

Observations

Objectives

After completing this exercise you should be able to

1. Identify an organism using a dichotomous key.
2. Provide the rationale for using scientific names.

Background

The study of science involves making **observations** of the natural world in which we live. The first step is to go outside and look around you. The ancient Greek philosophers provided the roots of the scientific method. They developed three rules to examine the laws of nature:

- Careful collect of observations about some aspect of nature.
- Careful examination of these observations for their similarities and differences.
- The production of a principle or generalization about the aspect of nature being studied.

Observations are made more effective by using some of the tools of the naturalist. These tools include field guides and **dichotomous keys** to identify the organisms you are observing.

Dichotomous keys are used for identification. In a dichotomous key, identification is based on successive questions, and each question has two possible answers (dichotomous means cut in two). After answering one question, the investigator is directed to another question until an organism is identified. Although these keys often have little to do with genetic relationships, they are invaluable for identification.

Scientists are continually exchanging information about living organisms, but not all scientists speak English. The common name “white oak” would likely be unfamiliar in to a Spanish or Chinese biologist, even though the tree may grow in Spain or China. Moreover, even within English, common names often

Materials

Leaf specimens
Shell specimens

present problems. For example, within North America, a **gopher** is:

- A little quadruped rodent having large cheek pouches *and*
- A burrowing land tortoise.¹

On the other hand, the same organism may have several different common names. One important lumber tree is called Douglas spruce, Douglas hemlock, Douglas pine, and Douglas fir. Interestingly, it is not a spruce, hemlock, pine, or fir tree. Organisms that are not generally encountered by nonscientists may not have common names. To circumvent these problems, biologists use **scientific names** that are unique to each organism and are universally used through the world. The mammalian gopher is *Thomomys bottae*, the reptilian gopher is *Gopherus agassizi*; and the tree is *Pseudotsuga menziesii*.

Today, you will use dichotomous keys and practice using scientific names.

Procedure

1. Pick up one leaf. Read the first question on the leaf key (Table 1-1). If the answer to question 1a is yes, go to question 2. If the answer to question 1a is no, go to question 1b. Follow the key to identify each leaf. Definitions of common leaf terms are shown in Figure 1-1.

¹ *Webster's Dictionary of the English Language*. Unabridged version.

2. Your box of shells contains the following:

- ① *Acmaea* ④ *Leukoma*
 ② *Angaria* ⑤ *Murex*
 ③ *Littorina* ⑥ *Olivella*

To make your own key to the shells, start by dividing the shells into two groups based on a characteristic such as coiled, flat, or domed. Don't use color and size because these vary with envi-

ronmental conditions. Some anatomical terms are provided in Figure 1-2.

- a. Now separate one group into two based on a different characteristic. Repeat until each organism is alone (identified).
 b. Repeat with the other group of shells that you made.

3. Turn in your Lab Report before you leave today.

Table 1-1. Key to Leaves

1a.	Leaves needle-like or scalelike.....	2
1b.	Leaves not at all needlelike or scalelike.....	3
2a.	Leaves small, scalelike, close together and overlapping.....	Red Cedar (<i>Juniperus virginiana</i>)
2b.	Leaves not scalelike, long and narrow, needlelike in twos united at the base to form bundles.....	Scotch Pine (<i>Pinus sylvestris</i>)
3a.	Leaves opposite.....	4
3b.	Leaves alternate.....	5
4a.	Leaves simple, deeply lobed, like fingers on a hand.....	Silver Maple (<i>Acer saccharinum</i>)
4b.	Leaves compound, pinnately compound.....	Green Ash (<i>Fraxinus pennsylvanica</i>)
5a.	Leaves simple.....	6
5b.	Leaves compound.....	12
6a.	Leaves lobed.....	7
6b.	Leaves not lobed.....	8
7a.	Outline of leaf elliptical or broadest above the middle.....	Bur Oak (<i>Quercus macrocarpa</i>)
7b.	Outline of leaf circular or nearly so.....	Sycamore (<i>Platanus occidentalis</i>)
8a.	Leaf margin smooth not toothed in anyway.....	9
8b.	Leaf margin toothed.....	10
9a.	Leaves 2 to 5 inches long, 1 to 3 inches wide, ovate-lance shaped with narrow pointed tip.....	Osage Orange (<i>Maclura pomifera</i>)
9b.	Leaves are heart or kidney shaped.....	Redbud (<i>Cercis occidentalis</i>)
10a.	Leaf margin with sharp double teeth, leaf shape elliptical, leaf distinctly lopsided at base.....	American Elm (<i>Ulmus americana</i>)
10b.	Leaf margin with single teeth, either finely toothed or rounded.....	11
11a.	Leaf margin has rounded teeth, leaf is triangular in outline.....	Cottonwood (<i>Populus freemontii</i>)
11b.	Leaf margin is finely toothed, leaf is lance shaped in outline.....	Black Willow (<i>Salix nigra</i>)
12a.	Leaf is twice compound.....	Honey locust (<i>Gleditsia triacanthos</i>)
12b.	Leaf is once compound.....	Black Walnut (<i>Juglans nigra</i>)

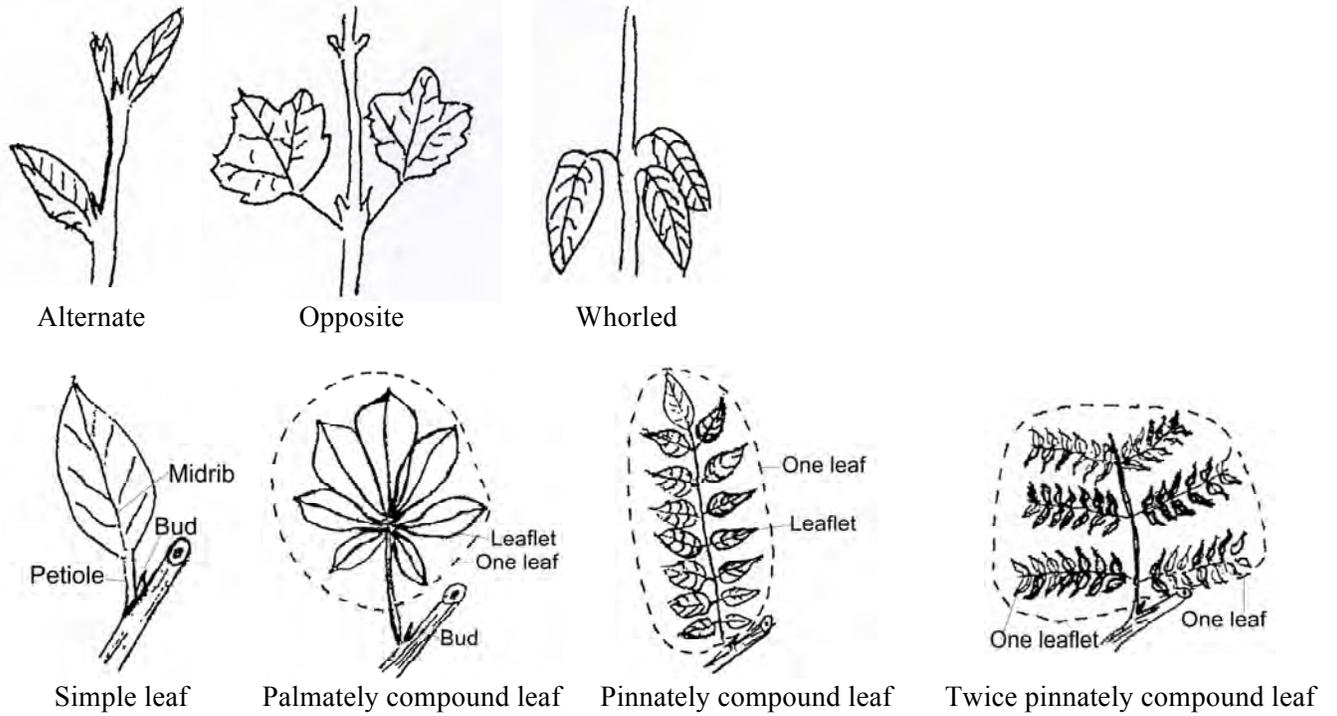


Figure 1-1. Common leaf terms.

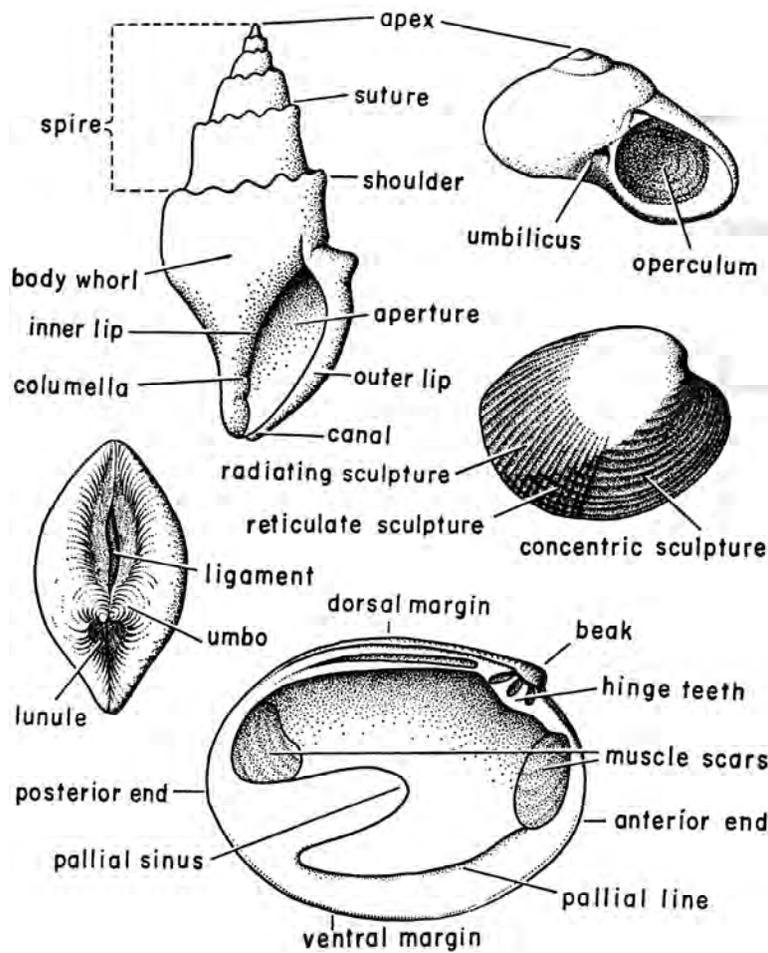


Figure 1-2. Terminology of shells.

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Lab Report 1
Observations

Name _____
Date _____
Biology 215

Purpose _____

Results

Leaf identification. Identify each species.

- | | |
|----------|-----------|
| 1. _____ | 7. _____ |
| 2. _____ | 8. _____ |
| 3. _____ | 9. _____ |
| 4. _____ | 10. _____ |
| 5. _____ | 11. _____ |
| 6. _____ | 12. _____ |
| | 13. _____ |

Key to the shells. Write out or diagram your key to the shells.

Question

You were bitten by a snake while traveling on the Limpopo River. Your Chinese friend says it was *she* but your German friend says it was *giftschlange*. Everything from pythons to vipers is *nyoka* in Swahili. What term will everyone agree on—so you can get the correct antivenin? (No one caught your *nyoka*.)

