Introduction to Classification and Taxonomy

Objectives:

1. Understand that evolution reveals that all organisms show relatedness and modification with descent.
2. Organize our understanding of relatedness among organisms using classification and taxonomy
3. Use and practice of the Linnean Classification system and a dichotomous key

Recommendation:

2. Cladogram, Mr. Anderson, 7:17 minutes https://www.youtube.com/watch?v=ouZ9zEhxGWg
3. Cladogram, 9:46 minutes https://www.youtube.com/watch?v=e4Yq41EypHc

Introduction: Classification and Variations

Systematics, or systematic biology, is a broad area of study that deals with such topics as classification, evolution, individual variation, distribution, and naming of organisms. The term taxonomy is used when referring specifically to the process of naming. Nomenclature refers to the actual names or word structure used in names. The naming system, or classification system, employed in biology involves a series of categories in a hierarchy so that each level includes several sublevels. Below is an example of a commonly used hierarchical classification system.
country
country
state
state
county
county
city
city
street number
street number

In biology the categories in the hierarchy are different, of course, but the same relationship exists among the various levels in the system.

kingdom
kingdom
phylum
phylum
class
class
order
order
family
family
genus
 genus
species

Consider the following example.

kingdom: Animalia
kingdom: Animalia
phylum: Chordata
phylum: Chordata
class: Mammalia
class: Mammalia
order: Carnivora
order: Carnivora
family: Felidae
family: Felidae
genus: Felis
genus: Felis
species: Felis concolor (panther)

Notice that the scientific name is underlined or in italics, if not underlined. The first word is the genus and the second word is the specific epithet; both together describes the species of the organism. The first letter of the genus is always capitalized and the species is always all in lower case. The advantage of scientific names should be clear when you consider the variety of common names that
most species have in various places. The panther, for example, is called mountain lion or cougar in some parts of its range, yet all three names refer to the same species.

When trying to decide the placement of a given individual into the proper group, systematists must compare the various anatomical or other characteristics of the individual to those of other similar organisms. Anatomy is relied on more than other characters since it is readily evident. Don't we always ask: "What does it look like?" when trying to identify an unknown quantity of any kind? It is easy to recognize broadly different anatomical patterns that distinguish such species as horses and cats, yet when the organisms in question are more similar the distinction may be more difficult. In fact, often distinct and repeating differences occur within a species, especially between members of different sexes. This sexual dimorphism is readily observed in humans, for example. In order to know how much variation to expect when comparing 2 different individuals or groups of individual biologists resort to statistical procedures.

Dichotomous keys are used to classify organisms. It is a systematic progression. You must first place the species in the largest of the categories and then work your way down to the lowest of the classification levels. To use the key, start at level 1. There will be 2 or more options. Select the option that most closely resembles the structures mentioned. That option will then indicate what level to go to next. That level will also have options. Select the appropriate option and proceed until a name is given.

**Worksheet:** Dichotomous key of Norns. Test your skills by keying out the different Norns.

**Sources**