



# The Classification of organism

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Biology

First Semester

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# Outline

- Classification science
- Contribution of C. Linnaeus in Classification
- History of classification
- **Five kingdoms of classification**

# Objectives



- Introducing the concept of classification
- Understanding the scientific name of organism
- Familiarize the students with five kingdom of classification
- Differentiate between kingdoms of classification

# Why Classify?

1. *To study the diversity of life, biologists use a classification system to name organisms and group them in a logical manner.*
2. *Classification makes life easier. What are some ways we classify in our daily living?*



**Taxonomy** is the part of science that focuses on naming and classifying or grouping of organisms 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 Capitalized; species is not; both are *italicized*
- Examples:

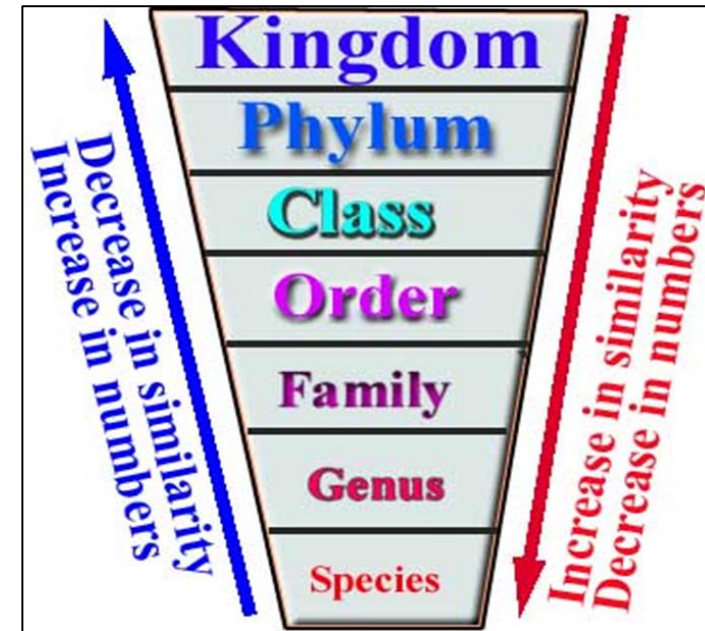
*Felis domesticus = cat*

*Panthera tigris = tiger*

## 2- Linnaean Classification Hierarchy



- The **Linnaean system of classification** consists of a hierarchy(levels) of groupings of organism, In taxonomic nomenclature, each level is called a taxon (plural: taxa) or taxonomic category.
- Linnaeus' hierarchical system of classification includes seven levels. They are, from largest to smallest, **kingdom**, **phylum**, **class**, **order**, **family**, **genus**, and **species**.

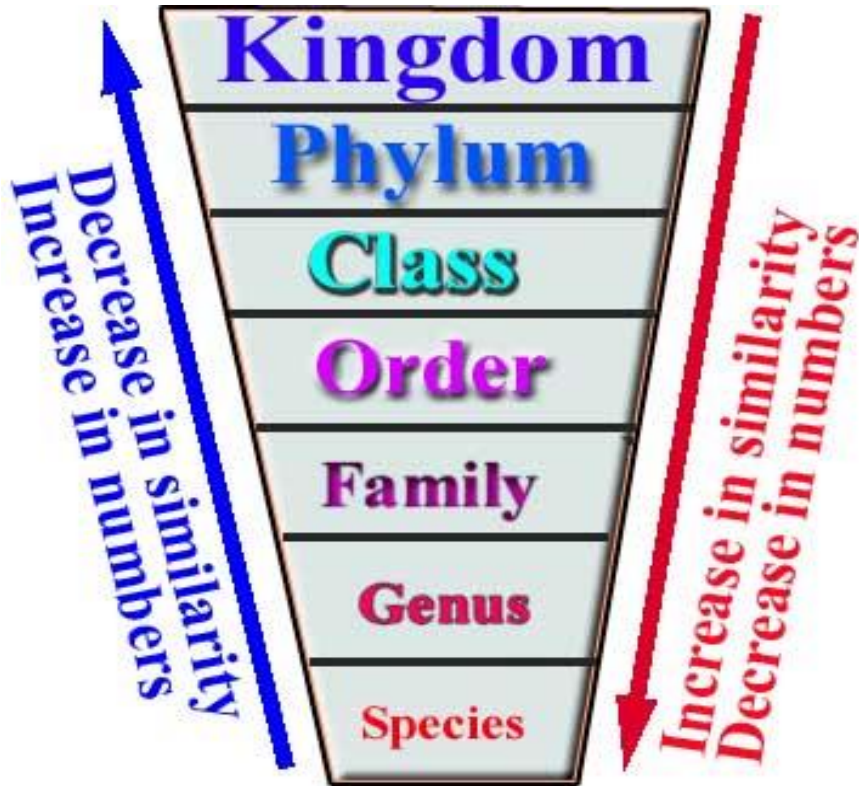




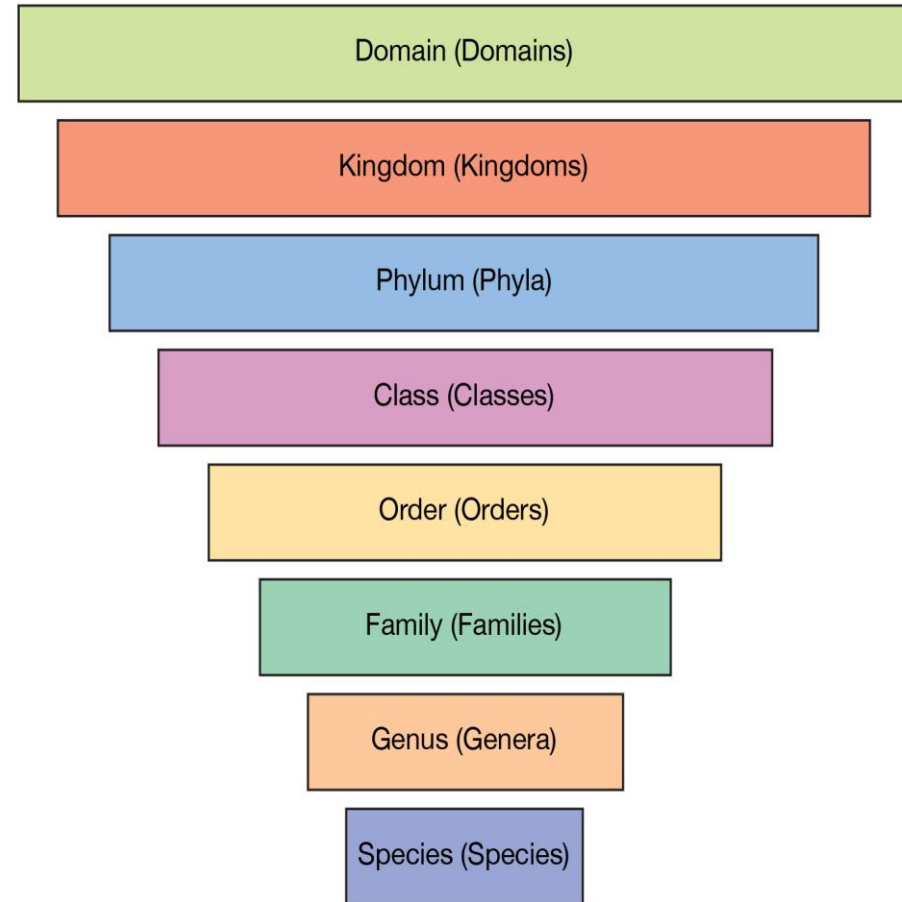
- The kingdom is the largest and most inclusive (includes) of the taxonomic categories.
- **Linnaeus** proposed that there were three **broad groups**, called kingdoms in which the whole nature could fit, the kingdoms were **plants, animals** and **minerals**, he divided each of these **kingdoms** into classes, classes were divided into **orders**, these were further divided into **genera** and then **species**, still we use these system today with some modification
- Species is the smallest and least inclusive of the taxonomic categories.
- **The more taxonomic categories that two organisms share, the more closely related they are considered to be.**



# Linnaean Classification Hierarchy

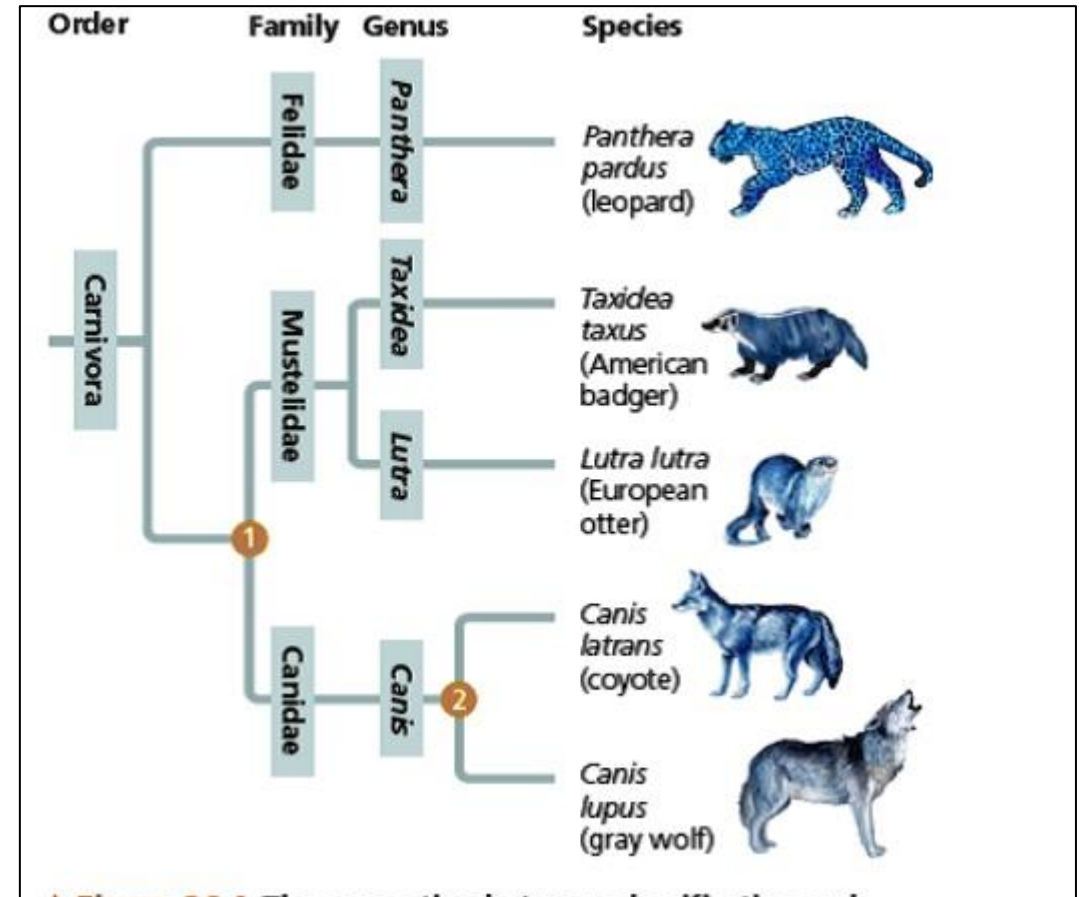


How animals are classified



- **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***

- *Equus caballus* (Horse)
- *Equus quagga* (zebra)
- *Equus asinus* ( Donkey )



*The Equus genus includes zebras, horses, and asses*



**DOMAIN**  
**Eukarya**  
eukaryotes



**KINGDOM**  
**Animalia**  
mostly multicellular  
and heterotrophs



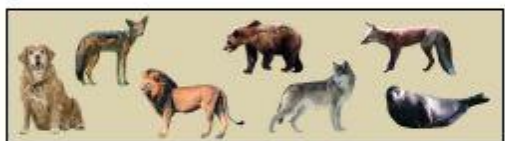
**PHYLUM**  
**Chordata**  
animals with a backbone



**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

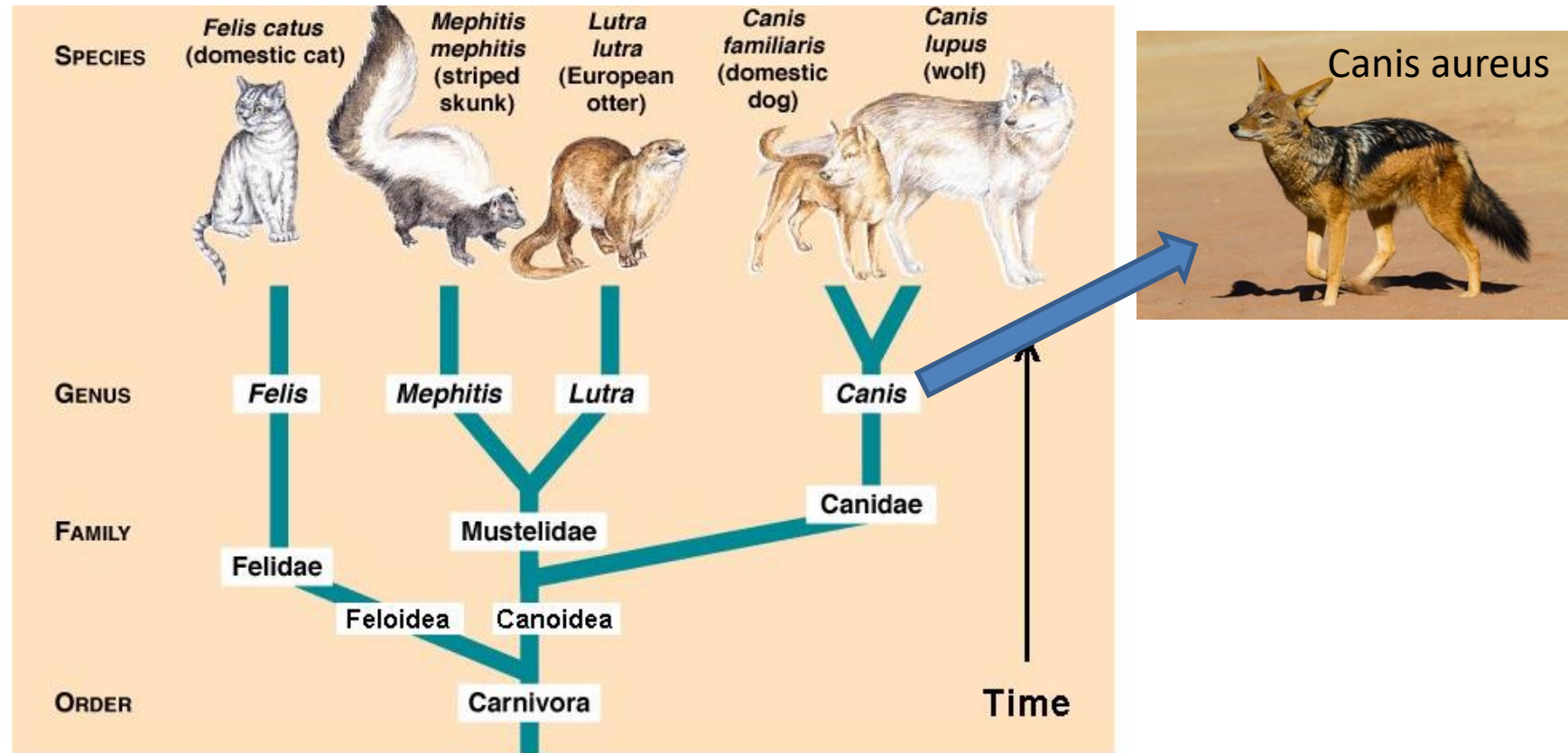


**SUBSPECIES**  
**Canis lupus familiaris**  
domesticated dog



- 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 into kingdoms

- From Aristotle's time(384-322 BC) 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.



## Basic characteristics of classification

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



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

- 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**

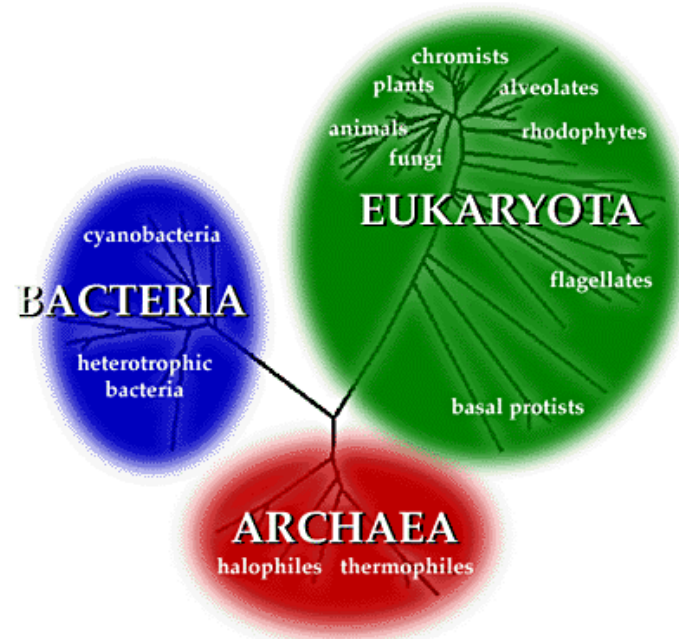
- Eubacteria
  - Peptidoglycan in the cell walls

Prokaryotic single celled organisms

- **Archea**

- Archeabacteria
  - No peptidoglycan in the cell walls

Prokaryotic single celled organisms that live in extreme environments



# Five Kingdoms of classification



## 1. Kingdom Monera (Prokaryotae): Most widespread organisms.

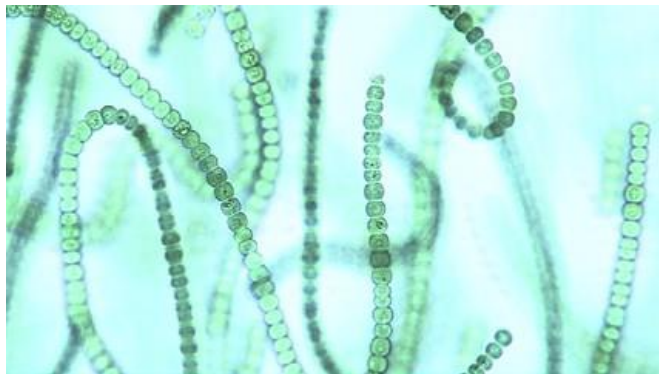
### – Prokaryotes (“Before nucleus”):

- 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 (photothosynthetic), others (heterotrophs) must eat on other organisms.**
- **Include: Protozoa, algae, slime molds.**

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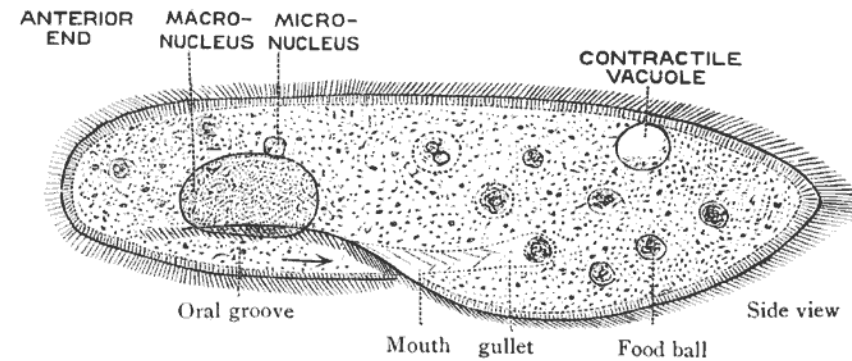
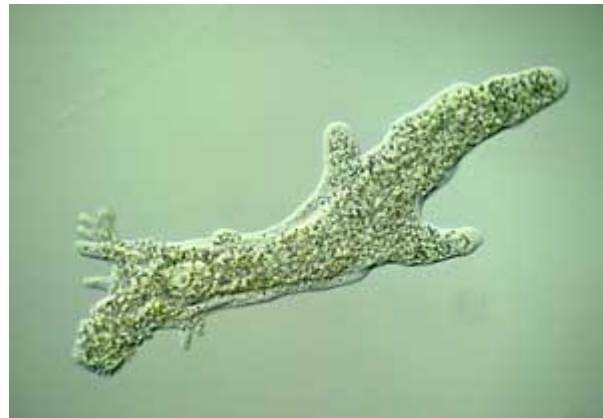


# Protists

- 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

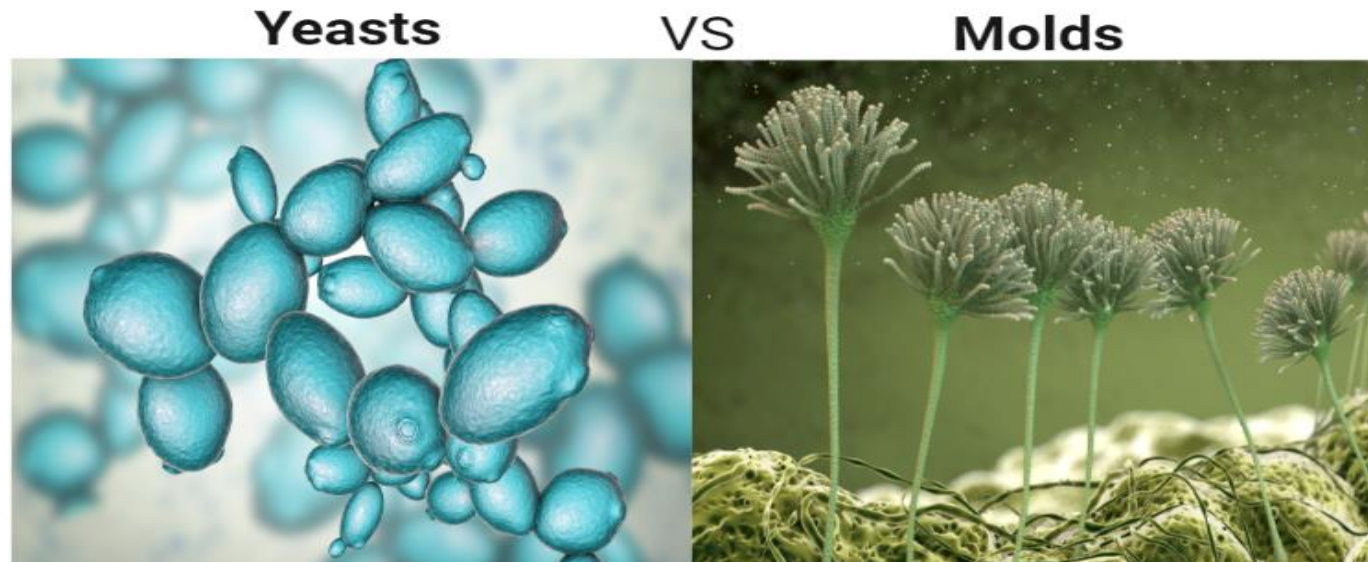


- Algae are protists that have a few characteristics in common with plants.
- Algae make their own food using photosynthesis.
- Green Algae and brown algae

# 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
- There are two groups of **fungi Yeasts**( Unicellular) and **Molds** (Multicellular )







## 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.







# References

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- Mader, Sylvia S. and Michael Windelspecht. 2022. *Biology*. New York, NY: McGraw-Hill Education.