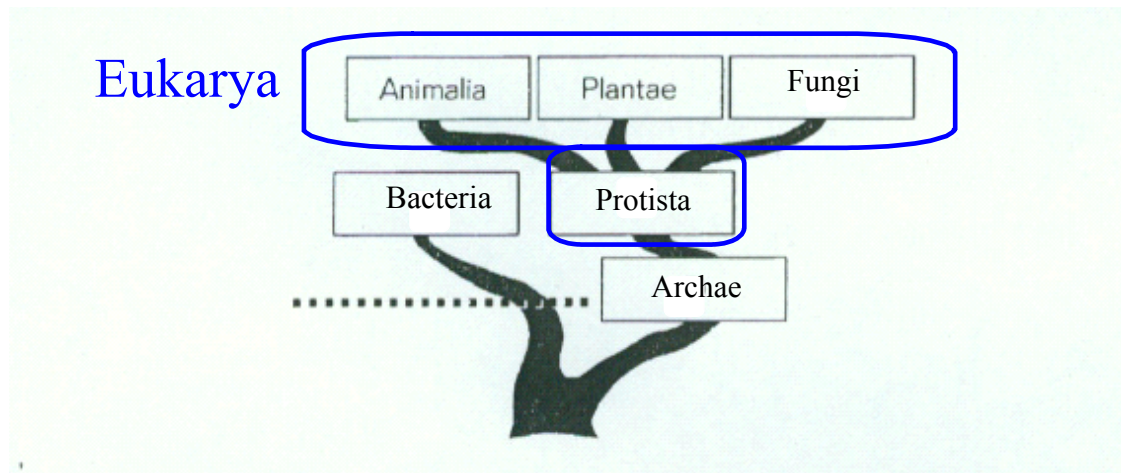


**COPY DIAGRAM ON THE BACK OF YOUR NOTES**

**Phylogeny of the Six Kingdoms/3 Domains**



**Ch. 17: The Tree of Life**

**I. Linnean System of Classification**

-**Organizing** items can help you understand them better and find them more easily.

-Classification = grouping of **objects** or **information** based on similarities.

-**Taxonomy** = branch of Biology that groups and names organisms based on studies of their different characteristics.

-Biologists who study taxonomy are called **taxonomists**.

### A. Aristotle's System

1. This *Greek* philosopher developed the first widely accepted system of biological *classification*.
2. He classified all the organisms he knew into two groups: *plants* and *animals*.
3. The plants were subdivided into three groups:
  - a. *Herbs*
  - b. *Shrubs*
  - c. *Trees*
4. The animals according to various characteristics, including *habitat* and *physical* differences.

## Classification



**What do  
you call  
this  
animal?**

**These are just some of the common  
names for this!**

## B. Linnaeus' system of Binomial Nomenclature

1. Swedish botanist Carolus *Linnaeus* developed a method of *grouping* organisms that is still used by scientists today.
2. Based on *physical* and *structural* similarities of organisms.
3. Binomial nomenclature = *two* word naming system used to identify species.



4. Genus = consists of a group of *similar* species (the first word *identifies* the genus of the organism).
5. Species = the *second* word, which sometimes describes a characteristic of the *organism*.
6. Therefore, the *scientific* name of a species is a *combination* of the genus and species names.

EX: *Homo sapiens*; Homo = genus and sapiens = species  
 (means "knowing man")

### C. Scientific and common names

1. **Latin** is the “universal” language of scientific names. Taxonomists are required to use Latin because the language is no longer used in **conversation**, hence, will not change grammatically (“**dead** language”).
2. Scientific names should be **italicized in print** (*Homo sapiens*) and **underlined** (each word **separately**) **when handwritten** (Homo sapiens); the first letter of the genus is **capitalized**, but the species is all **lowercase** letters.

## II. Modern Classification

-Today's taxonomists compare the **external** and **internal** structures of organisms, as well as their geographical **distribution** and **genetic** make-up to reveal their probable evolutionary relationships.

### A. Taxonomy: A framework

-Classification provides a **framework** in which to study the relationships among **living** and **extinct** species.

## B. Taxonomy: A useful tool

–Classifying organisms can be a useful tool for scientists who work in *agriculture, forestry,* and *medicine*.

## C. Taxonomy and the Economy

–It often happens that the *discovery* of a new source of lumber, medicine, and energy results from the *work* of taxonomist.

### III. How living things are classified

-In any classification system, items are categorized, making them *easier* to find and discuss

-Taxon = *a group of organisms*.

#### A. Taxonomic rankings

1. Ranked from *broad* to very specific characteristics.

2. The broader a taxon, the more *general* its characteristics, and the *more* species it contains.

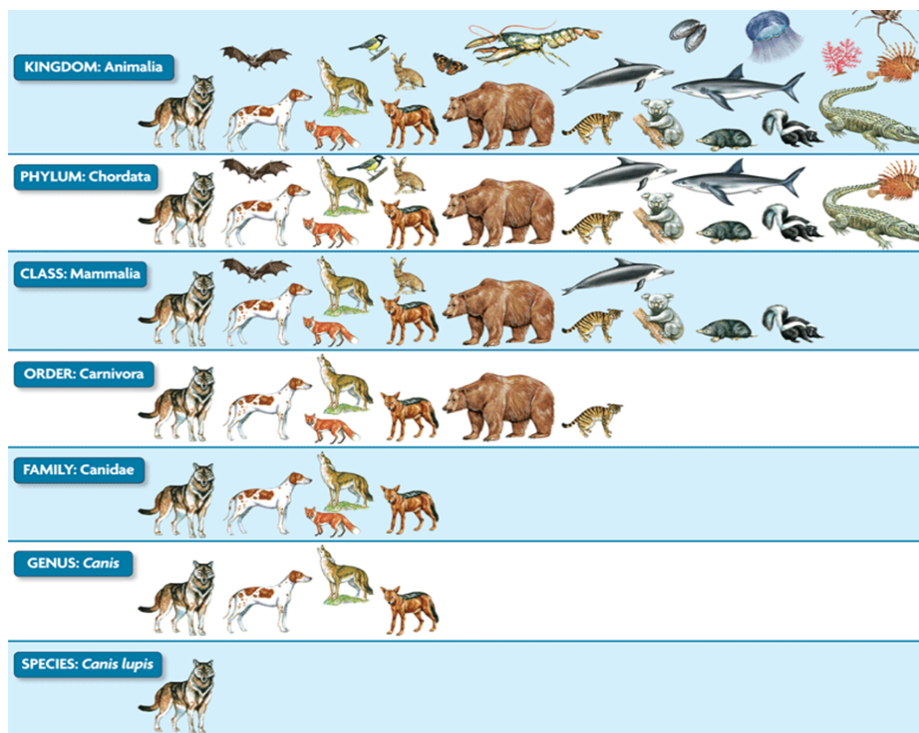
*Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species*

“Dashing King Philip Came Over For Great Soup”

## B. The larger taxa

1. Although the *six*-kingdom classification system primarily is used, several other classification systems exist.

2. Recently, many taxonomists began including another taxon called *domains (Bacteria, Archaea, Eukarya)* (READ pgs. R27 to R30)



### C. The Linnaean classification system has limitations.

-Linnaeus taxonomy doesn't account for *molecular* evidence.

-The *technology* didn't exist during Linnaeus' time. Linnaean system based only on physical similarities.

## IV. How are evolutionary relationships determined?

### A. Structural Similarities

-Species are closely *related* and may have *evolved* from a common ancestor.

### B. Breeding Behavior

-Sometimes *breeding* behavior provides important clues to *relationships* among species.

### C. Geographical Distribution

-*Location* helps to determine their relationships with other species.

## D. Chromosome Comparison

-Both the *number* and structure of chromosomes provides *evidence* of relationships among species.

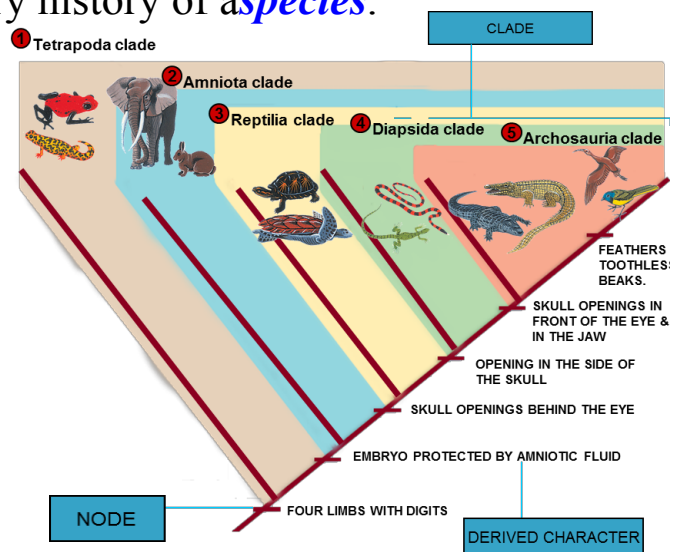
## E. Biochemistry

Closely related species have similar *DNA* sequences and therefore, similar *proteins*.

## V. Phylogenetic Classification: Models

-Species that share a common *ancestor* also share an evolutionary *history*.

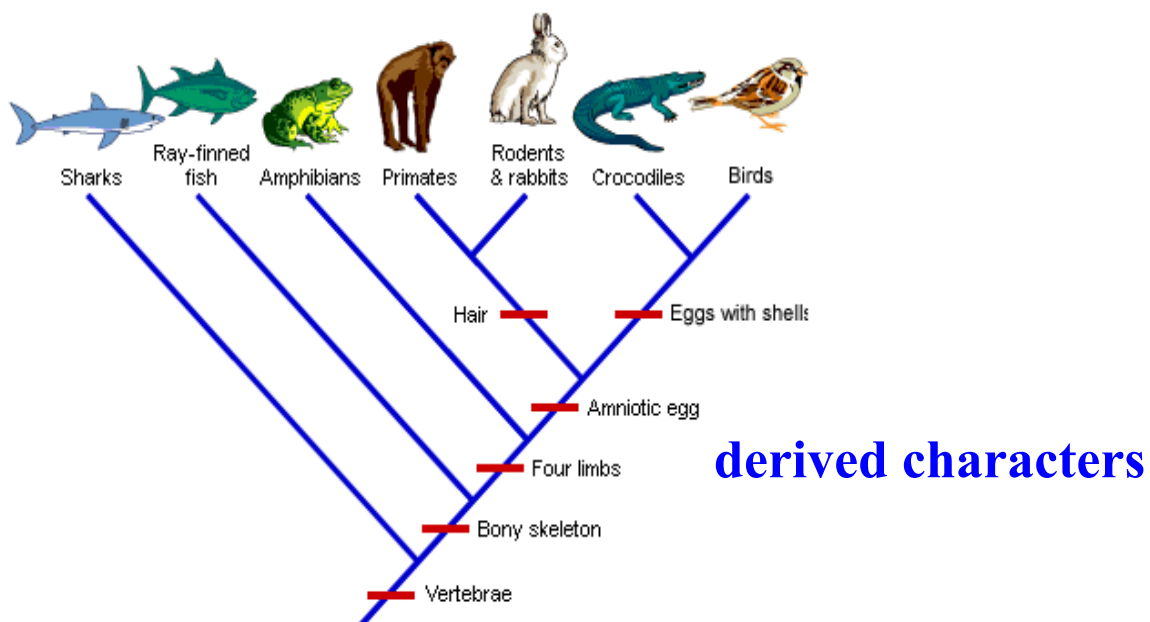
-**Phylogeny** = the evolutionary history of *species*.

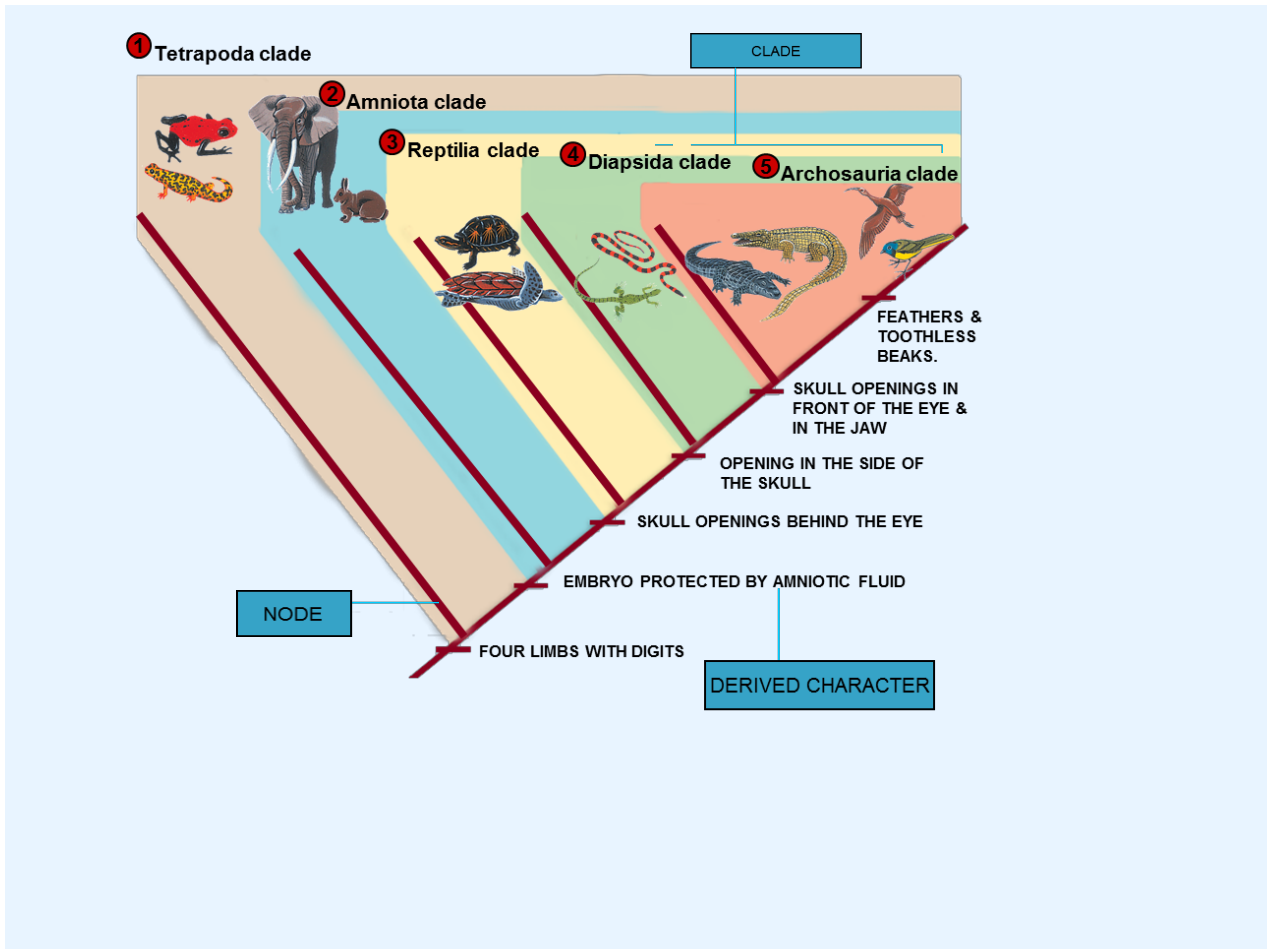




## A. Cladistics

1. One biological system of *classification* that is based on phylogeny is cladistics.
2. Scientists assume that as groups of organisms *diverge* and evolve from a common ancestral group, they retain some unique inherited characteristics that taxonomists call *derived characters*.
3. *Cladogram* = branching diagram that models the phylogeny of a species based on the derived traits of a group of a organisms.





## VI. The Six Kingdoms of Organisms

**A. Archaea** = Live in extreme, harsh environments *prokaryotic*; unicellular, gave rise to *eukaryotes*, can be helpful.

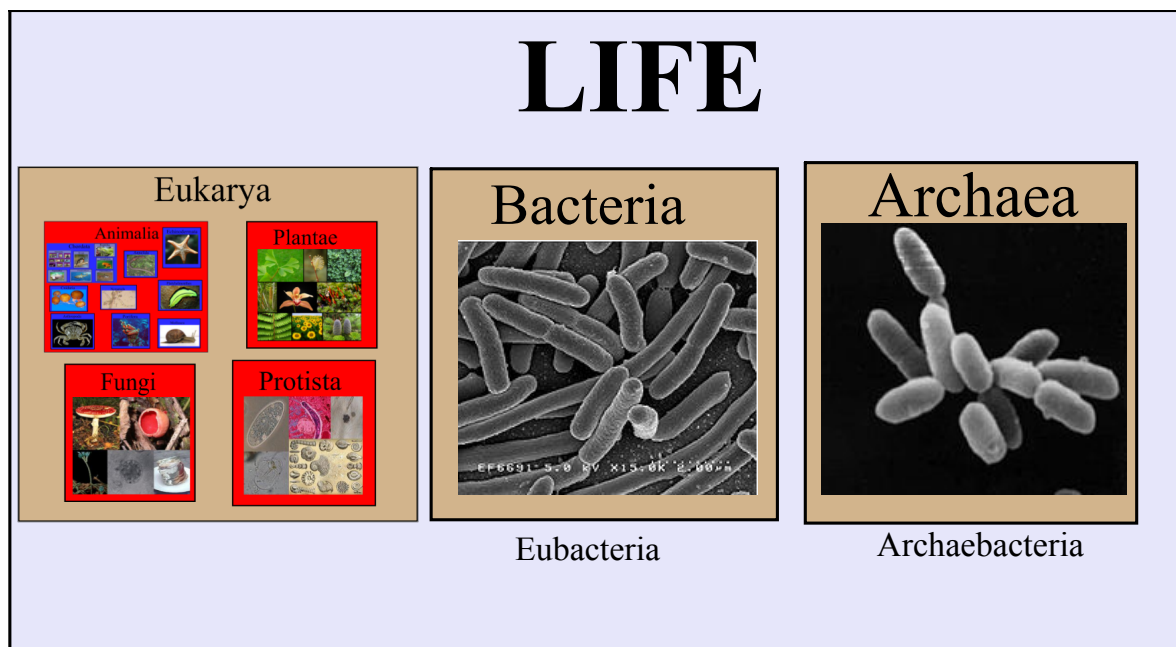
**B. Eubacteria** = *Prokaryotic*, very strong cell *walls*, some cause disease but most are harmless and actually helpful *unicellular*.

**C. Protists** = *Eukaryotic* organisms that *lack* complex organ systems and lives in moist environments, *most* diverse group - most unicellular and some multicellular, some with/ without cell walls, "*Catch All*" Kingdom.  
ex: *animal-like; plant-like; fungus-like*

**D. Fungi** = *Decomposer*, heterotrophic, *most* multicellular (*mushrooms, bread mold*) and one *unicellular* (*yeasts*), eukaryotic that absorbs nutrients from organic materials have cell walls made of *chitin*.

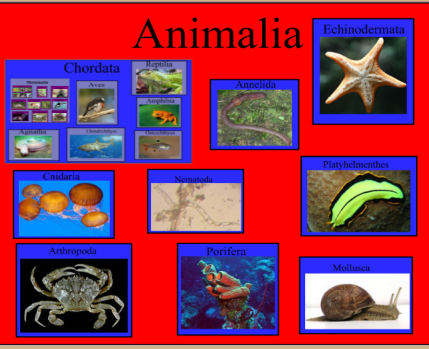
**E. Plants** = *Multicellular*, photosynthetic eukaryotes. Contains cell walls made of *cellulose, chloroplasts*.

**F. Animals** = Multicellular, heterotrophic, *lacking* cell walls

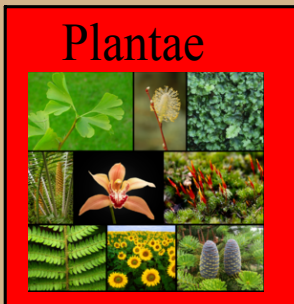


# Eukarya


## Animalia



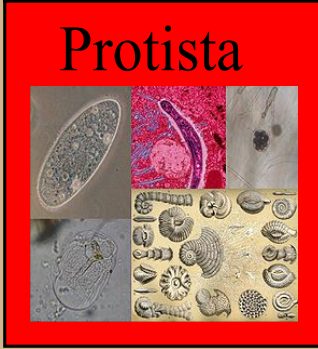
## Plantae



## Fungi





## Protista





# Animalia


### Chordata


**Mammalia**  



**Aves**  


**Reptilia**  



**Amphibia**  


**Agatha**  



**Chondrichthyes**  


**Osteichthyes**  



### Annelida




### Echinodermata




### Cnidaria




### Nematoda




### Platyhelminthes




### Arthropoda



### Porifera





### Mollusca





# Chordata


### Mammalia


**Carnivora**  



**Rodentia**  



**Primate**  



**Cingulata**  



**Artiodactyla**  


**Lagomorpha**  


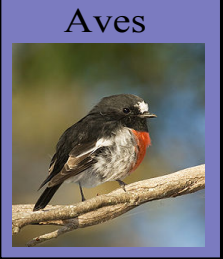
**Cetacea**  


**Chiroptera**  



**Perissodactyla**  


**Proboscidea**  



### Aves




### Reptilia




### Amphibia




### Agnatha



### Chondrichthyes





### Osteichthyes





# Mammalia


### Carnivora


**Felidae**  


**Ursidae**  



**Phocidae**  


**Procyonidae**  



**Mustelidae**  


**Canidae**  



### Rodentia




### Primate




### Artiodactyla




### Lagomorpha




### Cetacea




### Cingulata




### Chiroptera



### Perissodactyla








### Proboscidea




# Carnivora


### Felidae

<b>Panthera</b>  <i>Panthera pardus</i> - Leopard	<b>Felis</b>  <i>Felis catus</i> - Cat	<b>Acinonyx</b>  <i>Acinonyx jubatus</i> - Cheetah
<b>Leopardus</b>  <i>Leopardus pardalis</i> - Ocelot	<b>Puma</b>  <i>Puma concolor</i> - Puma	


### Ursidae




### Phocidae




### Procyonidae



### Mustelidae




### Canidae




# Felidae

### Panthera


 <i>Panthera pardus</i> - Leopard	 <i>Panthera tigris</i> - Tiger
 <i>Panthera leo</i> - Lion	 <i>Panthera onca</i> - Jaguar

### Felis




*Felis catus* - Cat

### Acinonyx




*Acinonyx jubatus* - Cheetah

### Leopardus



*Leopardus pardalis* - Ocelot

### Puma



*Puma concolor* - Puma

# *Panthera*



*Panthera pardus* - Leopard



*Panthera tigris* - Tiger



*Panthera leo* - Lion




*Panthera onca* - Jaguar



*Panthera pardus* - Leopard

Transparency **42** Classifying Organisms

**SECTION FOCUS**  
Use with Chapter 17,  
Section 17.2



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- 1 Find three ways to group these animals.
- 2 What characteristics did you use for each of your classifications?

**Science TAKS:** Obj. 3: 7A (11), 7B (10, 11)  
BIOLOGY: The Dynamics of Life

SECTION FOCUS TRANSPARENCIES