

TAXONOMY

The science of naming organisms.

**Why do we need a system
to classify and name
organisms?**

Diversity

- Natural selection makes new species – this increases biodiversity on the planet.
 - ***Biodiversity = the number of different species that are present in a certain area.***
- 1.5 million species have been identified so far - they estimate that millions of species are not yet discovered.



Why do we Classify?

- Taxonomy: the science of naming and classifying organisms.
- To study the diversity of life, biologists group organisms based on how they are the same (similarities).
- **WHY IS IT IMPORTANT TO CLASSIFY?**



Why do we Classify?

spider



sea monkey

sea horse

firefly



flyfish

mud puppy

toad

ringworm

black bear



fish

Taxonomic Hierarchy

- **Carolus Linnaeus** came up with the system we use to organize animals.
 - Organisms are put in categories based on their relationships from very broad to very specific.
- This system uses large groups divided into smaller groups (subgroups) called **taxa**.
- The organisms with the most similar groups will be most closely related.

Linnaeus' System of Classification

- **K**ingdom (biggest)
 - **P**hylum
 - **C**lass
 - **O**rders
 - **F**amily
 - **G**enus
 - **S**pecies (most specific)
- These are categories used to organize species.

Naming Organisms

- All organisms have a common & scientific name
- all organisms have only 1 scientific name!
 - usually Latin or Greek
- Linnaeus' system described organisms with two-word names:

binomial nomenclature

Binomial Nomenclature

- Scientific Name = genus + species
 - First word = genus name
 - Second word = species name
 - Ex: *Homo sapiens*; Homo sapiens
- Scientific names are always underlined or *in italics*

Binomial Nomenclature

- *Canis lupus*
- *Felis domesticus*
- *Pan pan*
- *Homo sapiens*



Kingdom:
The largest
taxon



Which two species are
more closely related?

Polar bear and red fox
or
Snake and sea star?

How did you make your
decision?

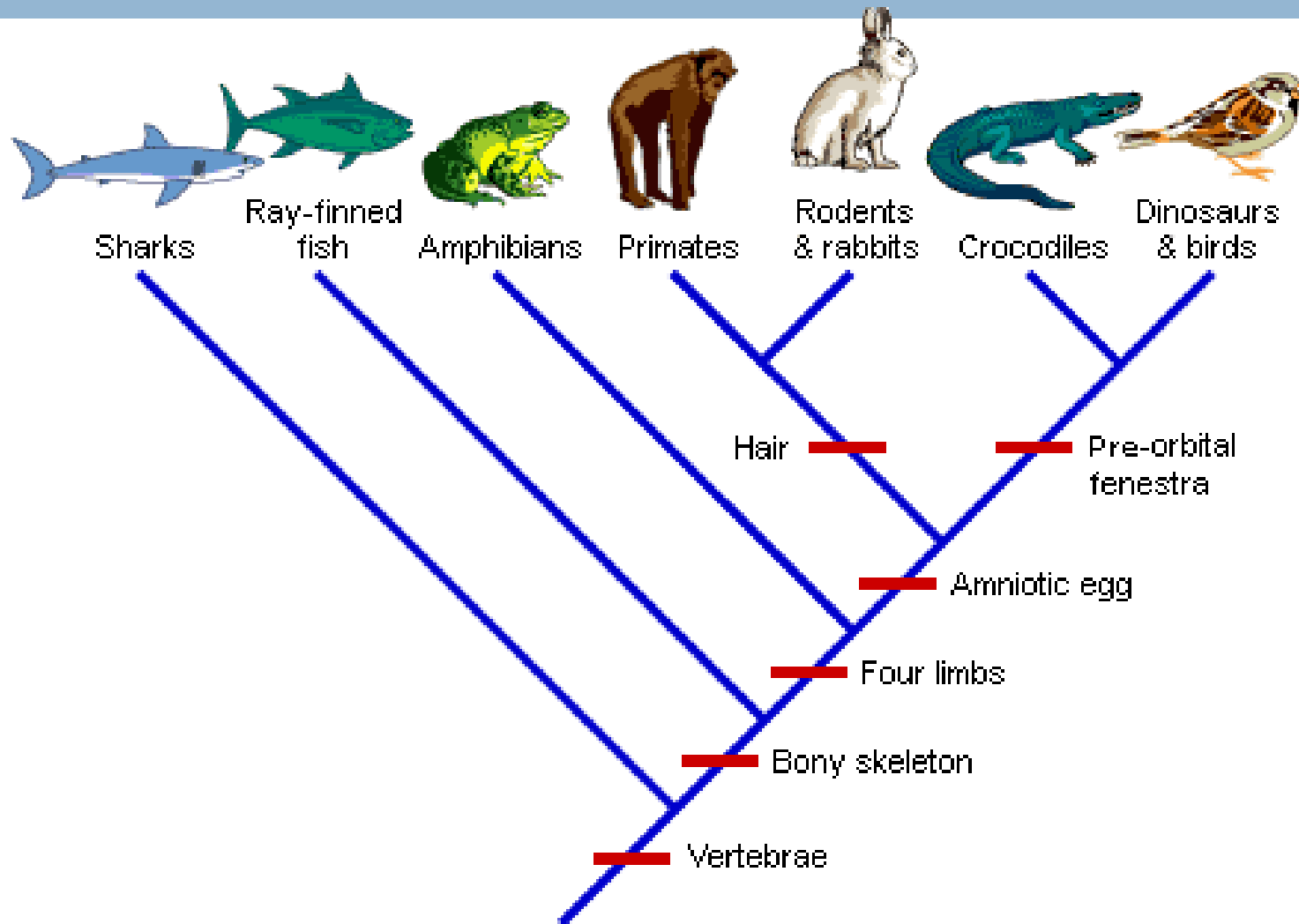
Species:
The smallest
taxon

	Human	Lion	Tiger	Pintail Duck
Kingdom	Animalia	Animalia	Animalia	Animalia
Phylum/Division	Chordata	Chordata	Chordata	Chordata
Class	Mammalia	Mammalia	Mammalia	Aves
Order	Primate	Carnivora	Carnivora	Anseriformes
Family	Homindae	Felidae	Felidae	Anatidae
Genus	<i>Homo</i>	<i>Panthera</i>	<i>Panthera</i>	<i>Anas</i>
Species	<i>sapiens</i>	<i>leo</i>	<i>tigris</i>	<i>acuta</i>

Why is Taxonomy Useful?

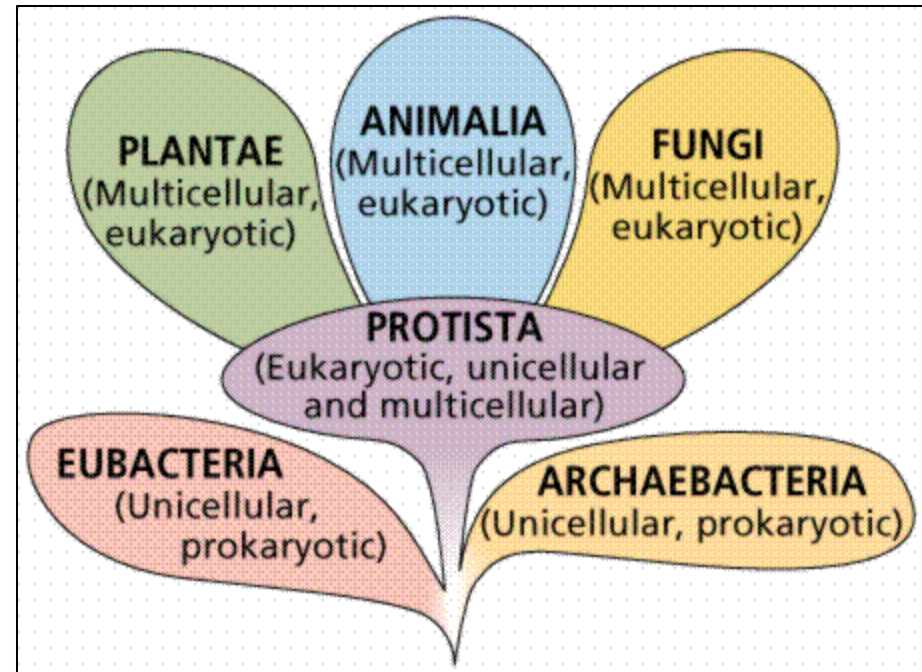
- Helps stop confusion within scientists.
- Helps to show how organisms are related.
- Can be used to figure out **phylogenies** – evolutionary histories – of an organism or group.

Phylogenetic Trees



The 6 Kingdoms

1. Eubacteria
2. Archaeobacteria
3. Protista
4. Fungi
5. Plantae
6. Animalia



How are organisms placed into their kingdoms?

Characteristics of Each Domain and Kingdom

<u>Domain</u>	Kingdom	Prokaryotic/Eukaryotic	Cell walls (yes/no)	Multicellular/unicellular ?	Autotroph/heterotroph	Other info/example
Archaea						
Bacteria						
Eukarya						

The 6 Kingdoms



How are organisms placed into their kingdoms?

- How many cells? (one or multi-)
- Cell type: complex or simple?
- How do they make food?
 - Autotroph – produces its own food
 - Heterotroph – feeds on other organisms

The 6 Kingdoms – 2 main categories

A. **Prokaryotes** (simple organisms)

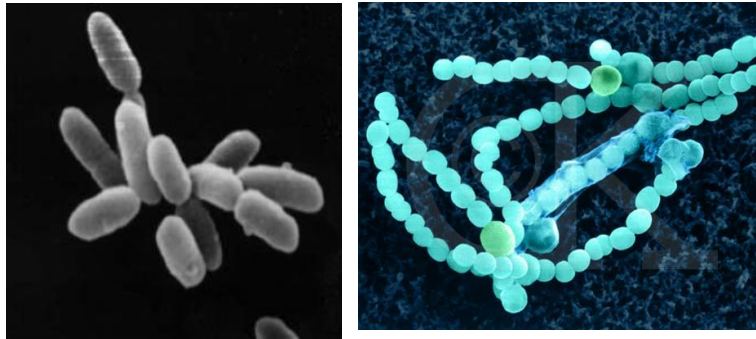
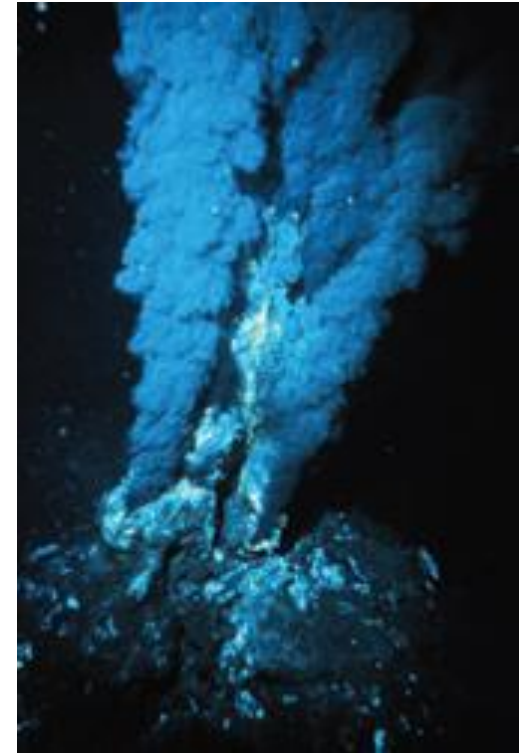
- Archaeobacteria
- Eubacteria

B. **Eukaryotes** (more complex organisms)

- All other kingdoms

1. ARCHAEBACTERIA

- Prokaryotic
- Cell walls
- Simple organisms (single cell)
- Autotroph/heterotroph
- Ancient bacteria
- Found in extreme environments
 - ▣ thermal vents, conditions with no oxygen

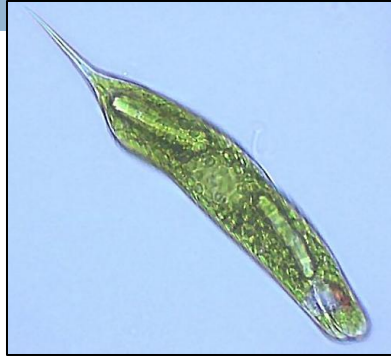


2. EUBACTERIA

- Prokaryotic
- Cell walls
- Simple organisms (single-cell)
- Autotroph/heterotroph.
- “Common bacteria” - most bacteria are in this kingdom.
- Found everywhere.



3. PROTISTA



- Eukaryotic
- Cell walls
- More complex (uni and multicellular)
- Autotroph/heterotroph.
- Slime molds and algae are protists.
- Members are very diverse.
- include all microscopic organisms that are **not** bacteria, **not** animals, **not** plants and **not** fungi.

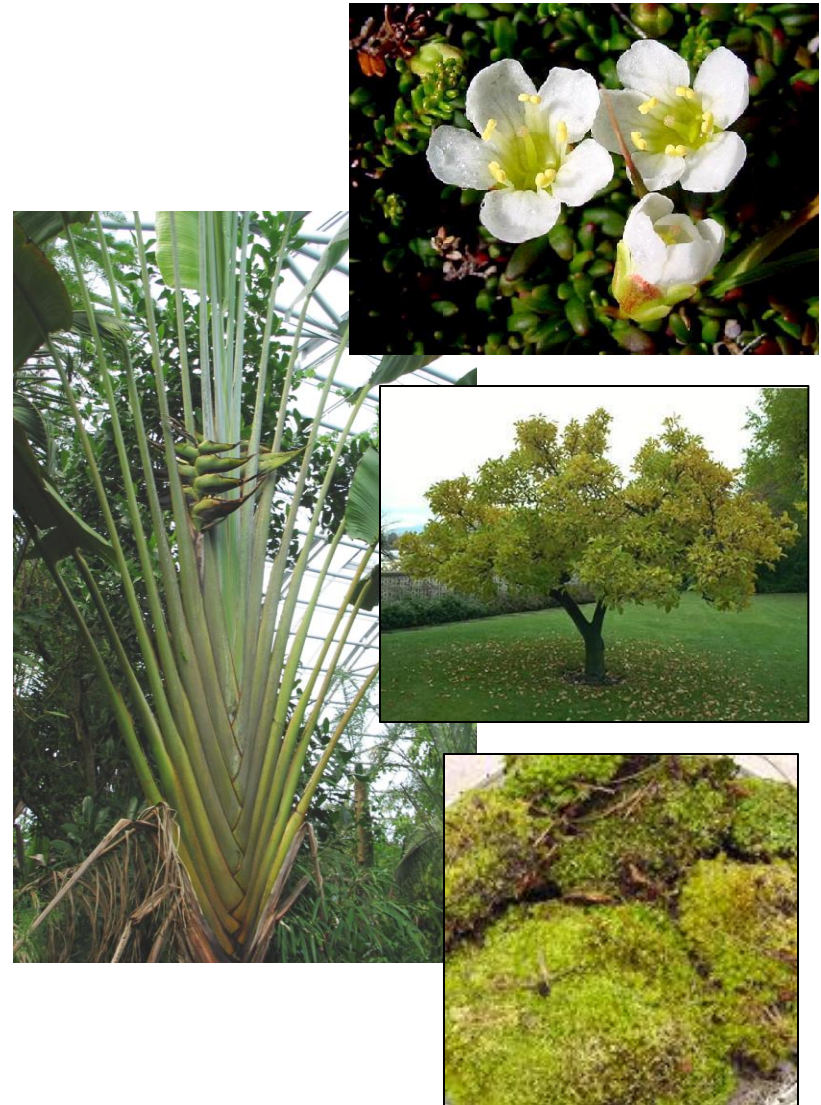
4. FUNGI

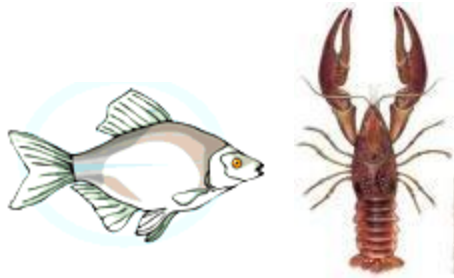
- Eukaryotic
- Cell walls
- Complex organisms
- Mostly multicellular
- Heterotrophs - ***fungi cannot make their own food – get their food from parts of plants that are decaying in the soil.***
- Mushrooms, mold are examples



5. PLANTAE

- Eukaryotic
- Cell walls
- Complex & multi-cellular
- Autotrophic
- Contains ALL of the plants
- Over 250,000 species
- Plant kingdom is the second largest kingdom.
- Species range from the *tiny* green mosses to giant trees.











6. ANIMALIA



- Eukaryotic
- No cell walls
- Complex & multi-cellular
- Heterotrophs
- The largest kingdom.
- Over ***1 million known species.***



Kingdom Characteristics

Domain	Bacteria	Archaea	Eukarya			
Kingdom	Bacteria	Archaea	Protista	Fungi	Plantae	Animalia
Example	<i>Pseudomonas</i>	<i>D. radiodurans</i>	<i>Paramecium</i>	Mushroom	Moss	Earthworm
						
Cell type	Prokaryote		Eukaryote			
Cell walls	Cell walls with peptidoglycan	Cell walls without peptidoglycan	Cell walls with cellulose in some	Cell walls with chitin	Cell walls with cellulose	No cell walls
Number of cells	Unicellular		Unicellular and multicellular	Most multicellular	Multicellular	
Nutrition	Autotroph or heterotroph			Heterotroph	Autotroph	Heterotroph