

Chapter 18 Classification

Identifying Vertebrates Using Dichotomous Keys

Introduction

Organisms such as vertebrates (animals with backbones) are classified into groups according to certain characteristics. Using these characteristics, dichotomous keys can be developed. Biologists develop these dichotomous keys so they can be used to identify unfamiliar organisms. Such keys are also useful in studying common characteristics and relationships among organisms.

In this investigation, you will learn to use a simple dichotomous key to identify some organisms.

Problem

How is a dichotomous key used to identify various animals?

Pre-Lab Discussion

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

1. Into which five basic groups will you be classifying vertebrates?

2. What information do you need in order to classify the animals shown in Figure 1? Where will you find this information?

3. What is a dichotomous key?

4. What do the **a** and **b** statements in the dichotomous key describe?

5. Read statement **1b** in the Dichotomous Key for the Extinct Animals shown in Figure 1. If an animal is ectothermic, what is the next step in the key? Explain.

Procedure

1. Vertebrates can be divided into five major groups: fishes, amphibians, reptiles, birds, and mammals. (These are not all formal taxonomic groups.) Fishes have gills. The other vertebrates mentioned have lungs. Fishes, amphibians, and reptiles are called ectothermic because they derive body heat mainly from their environment. (*Ecto-* means outside; *-therm* means heat.) Birds and mammals are called endothermic because they derive body heat mainly from metabolism. (*Endo-* means inside.) Some species in each vertebrate group have become extinct. Ten extinct animals are pictured in Figure 1 on pages 132–134. Study the characteristics of these animals by completing the Data Table on page 134.

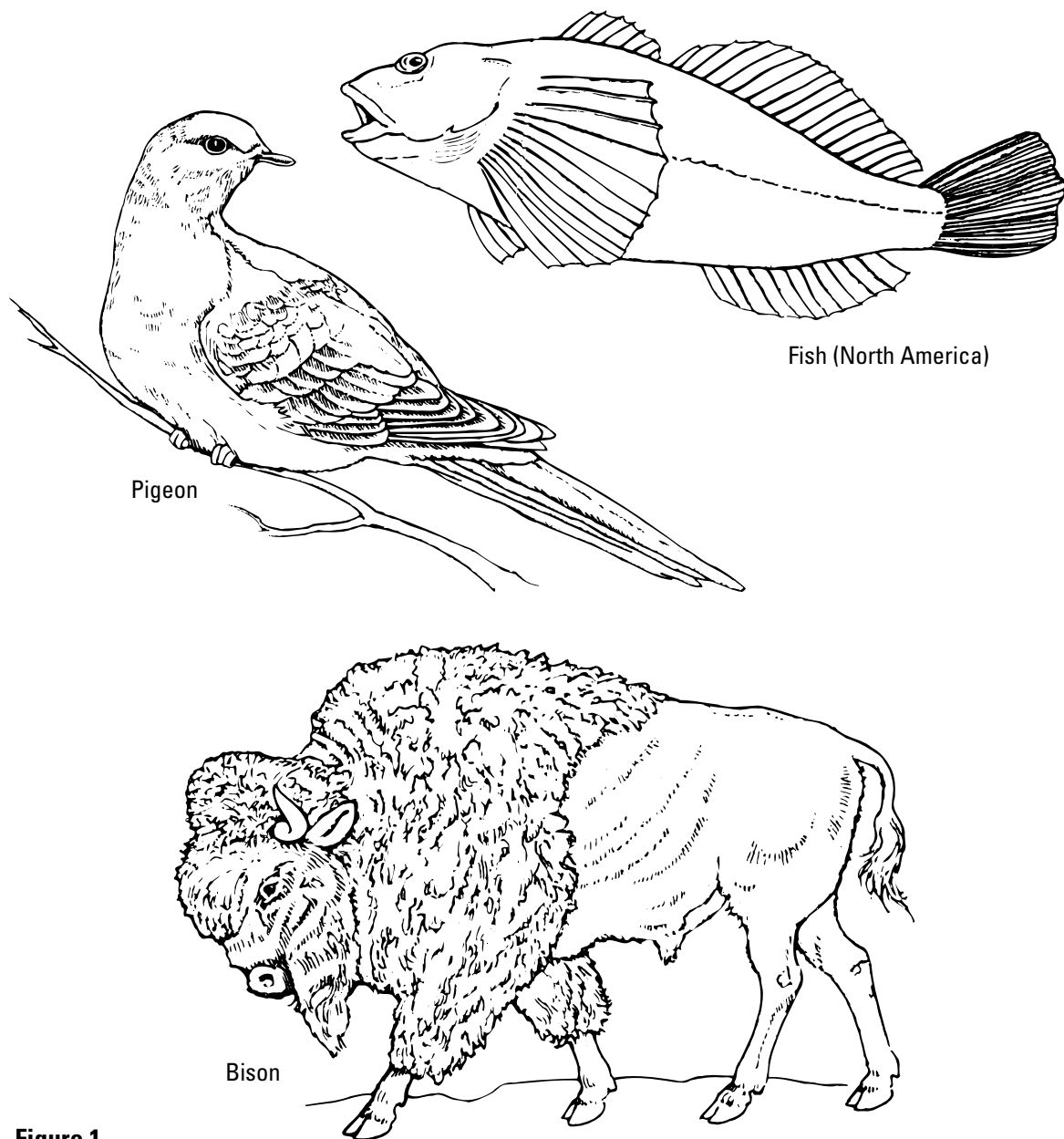
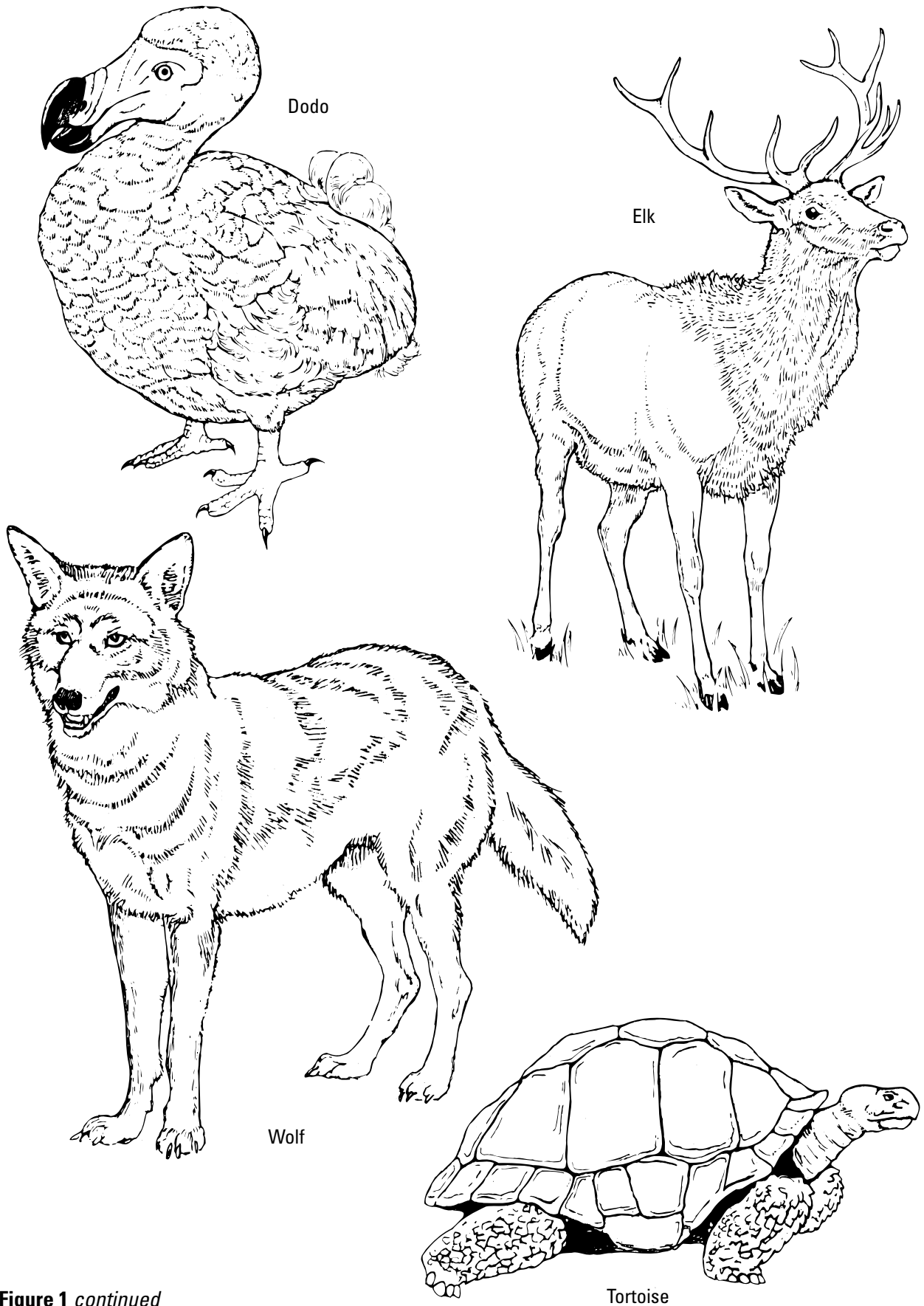


Figure 1



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Figure 1 continued

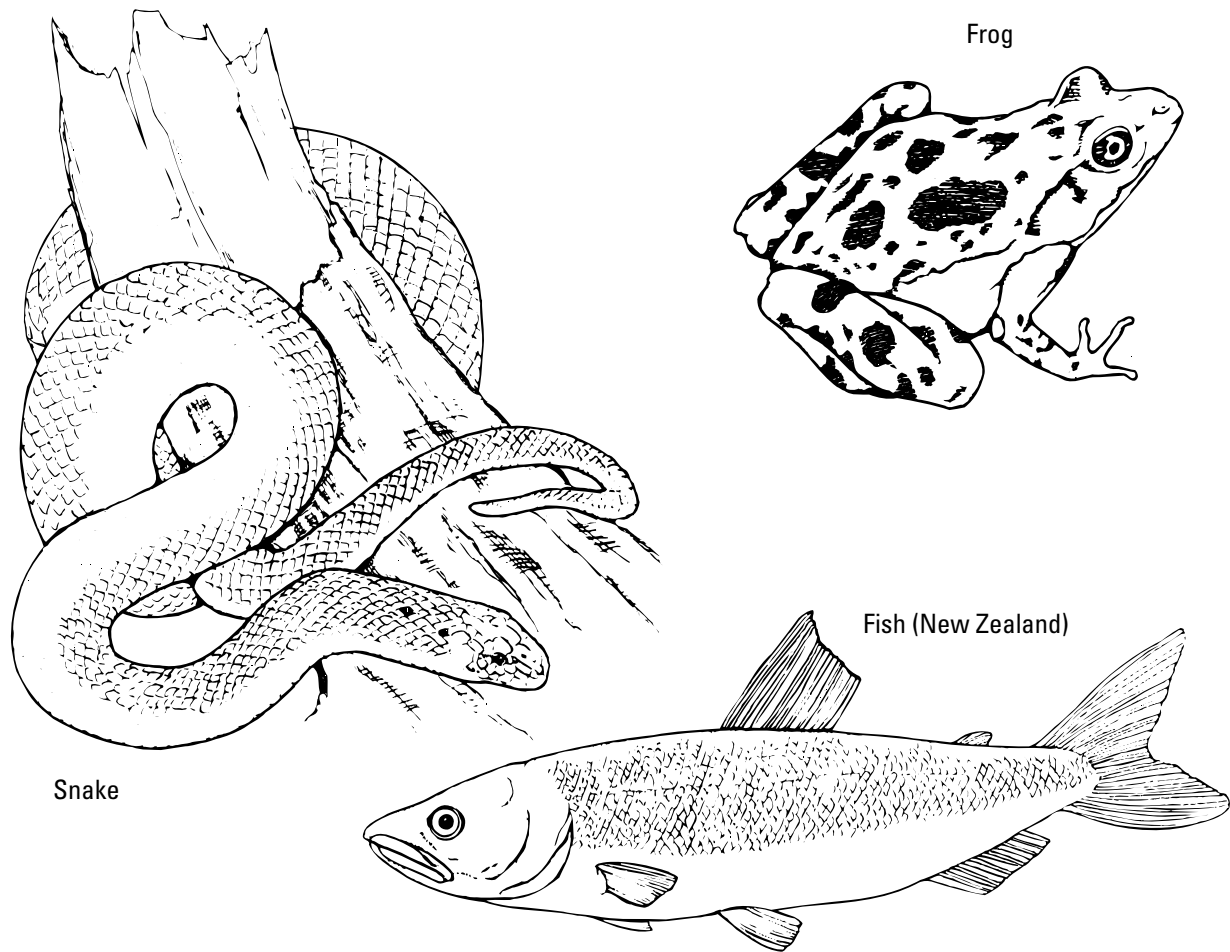


Figure 1 *continued*

Data Table

Name of Animal	Appendages					Body Covering				Temperature Regulation		Breathing Mechanism	
	Fins	Wings, 2 Legs	Forelegs	Hindlegs	Horns	Smooth skin	Scales	Feathers	Hair/Fur	Ectothermic	Endothermic	Gills	Lungs
Tortoise													
Dodo													
Fish (North America)													
Wolf													
Pigeon													
Elk													
Snake													
Frog													
Bison													
Fish (New Zealand)													

2. The following key is based on information from Figure 1 and the Data Table. Examine how a key works by using it to identify each animal.

Dichotomous Key for the Extinct Animals Shown in Figure 1

1	a Is endothermic	Go to 2
	b Is ectothermic	Go to 6
2	a Has feathers	Go to 3
	b Has hair or fur	Go to 4
3	a Has narrow, straight beak	Passenger pigeon
	b Has wide, crooked beak	Dodo
4	a Has horns	Go to 5
	b Has no horns	Texas red wolf
5	a Horns may have many branches	Eastern elk
	b Horns have no branches	Oregon bison
6	a Breathes with gills	Go to 7
	b Breathes with lungs	Go to 8
7	a Has large, fan-shaped fins just behind the head	Utah Lake sculpin
	b Has small pectoral fins	New Zealand grayling
8	a Has scaly skin	Go to 9
	b Has smooth skin	Palestinian painted frog
9	a Has front and hind legs	Domed tortoise
	b Has no legs	Round Island boa

Analysis and Conclusions

- Classifying** Reptiles are ectothermic, have scaly skin, and breathe with lungs. Which of the animals in Figure 1 are reptiles?

- Classifying** The Palestinian painted frog is an amphibian. What is one difference between amphibians and reptiles?

- Classifying** Mammals are endothermic, have hair or fur, breathe with lungs. (They also give birth to live young.) Which of the animals in Figure 1 are mammals?

- Classifying** Birds are endothermic vertebrates with feathers and wings. Which animals in Figure 1 are birds?

5. Drawing Conclusions To which vertebrate group do you belong? Explain.

6. Classifying Develop a dichotomous key for the following mythical creatures. The key has been started for you.

SPHINX:	body of lion, upper part a human
PEGASUS:	winged horse
CHIMERA:	front part a combination of lion and goat, hind part a serpent, breathes fire
CENTAUR:	human from head to waist, remainder of body a horse
GRIFFIN:	body of a lion, head and wings of an eagle, back covered with feathers
UNICORN:	body of a horse, head of a deer, feet of an elephant, tail of a boar, a single black horn in the middle of its forehead

Dichotomous Key for Mythical Animals

1	a Part of body is human	Go to 2
	b None of body is human	Go to 3
2	a	
	b	
3	a	
	b	
4	a	
	b	
5	a	
	b	

Going Further

Choose an organism that you would like to study. Find out how the organism is classified. Try to find out what characteristics are used to classify the organism. Make a chart of your findings. The chart should have columns headed with the terms "kingdom," "phylum," "class," "order," "family," "genus," and "species." In each column, write the characteristics of the organism that belong under the heading.