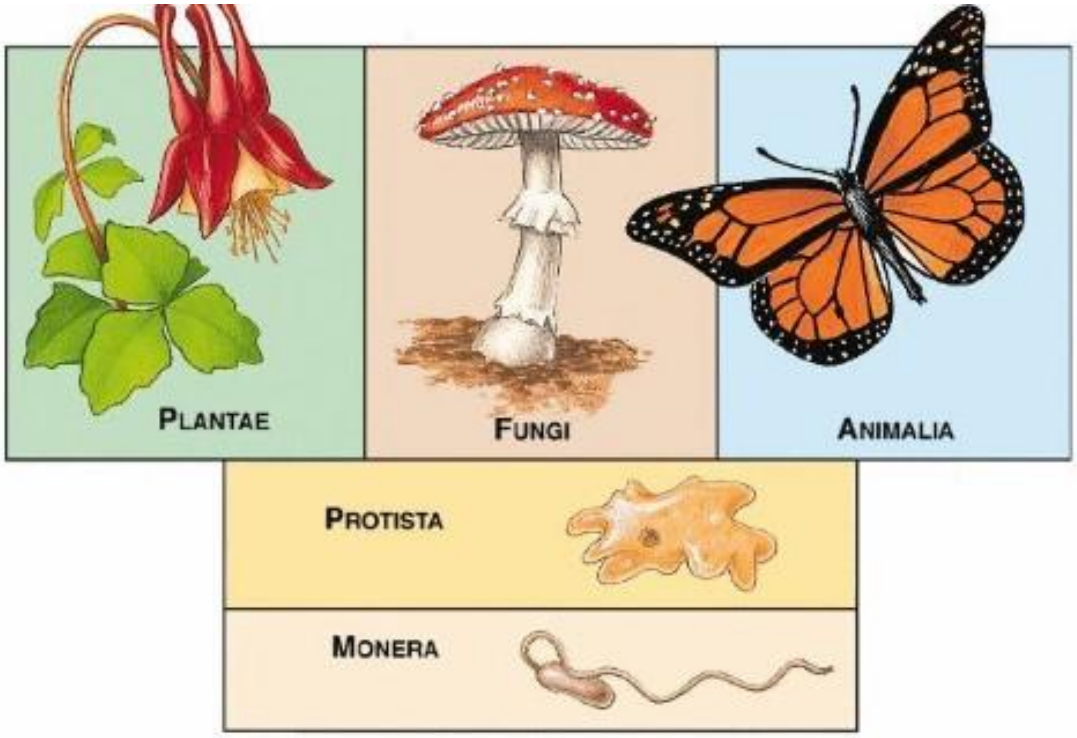
Tishk international university
Faculty of science
Medical analysis Department
Biology Module: Practical

The Classification of Animals
Lab4



Taxonomy is the part of science that focuses on naming and classifying or grouping based on their characteristics (similarities and dissimilarities).

Carolus Linnaeus

- All modern classification systems have their roots in the **Linnaean classification** system.
- It was developed by Swedish botanist Carolus Linnaeus in the 1700s. He tried to classify all living things that were known at his time. He grouped together organisms **that shared obvious physical traits**, such as number of legs or shape of leaves.
- For his contribution, Linnaeus is known as the **"father of taxonomy."** .

The of two important Linnaeus contributions to taxonomy are:
1-Binomial nomenclature

- Binomial nomenclature is the formal naming system for living things that all scientists use.
- The name of each organisms is consisted of two part both are **Latin**
- The first part of the name – the **Genus** name – identifies the genus to which the species belongs,
- The second part return to the **species** names
- Genus is **C**apitalized; species is not; both are *italicized*
- Examples:

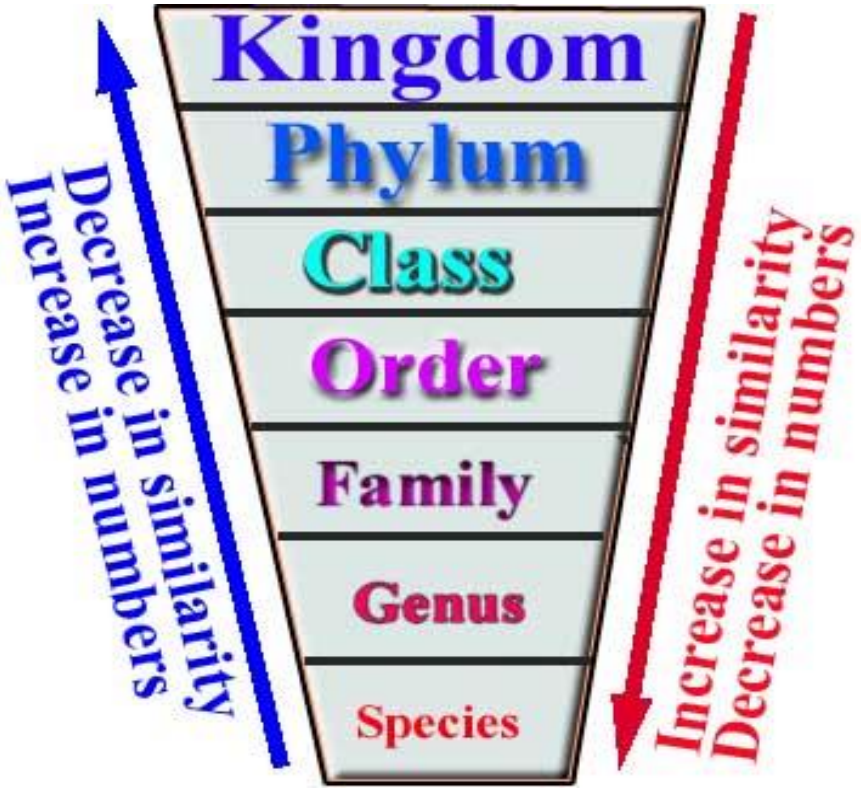
Felis domesticus = cat

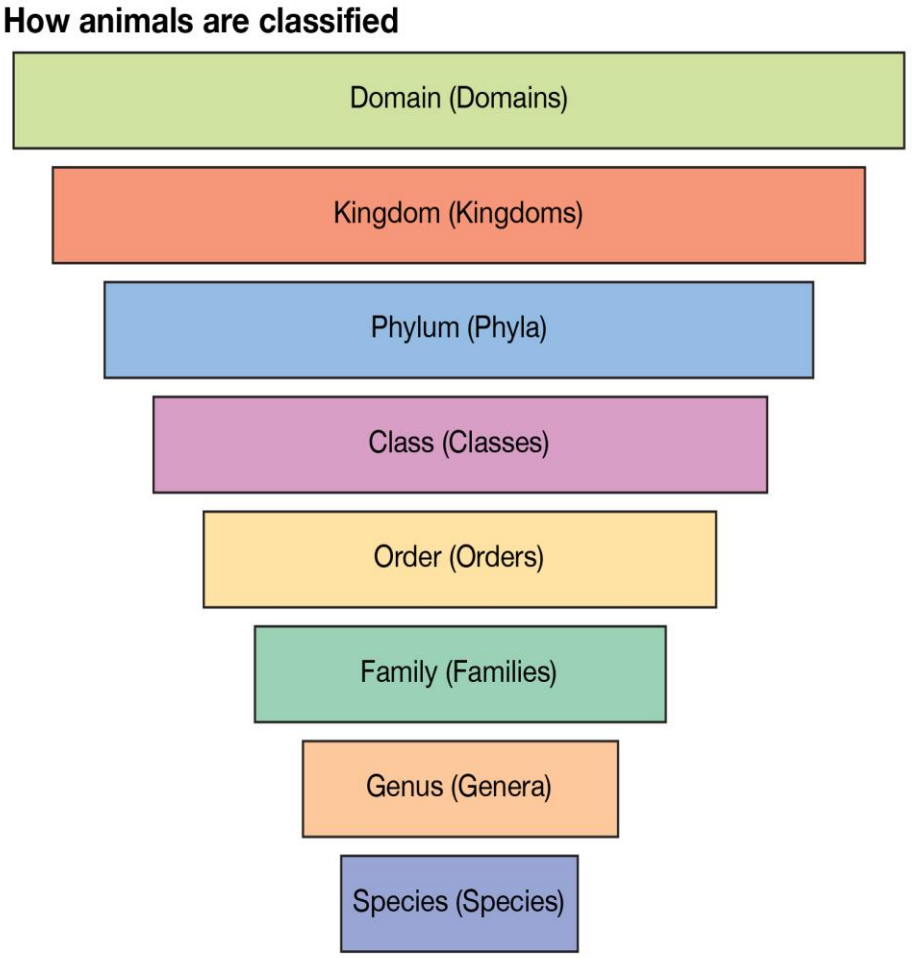
Panthera tigris = tiger

2- Linnaean Classification Hierarchy

- The **Linnaean system of classification** consists of a hierarchy of groupings, called taxa(singular, taxon).
- Taxa any unit used in the science of biological classification, or taxonomy. Taxa range from the kingdom to the species
- **Linnaeus** proposed that there were three **broad groups**, called kingdoms in which the whole nature could fit, the kingdoms were **plants**, **animals** and **minerals**, he divided each of these **kingdoms** in to classes, classes were divided in to **orders**, these were further divided into **genera** and then species, still we use these system today with some modification

Linnaean Classification Hierarchy

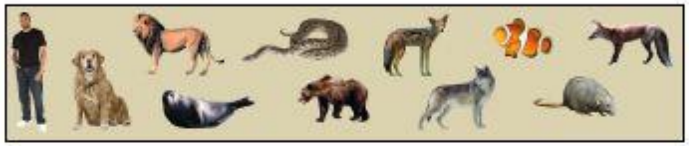
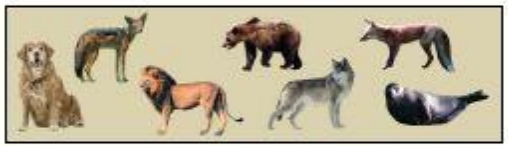




- The **kingdom** is the largest and most inclusive grouping. It consists of organisms that share just a few basic similarities.
- The **species** is the smallest and most exclusive grouping. It consists of organisms that are similar enough to produce fertile offspring together. Closely related species are grouped together in a **genus**.

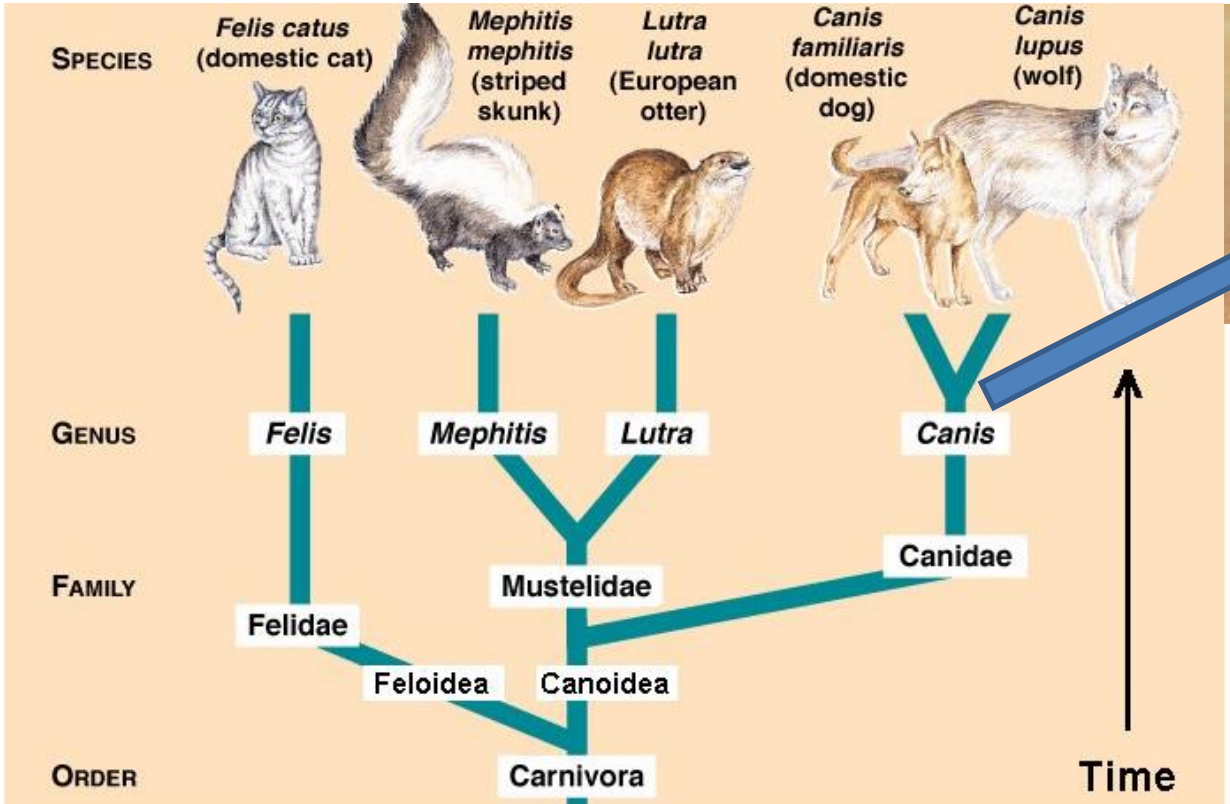
- **Genus**, plural **genera** biological classification ranking between family and species, consisting of structurally or phylogenetically related species
- Among animals, for example, the species of horses and zebras form the genus ***Equus***

The Equus genus includes zebras, horses, and

DOMAIN **Eukarya** eukaryotes	
KINGDOM **Animalia** mostly multicellular and heterotrophs	
PHYLUM **Chordata** animals with a backbone	
CLASS **Mammalia** have sweat glands and produce milk for offspring	
ORDER **Carnivora** most meat-eating animals	
FAMILY **Canidae** wolves, foxes, coyotes, and jackals	
GENUS **Canis** dogs, wolves, coyotes, and jackals	
SPECIES **Canis lupus** dogs and wolves	
SUBSPECIES **Canis lupus familiaris** domesticated dog	

- Species is defined as a group of organisms that can interbreed to produce a fertile offspring
- (**They have the same number of chromosomes**). Such as Dogs

- It comes below the family and above the species in the taxonomic hierarchy.
- A genus can have many species
- Organisms of different species of the same genus cannot produce a fertile offspring if interbred together



History of classification of organism in to kingdoms

- **From Aristotle's** time to the middle of the twentieth century, biologists recognized only two kingdoms: kingdom Plantae (plants) and kingdom Animalia (animals).
- Plants were literally organisms that were planted (immobile), whereas animals were animated (moved about).
- In the 1880s, a German scientist**, Ernst Haeckel**, proposed adding a third kingdom: **The kingdom Protista** (protists) included single-celled microscopic organisms but not multicellular, largely macroscopic ones.

- In 1969, R. H. Whittaker expanded the classification system to the **five-kingdom system:** Monera, Protista, Fungi, Plantae, and Animalia

Basic characteristics of classification

1. **Nature of Cells**: prokaryotic or eukaryotic
2. **Cellularity**: unicellular or multicellular
3. **Level of organizat**ion:** cellular, tissue, organ and organ system
4. **Mode of nutrition**: autotrophic or heterotrophic

Most Biologists classify organisms in to five kingdoms including :

1. **Kingdome: Monera e.g Bacteria**
2. **Kingdome: Protista e.g. Paramecium**
3. **Kingdome: Plantae e.g. Trees**
4. **Kingdome: Fungi e.g yeasts**
5. **Kingdome: Animalia e.g Birds**

- Today, additional levels of hierarchy is added. The broadest level of life is now Domain: All living things are now fit into one only three domains: **Archaea**, **Bacteria** and **Eukarya**. Within each of these domain there are kingdoms
- For example Domain Eukarya includes the kingdoms Animalia, planta, fungi and protests
- Many more new taxa has added to the hierarchy of classification such are phyla and family

Three Domains: Six Kingdoms

- **Eukarya**
  - Animal
  - Plant
  - Fungi
  - Protista

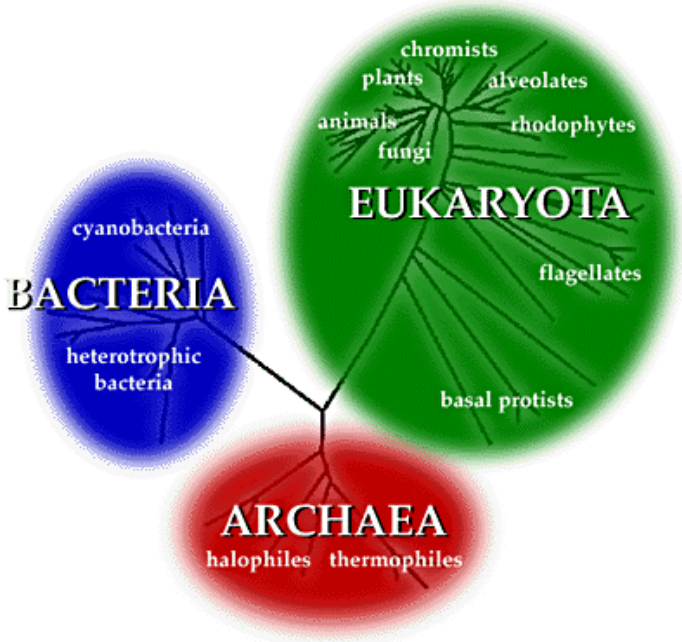
  All have organisms made of eukaryotic cells

- **Bacteria**
  - Eubacteria
    - Peptidoglycan in the cell walls

  Prokaryotic single celled organisms

- **Archea**
  - Archeabacteria
    - No peptidoglycan in the cell walls

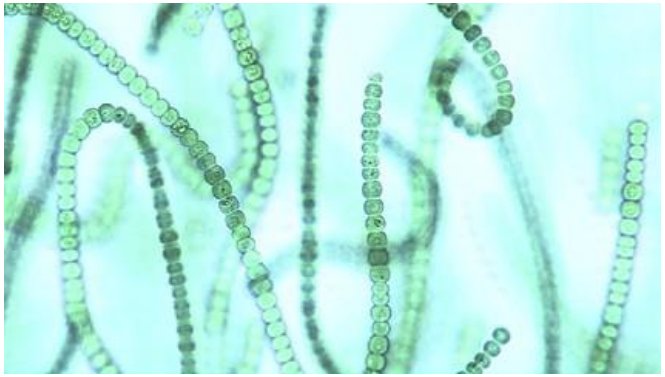
  Prokaryotic single celled organisms that live in extreme environments



Five Kingdome of classification

1. Kingdom Monera (Procaryotae): Most widespread organisms.

- **Procaryotes ("Before nucleus"):**
  - Lack nuclear membrane around DNA.
  - Lack membrane bound organelles (mitochondria, chloroplast, golgi, endoplasmic reticulum).
- Unicellular: Single celled organisms. Decomposers
- Have a cell wall.
- Include: Bacteria, blue green algae



2. Kingdom Protista:

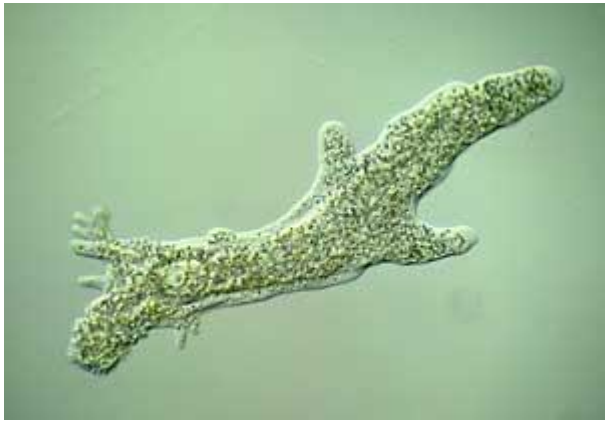
- **Eucaryotes (True nucleus)**
- **Have nuclear membrane around DNA.**
- **Have membrane bound organelles (mitochondria, chloroplast, golgi, endoplasmic reticulum).**
- **Motley Unicellular or simple multicellular.**
- Do not show cellular specialization or differentiation into tissues. That means their cells all look the same and for the most part, function the same
- **Most are larger and more complex than bacteria.**
- **Some make their own food (phothosynthetic), others (heterotrophs) must eat on other organisms.**
- **Include: Protozoa, algae, slime molds.**

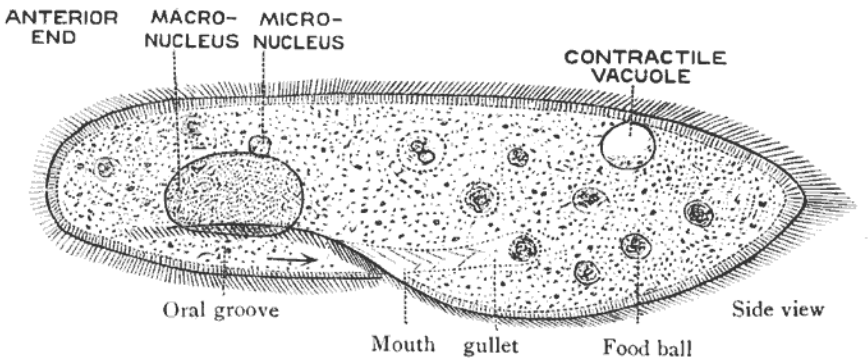
Protists

- Three Types of Protists
  - Protozoa (Animal like protists)
  - Algae (Plant like protists)
  - Slime molds (Fungi like protists)

Protists - Protozoa

- Protozoans are microscopic protists that have several characteristics that are like animals.





Protists - Algae

- Algae are protists that have a few characteristics in common with plants.
- Algae make their own food using photosynthesis.
- Green Algae and brown akgae

3-Kingdom: Fungi

- Eukaryotic and Mostly Multicellular
- Have membrane bound organelles (mitochondria, chloroplast, golgi, endoplasmic reticulum).
- Fungi must obtain their food from other organisms

  Heterotrophs
- Fungi are decomposers

4. Kingdom Plantae:

- Complex multicellular organisms.
- Cellulose cell walls.

- Eukaryotes: Have nuclear membrane around DNA and membrane bound organelles.
  - Autotrophs: Convert sunlight, water, and carbon dioxide into food through photosynthesis.
  - Other features:
    - Waxy cuticle that prevents water loss.
    - Multicellular sex organs.
    - Openings in leaves and stems for gas exchange (stomata).
  - Include: Trees, flowering plants, and mosses.

5. Kingdom Animalia:

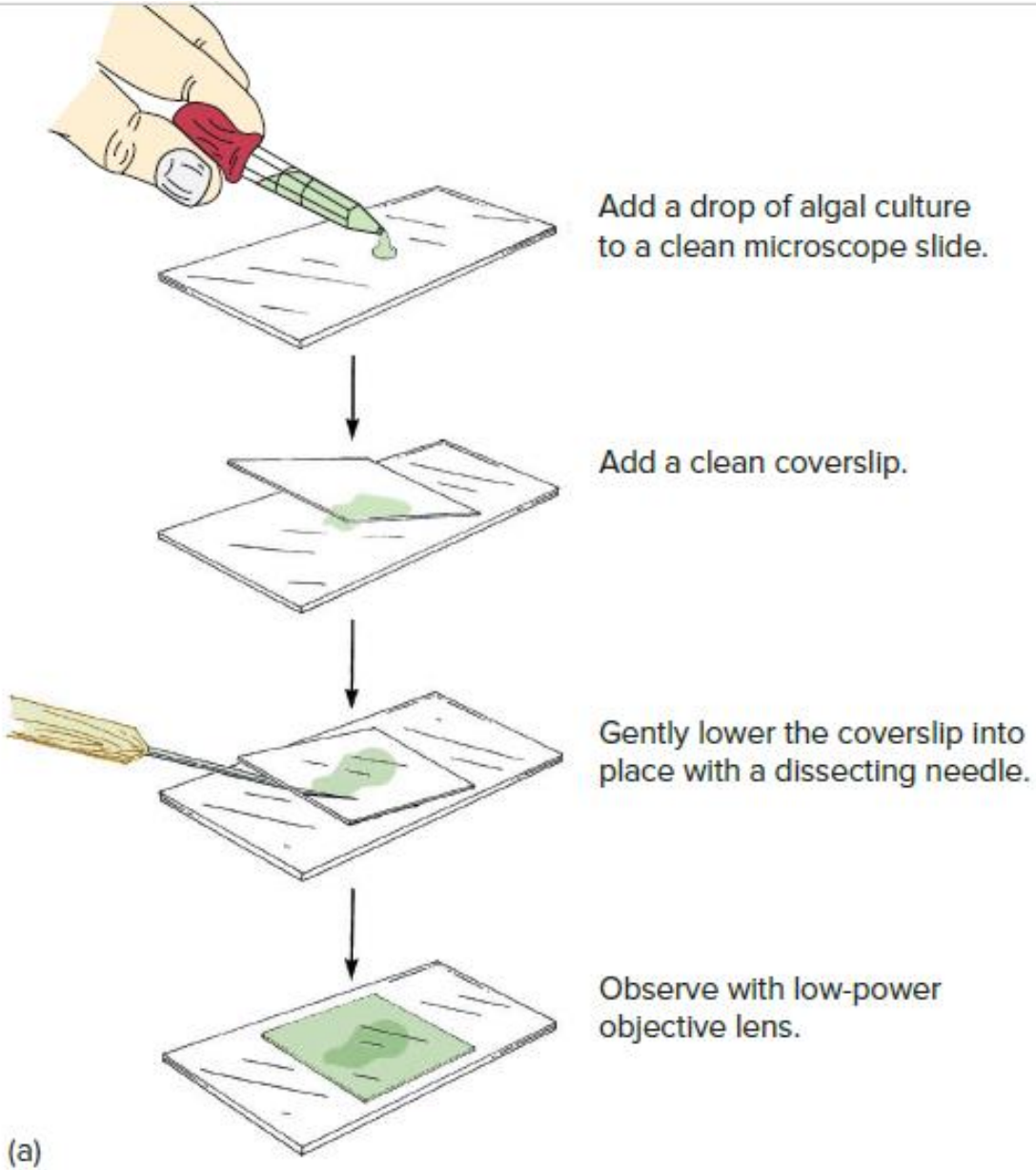
- Complex multicellular organisms
- Lack cell walls.
- Eucaryotes: Have nuclear membrane around DNA and membrane bound organelles.
- Heterotrophs: Obtain chemical energy from living sources. Eat other organisms for nourishment.
- Features of complex animals:
  - High degree of tissue specialization and body organization.
  - Locomotion.
  - Well developed sense organs, nervous system, and muscles.
- Include: Sponges, worms, insects, and vertebrates.

	Eubacteria	Archaebacteria	Protista	Fungus	Plant	Animal
Cell Type	prokaryotic	prokaryotic	eukaryotic	eukaryotic	eukaryotic	eukaryotic
Number of Cells	unicellular	unicellular	most unicellular	most multicellular	multicellular	multicellular
Level of Organization	cell	cell	most cell	most tissue	systems	systems
Cell Wall	peptidoglycan	contains uncommon lipids	pectin or none (green algae: cellulose)	chitin	cellulose	none
Mode of Nutrition	auto/heterotroph	auto/heterotroph	auto/heterotroph	heterotroph (absorption)	autotroph	heterotroph
Reproduction	asexual	asexual	sexual/asexual	sexual/asexual	sexual/asexual	sexual/asexual
Motility	some motile	nonmotile	motile/nonmotile	most nonmotile	nonmotile	motile
Symbiotic Relationship	fix nitrogen many pathogenic aid in human digestion	aid in digestion	many pathogenic (malaria, African sleeping sickness, amoebic dysentery) cellulose digestion	many pathogenic (athlete's foot, yeast infection, ringworm) lichen	epiphyte mycorrhizae mistletoe	parasitic worms, barnacles, clownfish
Examples	*Escherichia coli* *Streptococcus*	methanobacteria	algae, diatoms, amoebas,	lichen, yeast, mushrooms	trees flowers grass	sponges ↓ mammals

This chart sets the content to be covered in the Six Kingdoms Unit. Limit your content for teaching/testing purposes to these concepts.

Prepare a wet mount of a biological specimen

- Place a drop of water containing from a pond water on a clean microscope slide.
- Place the edge of a clean coverslip at an edge of the drop at a 45° angle; then slowly lower the coverslip onto the drop so that no air bubbles are trapped (fig. 3.7). (Your instructor will demonstrate this technique.) The coverslip holds the specimen in place and prevents the lens of an objective from contacting the water and the specimen.
- Experiment with various intensities of illumination. To do this, rotate the 4. objective into place and adjust the condenser iris diaphragm to produce the least illumination. Observe the image; note its clarity, contrast, and color.
- Repeat step 3 for the 10. and 40. objectives.

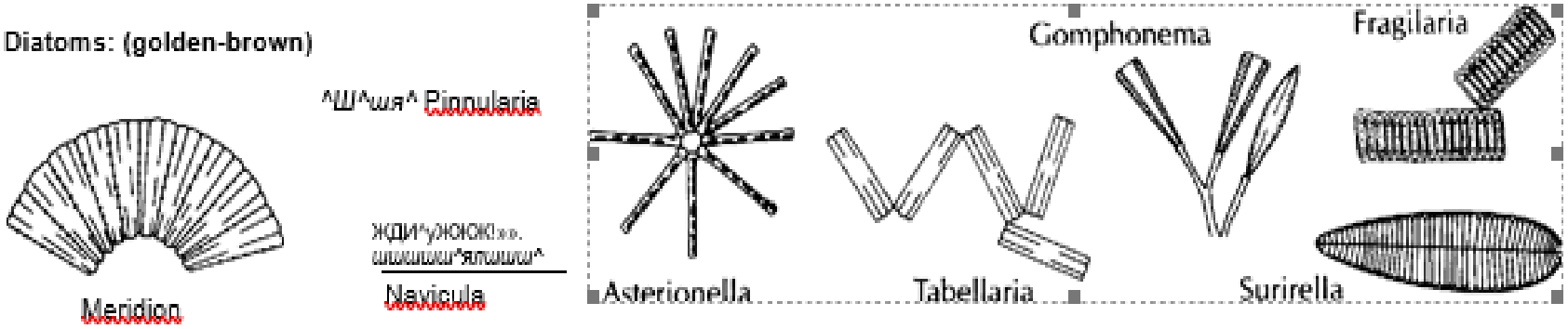

Add a drop of algal culture to a clean microscope slide.
Add a clean coverslip.
Gently lower the coverslip into place with a dissecting needle.
Observe with low-power objective lens.
(a)

(b)

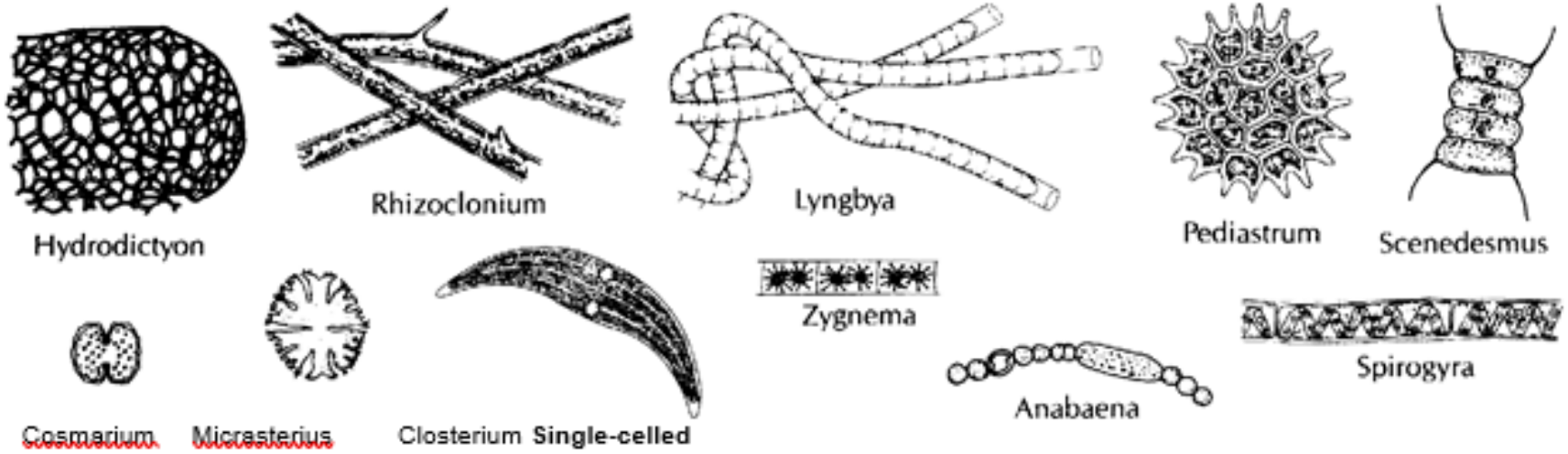
Figure 3.7 (*a*) Preparing a wet mount of a biological specimen. (*b*) A wet mount of pond water will often include the common cyanobacterium *Oscillatoria* (200×). See also figures 3.6 and 25.1–25.4.

FIGURE 1 Organisms in Pond Water

Diatoms: (golden-brown)



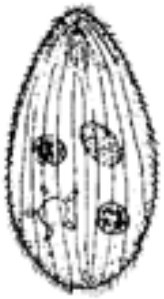
Algae: (green)



forms, attached or swimming:

Chlamydomonas Chifomonas
Amoeba

— Euglena



Paramecium

Larger animal and plant forms:

Stylonychia —^ K Tetrahymena

Vorticella Stentor

Pond snails

Campeloma

ers

Macrocyclops

Daphnia

Lymnaea Physa

Bosmina

Helisoma

a water mite, or Hydracarina

a mosquito larva

an amphipod *[Cammacus]* 3 ^^\ ^ ^^

a water *Gerris*

a whirligig beetle

a "phantom larva," *Chaoborus*

a pond caddis fly larva

Tubifex —elid worm

Two dragonfly nymphs

a chironomid larva, or blood worm/ *Tendipes*