

Unit 2

Unit 2

Diversity of Living Things



Chapter
5

Change Over Time

How does fossil evidence support the theory that species evolve, or change over time, as the better adapted organisms survive to reproduce?

Chapter
6

Classification of Living Things

How can similarities and differences among organisms be used to classify living things?



82



Change Over Time

Chapter 5



KEY CONCEPT A collection of assorted evidence shows that organisms evolve—or change over time.

Don't expect to see this ferocious cat anytime soon. The cat is a saber-toothed tiger, and it has not lived on Earth for at least 11,000 years. Yet scientists know a great deal about it: what it looked like, where it lived, what it ate, and why it disappeared.

How can modern scientists learn about organisms that lived so long ago? In this chapter, you will learn about the different types of evidence scientists used to piece together an ancient puzzle.

Think About Solving Mysteries

Do you like solving puzzles? Learning about a past event from bits of information is a lot like solving a puzzle.

- Think of an interesting event that might happen at home or in school. For example, your dog runs into the house from a muddy garden. He slides across the floor, jumps on the sofa, and heads out the back door.
- Imagine that you come in after the event has occurred. In your Science Notebook, write down the clues you see. Trade with a partner, and try to figure out what happened from the clues he or she provided.



83

Chapter 5

Lessons

5.1 Adaptations and Variations

5.2 Evidence from the Past

5.3 Modern Evidence of Evolution

5.4 Humans and Evolution

5.5 Natural Selection

Introduce Chapter 5

As a starting activity, use LAB 5A Happy Hunting on page 25 of the Laboratory Manual.

ENGAGE Direct students to look at the picture of the saber-toothed cat. Ask students to identify traits of the saber-toothed cat that are similar to those of animals that are alive today. List the traits on the board. Ask students to think about why some traits are more advantageous than others.

Think About Solving Mysteries

ENGAGE Tell students to be creative and descriptive. If partners cannot guess the event, you may have students go back to add more clues. In addition, you might use the situation to discuss how scientists have to make educated guesses from the limited clues that exist.

Chapter 5 Planning Guide

Instructional Periods	National Standards	Lab Manual	Workbook
5.1 1 period	C.3; C.5; F.2, C.2, C.4, C.6	Lab 5A—p. 25	Key Concept Review p. 29
5.2 1 period	E.2, A.1, B.2, D.1, D.2, E.2; UCP.3, UCP.1	Happy Hunting Lab 5B—p. 26	Vocabulary Review p. 30
5.3 1 period	C.2, G.2, A.2, C.3, G.2; UCP.4	Measuring Variations in a Population	Graphic Organizer p. 31
5.4 1 period	G.1; C.3, G.1; UCP.4	Lab 5C—p. 29	Reading Comprehension p. 32
5.5 1 period	C.4, G.1; C.3, G.1; UCP.2, UCP.4	The Genetics of Natural Selection	Curriculum Connection p. 33 Science Challenge p. 34

Middle School Standard; High School Standard; Unifying Concept and Principle

5.1 Introduce

ENGAGE Have students work in groups of four. Assign each group a habitat, such as the branches and leaves of rain-forest trees; the edge of a muddy, reedy pond; the parched surface of a desert; and the sandy shore of a lake. Tell students to list some characteristics of their assigned habitat. Then, have them think about the characteristics of a frog that might inhabit that area. Remind them to consider the frog's needs and what features might best help it survive. Tell students to list these characteristics also.

Have a volunteer from each group record the habitat and frog characteristics on the board. When all frogs have been identified, discuss the differences among them and how those differences relate to the habitats and help the frogs survive.

Before You Read

Have students brainstorm lists of their personal traits and then choose one to elaborate on in their Science Notebooks. Encourage students to think about a variety of traits—those that help them do well both in and out of school.

Vocabulary terms are listed on the first student page of each lesson. You may wish to preview the terms before introducing the lesson. Strategies for teaching the vocabulary appear on the pages where the terms are introduced.

Teach

EXPLAIN that in this lesson, students will learn to identify the various types of adaptations that organisms have and to explain how those adaptations help organisms survive and reproduce themselves in their environment. They will also be able to describe the reasons for variation among the members of a species.

Learning Goals

- Explain how adaptations help organisms survive.
- Identify the various types of adaptations organisms display.
- Describe the reasons for variation among the members of a species.

New Vocabulary

adaptation
predator
prey
variation
genetic diversity
mutation



Explain It!

The South African burrowing bullfrog inflates its body like a balloon when it senses danger. Explain what an adaptation is. Tell how this is an adaptation that helps the frog survive.

5.1 Adaptations and Variations

Before You Read

All people have traits that enable them to perform some tasks better than others. Some people can remember things easily, which helps them keep track of new information. Others can tell the difference between sounds, which helps them write or play music. In your Science Notebook, write how one of your traits helps you do something well.

It's a hot afternoon on the Serengeti. A hungry pride of female lions is eyeing a group of zebras. As the zebras move, their stripes blend together. It is difficult for the lions to pick out a single zebra. They can't tell how many there are or exactly how far away they are. Unless one zebra strays from the crowd, the lions will go hungry—for now.

Stripes on a zebra are an example of an adaptation. An **adaptation** is any trait that helps an organism survive and reproduce itself in its environment. The mixture of stripes created when many zebras stand together makes it difficult for predators, such as lions, to attack. This helps each zebra survive.



Figure 5.1 These zebras cannot outrun or outfight the lions that hunt them, but they are not without protection. Their patterns of stripes confuse the lions. Because this helps the zebras survive, the stripes are considered an adaptation.



Explain It!

ANSWER An adaptation is a trait that helps an organism survive and reproduce itself in its environment. The frog makes itself look larger than it is. This might prevent predators from attacking.

Background Information

An adaptation is a change that helps an organism survive and reproduce itself. Fitness is measured by the representation of an individual's alleles in the next generation. If the organism survives but does not reproduce, it has 0 fitness.

Prey Adaptations

Like a zebra's stripes, some adaptations protect an organism from predators. A **predator** (PRE duh tor) is an organism that kills and eats another organism for food. The organism that is eaten is known as the **prey** (PRAY).

Some adaptations help organisms hide from predators. Others, such as strong odors, cause predators to keep away. Still other adaptations, such as an antelope's fast speed, help prey escape from predators.

Figure 5.2 shows several more methods of defense against predators.

Mimicry Is this a highly poisonous coral snake? No, it's actually a harmless king snake. Mimicry is the ability to look like a different, often more dangerous, organism. Both king snakes and coral snakes have the same coloring in a slightly different arrangement. If this snake is lucky, predators will not try to find out which one it is.



Protective Covering Come too close to this porcupine and you're in for a sharp surprise. The pointy quills that cover its body protect the animal from predators. Some plants have sharp needles for the same reason.



Camouflage Do you see an insect? How about a stick? The color and slow movement of this stick insect make it look like one of the twigs on this tree. Camouflage is the ability to blend into the surroundings.



Warning Colors This poison arrow frog does not blend into its environment. In fact, its bright colors invite predators to see the frog. Like this frog, many brightly colored organisms are poisonous. The colors warn predators not to eat them.

Figure 5.2 Prey have many adaptations to protect themselves from predators. These photographs show several examples.

As You Read

In your Science Notebook, make a T-chart. On the left side, list several adaptations of living things. On the right, describe how each adaptation allows the organism to survive in its environment.

What is an adaptation?

Figure It Out

1. Why might a predator avoid eating a brightly colored grasshopper?
2. A harmless syrphid fly looks like a yellow jacket wasp. What is the name of this defense mechanism?

Teach

EXPLAIN Discuss the adaptations mentioned on this page and on page 84. Have students categorize the adaptations by method: speed, smell, shape/appearance, color, poison, sharp protrusions, etc. For each method, have students identify examples. Challenge students to add to the list by finding examples of methods, such as shells (snails) and size of body parts (small ears in the Arctic fox vs. large ears in the desert fox). Suggest that students create a bulletin board titled *Adaptations* to display the information.

As You Read

Model the T-chart on the board for students. Label the left column *Adaptation* and the right column *Advantage*.

ANSWER An adaptation is a trait that gives an organism an advantage that helps it survive and reproduce in its environment.

Science Notebook EXTRA

Encourage students to use the vocabulary section they created in their Science Notebooks. Remind them to record prefixes, suffixes, and root words to help them remember the meanings of vocabulary terms.

Vocabulary

adaptation Have students identify the verb in *adaptation* (*adapt*). Explain that *adapt* means "to change or adjust something to meet different conditions." Have them use this meaning to define *adaptation*. Explain that adaptations increase a living thing's chances of survival and reproduction.

predator Explain that *predator* comes from the Latin word *praedari*, which means "to plunder." A predator plunders, or steals, and eats its prey.

prey Tell students that the word *prey* can be used as both a noun and a verb. When *prey* is used as a noun, it is defined as the organism that is eaten by a predator. However, when used as a verb, *prey* describes what a predator does to its victim.

Figure It Out: Figure 5.2

ANSWER 1. It might be poisonous. 2. mimicry

ELL Strategy

Use Visual Information Provide students with photographs of animals that use camouflage, mimicry, warning colors, and protective covering as adaptations to protect themselves from predators. Have groups of students sort the photographs into categories and identify the adaptation each category represents. Have groups

share their categorizations with the class. Label four columns on the board with the names of the four adaptations. As students share their categories, record them on the board. If groups disagree, have students discuss their reasons for choosing the category.