# Lab 2: Systematics, Taxonomy, and the Diversity of Life I

## Part 1: Systematics and Taxonomy

Because life on earth is so diverse and so vast, biologists need a general organized system for describing and classifying organisms. **Systematics** is a broad field concerned with classification, evolution, individual variation, distribution, and **taxonomy** (naming). **Nomenclature** (name structure), involves a series of categories in a hierarchy so that each level includes several sublevels. Below is a commonly used hierarchical classification system.

country
state
county
city
street
number

Biology obviously employs a different set of categories that share a hierarchical relationship.

Domain
Kingdom
Phylum*
Class
Order
Family
Genus
Species

*Botanists use the term "division" to indicate the same level.

The broadest taxon is the domain (Bacteria, Archaea, and Eukarya). Some biologists differ in opinion on the number of kingdoms required to adequately classify all the known organisms on earth. Commonly the kingdoms are: Bacteria, Archaea, Protozoa, Chromista, Fungi, Plantae, and Animalia. See your lecture textbook for detailed descriptions.

Domain: Eukarya
Kingdom: Animalia
Phylum: Chordata
Class: Mammalia
Order: Carnivora
Family: Felidae
Genus: *Panthera*
Species: *Panthera leo*

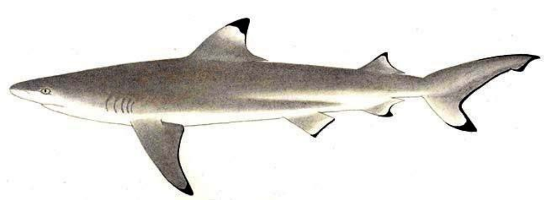
The species name is a binomial with 2 parts: the genus name and a species epithet. The genus is always capitalized and the epithet always lowercase with the entire binomial italicized since it usually is derived from Greek or Latin. For example, the scientific name of the lion is *Panthera leo*. If the scientific name is written by hand, the binomial is underlined instead of being italicized (e.g. <u>Panthera leo</u>). Scientific names might seem difficult to learn, but they are particularly useful when common names tend to vary by region (such as the names crawfish, crayfish, mudbug, crawdad).

**Questions:**

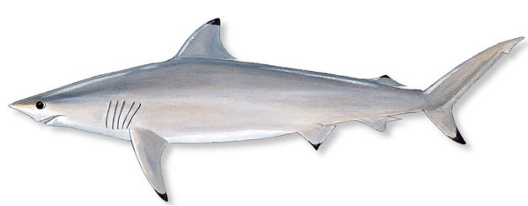
1) Llamas, alpacas, and camels are all in the same family: *Camelidae*. Therefore, it is reasonable to assume that these animals will also be in the same...

2) The scientific name of the brown-throated three-toed sloth is named *Bradypus variegatus*. What is the genus of the organism? The species?

3) Identify the black tip shark. Why are common names not the best way to ID a species?



*Carcharhinus melanopterus*



*Carcharhinus limbatus*

*Carcharhinus sorrah*

**Classification**

In order to decide the placement of a specimen into the proper group, scientists must compare anatomical, genetic, or other characteristics among similar organisms. Sometimes anatomical features are easily discernable patterns, however some organisms are very similar. Even within a species there can be very different patterns and structures especially between sexually dimorphic species. Recent techniques in systematics rely on molecular and genetic means to separate species; however, morphological features are still widely used and provide a more readily accessible way to categorize specimens.

**Dichotomous keys** are used to classify already described organisms by relying on a systematic progression usually of physical features. You first place the species in the largest category and follow the rules to the lowest level. At each level, select the option that best describes the specimen.

Some lab materials are from Dalton State.edu under Creative Commons

**Using a dichotomous key**: In the table, you have been given a list of creatures and their descriptions. The different characteristics, behaviors, and habitats of the creatures can be used in the dichotomous key to differentiate among them. Use the dichotomous key on the following page to identify the creatures in the images below.

| | Description |
|---|---|
| Jackelope | Mean-spirited horned jack rabbit |
| Chupacabra | Reptilian creature covered in scales with spines along the dorsal ridge; likes to eat goats |
| Altamaha-ha | Water monster with an alligator-like head and long neck; lives in the marshes of |
| Sasquatch | Stinky giant humanoid covered in brown fur; found in the forests of North America |
| Yeti | Giant mountain humanoid covered in white fur; prefers the snow |
| Kraken | Giant octopus-like creature; takes down ships in the open ocean |
| Nessie | Water monster with a snake-like head and long neck; lives in Loch Ness, in the Scottish |

What creature is this?

What creature is this?

**Creature dichotomous key:**

1. a. Creature is terrestrial →2
   b. Creature is aquatic →5

2. a. Organism bipedal →3
   b. Creature with more or less than two legs →4

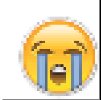
3. a. Creature covered in brown fur: Sasquatch!
   b. Creature covered in white fur: Yeti!

4. a. Creature covered in scales: Chupacabra!
   b. Creature has horns on its head: Jackelope!

5. a. Creature has tentacles: Kraken!
   b. Creature does not have tentacles→6

6. a. Creature has two large pectoral fins: Altamaha-ha!
   b. Creature has for small or reduced fins: Nessie!

**Building a dichotomous key**: In the table below, there are several different emojis. Your job is to build a dichotomous key that would help distinguish among them. There is space in the table to write out a description of each emoji, as well as a name for each. Record your question series in the space provided on the following page.

| Emoji | Description | Name |
|---|---|---|
|  | | |
|  | | |
|  | | |
|  | | |
|  | | |
|  | | |

Dichotomous Key Questions:

1. a.________________________________________________________________________

   b.________________________________________________________________________

2. a.________________________________________________________________________

   b.________________________________________________________________________

3. a.________________________________________________________________________

   b.________________________________________________________________________

4. a.________________________________________________________________________

   b.________________________________________________________________________

5. a.________________________________________________________________________

   b.________________________________________________________________________

**Using field guides to identify species**

There are many styles and formats of field guides. Today you will examine a few types. When identifying an organism, pay attention to the glossary which may contain critical anatomical words to tell specimens apart. In many instances, a specimen may appear very different from the photo or plate in the guide making it important to concentrate on the identifying features. Range maps can also help you narrow down potential species (though an organism may have been introduced or expanded its range). Also, realize that there can be many other clues for identification such as vocalization, tracks, and odor that may come with experience.

You may also find field guides online with regional features:
https://reefguide.org/home.html
https://www.fnai.org/fieldguides.cfm
https://www.arborday.org/trees/whatTree/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1. You and your class are walking around FIU's Biscayne Bay Campus and come across a tree species that you don't recognize. Your TA tasks you with identifying the tree for the class using the field guide at https://www.arborday.org/trees/whatTree/.

   You look at the tree and see that the leaves measure 2-5 inches long, are oblong or elliptical in shape, unlobed, and evergreen. You notice that one leaf blade is attached to a stalk and that the leaves are staggered on each twig (not directly across from each other). You touch a leaf and find that it is thick and leathery. Leaf margins are entire and leaves and twigs are not covered with silvery scales or scars. This tree produces acorns as fruit and you don't notice any large flowers, milky sap, spines, or thorns.

Species Name:_____________________________________________
Common Name:____________________________________________

2. Can you use a field guide or dichotomous key to identify a newly discovered species? Why or why not?

## Part 2: Diversity of Life I—Microbes, Protists, and Fungi

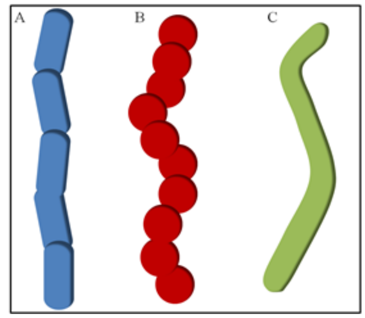



Figure 1. Three basic shapes of bacteria: a) bacillus, b) coccus,

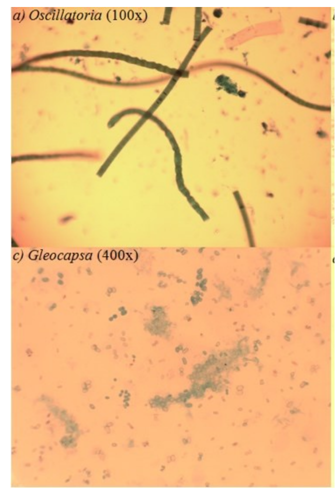



Figure 2. Cyanobacteria: a) *Oscillatoria* and c) *Gloeocapsa.*

**Domain: Prokaryotes**
**Kingdom: Bacteria** (Archaebacteria and Eubacteria)
Take some time to explore the Tree of Life website (tolweb.org/) as you are looking at preserved specimens and photos in lab. Take notes on your observations and ask yourself what is different about one organism from another. Cellular organisms evolved along two lines: 1) species lacking membrane-bound organelles and a nucleus (**prokaryotes**), and 2) species with a nucleus and membrane-bound organelles (**eukaryotes**). Within prokaryotes, there are two distinct groups: **Archaea** and **Bacteria**. Species within the domain Archea often inhabit, but are not restricted to, extreme and stressful environments (e.g. areas with very high temperatures or pHs) where other organisms cannot reside. Species within the domain Bacteria exist in a variety of environments, and are the most abundant and widely distributed organisms on Earth. Individual bacterial cells are microscopic, and their cell walls give them three characteristic shapes: bacillus (rod-shaped), coccus (spherical), and spirillum (spiral) (Fig. 1). Most bacteria are heterotrophic; they derive their energy from organic molecules made by other organisms. Heterotrophic bacteria are often decomposers, feeding on dead organic matter and releasing nutrients locked in dead tissue. However, cyanobacteria (Fig. 2) are photosynthetic bacteria that harness light energy to drive the synthesis of organic compounds. Most cyanobacteria are free-living, but some are symbiotic. They often contain a mixture of photosynthetic pigments that influence their color (blue-green to brown to dark green). Cyanobacteria are the base of the food web in many ecosystems, and also produce oxygen as a byproduct of photosynthesis.

**Procedure:**

1. Using a compound light microscope, observe the prepared slides of *Oscillatoria* and *Gleocapsa*. Draw what you see in the spaces provided.

Domain:
Phylum:
Genus: ***Oscillatoria***
Magnification:
Notes:

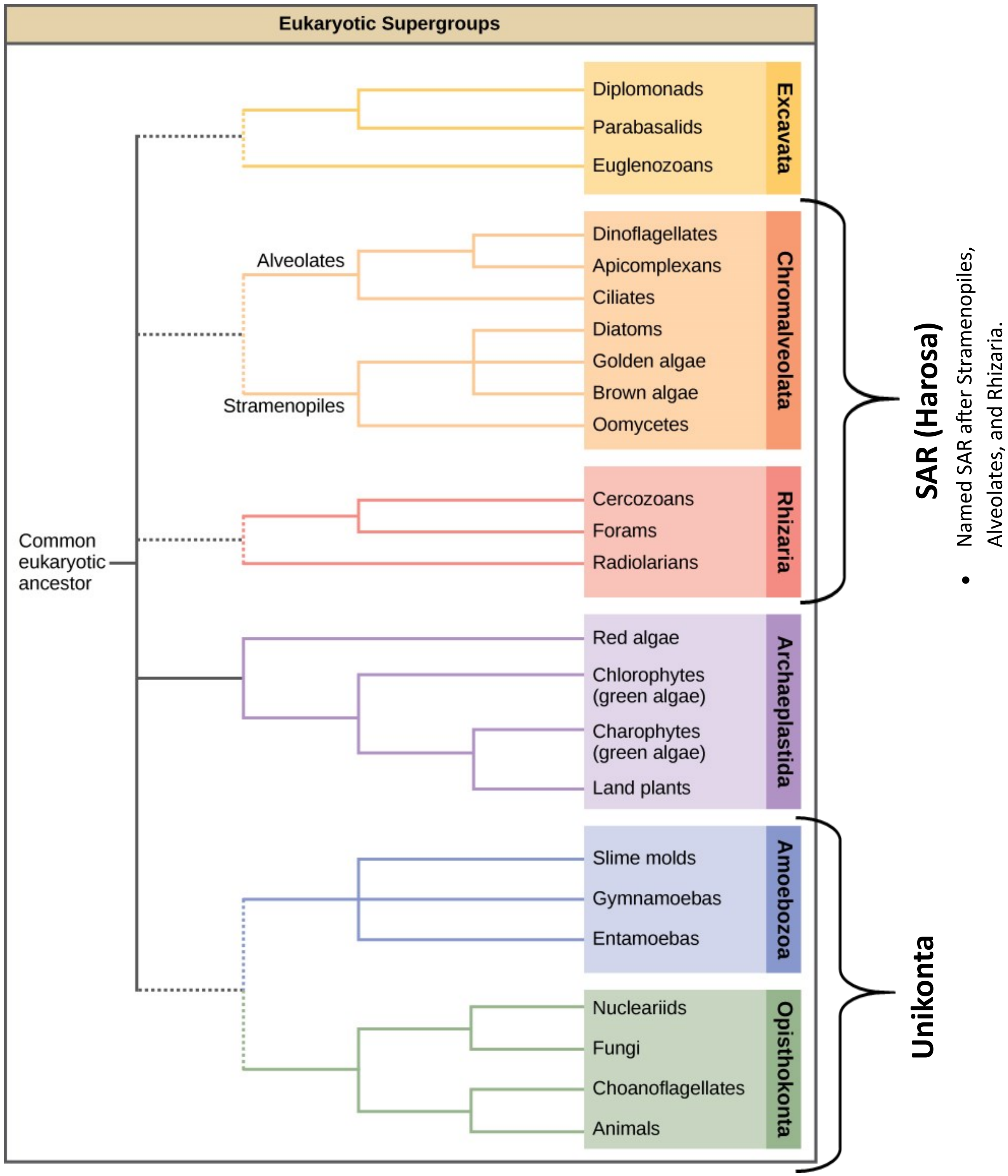
Domain:
Phylum:
Genus: ***Gloeocapsa***
Magnification:
Notes:

2. Which of the three basic shapes or bacteria does *Oscillatoria* most resemble? *Gloeocapsa*?

**Domain: Eukarya**, previously a 4 kingdom system (Protists, Fungi, Plants, and Animals), is now broken down into **4 supergroups: Excavata, SAR (Harosa), Archaeplastida, and Unikonta** (Fig. 3). This classification system dissolves the previous kingdom **Protista**, which was an informal “catch-all” group based on the cellular structure, feeding ecology, and life cycles of eukaryotic organisms that did not meet classification requirements for Fungi, Plant, or Animal kingdoms. Protista was broken into 3 main groups: Protophyta, protozoans, and slime molds. **Protophyta** most resemble plants because they are autotrophic and have a variety of pigments used to convert light energy to chemical energy via photosynthesis. They are an important component of aquatic ecosystems globally - producing a major component of the world’s oxygen and serving as an important food source for a variety of consumers. Organisms under Protophyta are now distributed amongst Excavata, SAR, and Archaeplastida. **Protozoans** most resembled animals due to their animal-like heterotrophy. Protozoans typically have food vacuoles to enclose food particles for digestion and contractile vacuoles to expel excess water. These organisms have now been redistributed to SAR and Unikonta. **Slime-molds**, like protozoans, also have a heterotrophic ecology and were recategorized under the Unikonta supergroup. Thanks to advances in molecular phylogenetic studies, this new classification system better reflects evolutionary relationships and phylogeny of eukaryotes.

**Supergroup (unranked): Excavata** is a clade of single-celled organisms named for the excavated feeding groove found on some individuals. Organisms in this group have diverse means of obtaining energy including photosynthesis, heterotrophic predation, and partisitism.

**Phylum: Euglenophyta** are unicellular, autotrophic organisms in the supergroup Excavata. Euglenoids are mostly found in fresh water, with a few marine species. This phylum is widely recognized for their flagella which allows the organisms to actively move through its environment (Fig. 4). Previously classified as




https://courses.lumenlearning.com/suny-biology2xmaster/chapter/classification-of-protists/

Figure 3. Classification of Eukarya broken into 4 main supergroups: Excavata, SAR (Harosa), Archaeplastida, and Uniconta. SAR or Harosa is comprised of 3 major clades: **S**tramenopiles, **A**lveolates, and **R**hizaria. Supergroup Unikonta is comprised of 2 major clades: Amoebozoa and Opisthokonta. Organisms originally under the Kingdom Protista have been redistributed amongst these seven major groups, some of which include fungi, plants, and animals. Dotted lines indicate hypothesized evolutionary relationships.

Protophyta under the kingdom Protists, these single cellular organisms share similarities with both plants and animals. Most euglenoids have chloroplasts like plants, allowing them to photosynthesize. Some euglenoids are able adjust their mode of energy acquisition based on the environmental conditions and alternate between auto– and heterotrophy.

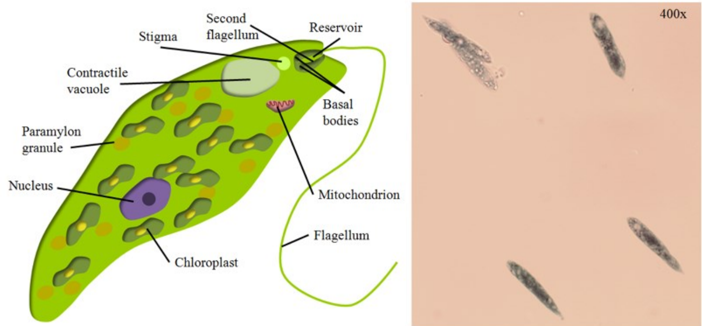



Figure 4. *Euglena* body plan.

**Procedure:**

1. Using your compound light microscope, observe the prepared slides and live cultures (if available) of euglenoids. Note any key structural components and their significance.

Domain:
Supergroup:
Phylum:
Genus: ***Euglena***
Magnification:
Method of locomotion:
Notes:

**Supergroup (unranked): SAR (Harosa)** is a clade that includes strameopiles, alveolates, and Rhizaria. The first letter of each group provides the "SAR" name. Advances made by phylogentic studies are continuously increasing our understanding of how these organisms are related, leading to frequent taxonomic reclassifications.

**Superphylum: Stramenopila**

**Class: Bacillariophyta (Diatoms)** are single-cellular, photosynthetic microalgae that are found in marine and freshwater throughout the world. Algae is an informal, polyphyletic term used to describe a diverse group of plant and plant-like organisms. These microalgae exist in very large numbers and reproduce very quickly. Diatoms are responsible for nearly 20% of Earth's yearly oxygen production. A unique characteristic of diatom anatomy is their silica-based cell wall called a "frustule" (Fig. 5). The frustule structure bends light in such a way that diatoms appear to have a

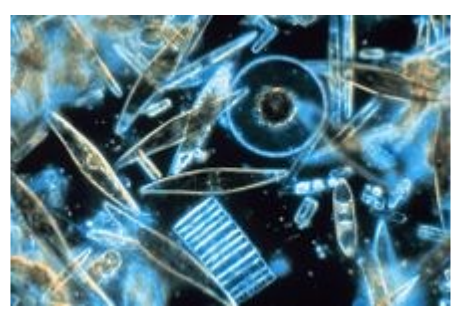


Figure 5. Light microscopy of marine diatoms found living in Antarctic sea ice.

kaleidoscope of colors. Unlike euglenoids, diatoms move passively though their environment. When diatoms die, their shells remain and contribute to half of the organic material found in oceans.

**Procedure:**

1. Using your compound light microscope, observe the prepared slides of diatoms. Note any key structural components and their significance.

Domain:
Supergroup:
Superphylum: Stramenopila
**Class: Bacillariophyta (Diatoms)**
Magnification:
Method of locomotion:
Notes:

**Class: Phaeophyta,** or brown algae, are one of three common types of algae including Rhodophya (red algae), and Chlorophyta (green algae). Classification of these groups are constantly changing as science advances. Recently, red and green algae were reclassified under Kingdom Plantae. Brown algae usual grows in coolers waters and may be free floating or attached to a substrate.

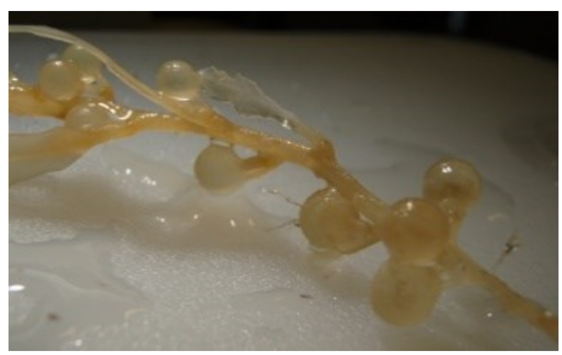


Figure 6. *Sargassum*, a common floating brown algae

**Genus: *Sargassum*** is an ecologically important brown alga that is commonly found attached to substrate on coral reefs by a root-like structure called a holdfast (Fig. 6). Gas filled air-bladders called pnematocysts help keep the sargassum vertical when attached to substrate. When the algae becomes detached, these gas bladders allow the algae to float at the surface and allow for the formation of large floating mats. These huge floating algae masses serve as habitat for a variety of micro– and macro-organisms. Large mats of *Sargassum* can be found in the middle of the North Atlantic Gyre called the Sargasso Sea.

**Procedure:**

1. Using your dissecting and compound light microscopes, observe *Sargassum*. Note any key structural components and their significance.

Domain:
Supergroup:
Superphylum:
Class**:**
**Genus: *Sargassum***
Magnification:
Notes:

**Superphylum: Alveolates** is a major group of diverse protists that share genetic and structural similarities, such as the presence of layered cortical alveoli, or “outer-region sacs”, that form a flexible skin-like layer. In dinoflagellates, they are often form armor-like plates. Alveolates have flagella or cilia with distinctive structures.

**Phylum: Dinoflagellata (Dinoflagellates)** are unicellular, autotrophic algae that are mostly found in marine environments; however, some species can be found in fresh water. Like euglenoids, dinoflagellates can propel themselves through the water using their flagella (Fig. 5). Like diatoms, dinoflagellates are very important to marine systems and can reproduce rapidly; however, when conditions are right, massive outbreaks, or algal blooms, can occur and cause fish and invertebrate kills due to the production of toxins (dinotoxins) and the depletion of oxygen.  These outbreaks are commonly referred to as “red ride” due to change in water color caused by the algal blooms. Some genera of dinoflagellates are bioluminescent and will emit a blue-green light. Dinoflagellates use their bioluminescence as a defense mechanism. By illuminating their surroundings, the dinoflagellates can make their attackers vulnerable by attracting predators further up the food chain—think “the enemy of my enemy is my friend”.

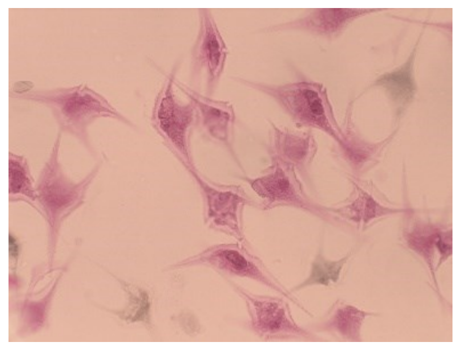


Figure 5. *Ceratium* is a genus of dinoflagellate with armored plates and two flagella within the grooves of the plates.

**Procedure:**

1. Using your compound light microscope, observe the prepared slides of diatoms. Note any key structural components and their significance.

Domain:
Supergroup:
Superphylum:
Phylum: **Dinoflagellata (Dinoflagellates)**
Magnification:
Method of locomotion:
Notes:

**Phylum: Ciliophora** or ciliates are a group of organisms previously considered protozoans that are characterized by the presence of hair-like organelles called cilia. They are found in almost all waters and roughly 4,500 species have been described and there are estimated to be estimated 27,000-40,000 extant (living) species. They include some of the most morphologically complex protozoans. Ciliates can reproduce both sexually and asexually.

**Genus: *Paramecium*** (Fig. 6) have a sub-membrane system of microtubules that can coordinate the movement of thousands of small cilia (hair-like projections) used for locomotion. Paramecium are quite small, ranging in size from 50 - 330 micrometers in length.

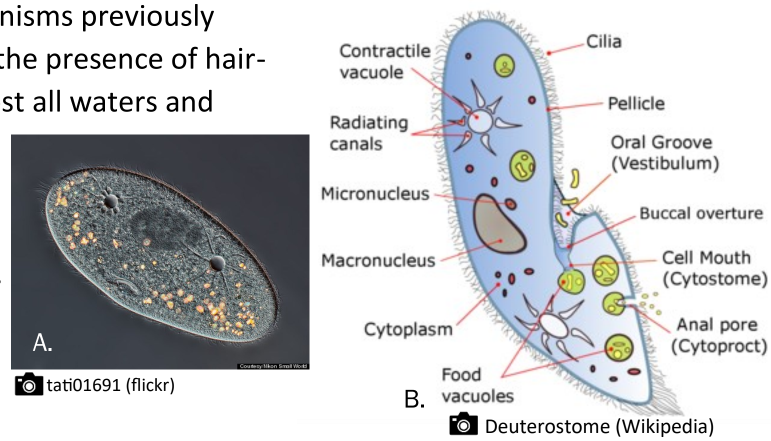



Figure 6. Paramecium body plan.

**Procedure:**

1. Using your compound light microscope, observe the prepared slides of diatoms. Note any key structural components and their significance.

Domain:
Supergroup:
Superphylum:
Phylum:
Genus: ***Paramecium***
Magnification:
Method of locomotion:
Notes:

**Clade 1: Rhizaria** are amoeboid organisms with thread-like pseudopodia found in marine, freshwater, and soil ecosystems. Pseudopodia are used in locomotion and gathering food. To move, they extend a pseudopodium, anchor it, cytoplasm streams into the pseudopodium, and the process is repeated. Pseudopodia can also be used to engulf food particles where enzymes are secreted for intracellular digestion. Food vacuoles may also be used in digestion to enclose food and contractile vacuoles are used to expel water. Two main phylums of Rhizaria are **Foraminifera** and **Retaria** (subphylum **Radiolaria**). Foraminifera are unicellular heterotrophs that can grow up to several centimeters and calcareous, porous shell-like structures called tests. Foraminifera are mostly marine, but there are some brackish and fresh water species. Radiolarians (Fig. 7) are small (0.1-0.2 mm) unicellular marine species and have an internal skeleton composed of silica. Radiolarians have needle like psuedopoda that radiate out from the body center.

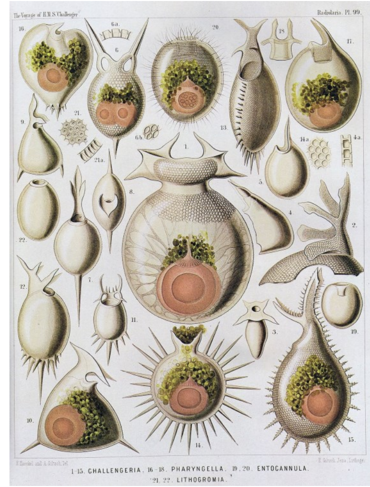


Figure 7. Radiolaria illustration from the Challenger Expedition

**Supergroup (unranked): Archaeplastida** are autotrophs that include Rhodophyta (red algae), Chloro– and Charophyta (green algae), and higher plants. Plastids in red and green algae arose by primary endosymbiosis by engulfing a cyanobacterium (Fig. 8). Today, we will be focusing on red and green algae. Higher plants will be covered next week during Diversity of Life II.

**Kingdom: Plantae**

**Division (Phylum): Rhodophyta (Red algae)** exist primarily in marine environments and may be attached to substrate or free floating. Red algae is typically found in warm waters, but can live in deep environments thanks to red pigments allowing them to absorb green and blue wavelengths that can penetrate deep into the water. Most red algae are fragile and delicate with leafy or filamentous morphology. However, some are calcareous with cell walls made of calcium carbonate, making them hard and resistant to ware, similar to corals. Coralline algae are type of calcareous algae that serve a role in the formation of tropical reefs by supporting the recruitment of coral larvae. Red algae are also important sources of gelling agents such as Agar.

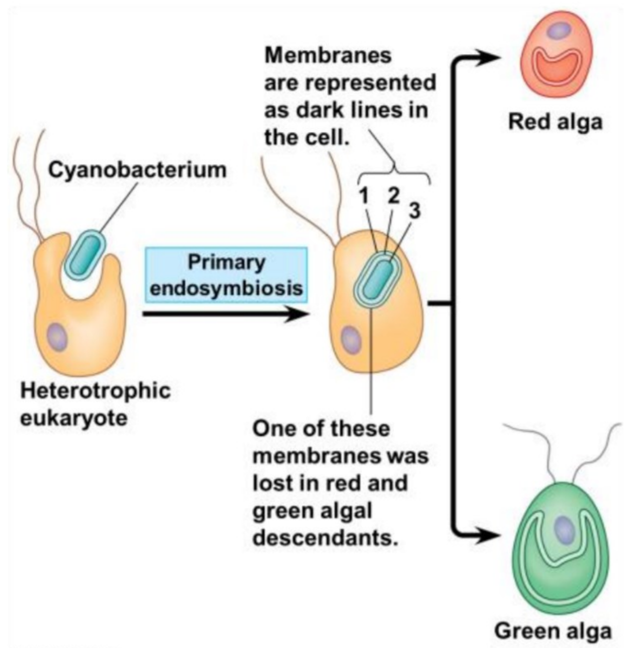



Figure 8. Plastid development in red and green algae.

**Procedure:**

1. Using your dissecting and compound light microscope, observe *Polysiphonia.* Note any key structural components and their significance.

Domain:
Supergroup:
Kingdom:
Division:
Genus: ***Polysiphonia***
Magnification:
Notes:

**Division (Phylum): Chlorophyta, Charophyta (Green algae)** live mostly in freshwater ecosystems, but there are also marine species. Green algae exhibit considerable variability in their structure and forms of reproduction. In addition to unicellular, filamentous algae, and calcarious, there are also colonial green algae. *Volvox* (Fig. 9) is a colonial alga where many individual photosynthetic cells (hundreds to thousands) with two flagella bound are bound in a common spherical matrix. Reproduction occurs within this matrix through binary fission where daughter colonies are formed.

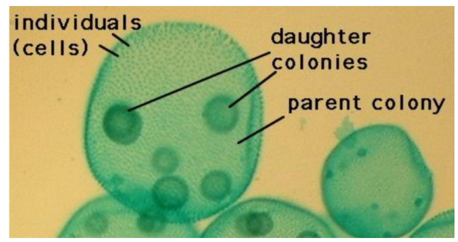


Figure 9. Volvox colony

**Procedure:**

1. Using your compound light microscope, view the available prepared slides of *Volvox*. Note any key structural components and their significance.

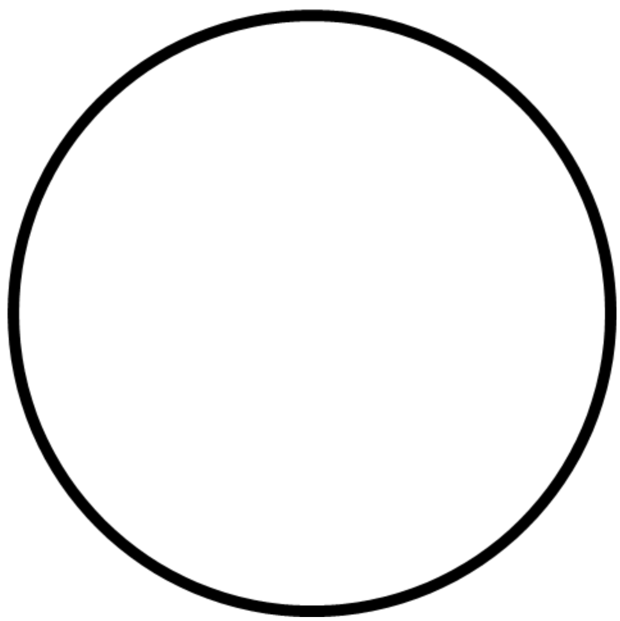
Domain:
Supergroup:
Kingdom:
Division:
Genus: ***Volvox***
Magnification:
Notes:

**Supergroup (unranked): Unikonta** is a taxonomic supergroup that includes Amoebozoa and Opisthokonta. Amoebozoa includes the subkingdom slime molds and the genus *Amoeba*. Opisthokonta includes kingdoms such as Fungi and Animalia. We will cover Kingdom Animalia during Diversity of Life II and III.
**Clade 1: Amboebozoa** is a major taxonomic group of 2,400 species of amoeboid protists. Species of Amoebozoa may either be naked (no protective shell) or have protective shells (testate). Amboebozoa may be found in marine and fresh water or in terrestrial systems among soil, loss or leaf litter.
**Subkingdom: Slime molds** are naked protists that are decomposers similar to fungi, but have amoeboid characteristics (e.g. pseudopodia used for movement, phagocytic nutrition), and lack some characteristics of fungi (no hyphae or chitin in cell walls). Plasmodial slime molds, like *Physarum*, stream along damp forest floors in a mass of brightly colored protoplasm called plasmodium, which resemble a moving mass of slime. These plasmodia are a collection of multiple slime mold cells in which nuclei are not separated by cell walls, and thus individual cells are indistinguishable. This structure maximizes the exposure of slime molds to their food source.

**Procedure:**

1. Using your dissection microscope, observe the slime mold. Note any key structural components and their significance.

Domain:
Supergroup:
Clade 1:
Subkingdom: **Slime Mold**
Magnification:
Notes:



**Genus: *Amoeba*** is a genus of amoeboids in the family Amoebidae (Fig. 10). *Amoebas* live in marine, freshwater, and terrestrial ecosystems, and have pseudopodia - moveable extensions of cytoplasm used for locomotion and gathering food.
When *Amoebas* move, they extend a pseudopodium, anchor it, cytoplasm streams into the pseudopodium, and the process is repeated. In addition to movement, pseudopodia can also be used to engulf food particles where enzymes are secreted for intracellular digestion.

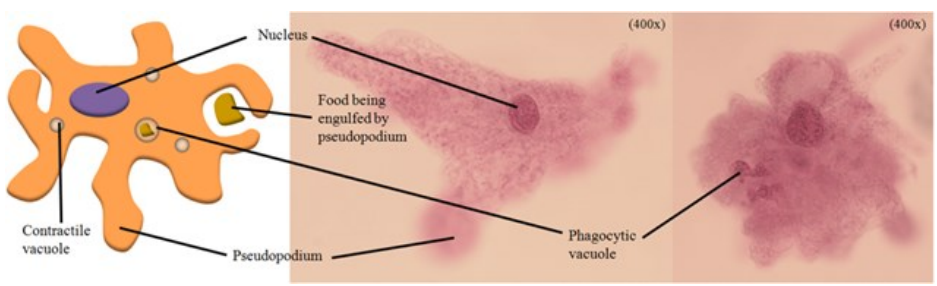


Figure 10. *Amoeba*

**Procedure:**

1. Using your compound-light microscope, observe the *Amoeba*. Note any key structural components and their significance.
2. How does the movement of *Amoeba* and the movement of *Paramecium* differ?

3. How does the size of *Amoeba* and size of *Paramecium* differ?

Domain:
Supergroup:
Clade 1:
Family: Amoebidae
Genus: ***Amoeba***
Magnification:
Method of locomotion:
Notes:

**Clade 1: Opisthonkonta** are a broad group of eukaryotes that include both animals and fungi. This group is named for the shared trait that flagellate cells (sperm for most animals and the spores in some fungi) have a single, posterior flagellum compared to other eukaryote groups that may have one or more anterior flagella. (Greek: opisthios = “rear, posterior” + kontos = “pole”, i.e “flagellum”).

**Kingdom: Fungi** are a diverse kingdom that serves a variety of functions for humans, including providing food, aiding in the production of antibodies, and the decomposition and recycling of organic material. Fungi are filamentous strands of cells that secrete enzymes and feed on the organic material on which they grow. The vegetative (nutritionally active) bodies of most fungi are usually hidden and diffusely organized around and within the tissues of their food sources. The basic structure of a fungus is the hypha - a slender filament of cytoplasm and nuclei enclosed by a cell wall. A mass of these hyphae makes up an individual organism and is collectively called a mycelium (Fig. 11). Fungi feed on many types of substrates, including dead organic material (saprophytes) and living organisms (parasites). They feed by secreting enzymes on organic substrates, and then absorb the

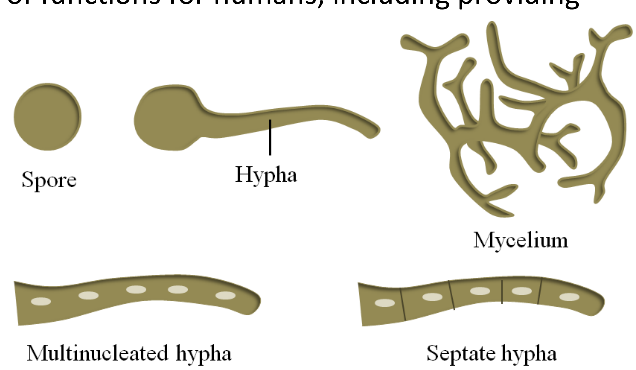


Figure 11. Elements of fungal structure

digested nutrients. The cell walls of fungi are usually made of chitin. Similar to many protists, reproduction can be sexual or asexual in fungi, which result in the production of spores that are carried by wind or water (Fig. 12). There are several phyla within the fungi kingdom. Most bread molds (division: *Zygomycota*) are saprophytic (live on dead organic matter) and their vegetative hyphae lack septa such as *Rhizopus* (black bread mold). Sac fungi (division: *Ascomycota*) includes yeast, truffles, and some molds. Some species are economically important; for example, *Penicillium* are used to produce antibiotics and give unique flavor to cheese, and *Aspergillus oryzae* is used to brew Japanese saki and to enrich food for livestock. Yeasts are unicellular fungi that inhabit liquid or moist environments, including plant sap and animal tissues. Club fungi (division: *Basidiomycota*) include mushrooms, shelf fungi, and economically important plant pathogens such as rusts and smuts. Club fungi are important decomposers of plant material and significant mycorrhiza-forming mutualists (found in most vascular plants) that aid in the absorption of water in plants and mineral exchange. Lichens are another important, and brightly colored fungi with symbiotic relationships to photosynthetic alga or cyanobacterium (Fig. 13). The fungal component of a lichen is called the *mycobiont*. The mycobiont may be an Ascomycete or Basidiomycete. The durable construction of fungi, linked with the photosynthetic properties of algae and bacteria, enables lichens to proliferate in harsh terrestrial habitats.

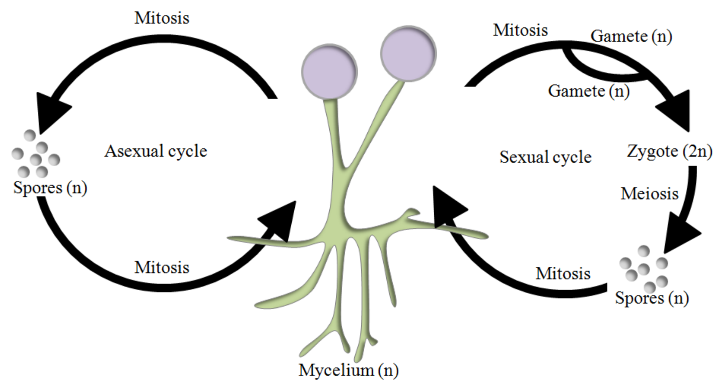



Figure 12. Generalized life cycle of a fungus.

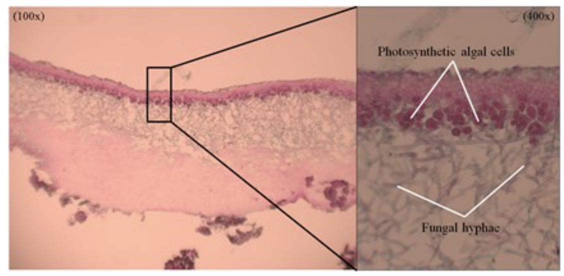



Figure 13. Lichen thallus with photosynthetic algal cells.

**Procedure:**

1. Use your dissecting microscope to examine common bread mold (do not open the container the mold is in). Note how many different colors (species) are present on the bread.

| |
|---|
| Domain:<br>Supergroup:<br>Clade 1:<br>Kingdom:<br>Division (phylum): **Zygomycota**<br>Magnification:<br>Notes: |

2. Obtain a culture of a living sac fungi (e.g. *Aspergillus* or *Penicillium*) and use your microscope to examine the general texture and the colonies' hyphae and spores.

Domain:
Supergroup:
Clade 1:
Kingdom:
Division (phylum): **Ascomycota**
Genus:
Magnification:
Notes:

3. Examine the prepared slides of a yeast (*Saccharomyces*) and a cup fungus (*Peziza*).

Domain:
Supergroup:
Clade 1:
Kingdom:
Division (phylum): Ascomycota
Genus: ***Saccharomyces***
Magnification:
Notes:

Domain:
Supergroup:
Clade 1:
Kingdom:
Division (phylum): Ascomycota
Genus: ***Peziza***
Magnification:
Notes:

4. Use your dissecting microscope to examine the mushrooms.

Domain:
Supergroup:
Clade 1:
Kingdom:
Division (phylum): **Basidiomycota**
Genus:
Magnification:
Notes:

5. Examine a prepared slide of a cross-section of a lichen thallus and note the close association between the symbionts.

Domain:
Supergroup:
Clade 1:
Kingdom:
Division (phylum):
Lichen
Magnification:
Notes:

LAB REVIEW #2— Lab 2 (DOL 1)
BSC2011L B5__
Spring 2020

Name: ______________________
Panther ID:____________________

Directions: In paragraph form, address (at minimum) the below questions/topics.

- In a few sentences, what was done in today's lab?
- What was your main take-away?
- What are some key concepts from today's lab that you think might be on your quiz next week?
- Applying knowledge: Look at the student-collected data from file **"StudentData_Journal1.xlsx"**. What identification skills did we learn in class today that could have been applied to improve the quality of data? If you were the scientists that collected this data, what measures would you have taken to improve the quality of your data?
- Applying knowledge: Look at the map of BBC below. Today we began our plunge into "*The Diversity of Life*". For each phyla group we discussed today, discuss their identifying characteristics and list an example specimen from each phyla that we could find in or around BBC. In a few sentences, discuss where on campus you would expect to find the example specimen and why. What are some characteristics of these specimen that would allow them to thrive in those locations?

**Writing should take about a page (more is ok)**
**Font: Calibri, 11pt font**
**Single spaced**
**1" Margins (except for headers)**