Name_____ Class_____ Date _____

Using and Constructing a Classification Key

Introduction

All cultures have developed names for the living things found in their environments. When various everyday names are used for the same organism, confusion is possible. So, scientists have developed an international system for naming and classifying all organisms. Identification guides, called keys, have been developed to help all peoples recognize and identify organisms according to their scientific names.

Classification keys are usually dichotomous in arrangement. The word *dichotomous* comes from the word *dichotomy,* meaning "two opposite parts or categories." A dichotomous key gives the reader a series of opposing descriptions of basic features of an organism. The reader studies the specimen and selects the descriptions that apply to it until reaching a statement that characterizes only one species and names it. In this investigation you will use a typical dichotomous key to identify the genus and species of several different salamanders. Then, you will create your own dichotomous key to categorize a diverse group of wildflowers.

Problem

How is a dichotomous key used to distinguish among similar organisms?

Pre-Lab Discussion

Read the entire investigation. Then, work with a partner to answer the following questions.

1. How many choices does a dichotomous key provide at each step?

_____

2. What are some of the apparent differences among the salamanders illustrated?

_____

_____

3. Based on the information in Figure 2, what is a distinguishing characteristic of the members of the genus *Ambystoma*?

_____

_____

4. What might be a good strategy for beginning to create a classification key for the six types of wildflowers shown in the diagram?

_____

_____

5. If you were to use live flowers instead of diagrams, what other characteristics could you use to identify the flowers?

_____

Procedure

Part A: Using a Classification Key

1. Examine the drawings of the salamanders in Figure 1. Choose one salamander to identify by using the key.

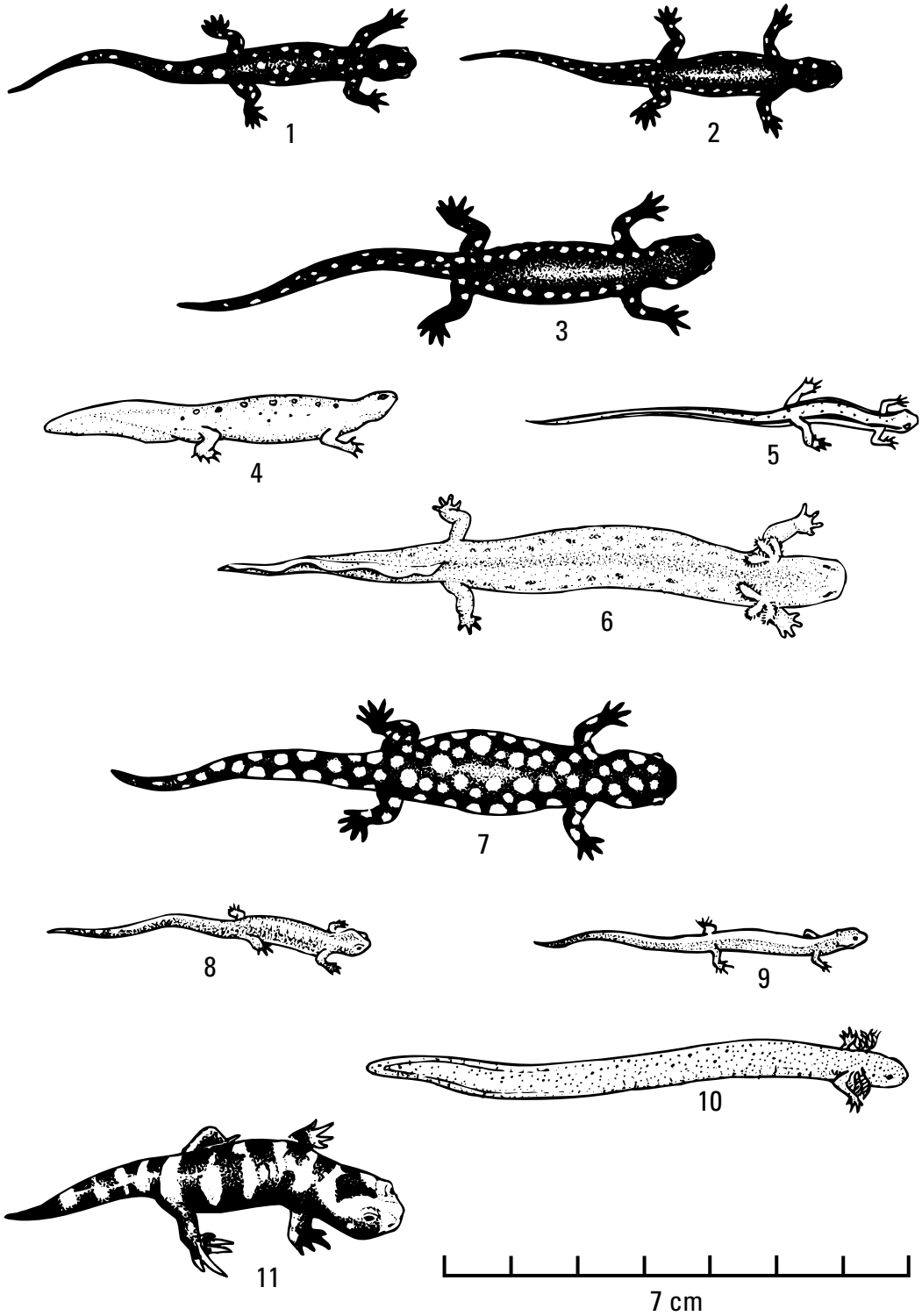

Figure 1

2. Use the dichotomous key (Figure 2) to determine the genus and species of that salamander. Begin by reading statements 1a and 1b. One of the statements describes the salamander; the other statement does not. Follow the directions for the statement that applies to that salamander and continue following the correct statements until you have identified it. Record the scientific and common name of the salamander in the Data Table on page 150.
3. Repeat step 2 for each of the other salamanders in Figure 1.

1	**a** Hind limbs absent	*Siren intermedia*, siren
	b Hind limbs present	Go to 2
2	**a** External gills present in adults	*Necturus maculosus*, 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)	Go to 5
4	**a** Body background black, large white spots variable in size completely covering body and tail	*Ambystoma tigrinum*, tiger salamander
	b Body background black, small round white spots in a row along each side from eye to tip of tail	*Ambystoma maculatum*, 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 black background in a row along each side from head to tip of tail	*Ambystoma jeffersonianum*, Jefferson salamander
	b Small white spots scattered throughout a black background from head to tip of tail	*Plethodon glutinosus*, slimy salamander
7	**a** Large irregular white spots on a black background extending from head to tip of tail	*Ambystoma opacum*, 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	*Triturus viridescens*, 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	*Eurycea bislineata*, 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	*Plethodon cinereus*, red-backed salamander
	b A light stripe extending the length of the body without dark pigment on the sides	*Hemidactylium scutatum*, four-toed salamander

Figure 2

Data Table

Number	Genus and species	Common name
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

Part B. Contructing a Classification Key

1. Examine Figure 3, which shows some common North American wildflowers. Note different characteristics in flower shape, number of petals, and leaf number and shape.

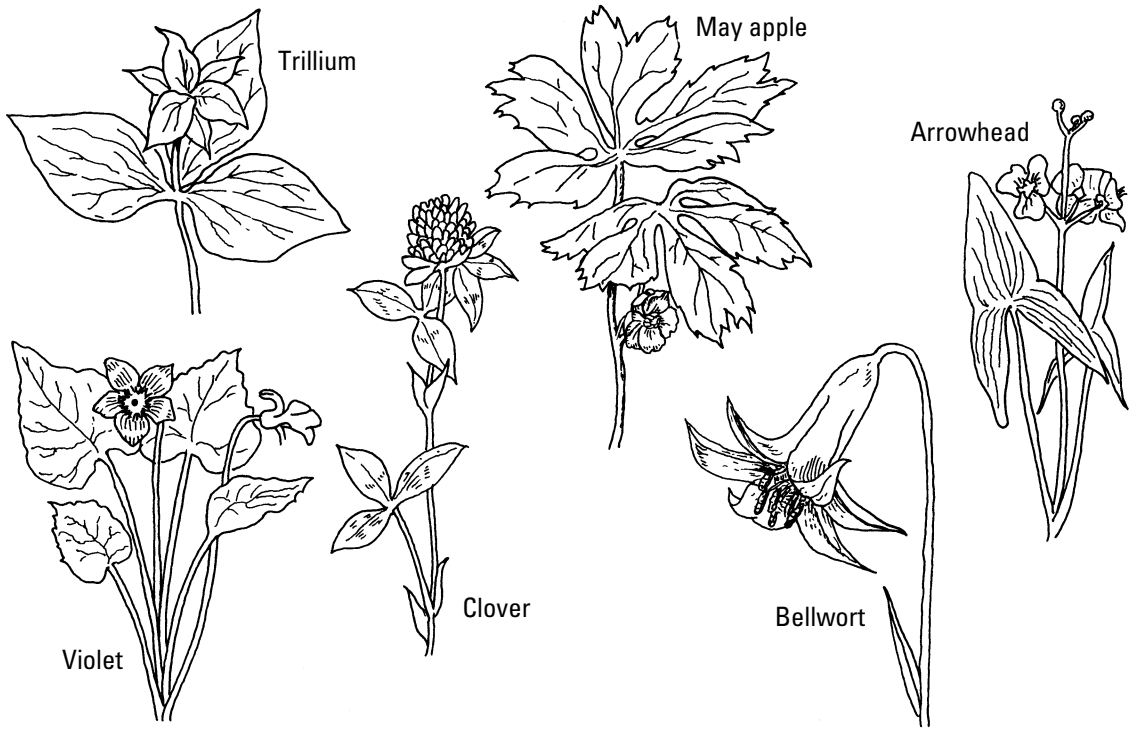

Figure 3

2. Use the space below to construct a dichotomous classification key for the wildflowers in Figure 3. Be sure to use enough pairs of statements to have a final positive statement for each to identify each of the six flowers shown. Use the key to salamanders as a model for developing your wildflower key.
3. Check the usefulness of your wildflower key by letting another student see if he or she can use it to identify each pictured flower.

Wildflower Classification Key

Analysis and Conclusions

1. **Analyzing Data** What are some examples of basic differences among the salamanders pictured?

2. **Drawing Conclusions** Do the classification keys you have just worked with have any limitations in distinguishing between species?

3. **Comparing and Contrasting** Do any of the wildflowers shown in Figure 3 appear to be similar enough to be in the same genus?

4. **Evaluating** What characteristics should be very similar in order to support an inference that two plants are closely related?

5. **Drawing Conclusions** Could the three salamanders from the genus *Ambystoma* be more closely related than *Necturus*, the mud puppy, and *Triturus*, the newt?

Going Further

Construct an evolutionary tree diagram based on the physical similarities and differences of the salamanders shown in Figure 1. Assume that those most similar share a recent ancestor and those that are most different had a common ancestor long ago. Explain why your evolutionary tree is a hypothesis, and describe what kind of evidence might show whether your hypothesis is correct.