Linnaeus’ Classification System

1. What is a species?
   A. A **population** of organisms that share similar **characteristics** and can **breed** with one another and produce fertile **offspring**.
   What are some examples of species? **Dogs, Cats, Humans**, etc.
   B. How many species have scientists identified (**about 1.5 million**) and how many have yet to be discovered? **Between 2 and 100 million**

2. Why classify organisms?
   A. Biologists must attempt to organize **living things** into groups that have **biological** meaning.
   B. To study the diversity of life, biologists use a **classification system** to name organisms and **group** them in a logical manner.
   C. The study where scientists classify organisms and assign a universally accepted name is called **taxonomy**.
   D. By using a **scientific name**, biologists can be certain that everyone is discussing the same organism.
   E. Scientists organize organisms into **groups** that have biological **significance**.
      - In a good system of classification, organisms placed into a particular group are more **similar** to each other than organisms in other groups.

3. Assigning Scientific Names
   A. Common names such as cougar, puma, and panther are all referring to the same animal but vary among **languages** and even among **regions** within a single country thus leading to confusion among different populations of people.
   B. A Swedish botanist by the name of **Carolus Linnaeus** developed a two-word naming system called **binomial nomenclature**.
      - Each species is assigned a **two-part scientific** name.
         1. The scientific name is always written in **italics**.
         2. The **first** word is always **capitalized** and represents the **genus** of an organism.
         3. The **second** word is always **lowercased** and is a **specific** Latin description of each **individual** organism.
         4. A few examples are: **Muntiacus muntjak, Ursus maritimus**, and **Felis concolor**.

![Grizzly Bear](Ursus_arctos)  ![Polar Bear](Ursus_maritimus)  ![Panda Bear](Ailuropoda_melanoleuca)

Do **Ursus arctos** and **Ursus maritimus** belong to the **same species**? **No**  To the **same genus**? **Yes**
4. **Linnaeus’s System of Classification**—based on similarities between structural characteristics
   
   A. This classification system is **hierarchical** which means it consists of levels.
   
   B. There are **8 levels** (most **broad** down to most **specific**):

   - **1. Domain**  (ex: Eukarya)
   - **2. Kingdom**  (ex: Animalia)
   - **3. Phylum**   (ex: Chordata)
   - **4. Class**    (ex: Mammalia)
   - **5. Order**    (ex: Carnivora)
   - **6. Family**   (ex: Ursidae)
   - **7. Genus**    (ex: Ursus)
   - **8. Species**  (ex: Ursus arctos)

   (Hint: **K**ing **P**hillip **C**ame **O**ver **F**or **G**ood **S**paghetti!)

   **Kingdom:** the **largest** and most inclusive of Linnaeus’s taxonomic categories; the **broadest** description of an organism.

   **Phylum:** includes many different organisms that **share** important **characteristics**; phyla make up Kingdoms.

   **Class:** a group of similar orders; several different classes make up a **phylum**

   **Order:** a broad taxonomic category composed of similar **families**; orders make up each **class**

   **Family:** a group of genera that share many **characteristics**; families make up **orders**

   **Genus:** a group of closely related **species**; the **first capitalized** word in the two-part naming system developed by **Linnaeus**

   **Species:** a **population** of organisms that share similar **characteristics** and **can breed** with one another and produce **fertile offspring**

**Note:** 2 organisms classified in the same class must also be in the same phylum and kingdom, but do not necessarily have to be in the same order.
5. **Classification Using Cladograms**

   A. Many biologists now use a method called **cladistic analysis** to identify and consider only those characteristics that arise as organisms **evolve over time**.

   B. Characteristics that appear in **recent parts** of a lineage but not in older members are called **derived characteristics**.

   C. **Cladograms** use derived characteristics to show **evolutionary relationships** among a group of organisms.