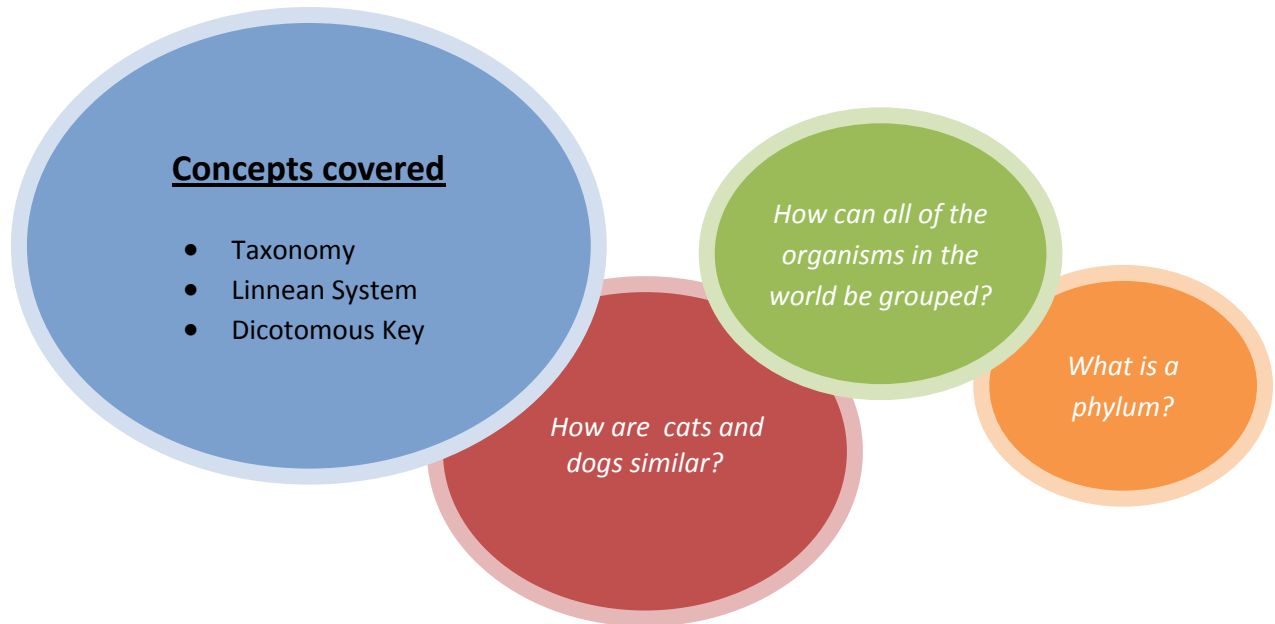




Lab 7: Classification



Classification is the process of organizing different objects into categories based on their common characteristics. Think about the dresser in your bedroom. Typically, one drawer is used for shirts, another for shorts, and yet another for socks. Each clothing item was classified based on how it is worn, and is then grouped with similar clothing in the dresser drawer.

Taxonomy

A similar process is used in life science to group organisms. There are numerous different organisms in the universe, each with a unique set of characteristics. To organize them, scientists use a system called **taxonomy**. Taxonomy is the science of identifying, naming, organizing, and classifying organisms.

Imagine that you are looking out your bedroom window at a beautiful tree. You may be seeing a tree with leaves, or one with needles, fruit, or nuts. There are many different types of trees, but all trees share some characteristics such as having roots and branches. Using the process of taxonomy, scientists can discover characteristics that certain organisms, such as trees, have in common and group them into appropriate categories.



Pre-Lab Activity

For each set of pictures below, decide on three ways to classify the objects. Two of the classifications need to categorize the objects by similarities, and one of the classifications needs to address differences.

Example:



Classification 1 (similarity): round

Classification 2 (similarity): some orange color

Classification 3 (difference): edible

1..



Classification 1 (similarity):

Classification 2 (similarity):

Classification 3 (difference):

2.

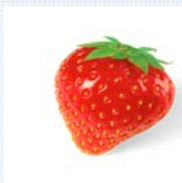


Classification 1 (similarity):

classification 2 (similarity):

Classification 3 (difference):

3.



Classification 1 (similarity):

Classification 2 (similarity):

Classification 3 (difference):

4.



Classification 1 (similarity):

Classification 2 (similarity):

Classification 3 (difference):



Linnean System

Though there is more than one system used to classify objects, science most commonly uses the **Linnean system** to group organisms. Originally developed by Carolus Linneaus in the mid-1700s, this system is used to classify organisms starting with the broad grouping and ending with the most specific. Though the system has changed somewhat since Linneaus' time, the general hierarchy he created remains intact. Linneaus came up with a tiered structure for classifying objects. Currently, the tiered system starts with domain and works down through kingdom, phylum, class, order, family, genus, and species (Figure 7.1).

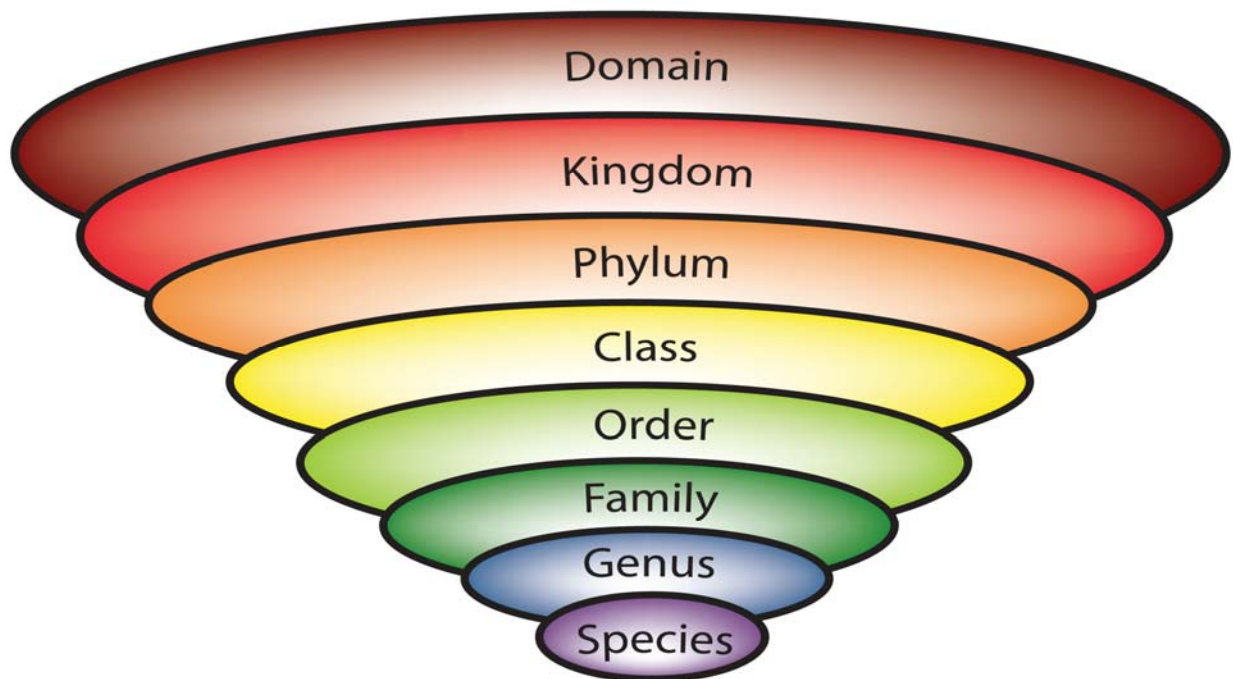


Figure 7.1 Taxonomy

As you move down the classification line, the categories become more specific. A concept known as **binomial nomenclature** (two-part name) was also created by Linneaus. Binomial nomenclature is a scientific name given to every organism that consists of its genus and its

Table 7.1 Linnean Classifications	Human Being	Red Maple Tree
Domain	Eukarya	Eukarya
Kingdom	Animalia	Plantae
Phylum	Chordata	Tracheophyta
Class	Mammalia	Angiospermae
Order	Primates	Sapindales
Family	Hominidae	Acerceae
Genus	Homo	Acer
Species	Sapien	Acer rubrum



unique species name. For example, humans are in the genus *Homo* and have a species name of *Sapien*. So the binomial nomenclature name for humans is *Homo Sapien*. Shown in Table 7.1 are the Linnean classifications for a human being and a Red Maple tree, to give you an example.

A useful tool to help remember the order of the Linnean classification system can be developed by using a mnemonic phrase. Each of the first letters of the mnemonic phrase are the same first letter of the corresponding classification category (i.e. **D**aring = **D**omain, **K**ids = **K**ingdom, etc.). For example, **D**aring **K**ids **P**ick **C**auliflower **O**ver **F**resh **G**rown **S**trawberries. Try to make your own to help you remember!

Dichotomous Key

A **dichotomous key** is a scientific tool used to determine the identity of an organism. This process is accomplished by going through a series of choices that eventually lead to the correct name for that organism. At each step of the key, two choices are given. The organism will fit into only one of the choices, allowing one to proceed to the next question until the organism is clearly identified.



For example, if there was a flower petal on the table, one question in the dichotomous key may be: “Does the flower have red coloring or purple coloring?”. Answer that question and move onto the next corresponding question which may be something like: “Is the petal over or under five inches from base to tip?”. As the questions are answered, the organism becomes more precisely classified until the specific identity of the organism is determined.

Always be sure when creating a dichotomous key that the characteristics being used remain constant. It would be difficult to classify an object if the dichotomous key asked about characteristics the organism only displayed at certain points in time. Also, be sure to use actual measurements rather than subjective words such as big, small, large, tiny, etc.

Lab 7.1: Dichotomous Dragons

You have just become the King/Queen of a far off magical kingdom. As the ruler of this kingdom, you have inherited eight lively dragons. Each of these dragons has its own name and is very sensitive if called by the wrong name.



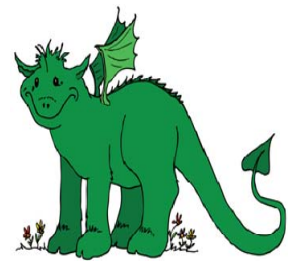
Materials

Dragon pictures
Dichotomous key
Ruler

Procedure: Dichotomous Dragons

1. You will follow the dichotomous key for each dragon to discover its unique name. Write the name under the picture of the dragon when you discover what it is.

Dragon Pictures



Dichotomous Key

1. Does the dragon have any green color on its body?
Yes—Go to question 2
No—Go to question 6
2. Does the dragon have spots?
Yes—Go to question 3
No—Go to question 4
3. Does the dragon have wings?
Yes—The dragon is Lenny
No—The dragon is Bubbles



4. Are the dragons wings longer than 2 cm?
Yes—The dragon is Glider
No—Go to question 5
5. Does the dragon have white eyes?
Yes—The dragon is Petey
No—The dragon is Sage
6. Does the dragon have a visible arrow at the end of the their tail?
Yes—The dragon is Peaches
No—Go to question 7
7. Does the dragon have gear-like attachments to their back?
Yes—The dragon is Fuego
No— The dragon is Starlit

Lab 7.2: Creating a Dichotomous Key

In this lab you will create a dichotomous key using the objects listed below.

Materials

Washer
Hex nut
Button
Toothpick
Marble

Procedure: Creating a Dichotomous Key

1. To begin, write five descriptive characteristics about each item in the space provided below. For example, if you were describing a pencil, you could say “has a point”, “has lead”, etc.

Washer -

Hex nut -

Button -



Toothpick -

Marble -

2. After you have written the five descriptive characteristics, determine common characteristics that some of the objects may share. Write these in the space below.

3. Now begin to formulate your dichotomous key from the descriptive characteristics of each object. Be sure that each classification question has only two answers (it will be easiest if the answers are “yes” or “no”, similar to the dichotomous key in the previous lab).

Example:

A sample question in the dichotomous key for a pencil, screw, and a permanent marker, a could be:

1. Can this object be used for writing?

Yes—Go to question 2

No—The object is a screw

Your Dichotomous Key