

Objectives

- Describe physical adaptations of animals.
- Identify behavioral adaptations of animals.
- Describe some animal behaviors that are learned.

Vocabulary

- camouflage p. 70
 mimicry p. 71
 behavioral
 adaptation p. 73
 instinct. p. 73
 migration p. 74
 learned
 behavior. p. 76

Find out what these words mean as you study this lesson.

**Essential Question**

What Are Some Animal Adaptations?

Engage

Get Ready to Learn How did God make animals different? Can you think of animals that have special adaptations that help them survive? Each adaptation an animal has helps it survive. Some of these adaptations serve more than one purpose. A rhinoceros, for example, has horns that it uses for several purposes. If a predator such as a lion attacks, a rhino will use its horn to protect itself and its young. Rhinos also use their horns to fight with other rhinos over territory, or for a mate.

Try This! What is your favorite animal? List what you know about the adaptations of this animal. How does the animal use these adaptations to meet its needs? Describe the adaptations of your animal to a partner and ask how the animal uses the adaptations to survive. If you are unsure about the adaptations of an animal, research it.





Record your work for this inquiry. Your teacher may also assign the related Guided Inquiry.

The Beaks Have It!

How is the shape of a bird's beak related to what it eats?



SAFETY: Never eat or drink anything in science class.

Materials

- beaks: straws, tweezers, nutcrackers, chopsticks, toothpicks, spoon
- food: gummy worms, sunflower seeds, plastic foam pieces, marshmallows, rice, colored water in a cup
- paper plates
- plastic cup
- stopwatch or clock with second hand

Step 1 Place each food on a different paper plate. Keep the water in the cup.

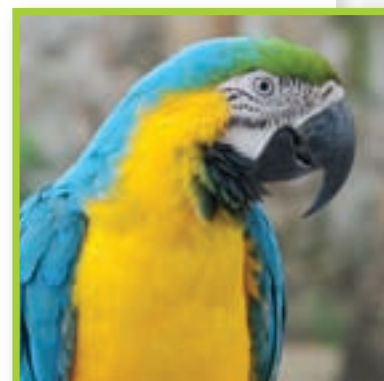
Step 2 **Develop a hypothesis** that has to do with the tools. Which beak will work best for eating the food or drinking the water?

Step 3 **Investigate.** Choose a “beak” to test first. Use the stopwatch to time how much of each type of food you can pick up and place in an empty cup in 30 seconds with your chosen beak.

Step 4 **Record your data** in a chart. Repeat Steps 3 and 4 for the next “beak.”

Create Explanations

1. How is the shape of a bird's beak related to what it eats?
2. How did using models help you conduct an investigation about bird beaks?



Physical Adaptations Explain



Think About It

Think of another example of an animal that uses camouflage. What advantage does camouflage give to the animal?

When you dress, you may choose colors, patterns, and shapes that attract attention. But suppose you did not want anyone to notice you. What colors, patterns, or shapes would you wear then?

Animals cannot choose their color, pattern, or shape. These are physical, or structural, adaptations. Many animals have physical adaptations that serve as a disguise. They can hide out in the open because they blend into their environment. The adaptation that allows some animals to blend into their surroundings is **camouflage**.

Color, patterns, and body shape are adaptations that help camouflage both predators and prey. Because a polar bear's fur looks white, for example, it can blend in with the snow. The polar bear can watch its prey without being seen, and attack when the time is right. The spots on a fawn camouflage it from predators in the light of the forest. An insect shaped like a twig is camouflaged by its shape.



This insect looks like a leaf.

Lesson Activity

Work with a partner. Cut an index card into four equal pieces. These pieces will be "insects." Keep two pieces and give two to your partner. Color your cards so they will be hard to see when placed on a surface somewhere in the classroom. Ask your partner to close his or her eyes while you tape your "insects" to the places you have chosen. Have your partner open his or her eyes and look for your "insects." Time how long it takes your partner to find the "insects." Then switch roles and have your partner hide his or her "insects." Talk with your partner about what made the "insects" easy or hard to find.



How did you color your "insects" to try to hide them?

How could you change your "insects" to hide them better?



The red-spotted purple butterfly is a mimic of the poisonous pipevine swallowtail butterfly. A bird can't tell them apart, so it will not eat either one.

God designed some animals to look, sound, or behave like other animals. These other animals may have warning signals to protect them. Their colors or patterns may inform predators they are poisonous or taste horrible. The animals that imitate them are neither poisonous nor terrible-tasting. However, predators stay away anyway, because they think both are the same kind of animal. When an animal imitates another animal or object to avoid predators, it is called **mimicry**.

An animal's body covering is a physical adaptation too. A fish's scales keep water out of its body. Scales keep a reptile's body from drying out. The moist skin of amphibians is adapted for water. Birds' feathers provide warmth, help birds fly or swim, and keep them dry. Fur or hair protects animals from extreme cold or heat and protects skin from scrapes and scratches and too much Sun. Fur may be colored or patterned to provide camouflage.

Woodpecker Adaptations

- strong, sharp beak for drilling holes
- stiff tail for support on the tree
- two toes point backward to help with climbing trees
- very long tongue has a barb to skewer insects



You already know that a bird's beak is adapted to its foods. Did you know that other animals have adaptations for specific purposes too? Some animals have sharp, pointed teeth for eating meat. For animals that swim, webbed feet are an adaptation. They help the animal swim faster and easier.

Explore-a-Lab

Structured Inquiry



What adaptations will help an animal survive in a new environment?

Working in a group, write a list of your favorite animals on small slips of paper. Place them in a cup or hat. Then write a list of environments, such as tundra, rain forest, and desert, on slips of paper and place them in another cup or hat. Make sure you have an equal number of environments and animals.

Without looking, choose one animal. Then choose an environment. Consider what adaptations the chosen animal might need to survive in the chosen environment. Draw the animal and label its adaptation. Communicate and explain why you changed the features of the model animal as you did.

Choose another animal and environment. Continue until all animals and environments have been chosen.

Behaviors That Are Instincts

Explain

Camouflage, mimicry, and animals' body parts and coverings are physical adaptations. The way in which an animal behaves is an adaptation, too—a **behavioral adaptation**. Behaviors that animals are born knowing how to do are **instincts**. A lion preying upon a zebra and a bird building a nest are examples of instincts. When animals flee from danger, they are following their instincts.

Why do some animals like to live in groups? Some animals are safer in a group. It's harder for predators to choose one from a moving herd. Zebras' stripes confuse predators when zebras travel in large groups. Although fully grown male bison are safe from most predators, they live in groups and form a circle to protect their females and young.



Think About It

Prey animals often live in groups. Predators also sometimes live in groups. What advantages might predators gain from living in groups?

Behavioral Adaptations

Puffer Fish Puffer fish can inflate to several times their normal size.




Fish Fish and other animals travel in groups for protection and to find food.



Opossum Opossums can roll onto their backs, slow their breathing, and become stiff, as if dead.





You may know that some animals travel south in the fall and return home in the spring. These animals are migrating. **Migration** is the act of traveling from one place to another, and back again. It is an instinctual behavior. For example, many birds that breed and raise their young in North America migrate in autumn. The areas where they spend winters are South and Central America, the Caribbean Islands, and the far southern United States.

Why do animals migrate? When it gets cold and the ground is covered with snow and ice, it's hard for many animals to find food and stay warm. However, some animals migrate during times other than fall. Wildebeests in Africa, for example, migrate throughout the year, always looking for grass and water.



Explore-a-Lab

Structured Inquiry

How will earthworms respond to light?

Work in small groups. Wet two paper towels and place them at the bottom of a tray. Place an earthworm in the center of the tray. Cover the tray with a cardboard lid that has a small hole about 5 cm (2 in.) from one side of the piece of cardboard. Set up a light so it shines through the hole in the lid. Wait for ten minutes. Then remove the lid and observe the location of the earthworm.

Female loggerhead turtles leave feeding areas and travel hundreds of miles to nesting grounds, where they lay their eggs. Then they swim back to their feeding area. Salmon spend most of their lives in the ocean even though they were hatched from eggs in rivers or streams. When they are ready to reproduce, they return to where they were hatched. Dall sheep in Alaska migrate up and down mountains. They spend summers near the top of mountains and then spend winter at lower elevations where there is less snow and where food is easier to find.

Rather than migrate when it gets cold, some animals stay in the same place and hibernate, or go into a deep sleep. Because they do not need a lot of energy while hibernating, they survive the winter without much food. Animals that hibernate include woodchucks, ground squirrels, and bats. Snakes, turtles, and frogs also hibernate.



Scripture Spotlight

Read Proverbs 6:6–8 and explain what animal adaptations you read about.

Lesson Activity

Find out about an animal that migrates to, from, or through the area where you live. Draw its migration route on a map.



What can you infer about the migration of the animal you chose?

Canada geese migrate north in spring, and south in autumn.



Learned Behaviors Explain



Think About It

Humans have both instinctive and learned behaviors. Make a list of what you do each morning before school. Which are instinctive and which are learned behaviors? How do you know?



Focus on Health

What are some healthy behaviors you have learned? What are some unhealthy learned behaviors?

A cat races into the kitchen when it hears a can opener. A deer returns every night to a backyard where people leave food. A dog avoids skunks after being sprayed. After eating a bad-tasting insect, a bird stays away from other insects of the same kind. These animals have learned these behaviors just as you have learned to speak, read, ride a bicycle, or play a sport. A behavior that is taught is a **learned behavior**.

Learned behaviors are similar to adaptations because they help animals survive. But they are not adaptations because they will not be inherited by offspring from their parents. Young animals, however, can learn many behaviors from watching their parents.

Animals learn behaviors through experience and practice. A raccoon searches for food in a garbage can because it has found food there before. If the garbage can is no longer available, the raccoon's behavior will no longer get it food. The raccoon will be forced to change its behavior.

Many animals learn behaviors from their parents or others of their own kind. Lions, for example, teach their cubs how to stalk and attack prey. Monkeys teach their young which leaves they can safely eat.



Some raccoons open garbage cans. This behavior is not natural. It is a learned behavior.

Make a Connection **Extend**

Make a list of ten adaptations that you have learned about in this chapter. Choose one form of communication that is your adaptation to learning. Write a poem or story, draw a picture, or make a cartoon that describes or shows the adaptations you listed. Share your work. When you adapt to learning, what is the benefit?

Lesson Review **Assess/Reflect**

Summary: What are some animal adaptations? Animals rely on physical adaptations, instincts, and learned behaviors to survive in their environments.

- 1. Graphic Organizer** Make a cause-and-effect chart to tell what adaptations animals have and why they have them.
- 2. Vocabulary** How is an **instinct** different from a **learned behavior**?
- 3. Test Prep** The nonpoisonous scarlet king snake looks and acts like the dangerous coral snake. What is this an example of?
 - A.** migration
 - B.** instinct
 - C.** mimicry
 - D.** camouflage
- 4. Inquiry Practice** Some animals' fur turns white at some times of the year. What can you **infer** is the reason this occurs?
- 5.** What are two ways that animals deal with changing weather?
- 6.** Some female sea turtles return to the beach where they were born to lay their eggs. What is this an example of? How do you know this?
- 7. Review Proverbs 6:6–8.** What lessons do you think God wants you to learn from the ants?



Family Link With a family member, visit a zoo or a park, or observe animals in your own backyard. Observe their physical adaptations and record them in a chart. Then, use the Internet or other reference sources to find out some of each animal's instincts and learned behaviors. Add the information to your chart. Share it with classmates.

Science and Technology

Extend

Bioshelter

Bioshelters are a way to raise plants and animals where people need them. Bioshelters allow plants and animals to live where they could not live in nature. A bioshelter is a solar greenhouse. It protects the plants and animals inside. Bioshelters are used to grow crops for food. They have ponds with fish. They also include insects and other animals. That helps keep the shelter habitat in natural balance.

The greenhouse protects the life inside of it. Solar energy heats it. The ponds help keep the temperature inside from getting too hot or too cold. Insects are used to naturally control harmful pests. Someday, people may live inside bioshelters.



Concept Check

1. How do bioshelters help living things survive in environments where they do not naturally live?
2. How would clay pot irrigation be useful to people who live in the desert?



Clay Pot Irrigation

The buried clay pot irrigation system, invented in China, has been used for over 2,000 years. It is an efficient way to water plants that grow in dry areas.

Clay pots are buried in a garden or small field. Then the pots are filled with water. The water slowly leaks out through the clay walls of the pots. The plants pull only as much water as they need from the pots.

Most irrigation systems water plants at regular times. The clay pot irrigation system provides continuous moisture at the plants' roots where it is needed. Water is added to the buried clay pots only once or twice a week. No water is wasted.

This irrigation system has been used successfully by farmers in parts of Latin America, Asia, and Africa. Tomatoes, corn, beans, onions, and garlic are grown using this system. Farmers in Mexico and India can now grow enough to feed themselves and sell extras at the market.

Herpetologist

A herpetologist studies amphibians and reptiles. Amphibians and reptiles are vertebrates (animals with backbones). They are ectotherms. That means they use behavior to control body temperature. They depend on heat from the environment to keep them warm.

Amphibians hatch from eggs in water. As they grow, they develop lungs and legs that allow them to live on land. Some amphibians are frogs, toads, salamanders, and newts.



Reptiles hatch from eggs on land. Reptiles have lungs to breathe air when they hatch. Some reptiles are alligators, crocodiles, turtles, snakes, and lizards.

Some herpetologists study amphibians to see what affect humans have on their habitat. Some herpetologists study ways to use venom from amphibians and reptiles to help people. Other herpetologists work to teach people about this diverse group of animals. There are almost 8,500 species of amphibians and reptiles. Since there are so many, herpetologists usually pick a specialty.

Animal Behaviorist

Animal behaviorists study how animals act in their natural habitats. They help protect animals whose natural habitats are endangered. They also study ways to help people and animals live together.

Animal behaviorists study how animals take care of their young. They study how animals find food, water, and shelter. They also study how animals protect themselves from predators.

Some animal behaviorists design healthy living areas for animals in zoos or aquariums. They train service animals for disabled people. They also help pets that behave badly. Animal behaviorists use what they learn to better understand how humans behave and learn.



Concept Check

1. Is the herpetologist holding an amphibian or a reptile? How do you know?
2. How can studying animal behavior help animals that belong to an endangered species?