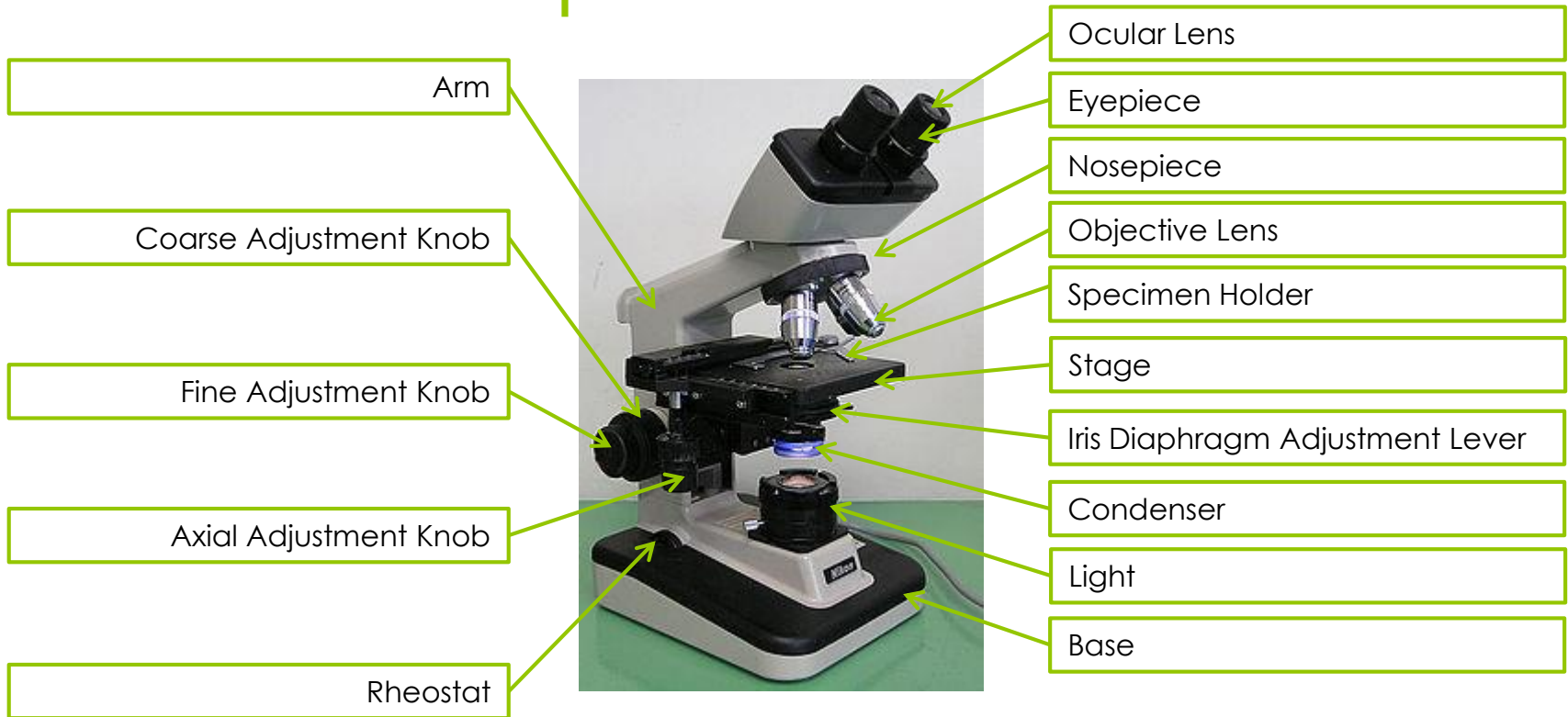
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# Microscopes

## Important Terms

- Eyepiece
- Ocular Lens – Magnifies object by 10x
- Nosepiece
- Objective Lenses – 4x, 10x, 40x, and 100x, Parfocal and Parcentral
- Specimen Holder
- Stage
- Iris Diaphragm Adjustment Lever
- Condenser – Focuses light
- Light
- Rheostat – Adjusts brightness of light
- Base
- Coarse Adjustment Knob
- Fine Adjustment Knob
- Axial Adjustment Knob
- Arm
- Magnification – How much an object is magnified, i.e. 10x
- Resolving Power – How clear an object remains after magnification
- Contrast – How well objects show up against their background

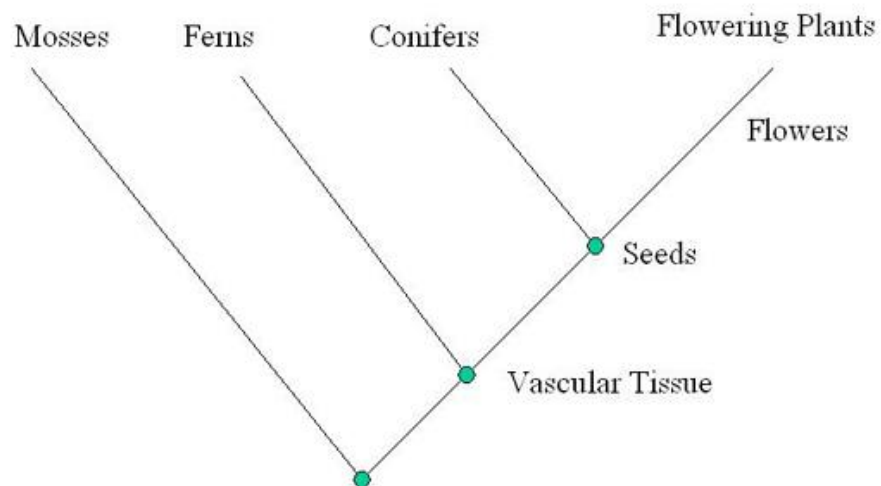
# Microscopes



# Taxonomy

- Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species
- Mnemonics to help you remember:
  - **D**ear **K**ing **P**hillip **C**ame **O**ver **F**rom **G**reece **S**aturday
  - **D**o **K**eeP **P**iling **C**hocolate **O**n **F**or **G**oodness **S**ake
- 3 Domains
  - Archaea, Bacteria, Eukarya
- 4 Kingdoms in Eukarya
  - Protista, Plantae, Fungi, Animalia

# Taxonomy - Cladogram



- Cladogram
  - a visual depiction, based on morphology or DNA evidence, that shows the relation of different organisms
  - Each point of divergence is a node, and each branch shows a different clade.

# Taxonomy – Dichotomous Key

- Dichotomous Key
  - A series of either or choices used to identify organisms based on morphological characteristics

Example 1



Dichotomous Key to Representative Birds

- |   |                     |
|---|---------------------|
| Dichotomous Key to Representative Birds                               |                     |
| 1. a. The beak is relatively long and slender.....                    | <i>Certhidea</i>    |
| b. The beak is relatively stout and heavy.....                        | go to 2             |
| 2. a. The bottom surface of the lower beak is flat and straight ..... | <i>Geospiza</i>     |
| b. The bottom surface of the lower beak is curved .....               | go to 3             |
| 3. a. The lower edge of the upper beak has a distinct bend .....      | <i>Camarhynchus</i> |
| b. The lower edge of the upper beak is mostly flat .....              | <i>Platyspiza</i>   |

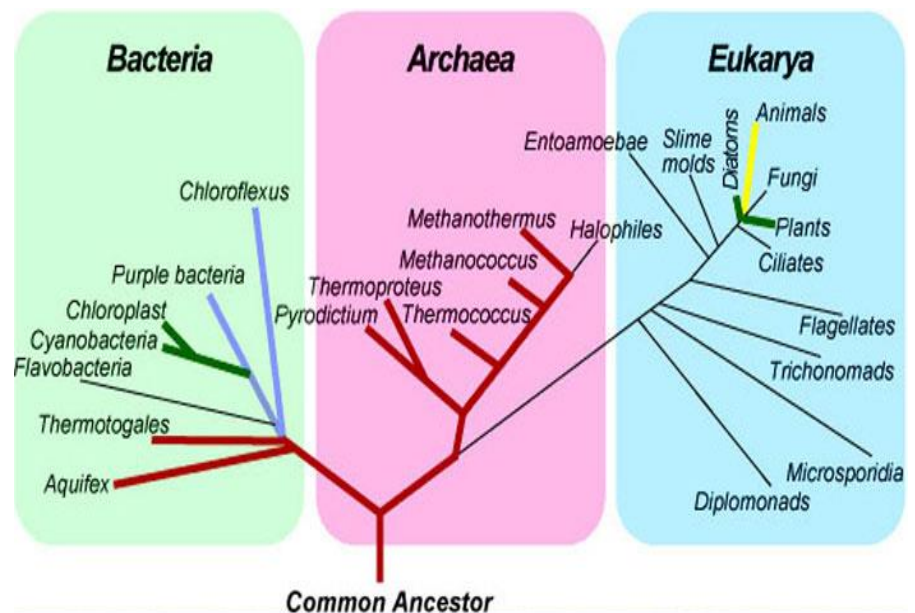
Example 2

Key to Writing Implements

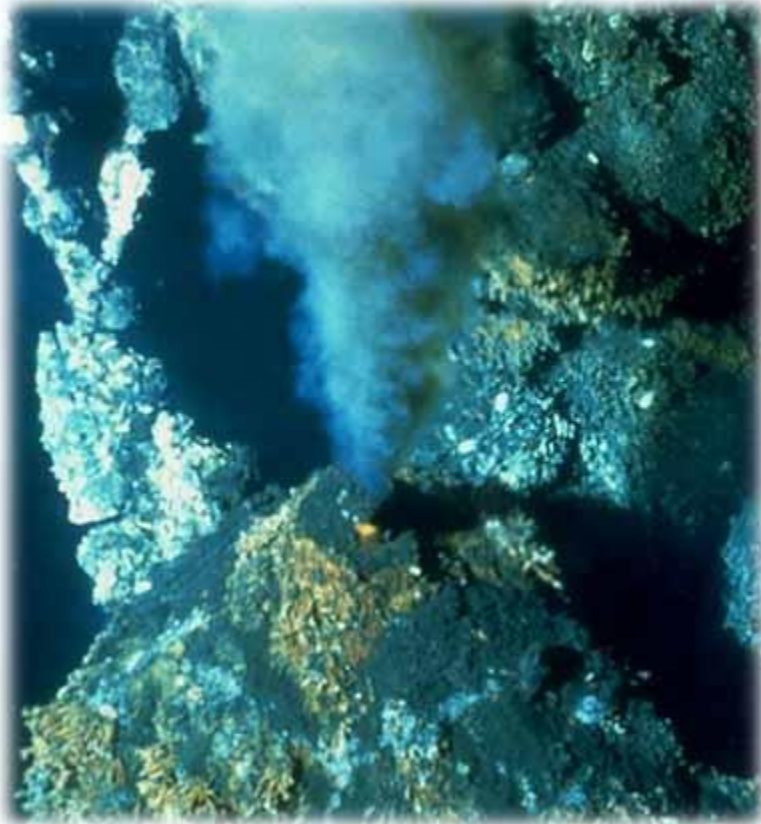
- |   |                 |
|---|-----------------|
| 1. Writes with ink.....                   | go to 2         |
| 1. Writes with graphite.....              | go to 4         |
| 2. Writing tip is metal.....              | go to 3         |
| 2. Writing tip is felt.....               | marker          |
| 3. Writing tip contains a ball.....       | ball point pen  |
| 3. Writing tip does not contain a ball... | calligraphy pen |
| 4. Body is made of wood.....              | regular pencil  |
| 4. Body is not made of wood.....          | mechanical      |

# Domains

- There are 3 domains
  - Archaea
    - Unicellular prokaryotic cells, extremophiles
  - Bacteria
    - Unicellular prokaryotic cells
  - Eukarya
    - Uni- and multicellular eukaryotic cells



# Domain Archaea

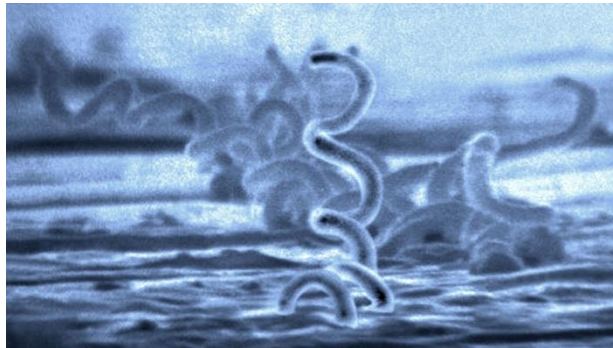


- Archaeans are extremophiles.
- They live in very harsh environments such as salt lakes and hydrothermal vents.

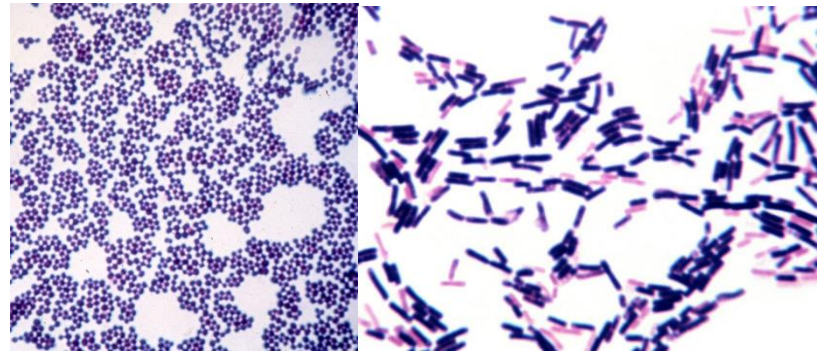
# Domain Bacteria

Bacteria are prokaryotic cells, lacking a nucleus and membrane-bound organelles. They are able to gain new genetic information via transduction, transformation, and conjugation

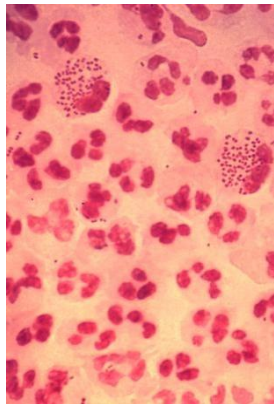
**Spirochaete**



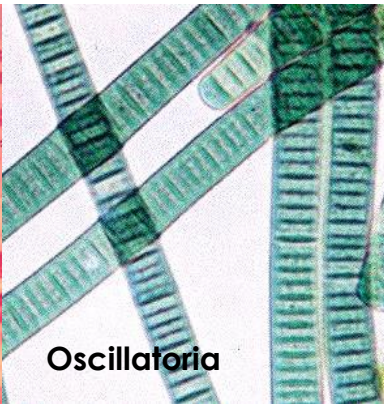
**Gram Positive**



**Chlamydia**



**Cyanobacteria**

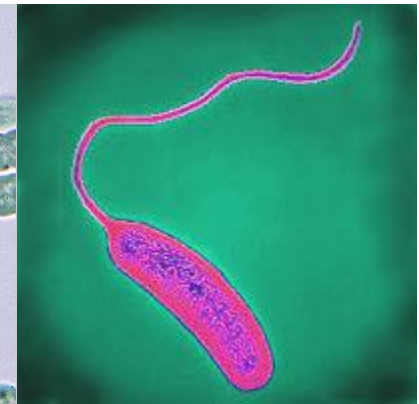


**Oscillatoria**

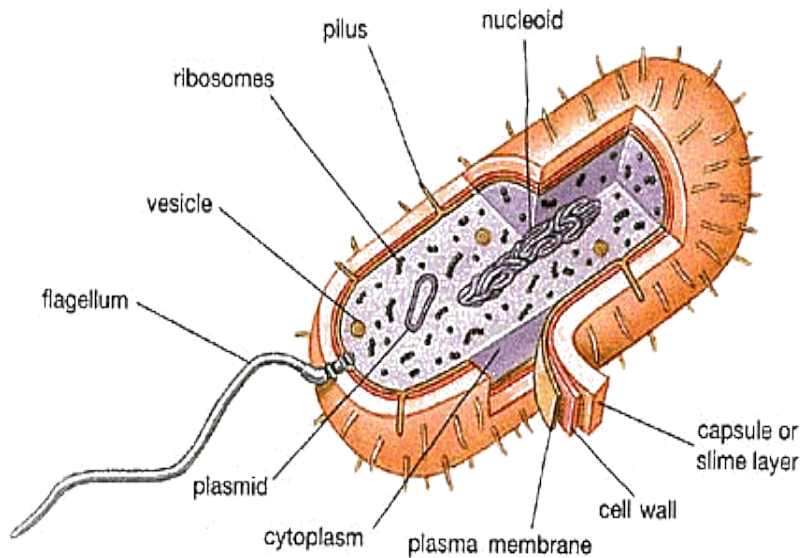


**Anabaena**

**Proteobacteria**



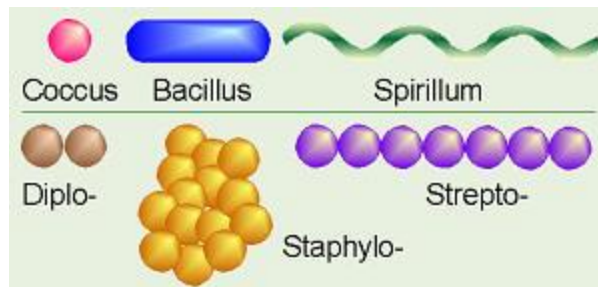
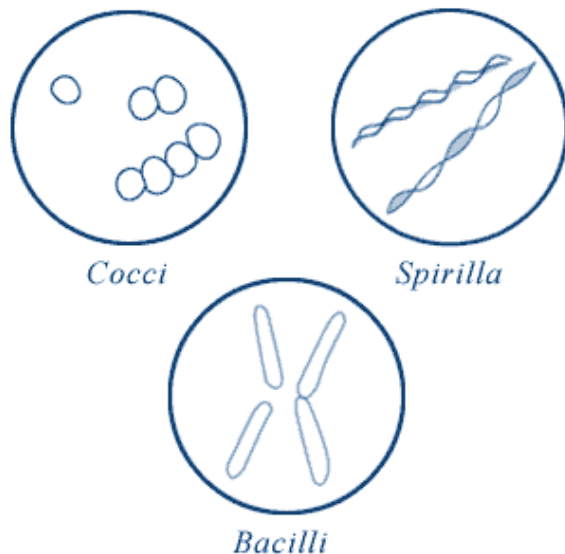
# Bacteria



- Cell Wall
  - provides structural support and some protection
- Capsule or Slime layer
  - Provides protection from phagocytosis and other environmental hazards, not all bacteria have this

- Nucleoid
  - A congregation of DNA in the general center of the cell. NOT a nucleus.
- Pilus
  - Assists in bacterial conjugation, allows two bacteria to attach to exchange genetic information
- Ribosome
  - makes protein
- Vesicle
  - small package made from pieces of membrane
- Flagellum
  - whip-like apparatus used for bacterial movement
- Plasmid
  - small circular piece of DNA
- Cytoplasm
  - liquid part of a cell
- Plasma Membrane
  - holds the cell together, separates the inside of the cell from the environment

# Bacteria



## Cell Shapes

- Cocci
  - Round Bacteria
- Bacilli
  - Rod-Shaped Bacteria
- Spirilla
  - Spiral Bacteria

## Types of Bacteria

- Chlamydia
- Cyanobacteria
  - Autotrophic, also called blue-green algae
- Gram Positive
  - Test positive (purple) in a Gram Stain
- Proteobacteria
  - Alpha, beta, and gamma
- Spirochaete
  - Spiral-shaped

# Bacteria

## Diseases Caused by Bacteria

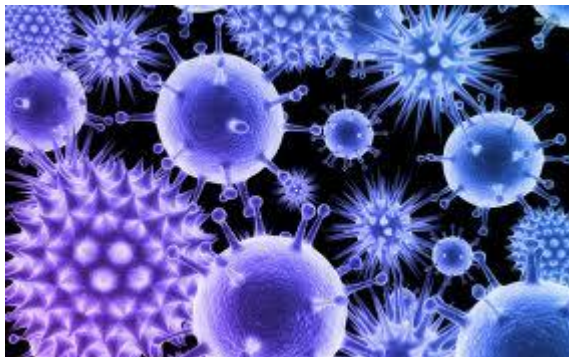
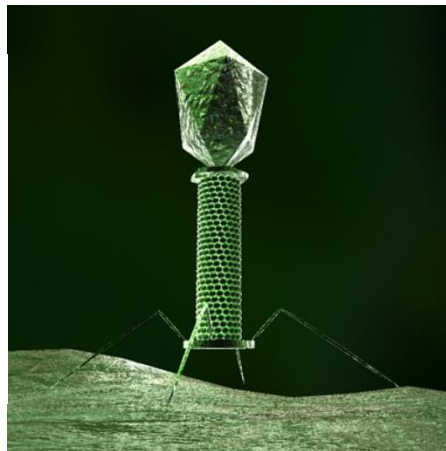
Organism	Disease
<i>Mycobacterium tuberculosis</i>	Tuberculosis
<i>Mycobacterium leprae</i>	Leprosy
<i>Neisseria gonorrhoeae</i>	Gonorrhea
<i>Neisseria meningitidis</i>	Meningitis
<i>Pseudomonas aeruginosa</i>	Lung and Bladder Infections
<i>Staphylococcus aureus</i>	Pimples, Boils, Toxic Shock Syndrome, MRSA
<i>Streptococcus pyogenes</i>	Strep Throat
<i>Corynebacterium diphtheriae</i>	Diphtheria
<i>Bacillus anthracis</i>	Anthrax
<i>Salmonella typhi</i>	Typhoid Fever
<i>Shigella</i> spp.	Bacterial Dysentery
<i>Escherichia coli</i>	Gastrointestinal Problems
<i>Legionella pneumophila</i>	Legionnaire's Disease
<i>Vibrio cholerae</i>	Cholera
<i>Vibrio vulnifous</i>	Flesh-Eating, Intestinal Problems

# Bacteria

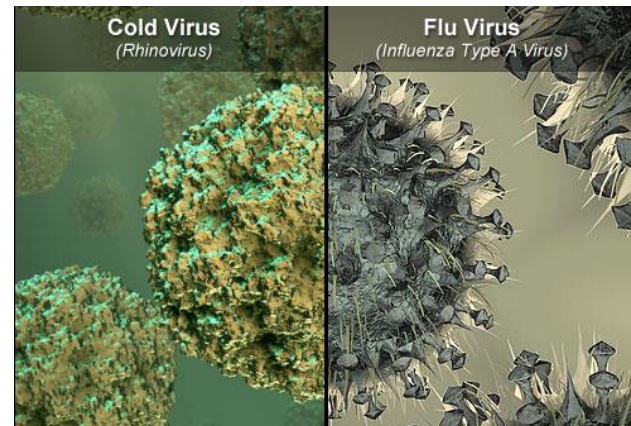
## Diseases Continued

Organism	Disease
<i>Yersinia pestis</i>	Bubonic Plague
<i>Haemophilus influenzae</i>	Meningitis, Pinkeye, Otitis Media
<i>Chlamidia trachomatis</i>	Chlamydia
<i>Clostridium perfringens</i>	Gangrene
<i>Clostridium tetani</i>	Tetanus
<i>Clostridium botulinum</i>	Botulism
<i>Helicobacter pylori</i>	Ulcers
<i>Leptospira interrogans</i>	Leptospirosis
<i>Treponema pallidum</i>	Syphilis
<i>Borrelia burgdorferi</i>	Lyme Disease
<i>Mycoplasma pneumoniae</i>	Atypical Pneumonia
<i>Rickettsia rickettsii</i>	Rocky Mountain Spotted Fever
<i>Rickettsia prowazekii</i>	Epidemic Typhus

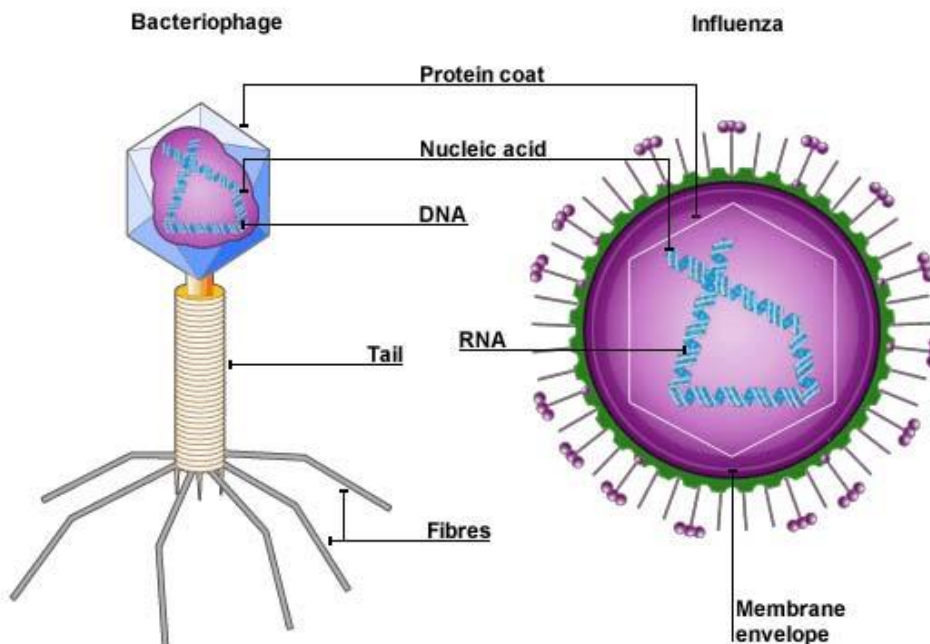
# Viruses



- Viruses are:
  - not cells
  - not technically alive
  - made up of some genetic material, either DNA or RNA
  - encased in a membrane or protein capsule of some kind.



# Viruses



- Protein Coat
  - also called a capsid, this protects the genetic material in all viruses
- Nucleic Acid
  - genetic material, either DNA or RNA, present in all viruses
- Membrane Envelope
  - present in some, but not all, viruses. Covers protein coat.
- Tail
  - In bacteriophages, allows virus to inject DNA into bacterial cell

# Viruses

## Types of Viruses and Examples

Type of Virus	Subtype	Name	Disease
dsDNA	Naked	Adenovirus	Viral Pneumonia, Conjunctivitis
		Papovirus	Warts, Human Papillomavirus
	Enveloped	Herpesvirus	Herpes Simplex Type I and II, Mononucleosis, Epstein-Barr, Shingles
		Poxvirus	Smallpox, Monkeypox
ssDNA	Naked	Inovirus	M13 Bacteriophage
		Parovirus	Parvo in Canines, Feline Panleukopenia
dsRNA	Naked	Cystovirus	Ph16 Bacteriophage
		Reovirus	Rotavirus, Bluetongue in Sheep, Colorado Tick Fever
ssRNA	Naked	Bunyavirus	Hantavirus, Crimean Congo Hemorrhagic Fever
		Calicivirus	Norwalk, Feline Herpes
		Picornavirus	Polio, Hepatitis A, Chronic Fatigue Syndrome, Common cold (Rhinovirus)
	Enveloped	Coronavirus	SARS, Canine Coronavirus
		Flavivirus	Yellow Fever, West Nile, Hepatitis C
		Filovirus	Ebola, Marburg, Reston
		Orthomyxovirus	Influenza Virus, Thogovirus
		Paramyxovirus	Mumps, Measles, Newcastle's Disease, Canine Distemper
		Rhabdovirus	Rabies, Lettuce Necrotic Yellow Virus
		Retrovirus	HIV, SIV, FIV, Mouse Mammary Tumor Virus, Chimpanzee Foamy Virus
		Togavirus	Rubella, Eastern Equine Encephalitis, O'nyong'nyong virus

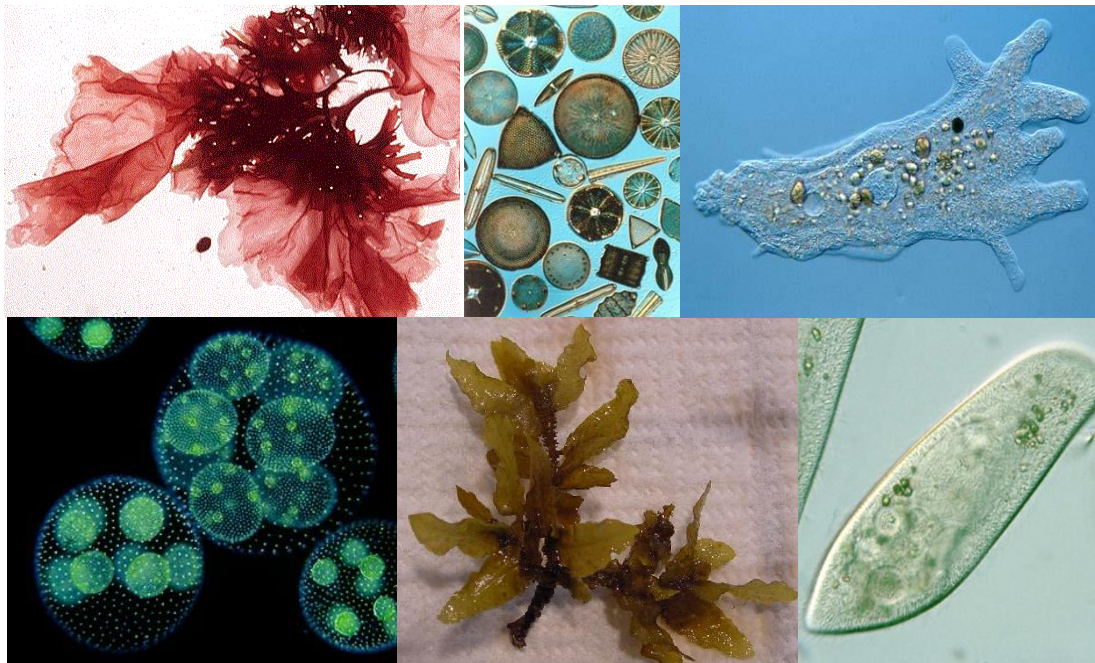
# Domain Eukarya



- All Eukaryotes have a nucleus and membrane-bound organelles. They can be unicellular, colonial, or multicellular organisms.

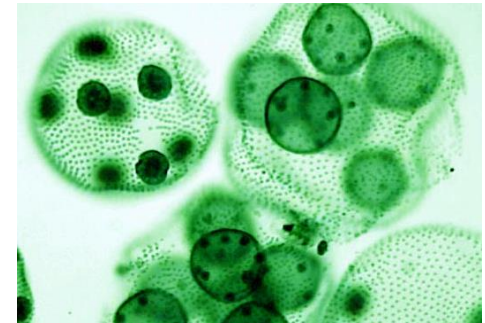


# Kingdom Protista



Protista is one of the most diverse kingdoms of Eukarya, containing both unicellular and colonial organisms of all different shapes, sizes, colors, and complexities.

# Phylum Chlorophyta



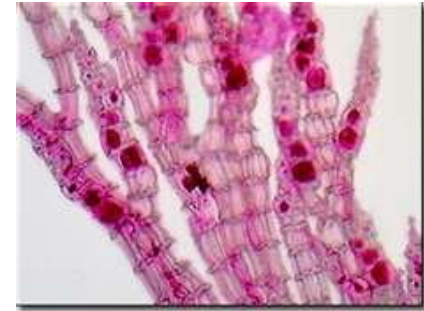
- Green Algae
- Photosynthetic
- Unicellular or Multicellular Colonial
- Motile and Nonmotile
- Ancestors of Modern Plants
- Found in freshwater and marine environments, as well as some terrestrial habitats
- Sexual and Asexual Reproduction

# Phylum Charophyta (Advanced Chlorophyta)



- Green Algae (Pond Scum)
- Photosynthetic
- Found in Freshwater
- Nonmotile
- Have Spiral or Complicated Chloroplasts
- More complex form of Chlorophyta
- Closer Ancestor of modern plants
- Sexual and Asexual Reproduction

# Phylum Rhodophyta



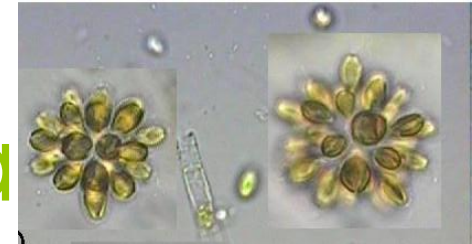
- Red Algae
- Photosynthetic
- Vary in color from red to brown to white depending on concentration and type of accessory photosynthetic pigments (phycobilin)
- Multicellular
- Nonmotile
- Used in production of Agar
- Found in Marine Environments
- Sexual and Asexual Reproduction

# Phylum Phaeophyta



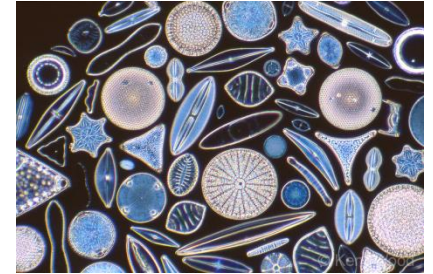
- Brown Algae (Kelps) seaweed
- Photosynthetic
- Nonmotile
- Found in cold marine environments
- Ranges from Dark Green to Brown to Gold depending on concentration of accessory pigments (fucoxanthin)
- Multicellular
- Have holdfasts (not roots, but similar function), stipes (similar to stems), and blades (similar to leaves)
- Sexual and Asexual Reproduction

# Phylum Chrysophyta



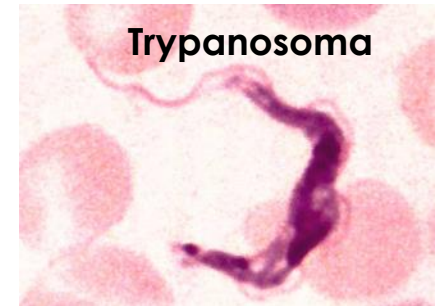
- Golden Algae
- Unicellular
- Motile
- Photosynthetic, though most are facultatively heterotrophic and a very few do no photosynthesis
- Planktonic
- Cell walls containing silicon
- Cells contain oil droplets that serve as food reserves
- Sexual Reproduction

# Phylum Bacillariophyta



- Diatoms
- Have a shell (test) made of two halves and composed of silica
- Found in both marine and freshwater environments
- Make up diatomaceous earth
- Come in multiple shapes, sizes and colors
- Asexual Reproduction

# Phylum Euglenophyta (Phytomastigophora and Zoomastigophora)



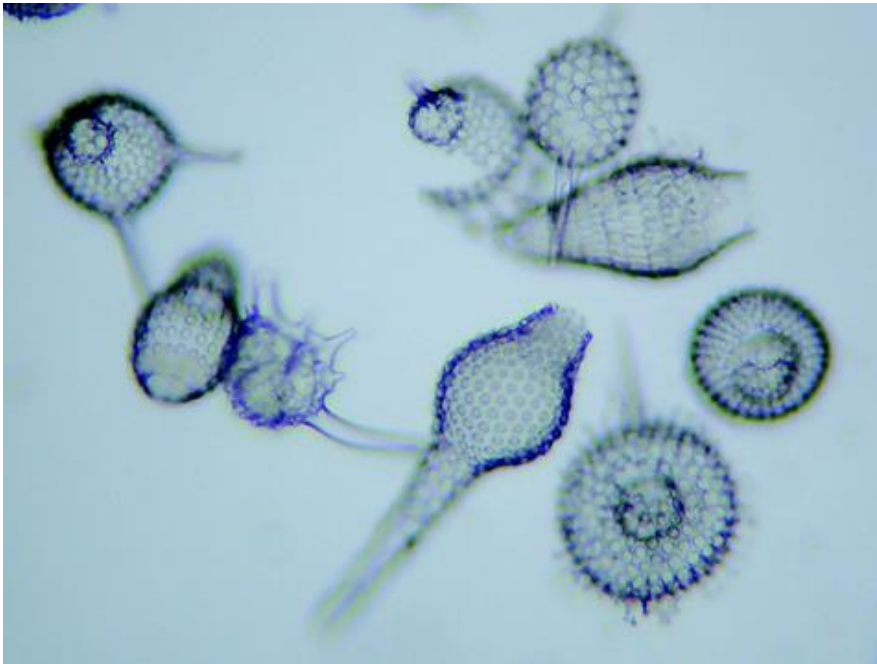
- Euglena (phytomastigophora)
- Trypanosoma (zoomastigophora)
- Unicellular
- Flagellated
- Some photosynthetic (phyto), some not (zoo)
- Some parasitic, pathogenic (trypanosoma)
- Asexual Reproduction

# Phylum Foraminifera



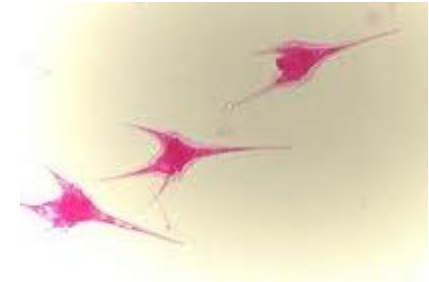
- Foraminiferans
- Amoeboid
- Motile
- Unicellular
- Non photosynthetic
- Have a shell made of calcium carbonate
- Aquatic and Marine
- Asexual Reproduction

# Phylum Actinopoda (Radiolaria)



- Radiolarians
- Endoskeleton made of silicon dioxide arranged in radial, symmetric, geometric shapes
- Unicellular
- Motile
- Stiff pseudopods
- Asexual Reproduction

# Phylum Pyrrophyta (Dinoflagellata)



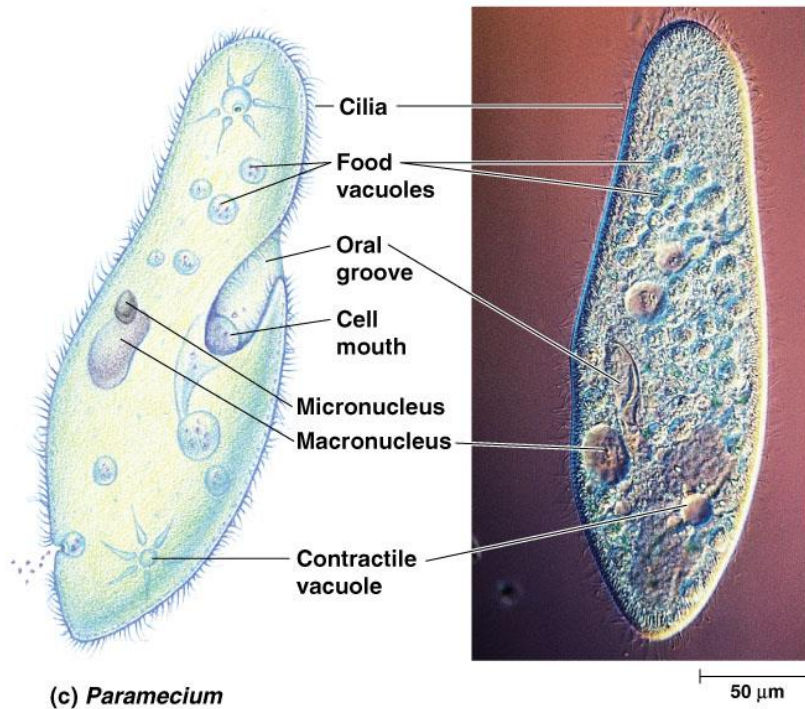
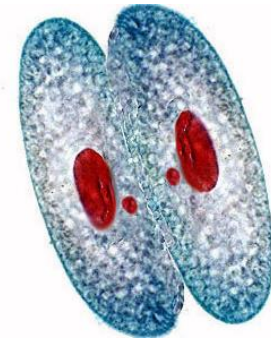
- Dinoflagellates
- Have two flagella, one long and one wraps around in the flagellar groove
- Mainly marine
- Cellulose case
- Responsible for red tide
- Some symbiotic species
- Unicellular
- Asexual Reproduction

# Phylum Sarcodina (Rhizopoda/Amoebozoa)



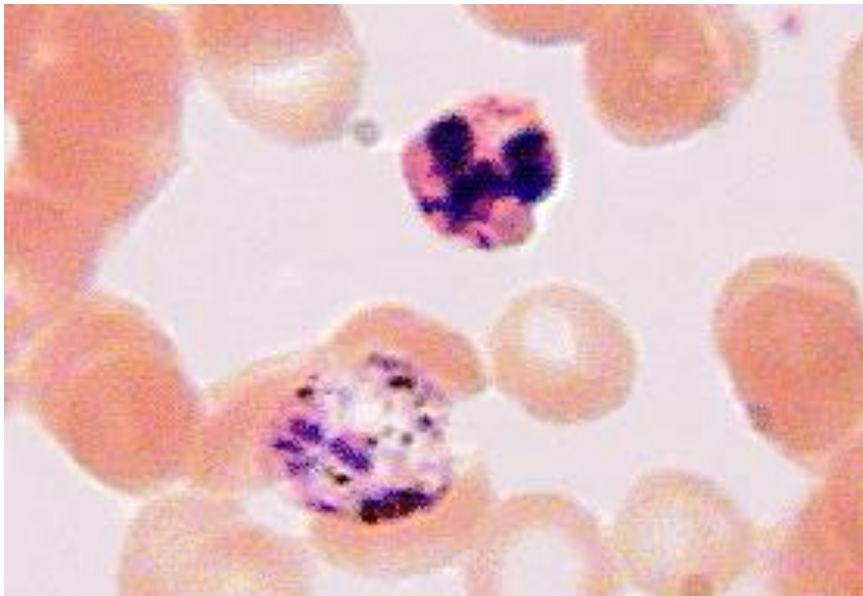
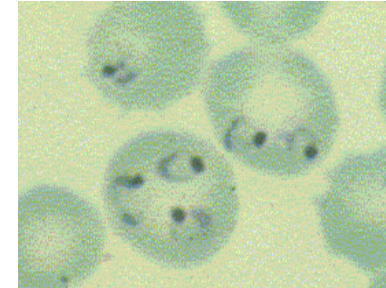
- **Amoeba**
- Motile
- Unicellular
- Have Pseudopods
- Freshwater Environments
- Asexual Reproduction

# Phylum Ciliophora



- **Paramecium**
- Freshwater or Marine environment
- **Ciliated**
- Multinucleate (one macronucleus and at least one micronucleus)
- Some motile and some nonmotile
- Complex organisms
- Sexual Reproduction

# Phylum Apicomplexa



- Apicomplexans
- Parasitic
- Motile and nonmotile (in adult stage)
- Sexual and Asexual Reproduction
- Unicellular
- Cluster of organelles at apical end of cell
- Malaria

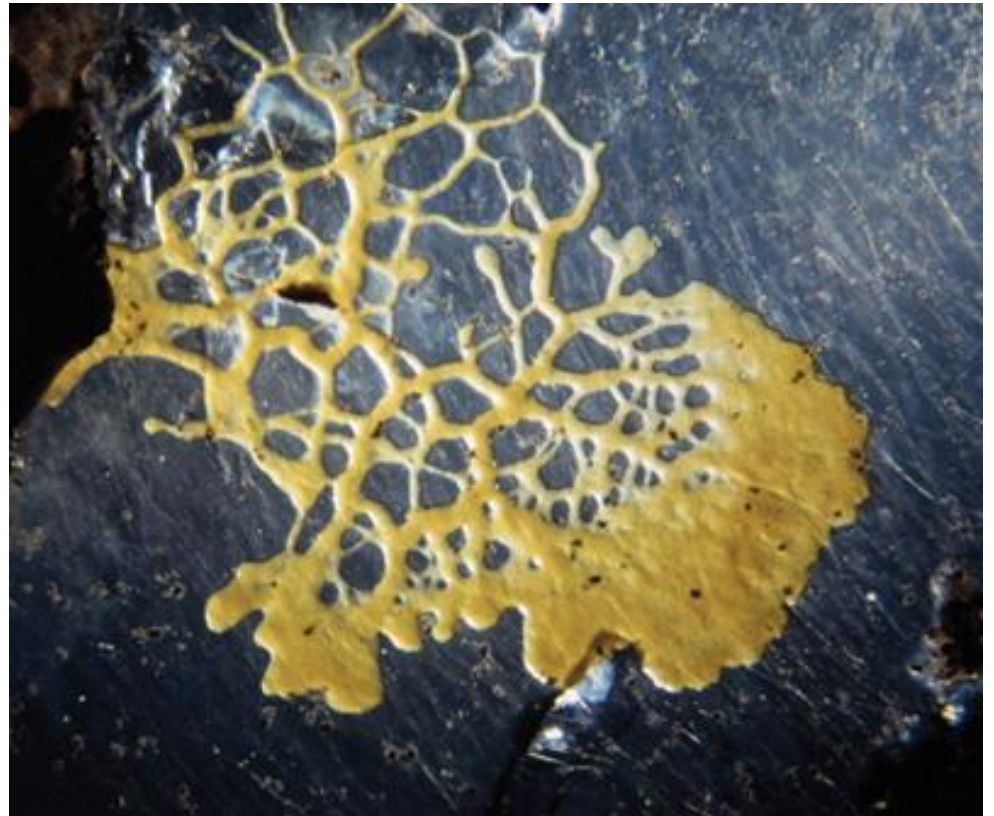
# Phylum Oomycota



- ◉ Water Molds
- ◉ Cell Wall composed of cellulose
- ◉ Multicellular
- ◉ Filamentous
- ◉ Heterotrophic
- ◉ Decomposers
- ◉ Responsible for Irish Potato Famine of the 1840s

# Phylum Myxomycota

- Plasmodial Slime Molds
- Multicellular
- Heterotrophic



# Phylum Acrasiomycota

- Cellular Slime Molds
- Unicellular, in harsh environmental conditions will form an aggregate body made up of multiple merged cells to form a large multinucleate cell



# Kingdom Plantae



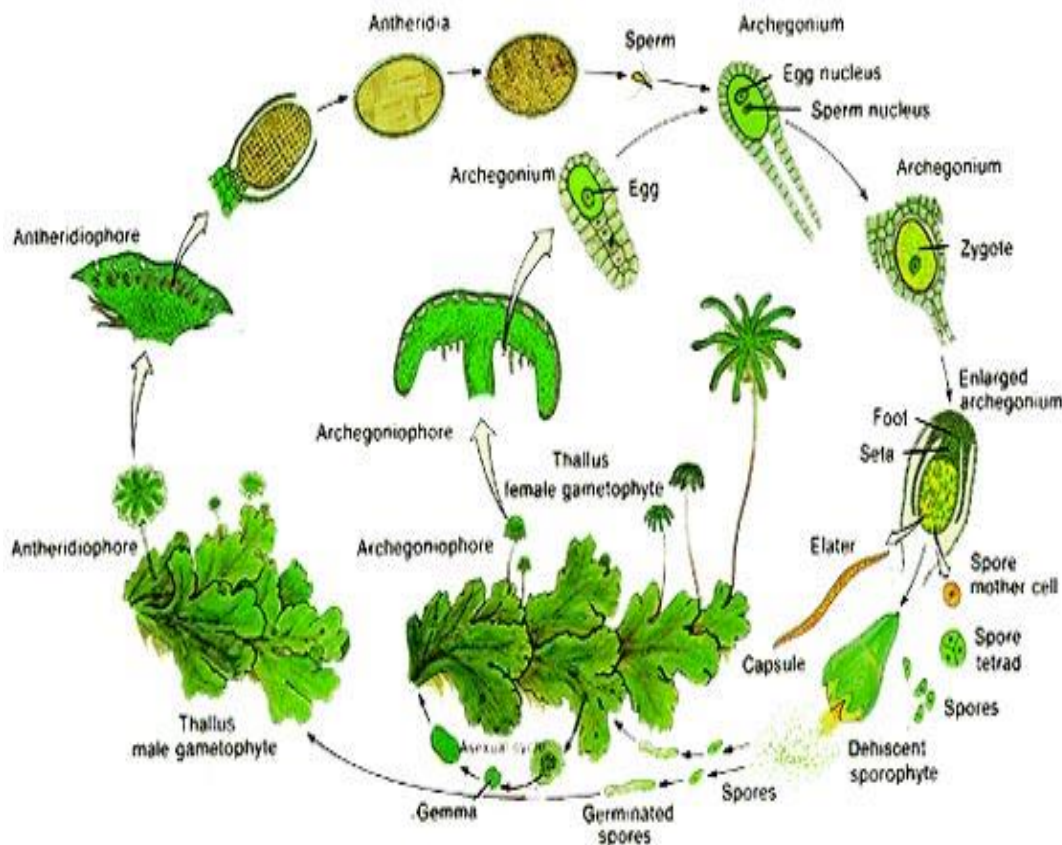
- Plants:
  - Are autotrophic (photosynthesis) multicellular organisms
  - Have cell walls made of cellulose
  - Have an alternation of gametophyte and sporophyte generations with distinct characteristics
  - Are descended phylogenetically from Charophytes (Chlorophytes).



# Nonvascular Plants

- Lack Vascular Tissue
- Often live in wet environments
- Small and herbaceous
- Gametophyte has rhizoids and a thallus
- Sporophyte has a foot, seta, and capsule, and grows out of the gametophyte
- Gametophyte Generation is dominant
- Three Phyla
  - Hepatophyta – Liver Worts
  - Anthocerophyta – Horn Worts
  - Bryophyta – True Mosses

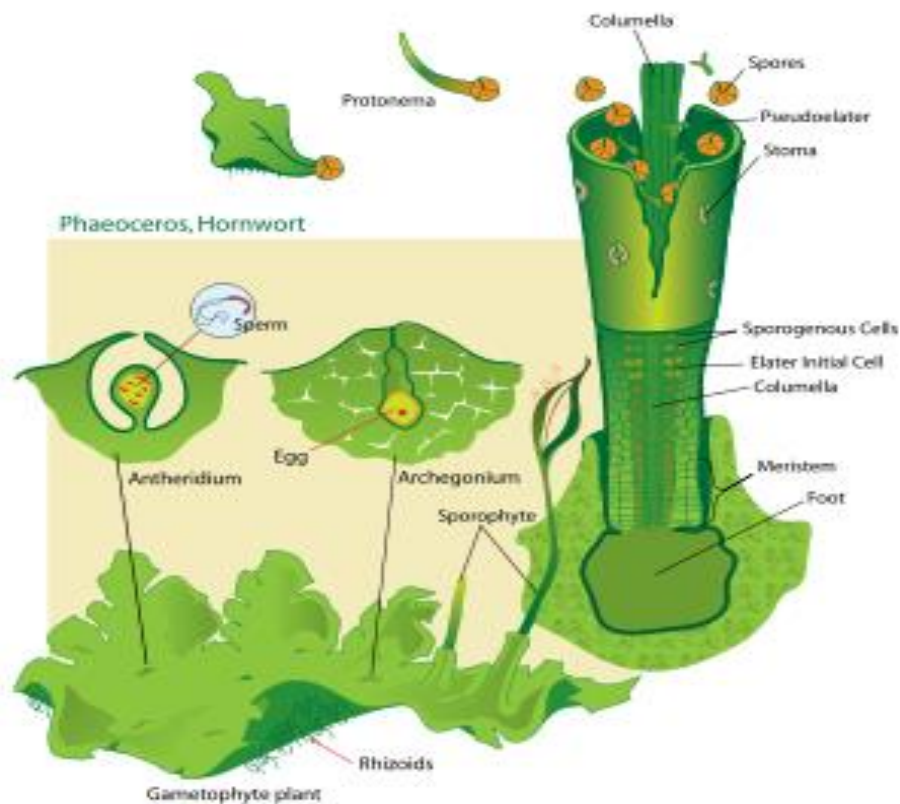
# Hepatophyta



- Liver Worts
- Leafy and herbaceous
- Mostly tropical
- Gametophyte grows out of sporophyte, but is not reliant on sporophyte

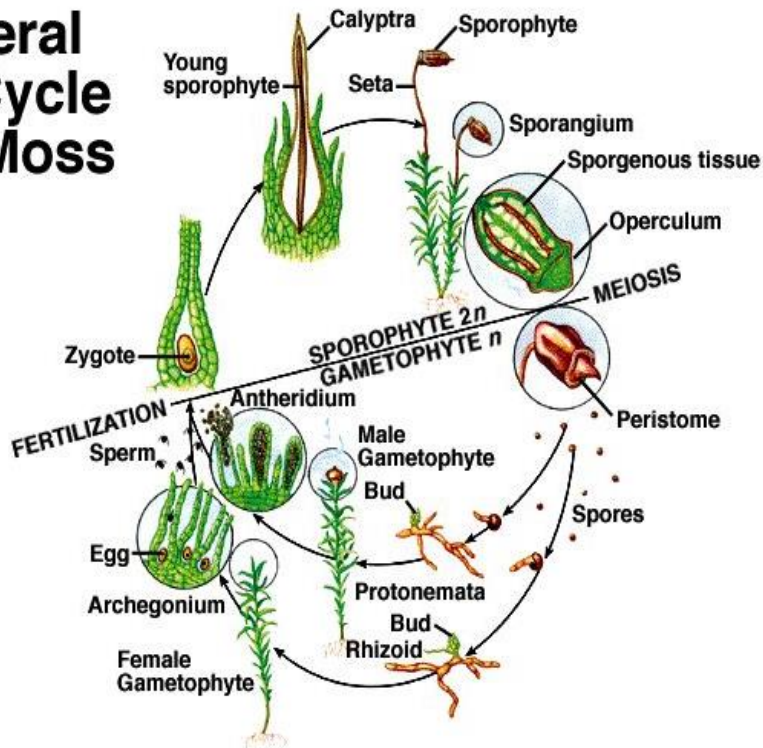
# Anthocerophyta

- Hornworts
- Thin, not very herbaceous
- Prefer shade



# Bryophyta

## General Life Cycle of a Moss



- True Mosses
- Small herbaceous gametophyte, with a tall brownish sporophyte growing out of the gametophyte
- No Vascular tissue, no seed



*Polytrichum commune*, hairy-cap moss

Capsule } Sporophyte  
(a sturdy plant that takes months to grow)

Seta

Gametophyte

# Vascular Seedless Plants

- Have vascular tissue but do not produce seeds
- Sporophyte Dominant
- Have roots, stems, and leaves
- Produce spores in special structures
- Four Phyla
  - Phylum Pterophyta - Ferns
  - Phylum Lycophyta – Club Mosses
  - Phylum Psilophyta – Whisk Ferns
  - Phylum Sphenophyta – Horse Tails

# Phylum Lycophyta

- Club mosses, ground pines, spike mosses
- Produce spores in sporophylls contained inside a strobilus



# Phylum Psilophyta

- Whisk ferns
- Only a few left



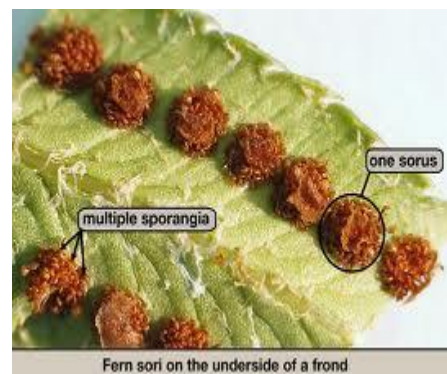
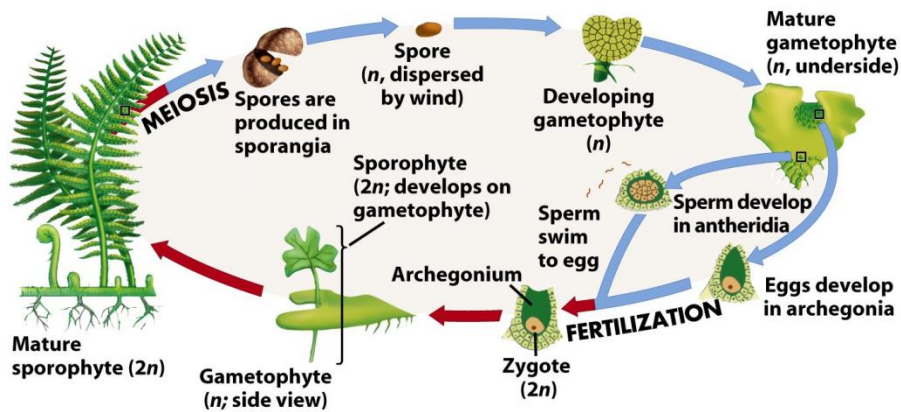
# Phylum Sphenophyta

- Horse Tails
- Only one genus left



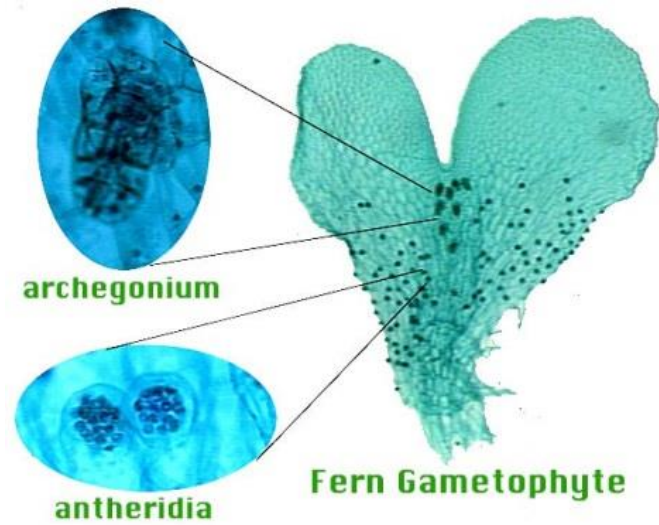
# Phylum Pterophyta

**Ferns:** Sporophyte is large and long lived but, when young, depends on gametophyte for nutrition.



Fern sori on the underside of a frond

- Ferns
- Vascular Tissue
- Have fronds with sori on underside
- Each sorus has multiple sporangia, which produce spores
- No Seeds



# Vascular Seed Plants

- ◉ Gymnosperms – Coniferophyta, Ginkgophyta, Cycadophyta, Gnetophyta
  - ◉ Have male pollen cones and female seed cones
- ◉ Angiosperms – Anthophyta
  - ◉ Have flowers with male and female parts, and produce fruit
- ◉ Vascular seeds plants all have vascular tissue (xylem and phloem) and produce seeds
  - ◉ Sporophyte Dominant with a greatly reduced gametophyte stage (microscopic in some)
  - ◉ Produce two types of gametophytes (male and female)
    - ◉ Pollen grain (male) microspores
    - ◉ Ovules with megasporangia which make megaspores (female)

# Gymnosperms

**Gnetophyta**



**Ginkgophyta**



**Cycadophyta**



**Coniferophyta**



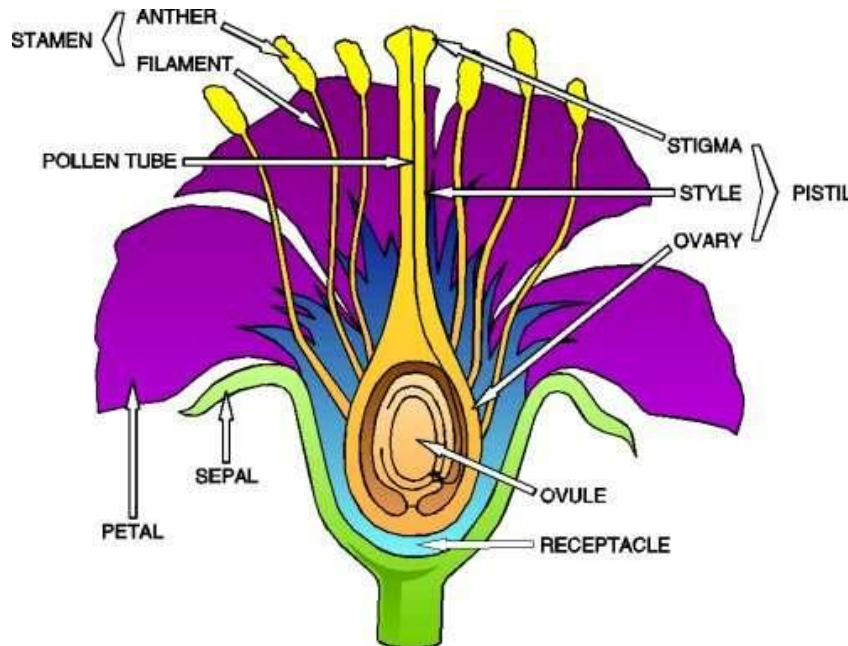
# Phylum Coniferophyta



- Conifers
- Have male and female cones
- Have needle-like leaves
- Woody – Softwoods
- No Flower



# Phylum Anthophyta



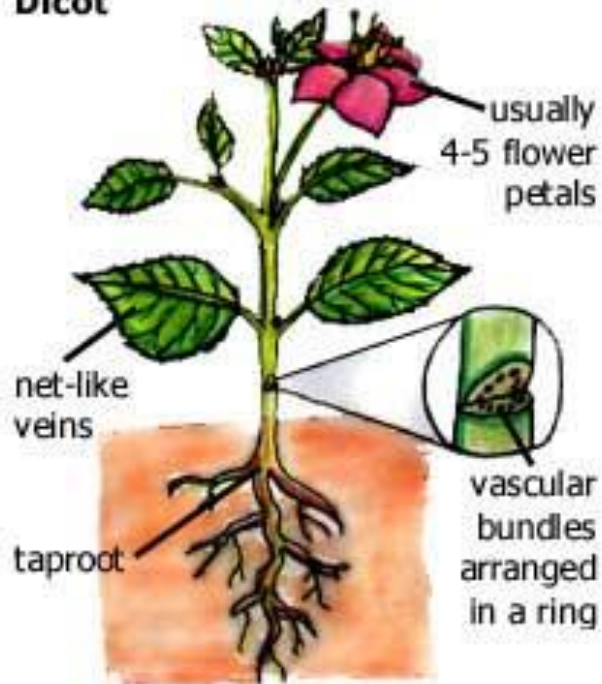
- Flowering Plants
- Parts:
  - Stamen – male
  - Pistil – female
  - Petals – modified leaves
  - Sepals
  - Receptacle – Catches nectar
- Monocotyledon or Dicotyledon
- Woody – Hardwoods
- Herbaceous



# Phylum Anthophyta

## Dicotyledon

**Dicot**



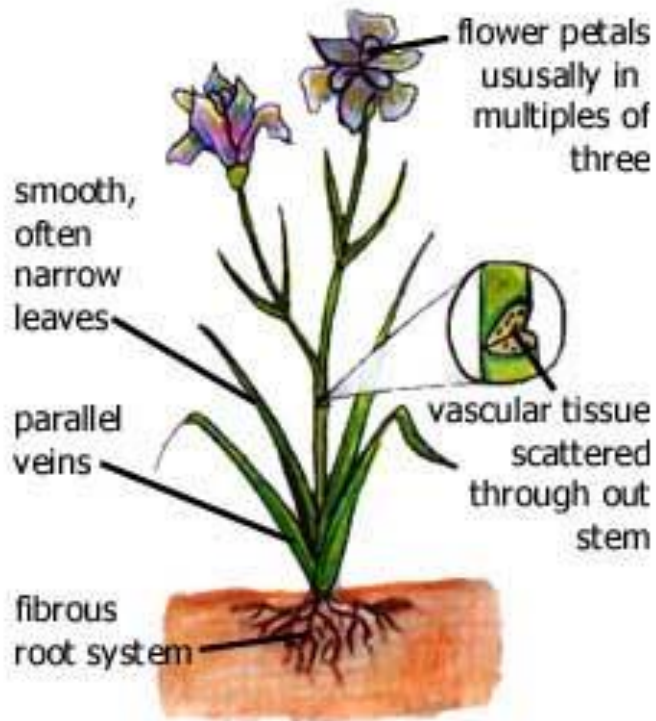
- Plants with two embryonic leaves (cotyledons) in the seed
- Have petals in multiples of four or five
- Vascular tissue in rings
  - Can be counted to find age
- Have branched leaves
- Pollen with three pores
- Branched, extensive root system



# Phylum Anthophyta

## Monocotyledon

### Monocot



- Plants with one embryonic leaf (cotyledon)
- Petals in multiples of three
- Scattered vascular tissue
  - No rings, no way to count rings for age
- Parallel leaves
- Pollen with one pore
- Clustered, shallow roots



# DAYTONA STATE COLLEGE

## Questions



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