

## Using and Constructing a Classification Key

### Pre-Lab Discussion

Suppose you find a large colorful wildflower while walking through the woods. Chances are the flower has already been named and classified, but how can you learn its identity? As an aid to help others identify unknown organisms, biologists have developed classification keys.

Many classification keys have been developed to help identify wildflowers and many other kinds of plants and animals. Although these keys may vary in purpose and complexity, they have certain features in common. These classification keys are often called *dichotomous keys*. The word *dichotomous* comes from the word *dichotomy*, meaning “two opposite parts or categories.” A dichotomous classification key presents the user with two opposite statements about some trait of an organism. By choosing the statement that best describes the unknown organism, the user is led to further pairs of statements. By going from one set of statements to another, the name of the organism or its classification group is finally determined.

In this investigation, you will use a classification key to identify several organisms. You will then write a classification key for another group of organisms.

### Problem

How can a classification key be used to identify organisms?

### Materials (per student)

No special materials are needed

Procedure

Part A. Using a Classification Key

1. Examine the drawing of salamander 1 in Figure 1.

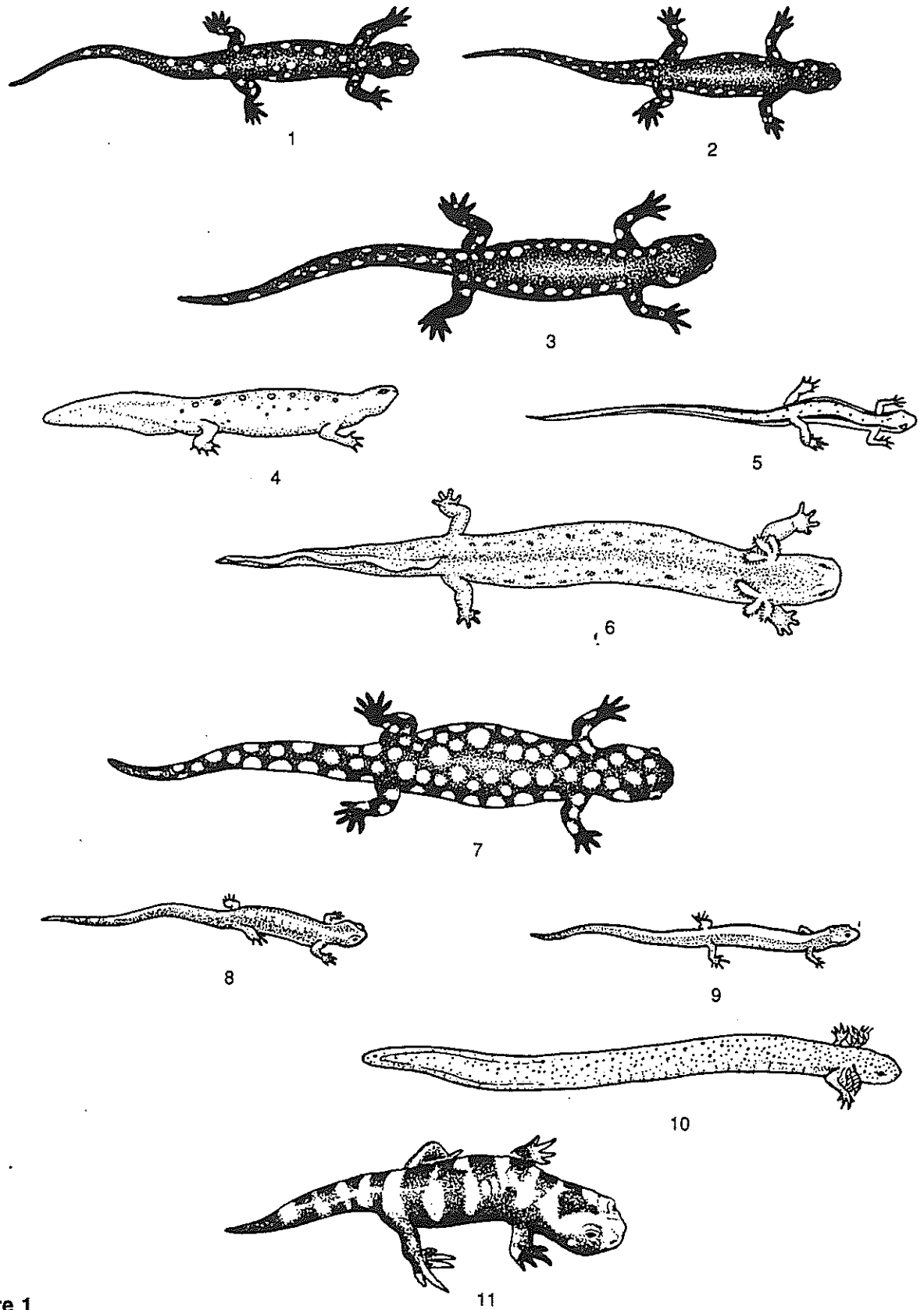


Figure 1

2. Read statements 1a and 1b in the classification key in Figure 2. One of these statements describes salamander 1; the other statement does not. Follow the directions in the statement that describes salamander 1 and continue following the correct statement directions until salamander 1 has been identified.

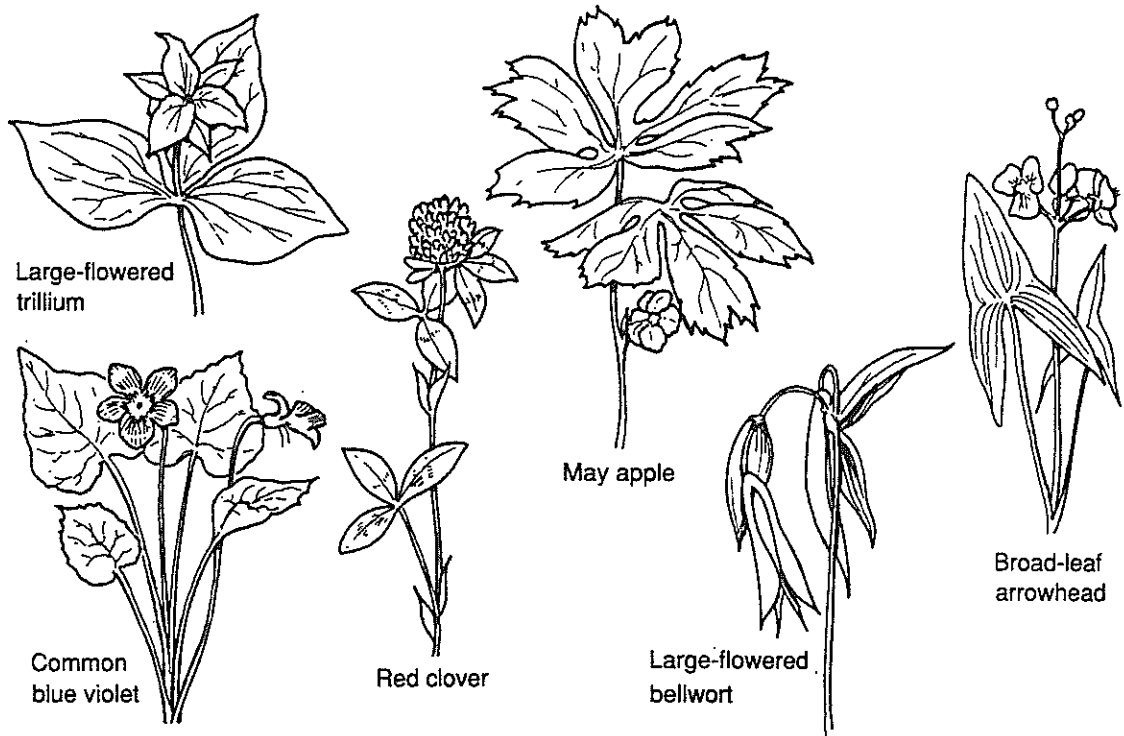
1	a Hind limbs absent	<i>Siren intermedia</i> , siren
	b Hind limbs present	Go to 2
2	a External gills present in adults	<i>Necturus maculosus</i> , mud puppy
	b External gills absent in adults	Go to 3
3	a Large size (over 7 cm long in Figure 1)	Go to 4
	b Small size (under 7 cm long in Figure 1) <i>or equal to 7 cm.</i>	Go to 5
4	a Body background black, large white spots irregular in size and shape completely covering body and tail	<i>Ambystoma tigrinum</i> , tiger salamander
	b Body background black, small round white spots in a row along each side from eye to tip of tail	<i>Ambystoma maculatum</i> , spotted salamander
5	a Body background black with white spots	Go to 6
	b Body background light color with dark spots and/or lines on body	Go to 7
6	a Small white spots on a black background in a row along each side from head to tip of tail	<i>Ambystoma jeffersonianum</i> , Jefferson salamander
	b Small white spots scattered throughout a black background from head to tip of tail	<i>Plethodon glutinosus</i> , slimy salamander
7	a Large irregular black spots on a light background extending from head to tip of tail	<i>Ambystoma opacum</i> , marbled salamander
	b No large irregular black spots on a light background	Go to 8
8	a Round spots scattered along back and sides of body, tail flattened like a tadpole	<i>Triturus viridescens</i> , newt
	b Without round spots and tail not flattened like a tadpole	Go to 9
9	a Two dark lines bordering a broad light middorsal stripe with a narrow median dark line extending from the head onto the tail	<i>Eurycea bislineata</i> , two-lined salamander
	b Without two dark lines running the length of the body	Go to 10
10	a A light stripe running the length of the body and bordered by dark pigment extending downward on the sides	<i>Plethodon cinereus</i> , red-backed salamander
	b A light stripe extending the length of the body, a marked constriction at the base of the tail	<i>Hemidactylium scutatum</i> , four-toed salamander

Figure 2

- Write the scientific name and the common name of salamander 1 on the appropriate line provided in Observations.
- Repeat steps 1 through 3 with each salamander until all the animals have been identified.

**Part B. Constructing a Classification Key**

- Study Figure 3, which shows some common North American wildflowers. As you study the drawings of various flowers, note different characteristics in flower shape, number of petals, and leaf number and shape.



**Figure 3**

- In the space provided in Observations, develop a classification key to identify each wildflower. Use the key to salamanders as a model for developing your wildflower key.
- Check the usefulness of your wildflower key by letting another student see if he or she can use it to identify each pictured flower.

**Observations**

**Part A. Using a Classification Key**

Write the scientific and common names of each salamander in Figure 1 on the line that corresponds to its number.

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

- 7. \_\_\_\_\_
- 8. \_\_\_\_\_
- 9. \_\_\_\_\_
- 10. \_\_\_\_\_
- 11. \_\_\_\_\_

**Part B. Constructing a Classification Key**

Use the space below to construct a wildflower classification key.

**Wildflower Classification Key**

**Analysis and Conclusions**

- 1. As you used the classification key to identify the salamanders, did you go from general to specific characteristics or from specific to general characteristics? \_\_\_\_\_  
\_\_\_\_\_
- 2. What two groupings do the scientific names of the salamanders represent?  
\_\_\_\_\_
- 3. Was the classification key you constructed exactly like those of other students? Explain why or why not. \_\_\_\_\_  
\_\_\_\_\_

4. If you were using actual wildflowers, what other characteristics could you use to identify them? \_\_\_\_\_  
\_\_\_\_\_

### Critical Thinking and Application

1. Do you think that there may be some closely related species of organisms that cannot be identified with a classification key? Explain your answer. \_\_\_\_\_  
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\_\_\_\_\_  
\_\_\_\_\_
2. Why do you think biological classification keys always present two, rather than some other number, of choices at each step? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. What types of problems would scientists have today if Carolus Linnaeus had not developed his classification and naming system for organisms? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. Explain what is meant by the statement "Classification systems are the inventions of humans; diversity is the product of evolution." \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Going Further

Use the key presented in this investigation as a model to construct a classification key to identify one or more of the following:

1. Instruments of a band or orchestra
2. Balls used in different kinds of sports (tennis ball, basketball, football, bowling ball, golf ball, and so on)
3. The students in your biology class