

Current taxonomic thought separates all living organisms into six kingdoms:

1. Kingdom Bacteria (prokaryotic cells of great diversity, and that include pathogens)
2. Kingdom Archaea (prokaryotic organisms that are evolutionarily between eukaryotes and bacteria)
3. Kingdom Protista (as collection of lineages, some single-celled and some multi-celled; includes euglenoids, ciliates, dinoflagellates, amoebas, and many groups of "algae")
4. Kingdom Fungi (fungi)
5. Kingdom Plantae (plants)
6. Kingdom Animalia (animals)

Let's consider the scientific system of classification, using ourselves as examples. All members of our species belong to Kingdom Animalia (animals):

- Phylum Chordata (animals with a notochord)
- Class Mammalia (animals with mammary glands and skin with hair)
- Order Primates (mammals that walk upright on two legs)
- Family Hominidae (human forms, existing and extinct)
- Genus *Homo* (mankind)
- Specific epithet *sapiens* (wise)
- Species: *Homo sapiens*

The more closely related evolutionarily two organisms are, the more categories they share. You and I are different individuals of the same species. We share the same genus and specific epithet, *Homo* and *sapiens*. A creature believed to be a close, extinct ancestor walked the Earth 1.5 million years ago. That creature shared our genus name but had a different specific epithet, *erectus*. Thus, *Homo sapiens* and *H. erectus* are different species.

Like all science, taxonomy is subject to change as new information becomes available. Modifications are made to reflect revised interpretations.

3.1 Constructing a Dichotomous Key (About 45 min.)

To classify organisms, you must first identify them. A *taxonomic key* helps to identify an object or organism unknown to you but that someone else has described. The user chooses between alternative characteristics of the unknown object and, by making the correct choices, arrives at the name of the object.

Keys that are based on successive choices between two alternatives are known as **dichotomous keys** (*dichotomous* means "to fork into two equal parts"). When using a key, always read both choices even though the first appears to describe the subject. Don't guess at measurements; use a ruler. Since living organisms vary in their characteristics, don't base your conclusion on a single specimen if more are available.

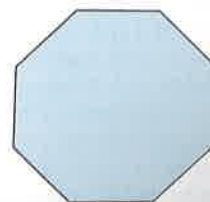
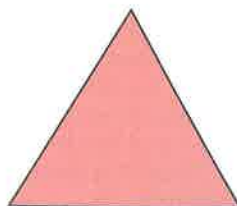
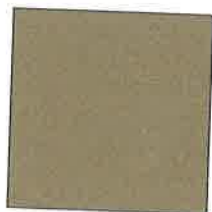
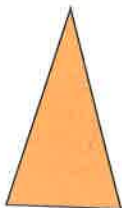
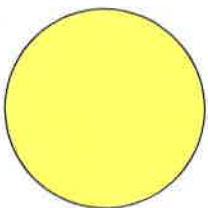
MATERIALS

Per lab room:

- several meter sticks or metric height charts taped to a wall

PROCEDURE

1. Suppose the geometric shapes below have unfamiliar names. Look at the dichotomous key following the figures. Notice there is a 1a and a 1b. Start with 1a. If the description in 1a fits the figure you are observing better than description 1b, then proceed to the choices listed under 2, as shown at the end of line 1a. If 1a does *not* describe the figure in question, 1b does. Looking at the end of line 1b, you see that the figure would be called an Elcric.
2. Use the key provided to determine the hypothetical name for each object. Write the name beneath the object and then check with your instructor to see if you have made the correct choices.

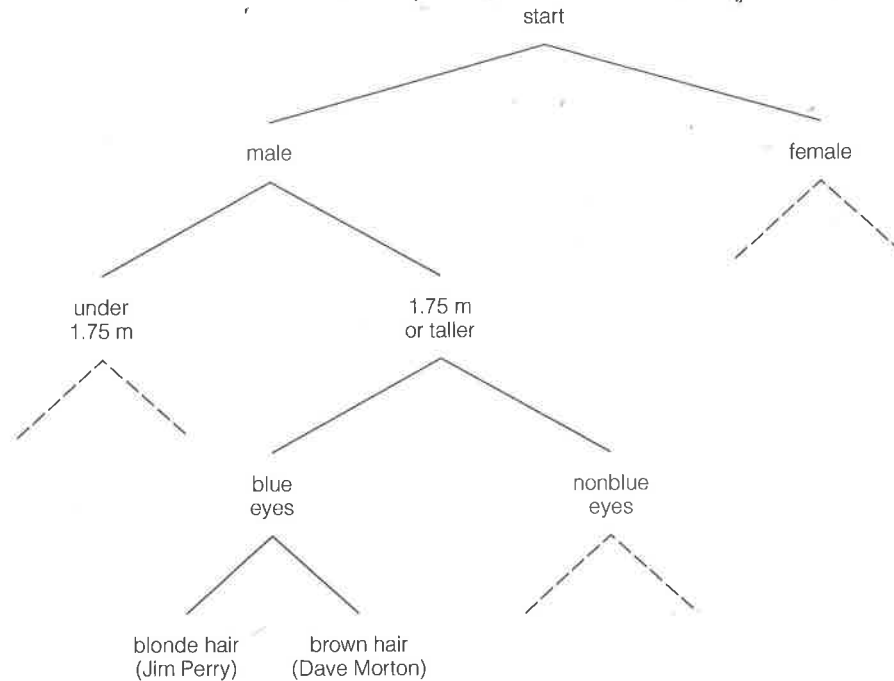


Key

1a.	Figure with distinct corners	2
1b.	Figure without distinct corners	Elcric
2a.	Figure with 3 sides	3
2b.	Figure with 4 or more sides	4
3a.	All sides of equal length	Legnairt
3b.	Only 2 sides equal	Legnairtosi
4a.	Figure with only right angles	Eraqus
4b.	Figure with other than right angles	Nogatco

- Now you will construct a dichotomous key, using your classmates as subjects. The class should divide up into groups of eight (or as evenly as the class size will allow). Working with the individuals in your group, fill in Table 3-1, measuring height with a metric ruler or the scale attached to the wall.
- To see how you might plan a dichotomous key, examine the following branch diagram below. If there are both men and women in a group, the most obvious first split is male/female (although other possibilities for the split could be chosen as well). Follow the course of splits for two of the men in the group.

Note that each choice has *only* two alternatives. Thus, we split into "under 1.75 m" and "1.75 m or taller." Likewise, our next split is into "blue eyes" and "nonblue eyes" rather than all the possibilities.



- On a separate sheet of paper, construct a branch diagram for your group using the characteristics in Table 3-1 and then condense it into the dichotomous key that follows. When you have finished, exchange your key with that of an individual in another group. Key out the individuals in the other group without speaking until you believe you know the name of the individual you are examining. Ask that individual if you are correct. If not, go back to find out where you made a mistake, or possibly where the key was misleading. (Depending on how you construct your key, you may need more or fewer lines than have been provided.)

TABLE 3-1 Characteristics of Students

Student (name)	Sex (m/f)	Height (m)	Eye Color	Hair Color	Shoe Size
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					

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Key to Students in Group

- 1a.
- 1b.
- 2a.
- 2b.
- 3a.
- 3b.
- 4a.
- 4b.
- 5a.
- 5b.
- 6a.
- 6b.
- 7a.
- 7b.
- 8a.
- 8b.

3.2 Using a Taxonomic Key

A. Some Microscopic Members of the Freshwater Environment (About 30 min.)

Suppose you want to identify the specimens in some pond water. The easiest way is to key them out with a dichotomous key, now that you know how to use one. In this section, you will do just that.