Systematics

A simple branching diagram may be used to classify living groups of organisms by shared derived (original) characteristics and expanded to include fossil organisms.

The process of classifying living things according to their evolutionary relationships is called systematics.

- Systematics is based upon both shared characteristics as well as upon derived characteristics.
  - Derived means that the characteristics evolved from a common ancestor.
- A cladogram is used to show these evolutionary relationships.

The evolutionary development of a house cat is shown by this cladogram.

The characteristics listed along the right-side of the cladogram distinguish the levels above each node.

- A node is the point where two branches meet. The nodes indicate a common ancestor between two groups.
- As you move up a cladogram, organisms are separated into more specific groups.
- Following the cladogram down to the root points to a common ancestor for all of the organisms.

Let’s now look at another example: the evolutionary development for primates.

Humans, chimpanzees, baboons, and lemurs, for example, are classified together in the order primates.

- All four organisms are thought to have evolved from a common ancestor with similar characteristics.
Exactly what are some of the shared common characteristics of primates?

• All primates, for example, have binocular vision and opposable thumbs.
  - Binocular refers to vision in which both eyes are used together.
  - Opposable means the thumb can touch the tips of all of the other fingers.

Today, scientists may also use DNA analysis to classify living species.

• By comparing the DNA base sequences of different species, scientists can tell how closely related the species are.
• Then they can accurately classify them.

Skunks, for example, were once thought to part of the weasel family, which includes weasels, ferrets, and minks.

• All have a “musky” odor.
• By comparing their DNA though, scientists have determined that skunks are very different from other members of the weasel family, and they have created a new family especially for skunks!

An evolutionary tree is another way to classify organisms which or either living or extinct.

• An evolutionary tree is a diagram with many branches that shows evolutionary relationships among organisms.
• The root of the diagram represents a common ancestor of all organisms.
• The point between each branch represents a common ancestor between branching groups.
In a complete evolutionary tree, the levels of classification (phylum, class, order, etc.) would branch off from each kingdom all the way down to the species level.

Classification Video Clip from Bill Nye

http://www.mbusd.org/staff/pware/video/classification.mov