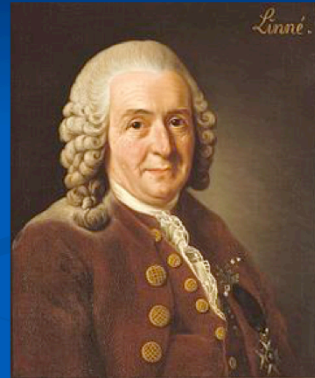


# Taxonomy

In this lecture we will focus on the classification and naming of organisms, both extant (living) and extinct.

# Binomial Nomenclature

- Swedish botanist Carl Linnaeus, wrote *System Naturae* in 1758, proposing a **binomial nomenclature**
- He standardized **scientific names** for plants and animals allowing scientists from across the world to discuss the same organism that might be called by different common names in each region.



**Carl Linnaeus** in the 18th Century put forth a classification system giving unique names to every plant and animal both extant and extinct. Linnaeus proposed a **binomial nomenclature** which turned out to be an important turning point in how one gives formal names to organisms. By using a two part name unique to each organism, confusion would be eliminated. The **scientific names** that Linnaeus proposed allowed scientists from across the world to discuss the same organism that might be called by different common names in each region in which they existed. Linnaeus used latin as this was the language of science at the time in Europe.

Linnaeus's classification was based on its morphology; he defined groups of biological organisms based on shared characteristics of its form and structure. The scientific name reflected the relationships among organisms. For example you can tell if animals have the same genus name, then they must be closely related.

Today classification methods have expanded and also include ancestral or evolutionary relationships (**phylogenetic analysis**), overall similarity of morphology and observable traits (**phenetic analysis**), and lastly **DNA analysis**.

# Classification of Living Things

- *Kingdom*
- *Phylum*
- *Class*
- *Order*
- *Family*
- *Genus*
- *Species*



**Kingdom** is the broadest category for classifying organisms. Animalia and Plantae are two of the five Kingdoms. These Kingdoms are subdivided into smaller and smaller groups: **Phylum**, **Class**, **Family**, **Genus**, and finally **Species**. Species are similar organisms that are able to interbreed in the wild; they are a group of organisms that can potentially breed with one another. **Note:** A simple mnemonic for remembering is **Kings Play Chess On Fine Gold Sets** will help you remember the order.

A species' **scientific name** combines its genus and species. The first part of the name identifies the genus to which the species belongs. It is always capitalized. The second part identifies the species within the genus and it never capitalized. The specie's scientific name is underlined or in italics. For example, Humans' scientific name is *Homo sapiens* or Homo sapiens. You may also see an abbreviation of this name as *H. sapiens* where the genus is only represented by the first letter.

You can have subspecies too. As with the species, the subspecies is not capitalized, but underlined or in italics. The scientific name for a gorilla is *Gorilla gorilla* and for the subspecies western lowland gorilla is *Gorilla gorilla gorilla*.

## Example - Chimpanzee

### *Pan troglodytes*



- Kingdom: Animalia
- Phylum: Chordata
- Class: Mammalia
- Order: Primates
- Family: Hominidae
- Genus: *Pan*
- Species: *troglodytes*

Chimpanzees have the species name of *Pan troglodytes*.

They are in the same family as human beings or *Homo sapiens*, the Hominidae Family.

The Family name Hominidae is used for all great apes in the Order Primates. **Note:** Family names typically end in “-idea”.

The Class is Mammalia, which is all mammals. All mammals and vertebrates are part of the Phylum Chordata. And finally all animals are in the Kingdom Animalia.

## Example - Tiger

### *Panthera tigris*



- Kingdom: Animalia
- Phylum: Chordata
- Class: Mammalia
- Order: Carnivora
- Family: Felidae
- Genus: *Panthera*
- Species: *tigris*

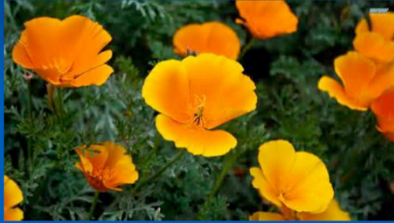
Tigers have the species name of *Panthera tigris*. The Amur or Siberian and the Sumatran tigers we have at the zoo are subspecies and have the scientific names of *Panthera tigris altaica* or *P.t. altaica* and *Panthera tigris sumatrae* or *P. t. sumatrae* respectively.

They are all part of the Genus *Panthera* which includes the big cats: tigers, lions, jaguars and leopards. The Family name Felidae is used for all cats in the Order Carnivora.

The Class is Mammalia, which is also the Class for *Homo sapiens* or humans.

Note: the tiger and chimpanzee are in the same Class, Phylum and Kingdom.

## Example - California Poppy *Eschscholzia californica*



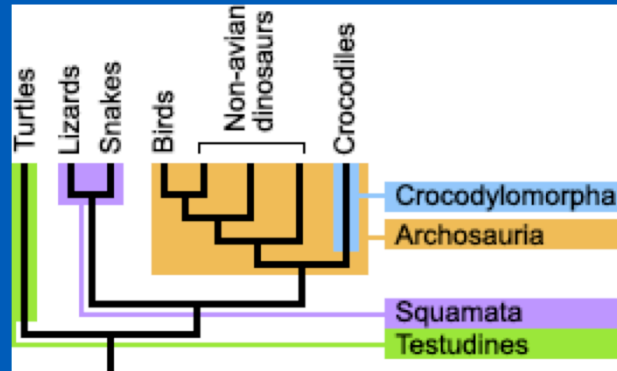
- Kingdom: Plantae
- Division: Magnoliophyta
- Class: Magnoliopsida
- Order: Ranunculales
- Family: Papaveraceae
- Genus: *Eschscholzia*
- Species: *californica*

The California Poppy is known as *Eschscholzia californica*.

**Note:** traditionally in botany the term **Division** is used in plant and fungi classification and is equivalent to the rank of Phylum.

# Phylogenetic Trees

- **Phylogenetic Tree** branches represent real lineages that occurred in evolutionary history
- Shared derived characters can be used to group organisms into **clades**



The Linnaean classification system is not based on evolution. This system was created long before scientists understood that organisms evolved. More recently, biologists are switching to a classification system that reflects the organisms' evolutionary history or **phylogeny**. This phylogenetic classification system names **clades** (groups of organisms, living and extinct, that are all descended from a common ancestor). The branching pattern of phylogenies provides information about the relationships among organisms.

## Key Taxonomy Concepts

- The classification and scientific naming of living things provides a common way to refer to specific species
- Classification provides a basis for studying the relationships between these organisms both extinct and extant
- The Linnaean system of classification is a hierarchical system: Kingdom, Phylum or Division, Class, Order, Family, Genus, species
- Phylogenetic Trees represent evolutionary relationships between organisms; groups of organisms are organized in clades

Corresponds with the pages 2-4 of the Zoology Study Guide in the Docent Notebook.



# Key Vocabulary

- Binomial nomenclature
- Clade
- Phylogeny, phylogenetics

Definitions:

**Binomial nomenclature:** a formal system of naming species by giving each a name composed of two parts; one indicating the genus and one indicating the species. Each binomial name is unique to a specific species.

**Clade:** a taxonomic group of organisms classified together on the basis of homologous features traced to a common ancestor. A clade is a grouping that includes a common ancestor and all the descendants (living and extinct) of that ancestor.

**Phylogenetics:** the study of evolutionary relationships among organisms

**Phylogeny:** the evolutionary history of a kind of organism