Classification

I can classify living organisms?

Standards

- **GSE S7L1: Obtain, evaluate, and communicate information to investigate the diversity of living organisms and how they can be compared scientifically.**
- **GSE 7L1b: Evaluate historical models of how organisms were classified based on physical characteristics how that led to the six-kingdom system (currently archaea, bacteria, protists, fungi, plants and animals)**

(Clarification statement: This includes common examples and characteristics such as, but not limited to, prokaryotic, eukaryotic, unicellular, multicellular, asexual reproduction, sexual reproduction, autotroph, heterotroph, and unique cell structures.)

Classification KIMS

- **Diversity**
- **Binomial Nomenclature**
- **Taxonomy**
- **Classification**
- **Cell**
- **Organism**
- **Unicellular**
- **Multicellular**
- **Producer (Autotroph)**
- **Consumer (Heterotroph)**
- **Prokaryote**
- **Eukaryote**
- **Kingdom**
- **Dichotomous Key**

What are the characteristics of ALL living things?

1. Made of Cells
2. Use and need energy
3. Grow and Develop
4. Reproduce
5. React to changes
6. Respond to their environment

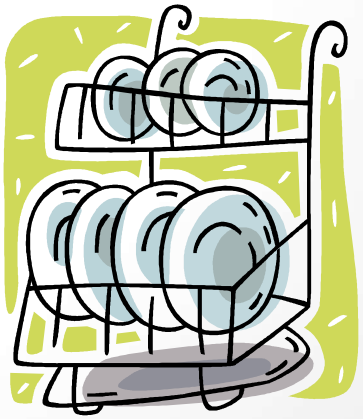
What is Taxonomy?

- Taxonomy is the branch of biology concerned with classifying and naming of organisms

- Biologists who study this are called Taxonomists

What is classification?

Classification is the process of arranging organisms into groups based on similarities.



Why should things be classified?

Classification makes things easier to find, identify, and study.

How did it start?

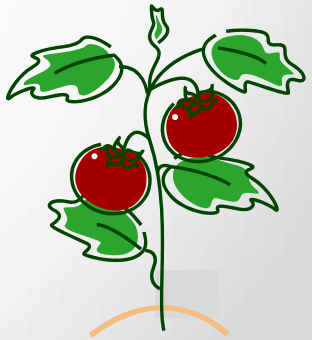
- People wanted to organize their world so they began grouping, or classifying everything they saw.

- Things that fly
- Things that swim
- Things that crawl
- Things that walk on four legs
- Things that chew their food
- Things that swallow food whole
- Things that are toxic

Who is Carolus Linnaeus?

- Carolus Linnaeus was a Swedish botanist
- He developed a classification system based on similarities between organisms (plants/animals)
- Today we use an eight level system to classify living things

Scientists use a system of classification to organize and name living organisms.

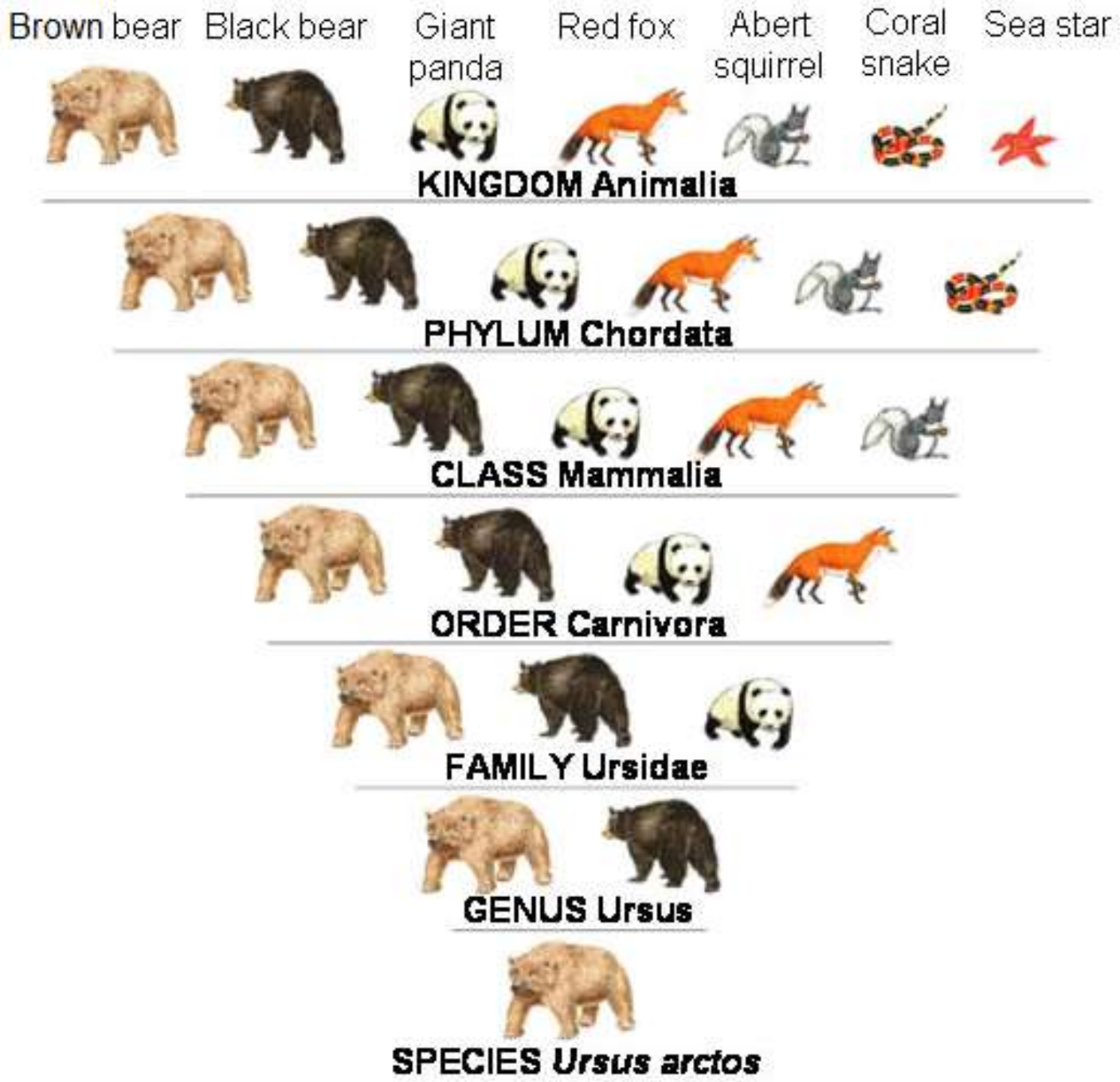


Levels of classification from largest to smallest:

The Best Classification Rap with Lyrics
https://www.youtube.com/watch?v=gj15UF08lUI

Classification of Organisms
https://www.youtube.com/watch?v=6WPBA4a6NjU

Domain
Kingdom
Phylum
Class
Order
Family
Genus
Species


Brown bear
Black bear
Giant panda
Red fox
Abert squirrel
Coral snake
Sea star
KINGDOM Animalia
PHYLUM Chordata
CLASS Mammalia
ORDER Carnivora
FAMILY Ursidae
GENUS Ursus
SPECIES Ursus arctos

Choose one of mnemonic device to help you remember the levels of classification from largest to smallest.

Examples:

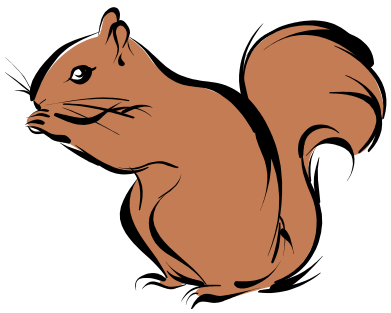
King Phillip came over for grape soda.

King Phillip came over from Germany Saturday.

King Phillip can order fresh green salad

Latin and Greek words are used to give organisms a name (similar to a first and last name) for identification.

Thus, the scientific name for the brown squirrel is *Tamiasciurus hudsonicus*



What is Binomial Nomenclature?

- Bi means two
- Nomen means name
- A binomial nomenclature is a scientific way of naming living organism with a genius and a species

Genus + *species* = scientific name

Capital lower case

A scientific name is the same no matter how many common names an organism might have.

(Notice that scientific name are always written in *italics)*

Classification of Living Things Video:

6-Kingdoms
https://www.youtube.com/watch?v=u90WvBZe-tY

Mr. Parr: Classification Song (same but with words)
https://www.youtube.com/watch?v=dnF_UdPbJZ0

Mr. Parr: Classification Song (modified w/pics)
https://www.youtube.com/watch?v=wgivfVM9yOQ

Other examples:

Ursus horribilis

for grizzly bear

F*elis domesticus* for house cat

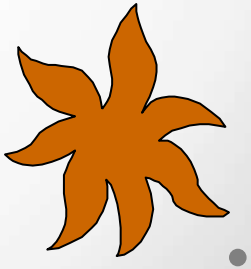
https://www.youtube.com/watch?v=aJUB4R5j0dI

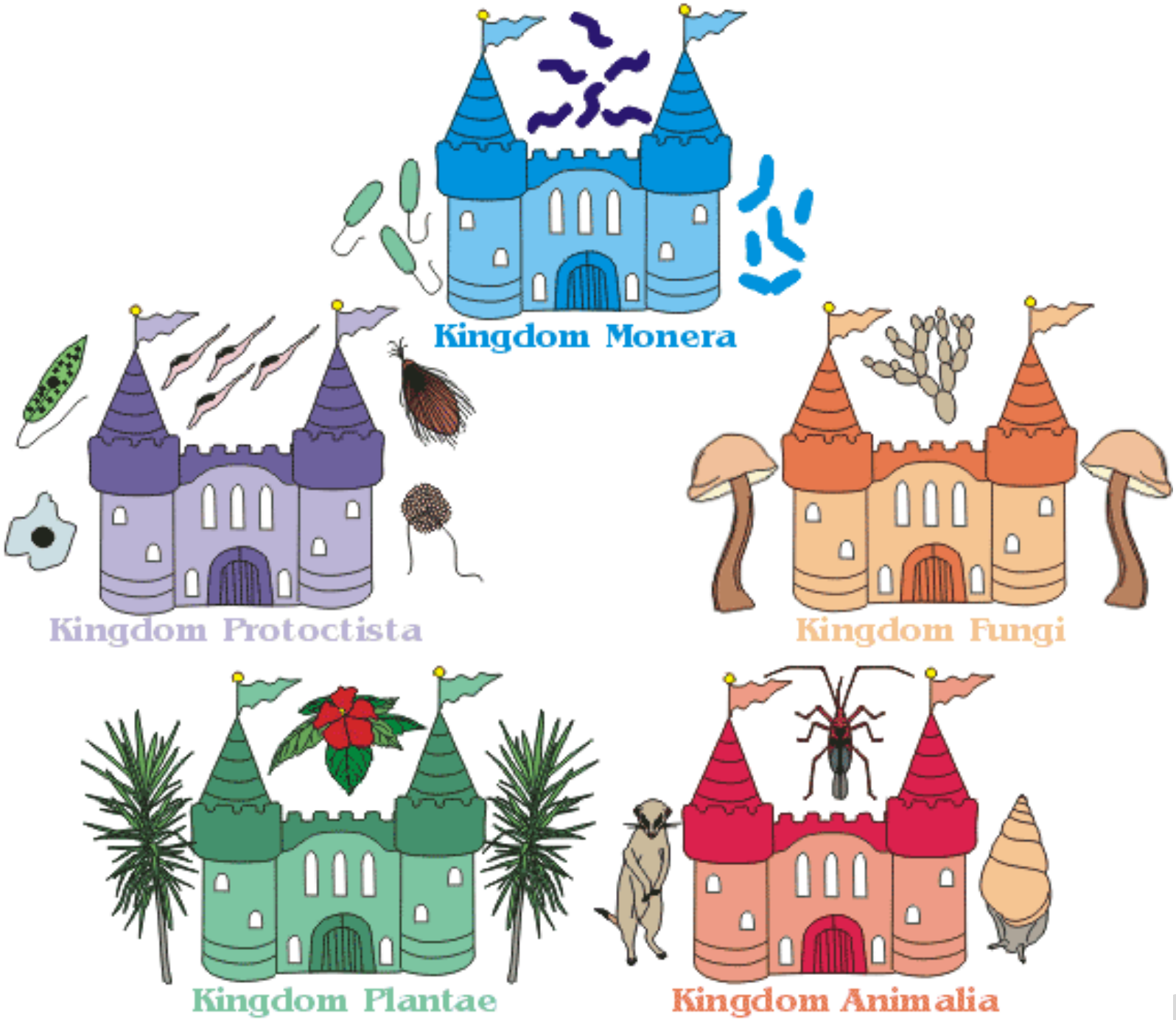
Most scientists today use a system that includes six kingdoms.

Kingdoms

Moneran:

1. Archaebacteria
2. Bacteria
3. Protists
4. Fungi
5. Plants
6. Animals

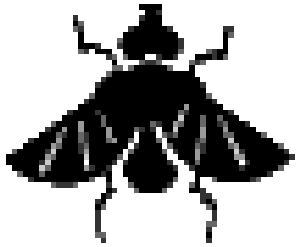


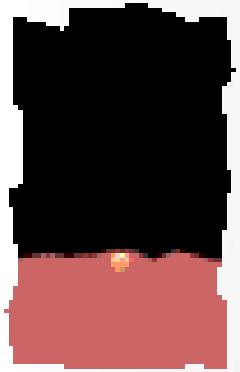

Kingdom Monera
Kingdom Protoctista
Kingdom Fungi
Kingdom Plantae
Kingdom Animalia


Kingdoms
BACTERIA
REPRODUCTION
ASEXUAL
Plantae
ARCHAEA
PROKARYOTE
ASEXUAL
KINGDOMS
ANIMALIA
FUNGI
Kingdoms
ARCHAEA
PROTISTA
ORGANISM
CLASSIFY
HETEROTROPH
PLANTAE
AUTOTROPH
MULTICELLULAR
GROUPS
SIMILAR
EUKARYOTE
BACTERIA
SEXUAL
Animalia
AEROBE
Kingdoms
FUNGI
unicellular
CLASSIFY
multicellular
ANIMALIA
organism
REPRODUCTION
HETEROTROPH
aerobe
FUNGI

Kingdoms

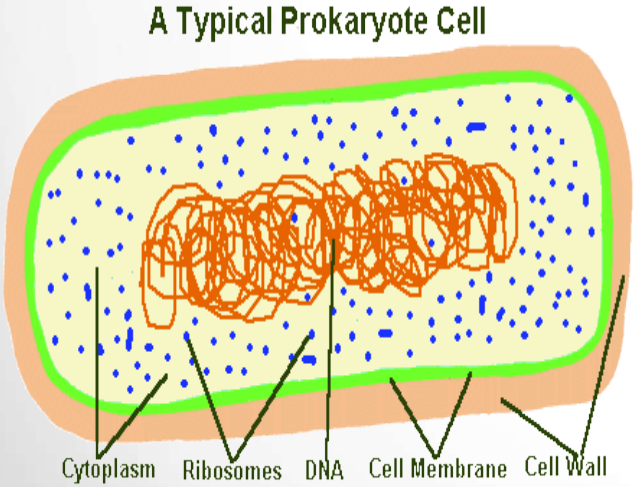
- The grouping of organisms into KINGDOMS is based on 4 factors:
  - 1. Cell Type
  - 2. Cell Number
  - 3. Feeding Type
  - 4. Reproduction



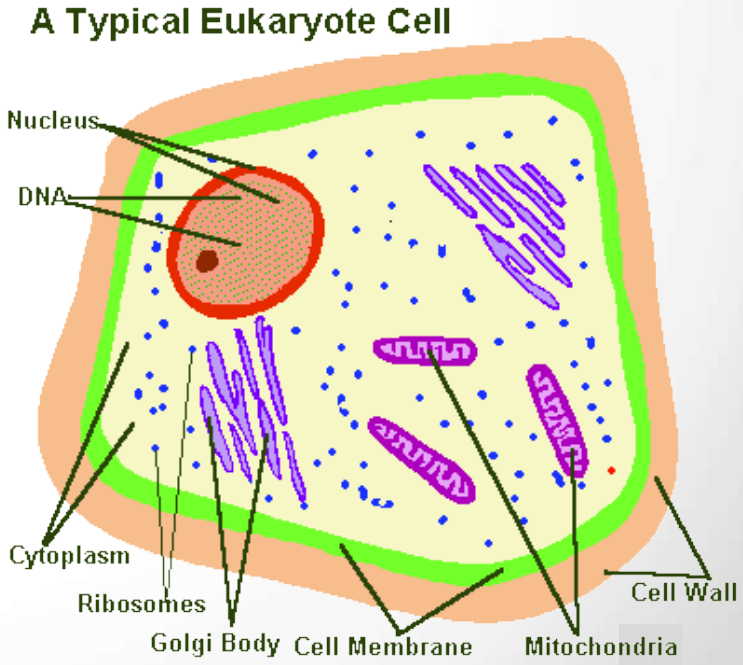


1. Cell Type- The presence or absence of a nucleus.

Prokaryotes (NO nucleus)



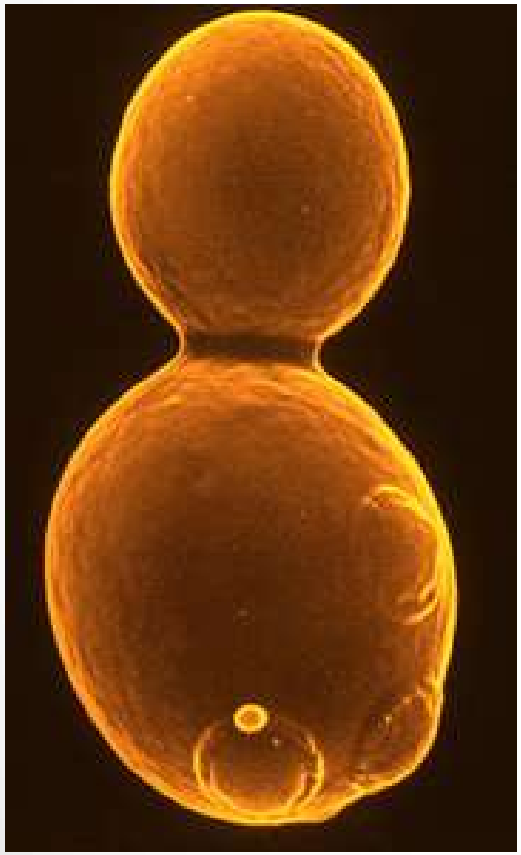
& Eukaryotes (DO carry a nucleus)



2. Cell number - Whether the organisms exist as single cells or as many cells

- Unicellular- single celled organism
- Multicellular- many celled organism

- Unicellular

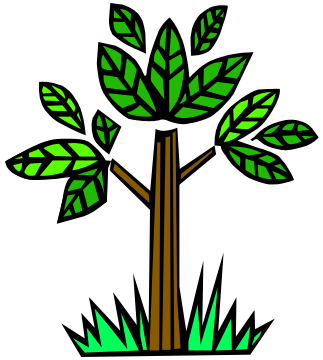


◇ Multicellular

3. Feeding Type – How the organisms get their energy

*Producer (Autotroph)

- Makes it's own food



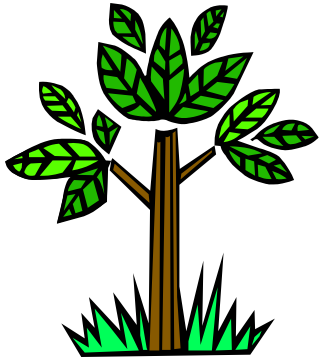
*Consumer (Heterotroph)

Must eat other organisms to survive

4. Reproduction Type – How the organisms produce offspring

*Asexual One parent
  - Binary Fission
  - Fragmentation
  - Budding

*Sexual



6 Kingdoms

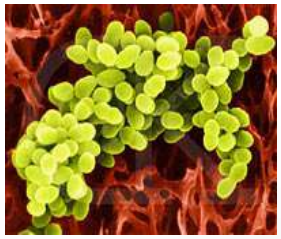
- Archaebacteria
- Eubacteria
- Protista
- Fungi
- Plantae
- Animalia

} Prokaryotes

} Eukaryotes

First Two Kingdoms

- The first two kingdoms involve bacteria. Scientists at one time grouped bacteria into one kingdom but just recently divided them into two groups: Archaebacteria and Eubacteria
- Both groups of bacteria are prokaryotes and unicellular



Archaebacteria

- Archaebacteria is called ancient bacteria as they date back 4 billion years
  - Found in harsh environments that no other organism lives. We call them "heat-loving" or "salt-loving" or "Methane-loving"
  - The yellow and orange rings around the hot springs in Yellowstone National Park were formed by the remains of archaebacteria billions of years ago!

Archaebacteria

- Gets energy from sunlight (producer/autotroph)
- Breaks down things in dead or decaying organisms (decomposer/heterotroph)
- Asexual reproduction by binary fission
- Reproduces in a short amount of time
- Different chemical makeup than bacteria

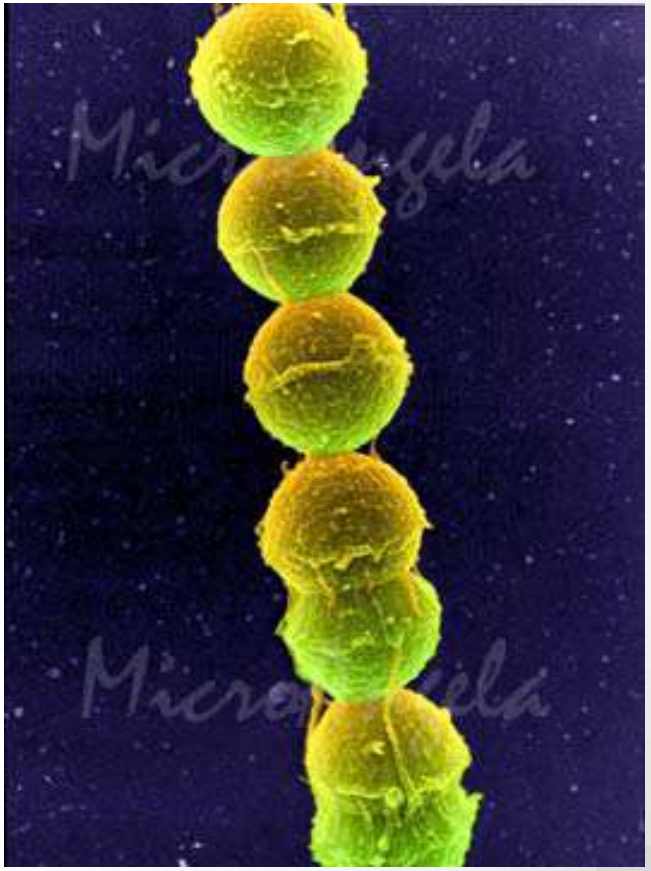
Archaebacteria

Examples:

- Halophiles- found in conditions with high salt content. Lakes and seawater.
- Methanogens- produce methane and found in intestines of ruminants and in bogs and sewage treatment plants.
- Thermophiles- found in environments with intense heat, like springs and near hydrothermal vents.

Eubacteria

- It is the eubacteria that most people are talking about when they say bacteria, because they live in normal conditions like the human body or pond water.



Bacterial Shape

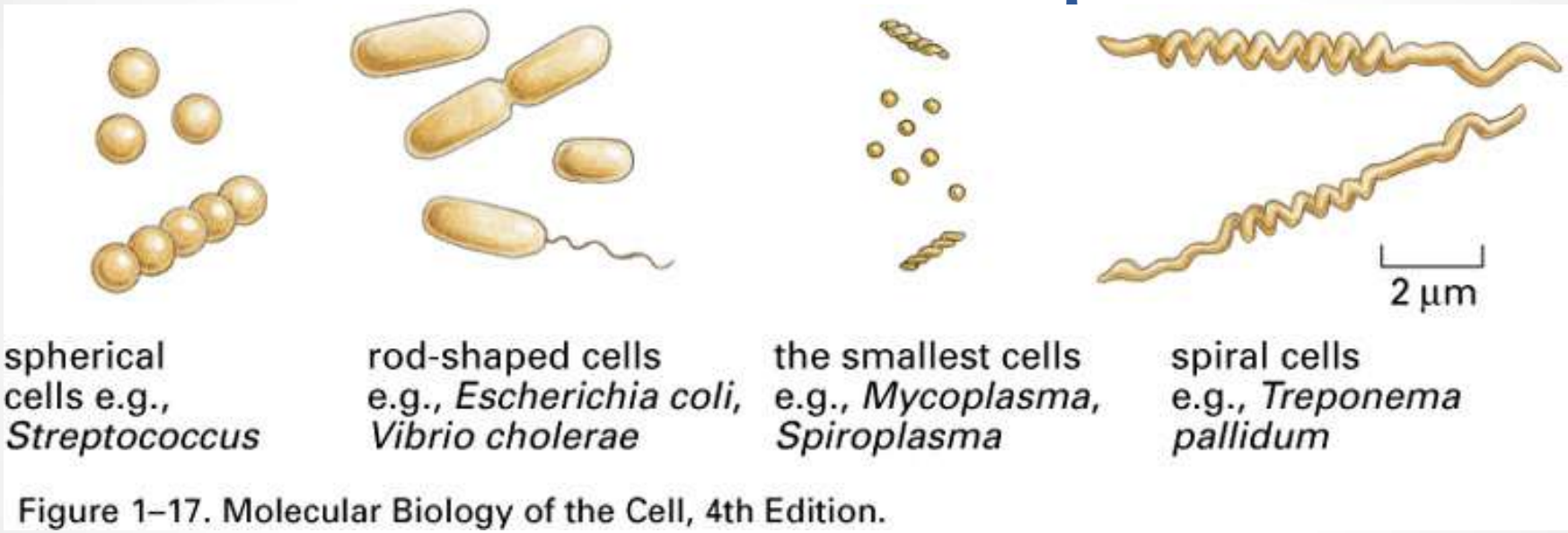
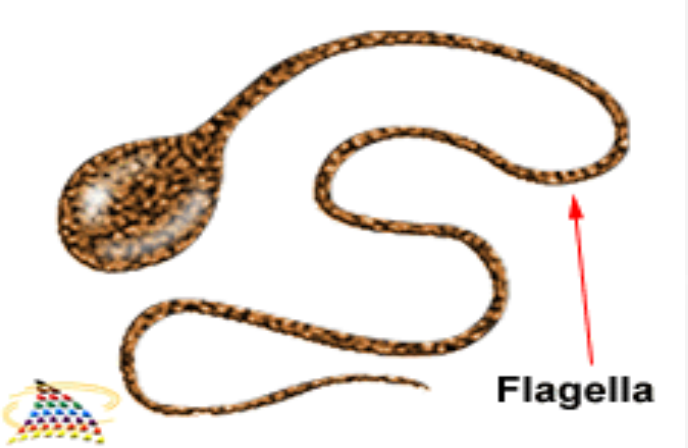


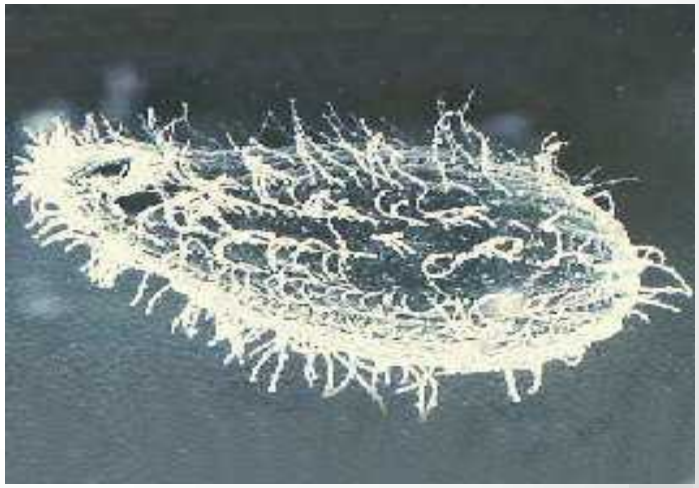
Figure 1–17. Molecular Biology of the Cell, 4th Edition.

- Spherical
- Rod
- Spiral

Bacterial Locomotion

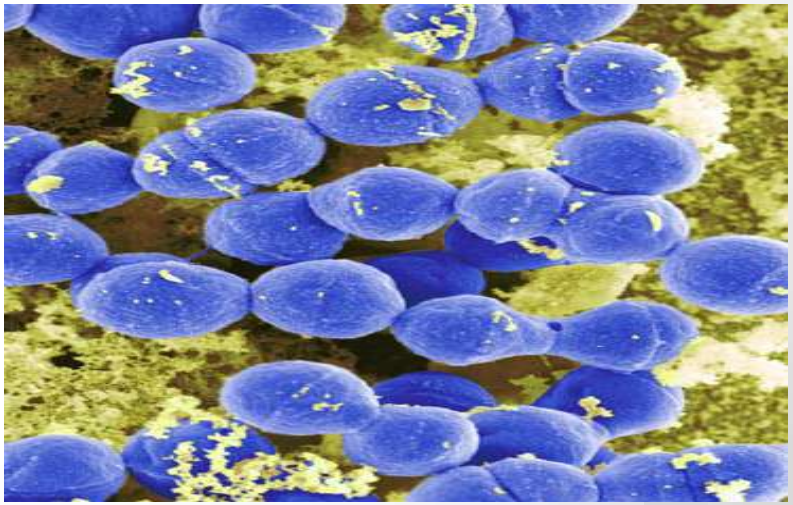
- Some bacteria have flagella or cilia for movement
- Some secrete a slime layer and ooze over surfaces like slugs





Bacterial Feeding

- Some are producers/autotroph and can photosynthesize like a plant.
- Some are decomposers/heterotroph that decompose dead or decaying organisms.



Bacteria creates yogurt, cheese, medicines and cleaning solutions. They also are decomposers and help with the nitrogen cycle.

Examples: E. Coli, Streptomyces, Rhizobium

- 99% of bacteria is helpful and only 1% is harmful causing diseases such as tuberculosis and diphtheria.

Bacteria Reproduction

- Reproduces asexually by binary fission.
- Reproduces in a short amount of time

3rd Kingdom/Protists

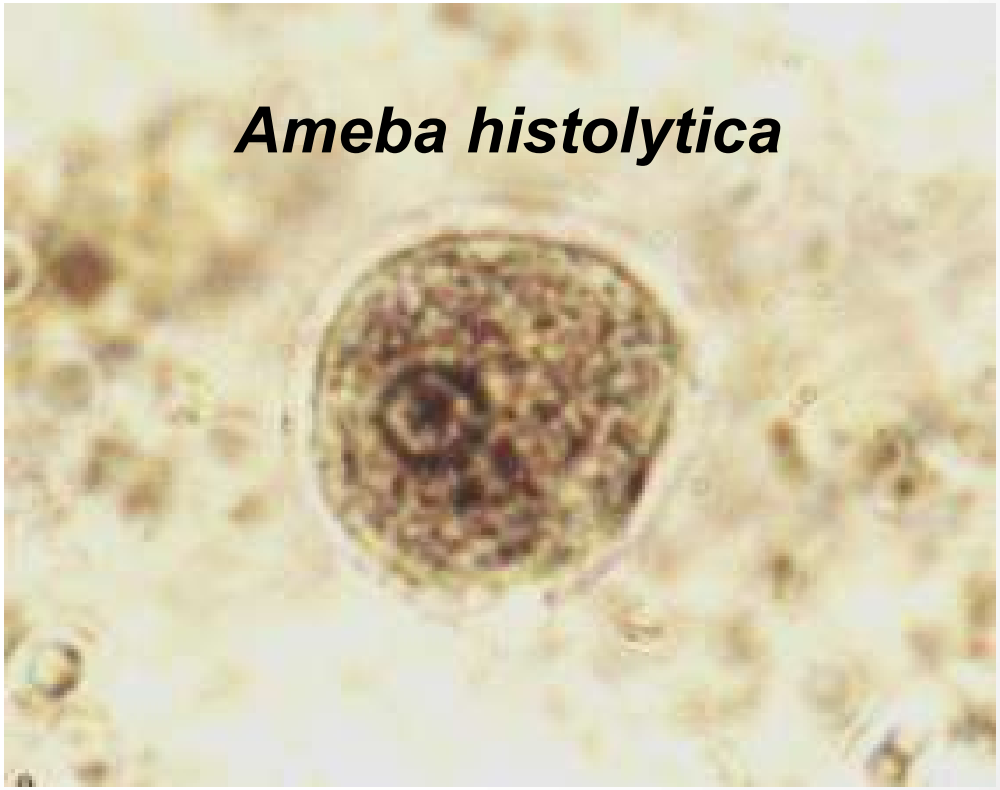
- Protists are Eukaryote unicellular and multicellular organisms.
- Examples: slime molds, protozoa, primitive algae and brown algae.

Protists

- Most diverse Kingdom
- Animal-like, fungus-like, and plant-like protists (the left-overs)
- Some are beneficial
- Mostly asexual reproduction, but some sexual reproduction
- Found in lakes and ponds
- Some can cause diseases in humans, such as:

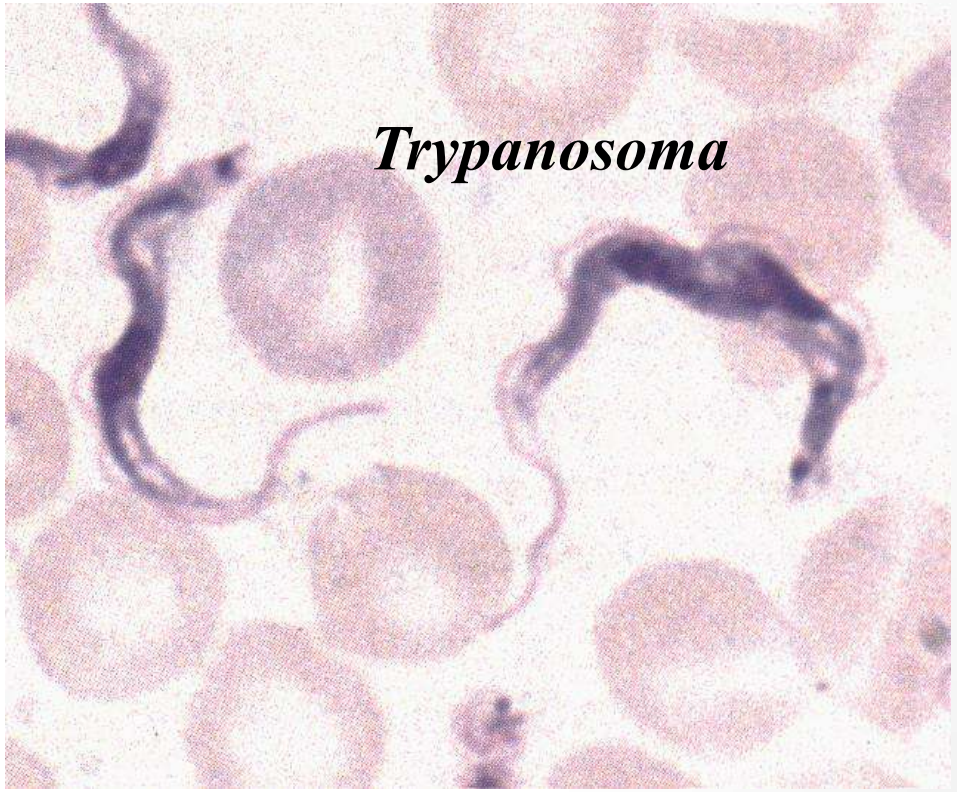
Protists Disease

- Amebic dysentery



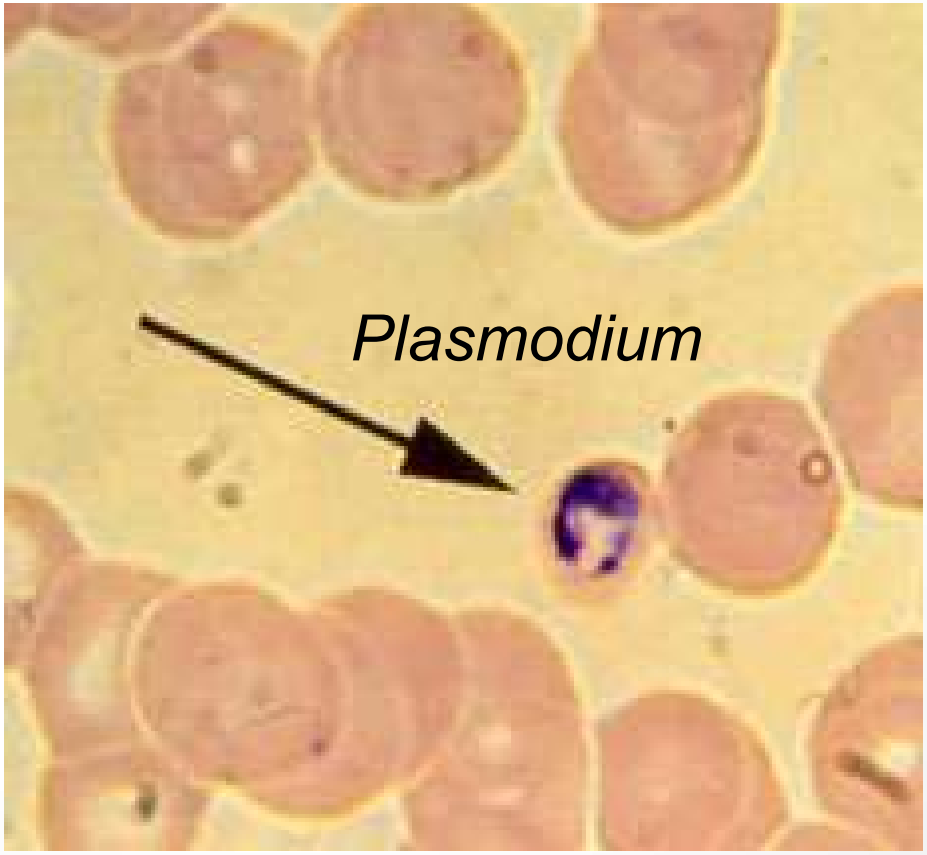
Protists Disease

- African Sleeping Sickness



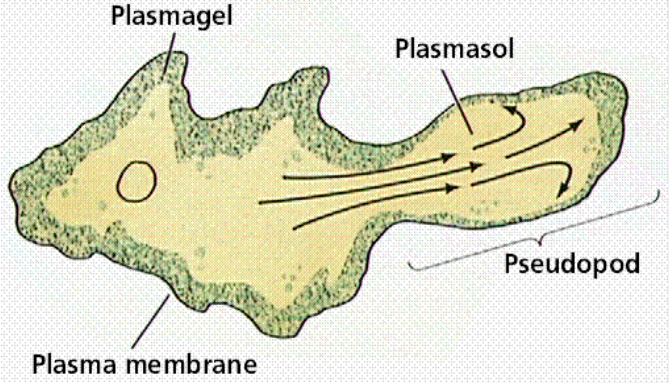
Protists Disease

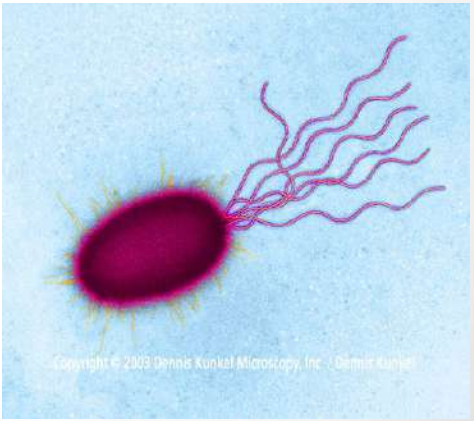
- Malaria
- Malaria kills about one million people every year!



Protists Movement

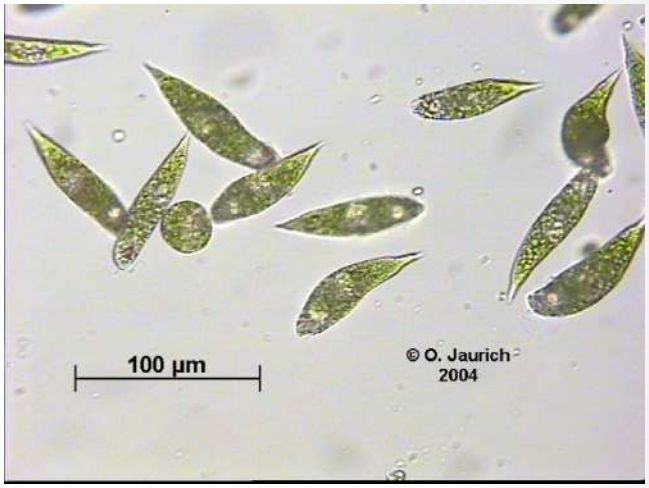
- Pseudopod (false foot)
- Flagella/cilia (hairs)



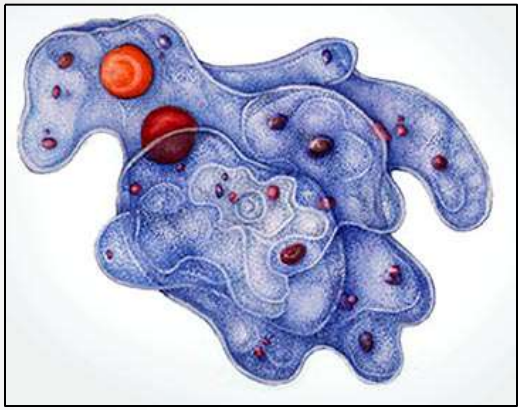


Protists Feeding Style

- Protists can be
- producers(autotrophs)
- or
- consumers(heterotroph)
- or
- Decomposers(heterotroph)



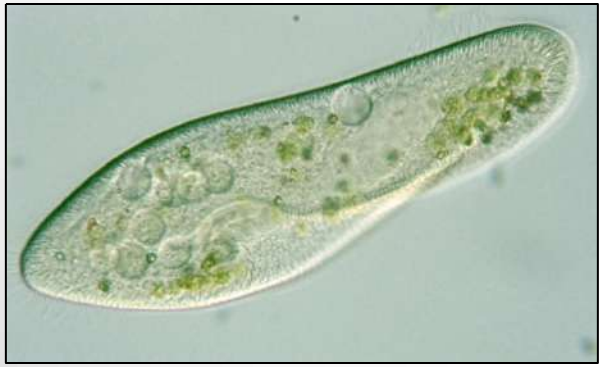
Protists



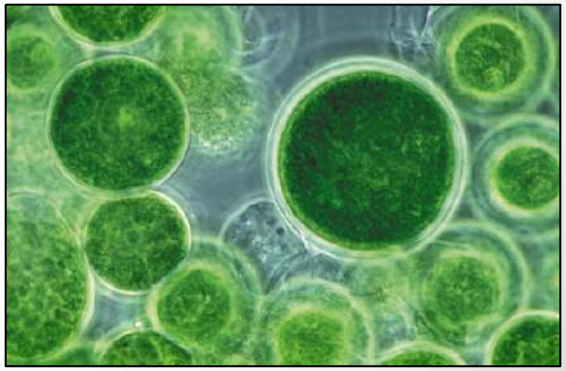
Ameoba

Diatom

Euglena



Paramecium



Algae

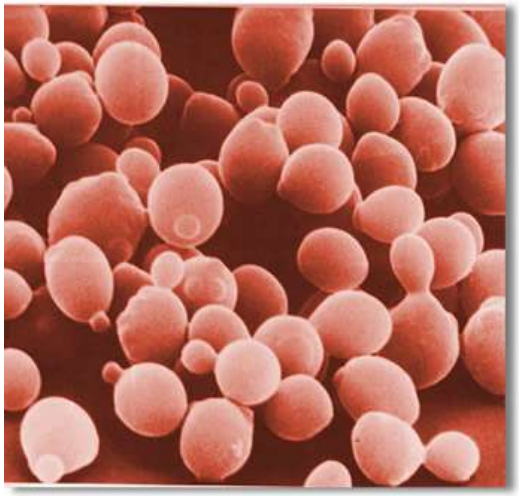
4th Kingdom/Fungi

- Fungi includes some of the most important organisms.
- Cycle nutrients through ecosystem by breaking down dead organic material.

Fungi

- All fungi are eukaryotic
- They may be unicellular or multicellular
- Asexual or sexual reproduction
- Found in wet areas

Unicellular (yeast)



Multicellular

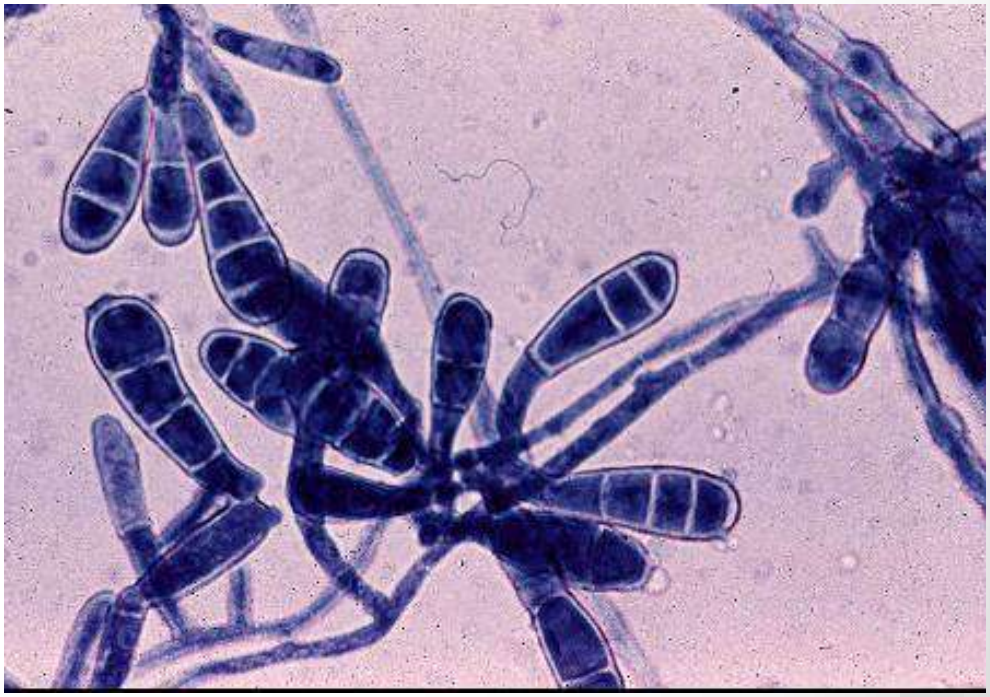
Fungi

- Fungi can be very helpful
- Many antibacterial drugs are derived from fungi

Penicillin

Fungi

- Fungi also causes a number of plant and animal diseases:
  - Athlete's Foot



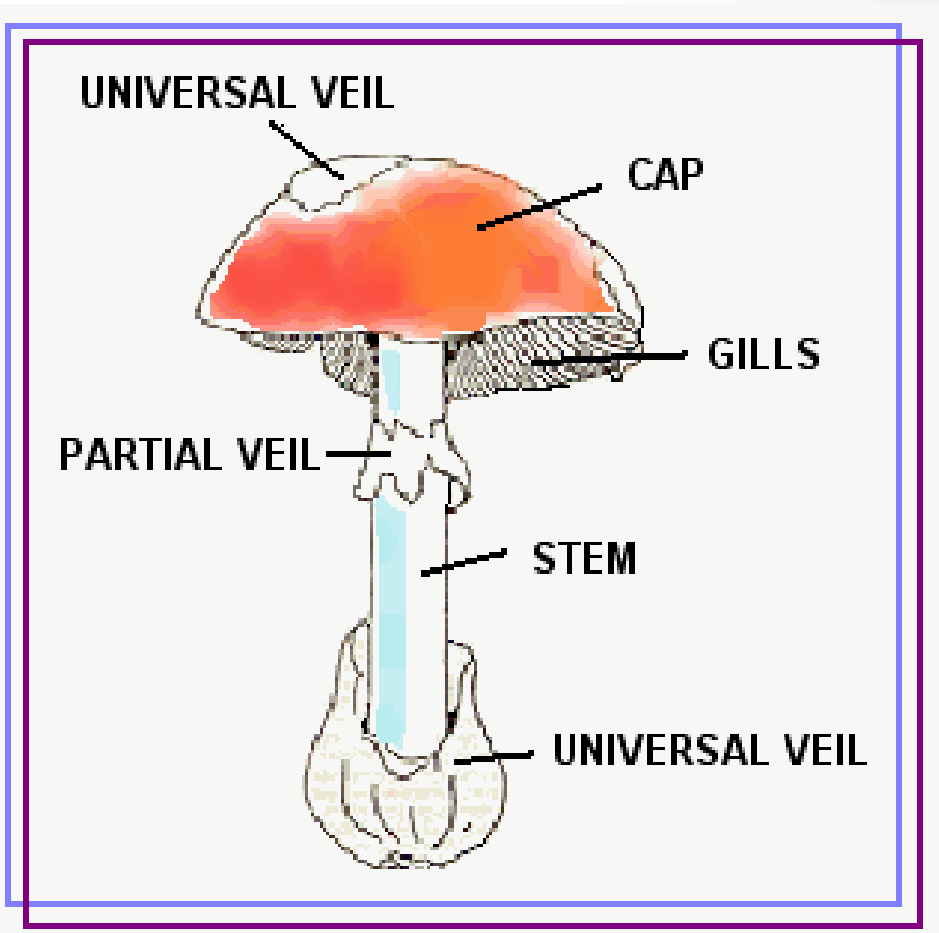
Fungi

- Ringworm

Fungi Movement

- Fungi do not move

- They have root-like structures that they use for attachment



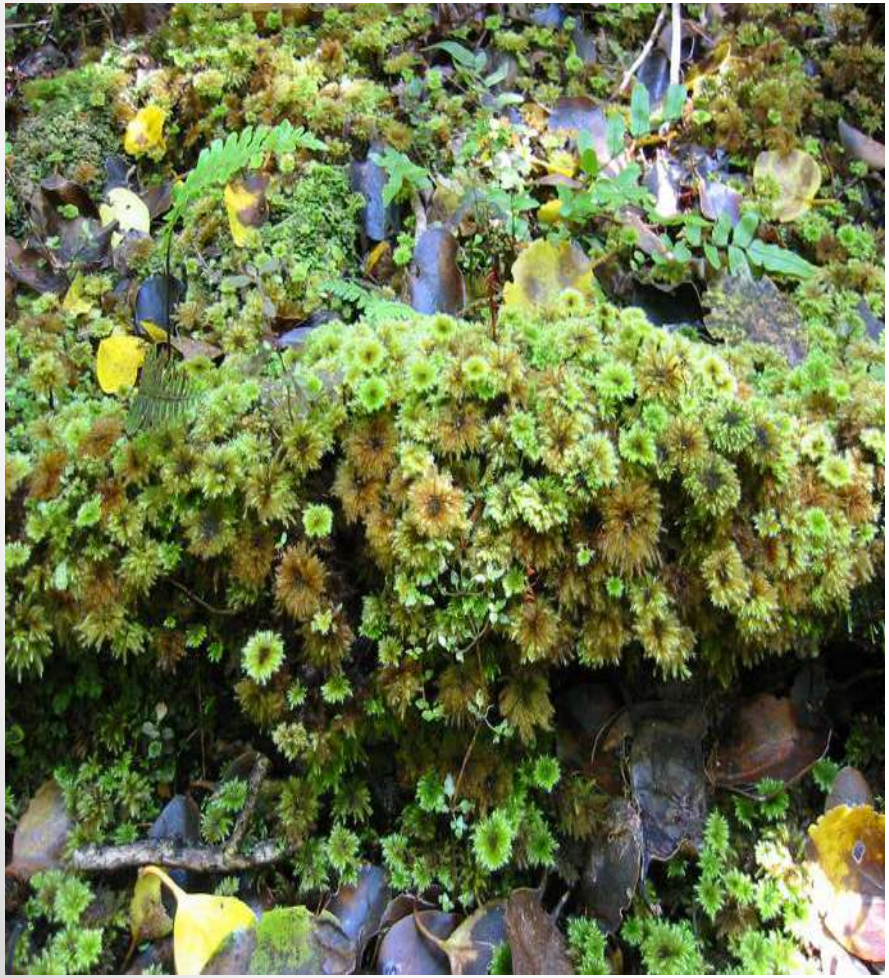
Fungi Feeding

- All fungi are consumers (heterotrophs)
- They absorb nutrients from dead organic matter

5th Kingdom/Plants

- Plants are multicellular organisms made of Eukaryotic cells that have a cell wall. They get food through photosynthesis so they are producers (autotrophs).
- Asexual or sexual reproduction

- Mosses

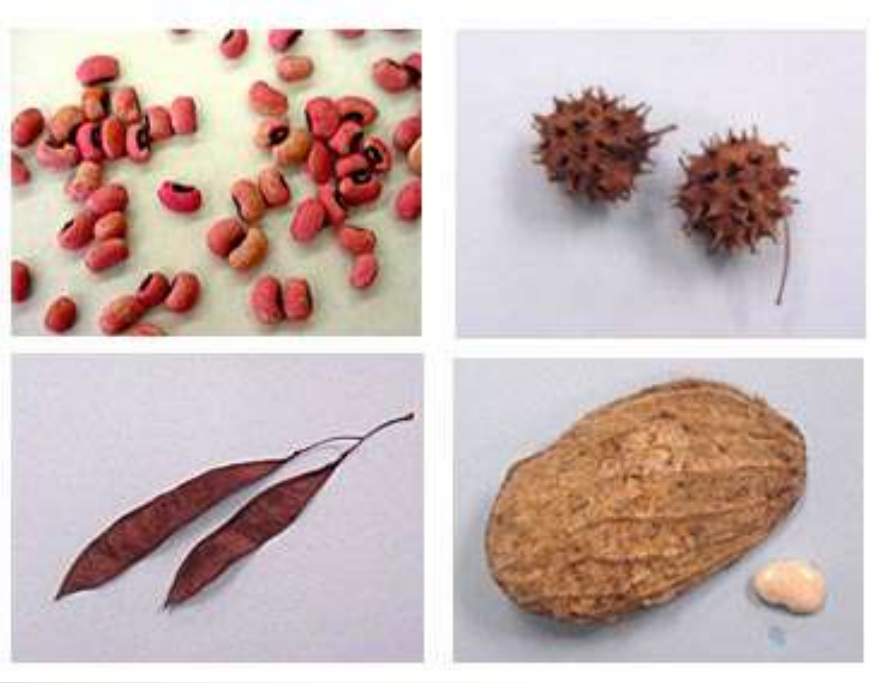


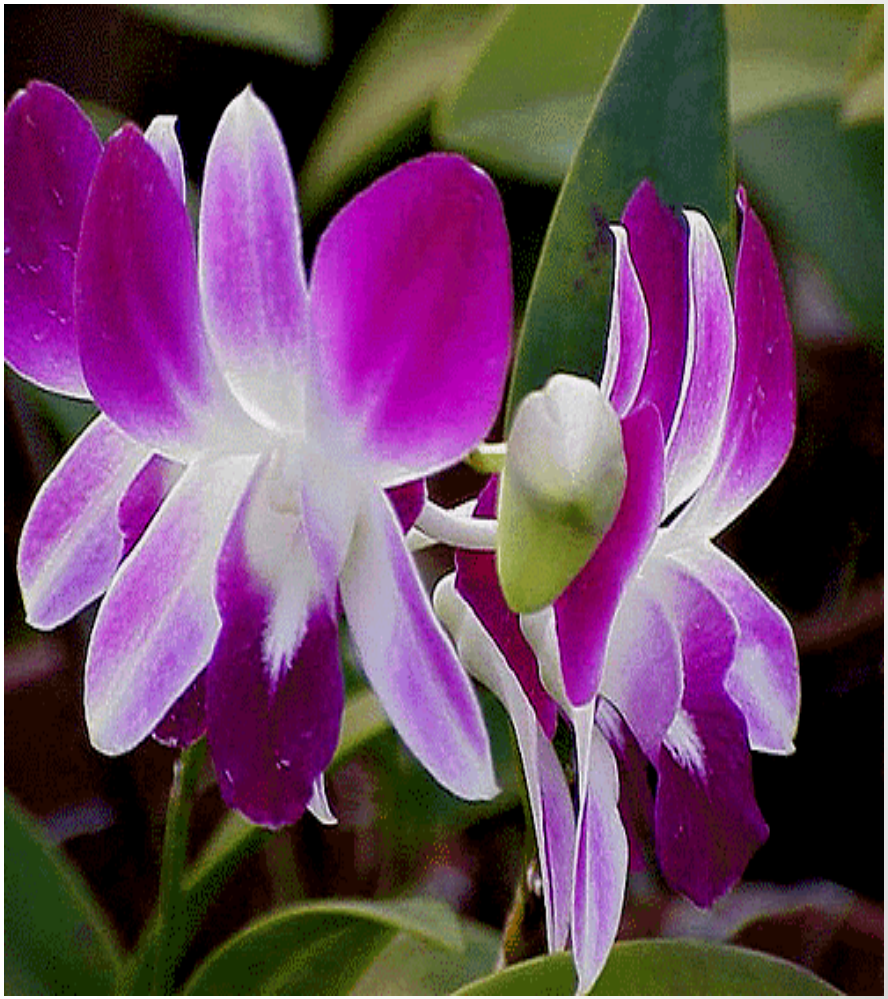
- Liverworts & Hornworts

- Ferns

- Conifers (cone bearing)
  - Gymnosperms
    - Oldest vascular plants

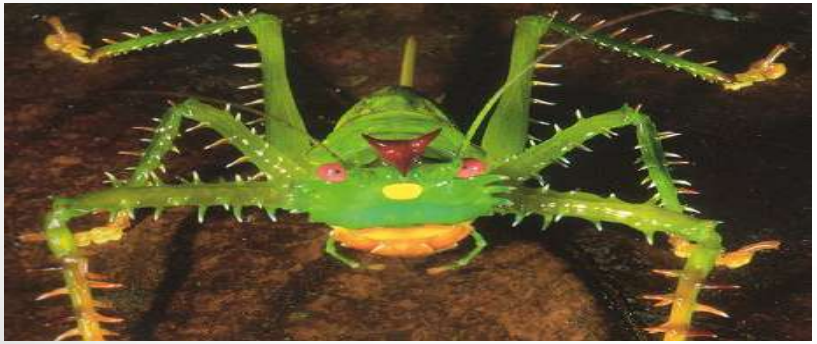
- Flowering plants
  - Angiosperms





6th Kingdom/Animalia

Animals are multicellular and made of the more complex Eukaryotic cells. All are consumers (heterotrophs) that are capable of movement at some point in their lives.

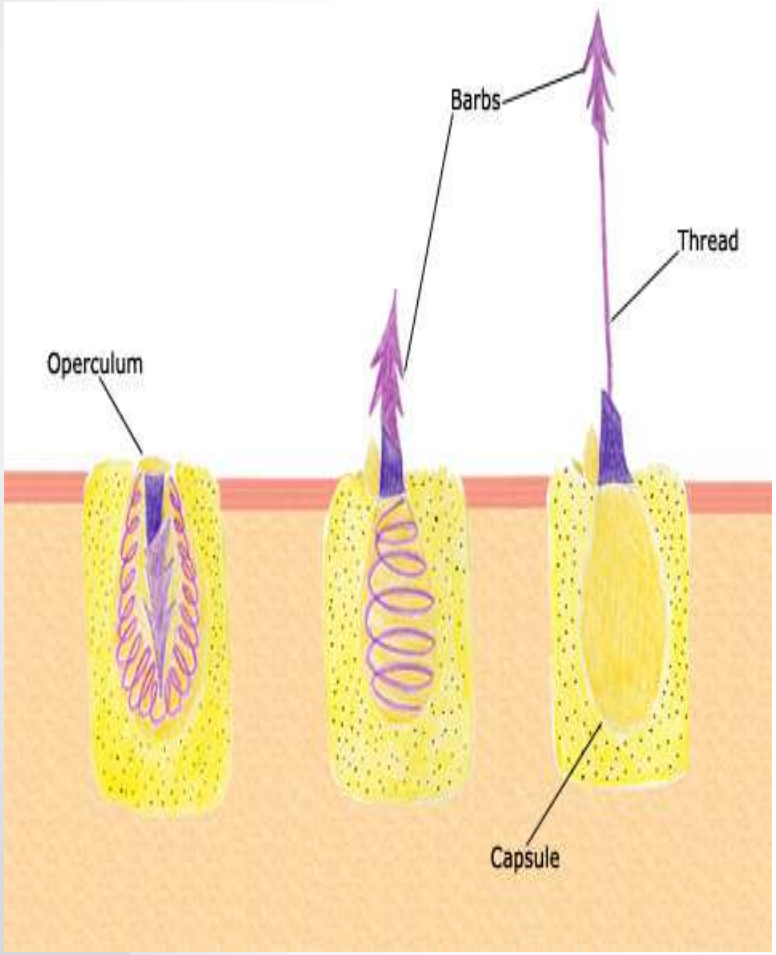


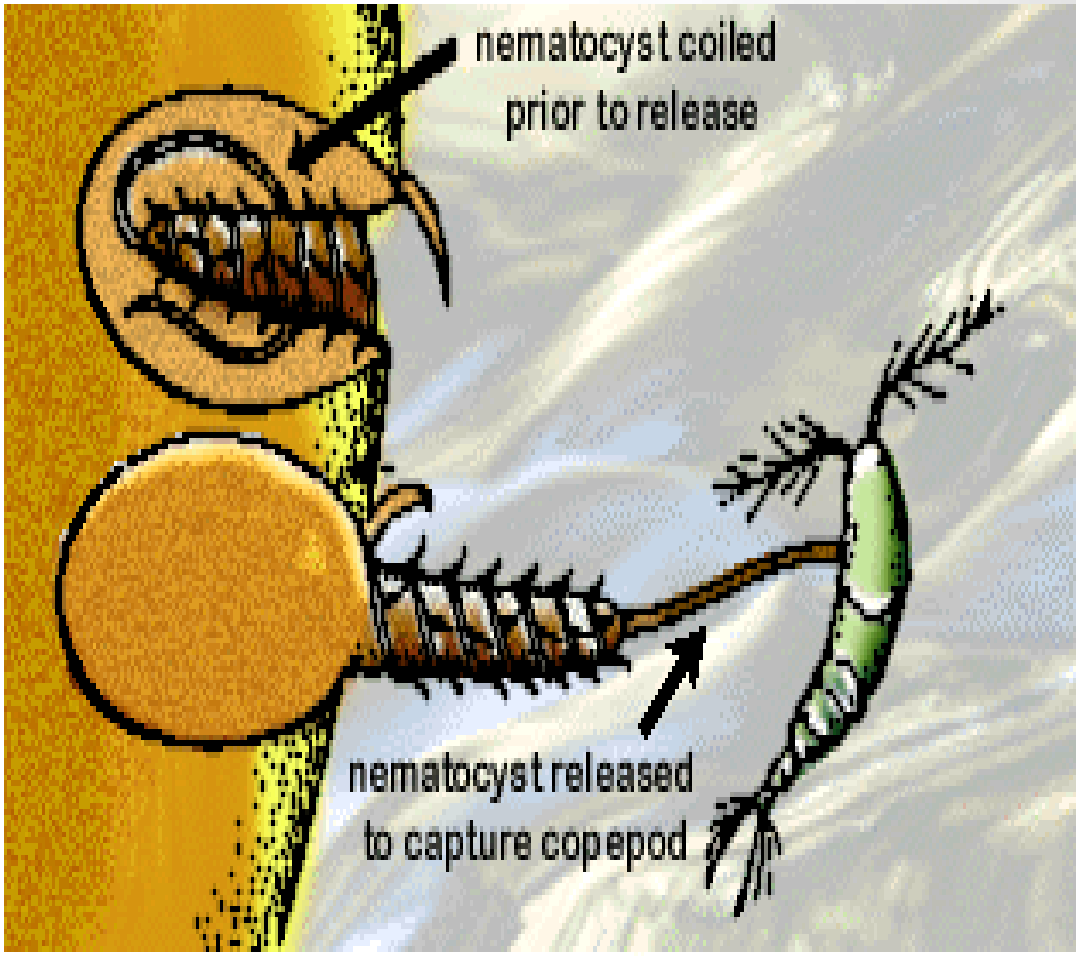
- Sexual reproduction
- Some important animal groups (phyla) are the:

- Porifera: sponges

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

- Nematocyst

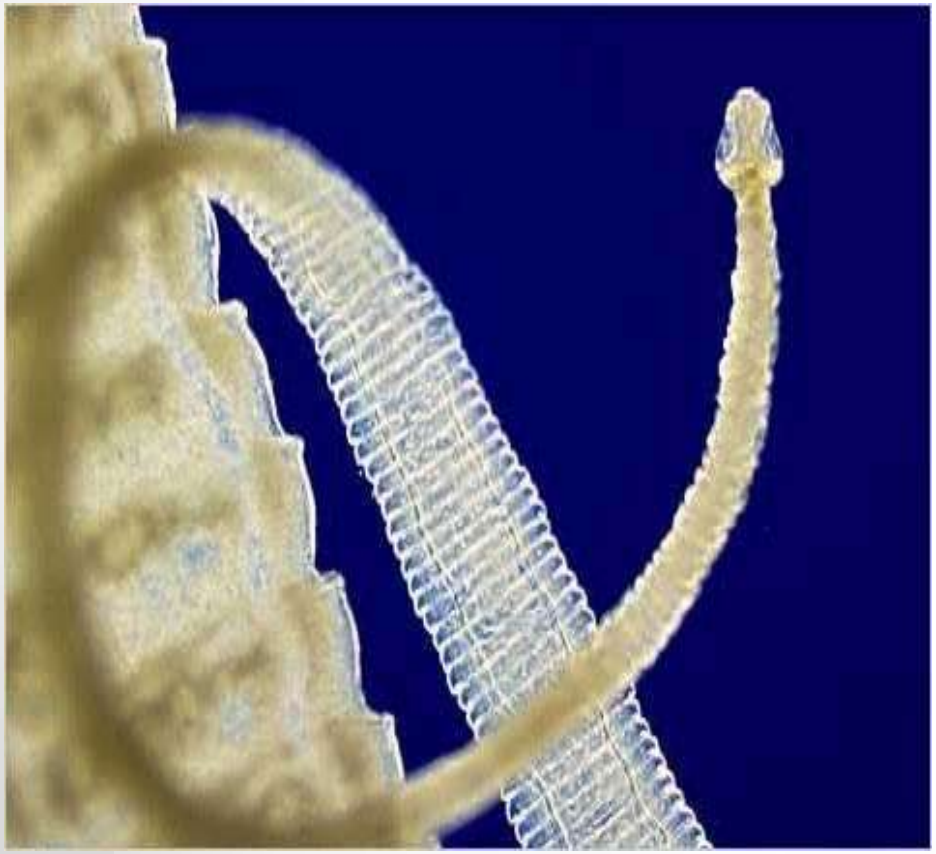




The stinging cells (nematocyst) found in coral tentacles in coiled and released positions.

- Mollusks
  - Octopi, squid
  - Clams, oysters
  - Snails, slugs

- Platyhelminthes (flat worms)
  - Tapeworms & flukes



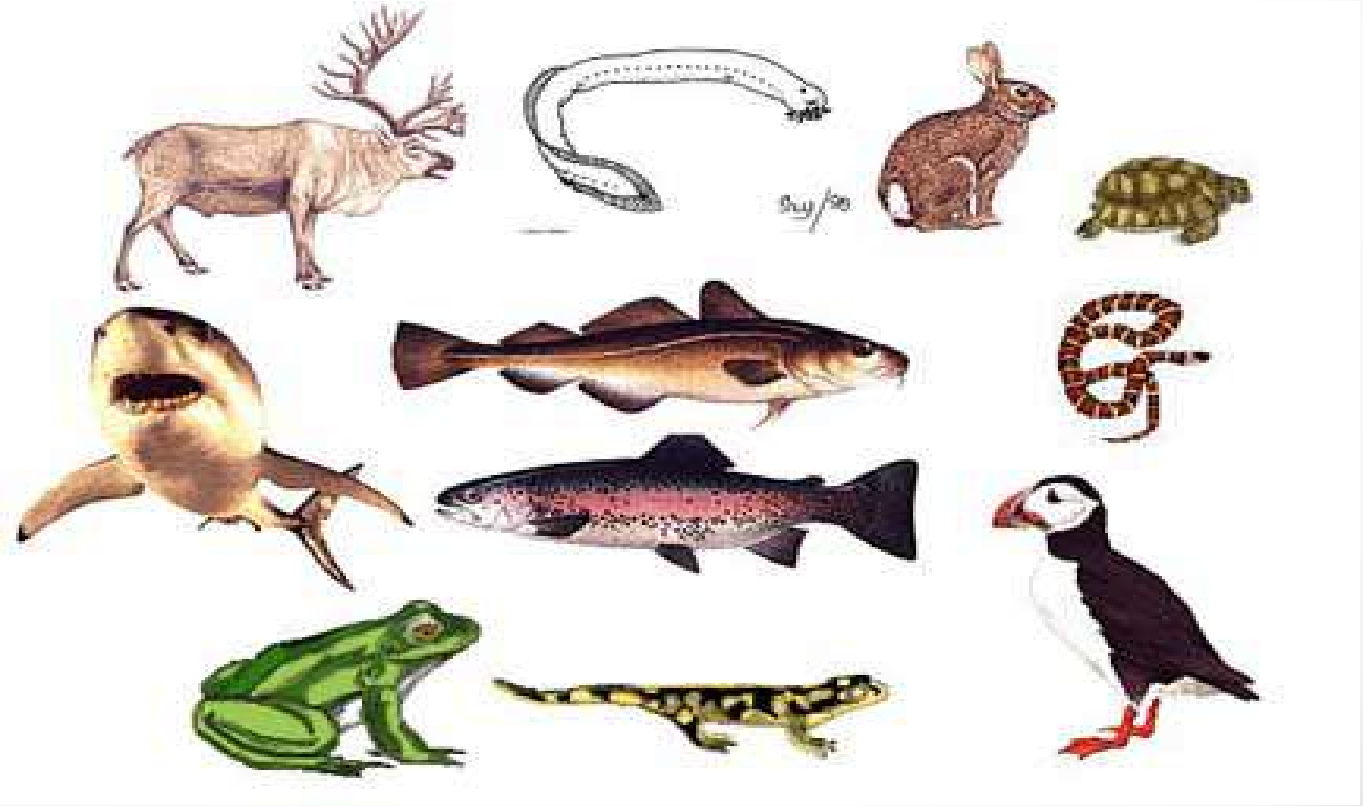
Human liver fluke

- Annelids (segmented worms)
  - Worms & leeches

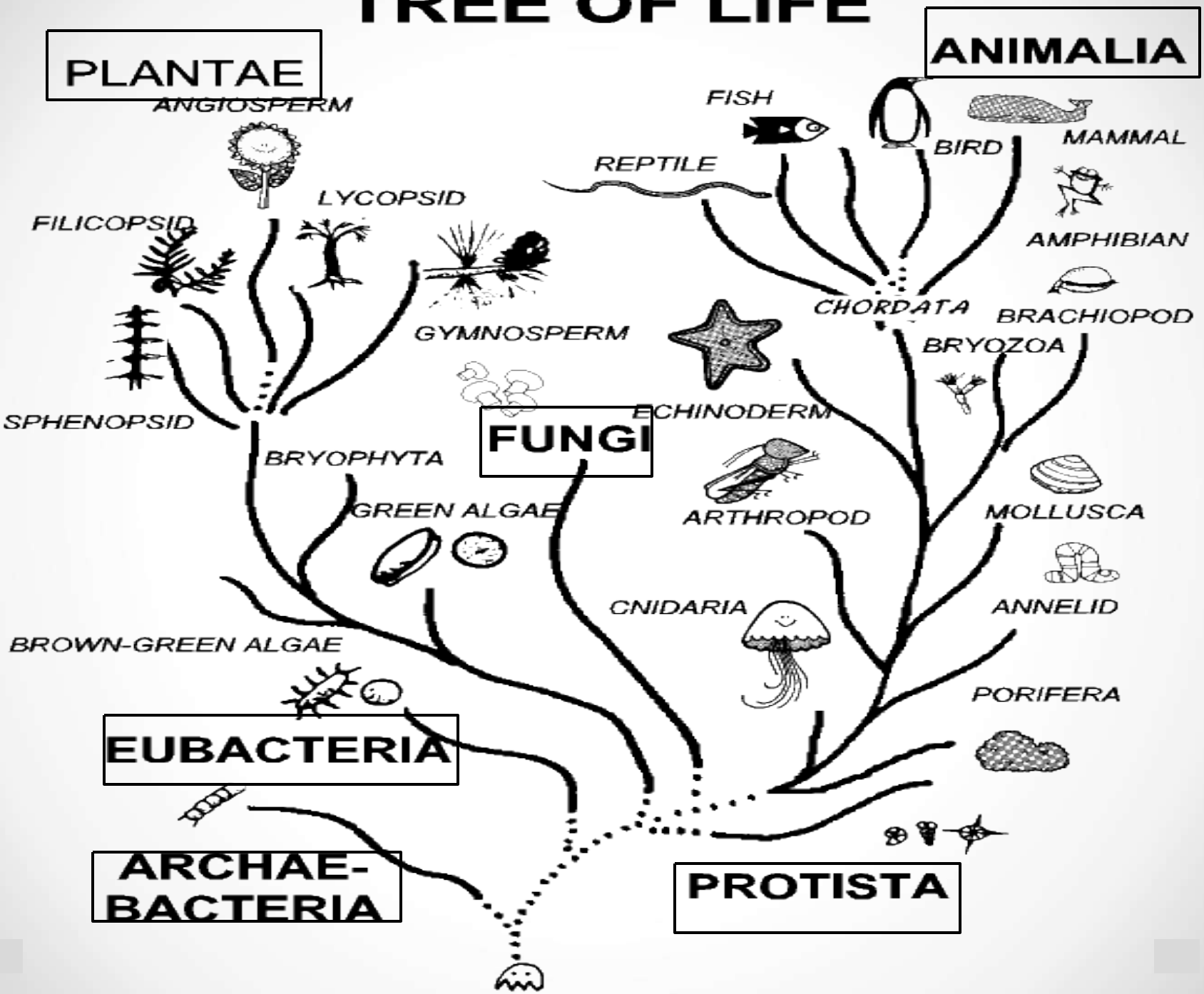
- Echinoderms
  - Starfish, sea urchins, sea cucumbers

- Arthropods
  - Shell fish, arachnids & BUGS!

- Chordates
  - The Chordata is the animal phylum with which everyone is most familiar, since it includes humans and other vertebrates.



TREE OF LIFE


PLANTAE
ANGIOSPERM
LYCOPSID
FILICOPSID
GYMNOSPERM
SPHENOPSID
BRYOPHYTA
GREEN ALGAE
BROWN-GREEN ALGAE
EUBACTERIA
ARCHAE-
BACTERIA
ANIMALIA
FISH
REPTILE
BIRD
MAMMAL
AMPHIBIAN
CHORDATA
BRACHIOPOD
BRYOZOA
ECHINODERM
FUNGI
ARTHROPOD
MOLLUSCA
ANNELID
CNIDARIA
PORIFERA
PROTISTA