

Reptiles

Reading Preview

Key Concepts

- What are some adaptations that allow reptiles to live on land?
- What are the characteristics of each of the three main groups of reptiles?
- What adaptation helped dinosaurs survive before they became extinct?

Key Terms

- reptile
- kidney
- urine
- amniotic egg

Target Reading Skill

Identifying Main Ideas As you read the information under the heading titled Adaptations for Life on Land, write the main idea in a graphic organizer like the one below. Then write three supporting details that give examples of the main idea.

Main Idea			
Reptiles are adapted to conserve water.			
Detail	Detail	Detail	

Lab zone Discover Activity

How Do Snakes Feed?

1. To model how a snake feeds, stretch a sock cuff over a grapefruit "prey" by first pulling on one side and then on the other. Work the grapefruit down into the "stomach." A snake's jawbones can spread apart like the sock cuff.
2. Remove the grapefruit and put a rubber band around the sock about 8 centimeters below the opening. The rubber band represents the firmly joined jawbones of a lizard. Now try to repeat Step 1.



Think It Over

Inferring What is the advantage of having jawbones like a snake's?

The king cobra of Southeast Asia is the world's longest venomous snake. It can grow to more than 4 meters long. When it encounters a predator, a king cobra flattens its neck and rears up. Its ropelike body sways back and forth, and its tongue flicks in and out.

A king cobra's fearsome behavior in response to a predator contrasts with the gentle way it treats its eggs. King cobras are one of the few snakes that build nests. The female builds a nest of grass and leaves on the forest floor. She lays her eggs inside the nest and guards them until they hatch.

King cobra ▶

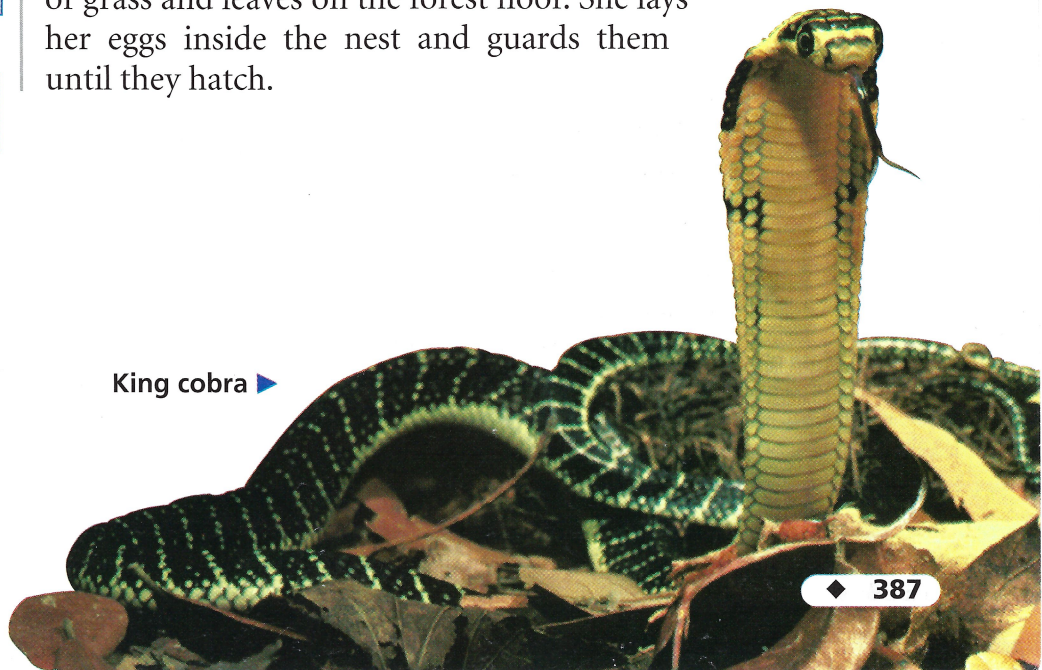


FIGURE 18

A Desert Tortoise

The tough, scaly skin of this desert tortoise helps it survive in a dry environment.



Adaptations for Life on Land

Like other reptiles, king cobras lay their eggs on land rather than in water. A **reptile** is an ectothermic vertebrate that has lungs and scaly skin. In addition to snakes such as the king cobra, lizards, turtles, and alligators are also reptiles. Unlike amphibians, reptiles can spend their entire lives on dry land.

The ancestors of modern reptiles were the first vertebrates adapted to life completely out of water. Reptiles get their oxygen from air and breathe entirely with lungs. Reptiles that live in water, such as sea turtles, evolved from reptiles that lived on land. So, even though they live in water, they still breathe with lungs and come ashore to lay eggs.

You can think of a land animal as a pocket of water held within a bag of skin. To thrive on land, an animal must have adaptations that keep the water within the “bag” from evaporating in the dry air. **The skin, kidneys, and eggs of reptiles are adapted to conserve water.**

Skin and Kidneys Unlike amphibians, which have thin, moist skin, reptiles have dry, tough skins covered with scales. This scaly skin protects reptiles and helps keep water in their bodies. Another adaptation that helps keep water inside a reptile’s body is its **kidneys**, which are organs that filter wastes from the blood. The wastes are then excreted in a watery fluid called **urine**. The kidneys of reptiles concentrate the urine so that the reptiles lose very little water.

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What are two functions of a reptile’s skin?

An Egg With a Shell Reptiles have internal fertilization and lay their eggs on land. While still inside a female's body, fertilized eggs are covered with membranes and a leathery shell. Unlike an amphibian's egg, a reptile's egg has a shell and membranes that protect the developing embryo and help keep it from drying out. An egg with a shell and internal membranes that keep the embryo moist is called an **amniotic egg**. Pores in the shell let oxygen gas in and carbon dioxide gas out.

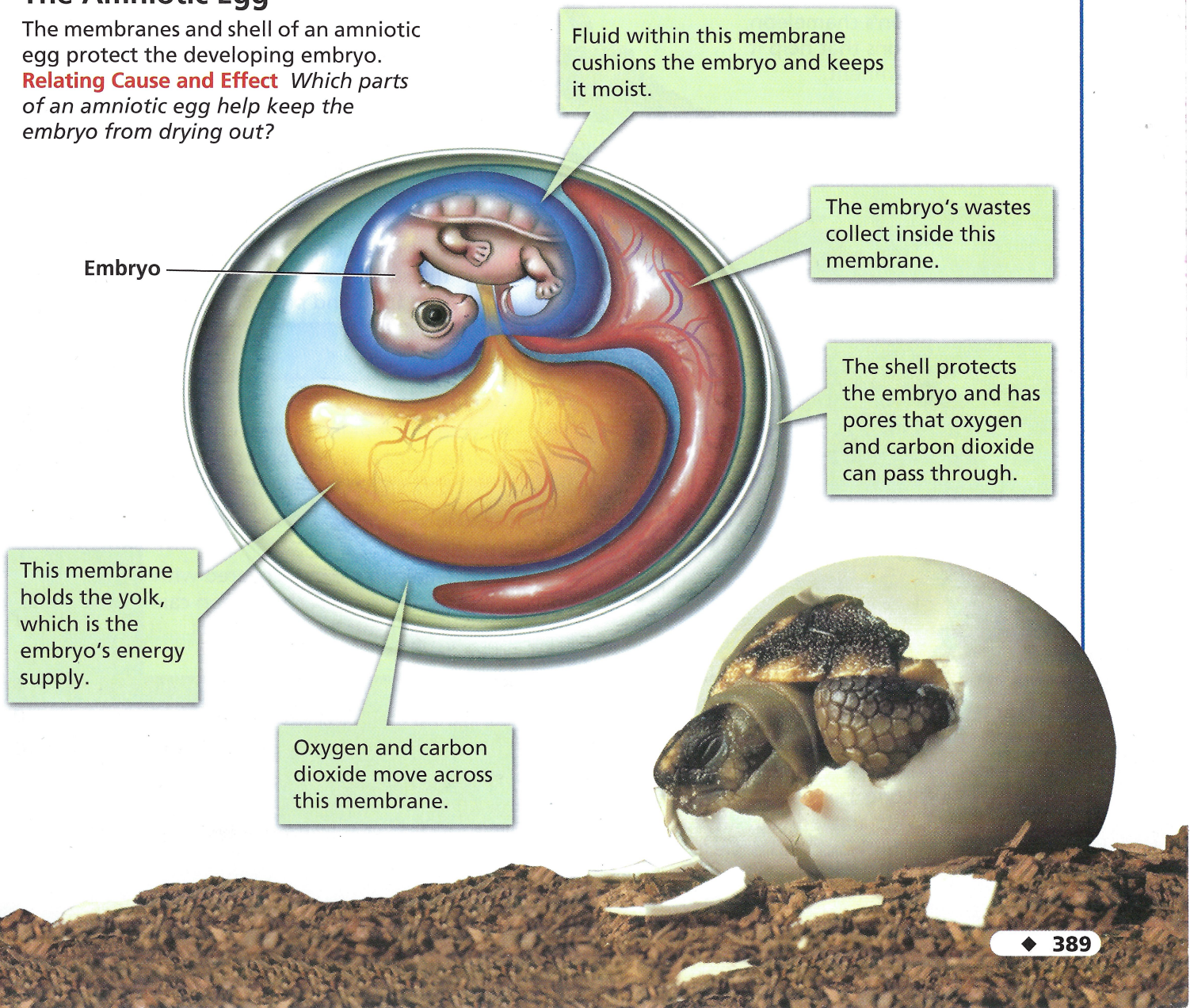
Look at Figure 19 to see the membranes of a reptile's egg. One membrane holds a liquid that surrounds the embryo. The liquid protects the embryo and keeps it moist. A second membrane holds the yolk, or food for the embryo. A third membrane holds the embryo's wastes. Oxygen and carbon dioxide are exchanged across the fourth membrane.

FIGURE 19

The Amniotic Egg

The membranes and shell of an amniotic egg protect the developing embryo.

Relating Cause and Effect Which parts of an amniotic egg help keep the embryo from drying out?



Lizards and Snakes

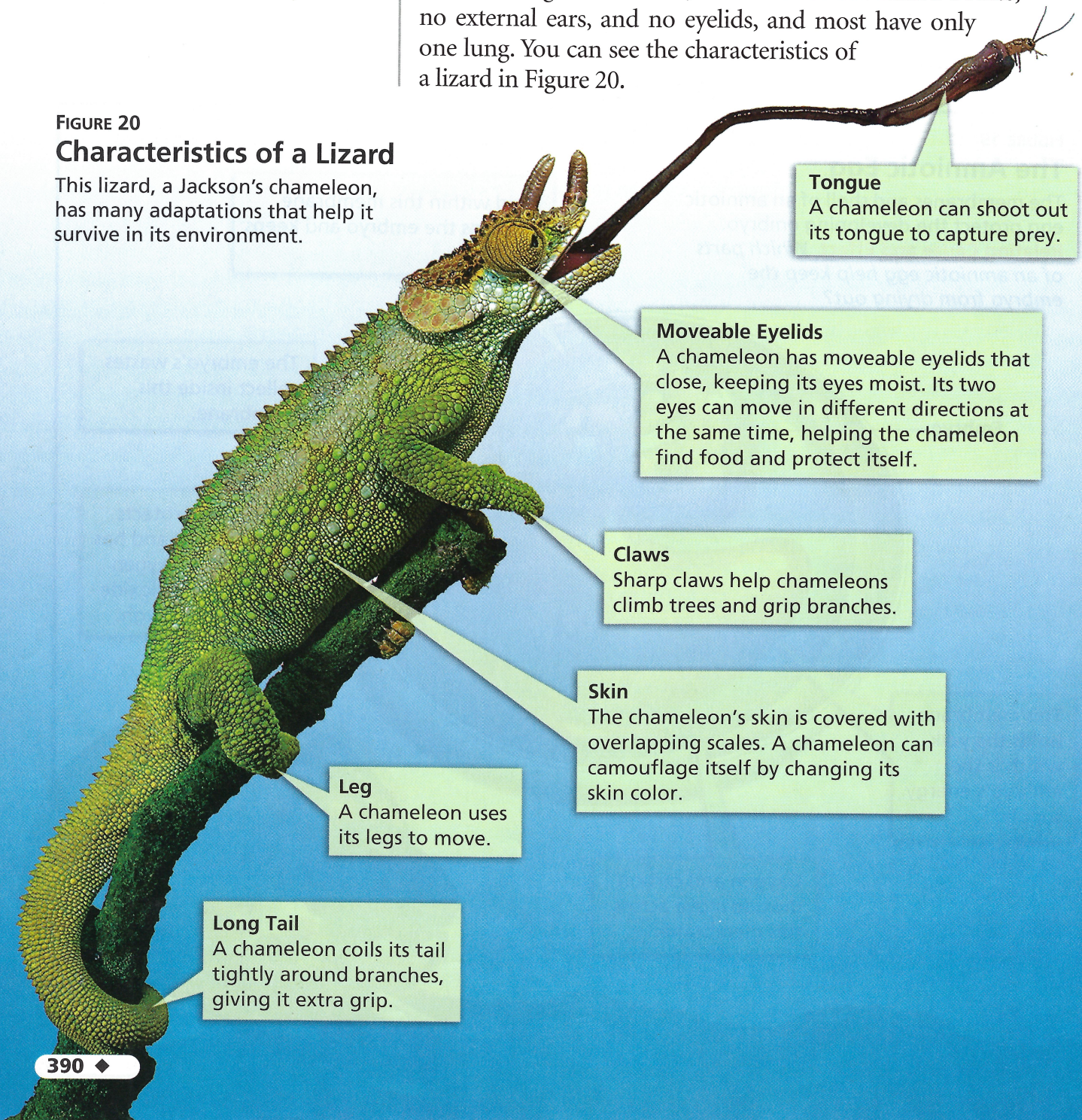
Most reptiles alive today are either lizards or snakes. These two groups of reptiles share some important characteristics. **Both lizards and snakes are reptiles that have skin covered with overlapping scales.** As they grow, they shed their skin and scales, replacing the worn ones with new ones. Most lizards and snakes live in warm areas.

Lizards differ from snakes in an obvious way. Lizards have four legs, usually with claws on the toes, and snakes have no legs. In addition, lizards have long tails, external ears, movable eyelids, and two lungs. In contrast, snakes have streamlined bodies, no external ears, and no eyelids, and most have only one lung. You can see the characteristics of a lizard in Figure 20.

FIGURE 20

Characteristics of a Lizard

This lizard, a Jackson's chameleon, has many adaptations that help it survive in its environment.



Tongue

A chameleon can shoot out its tongue to capture prey.

Moveable Eyelids

A chameleon has moveable eyelids that close, keeping its eyes moist. Its two eyes can move in different directions at the same time, helping the chameleon find food and protect itself.

Claws

Sharp claws help chameleons climb trees and grip branches.

Skin

The chameleon's skin is covered with overlapping scales. A chameleon can camouflage itself by changing its skin color.

Leg

A chameleon uses its legs to move.

Long Tail

A chameleon coils its tail tightly around branches, giving it extra grip.

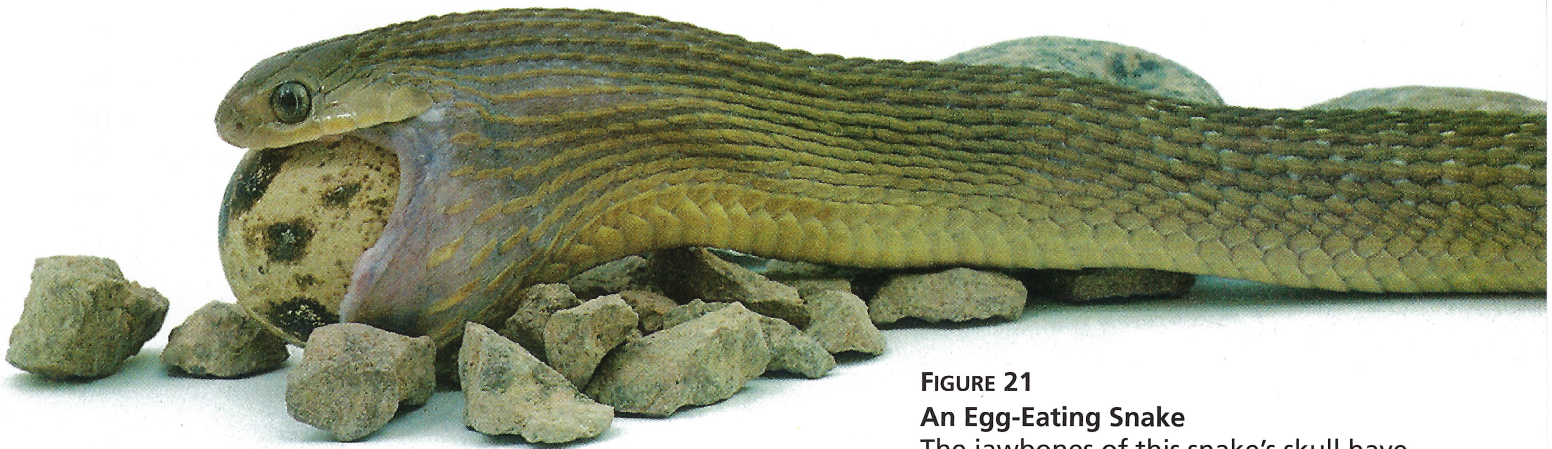


FIGURE 21

An Egg-Eating Snake

The jawbones of this snake's skull have moved to let the snake swallow an egg. **Making Generalizations** How are snakes different from lizards?

Obtaining Food A few lizards are herbivores that eat leaves. Most lizards, however, are carnivores that capture their prey by jumping at it. While some large lizards will eat frogs and birds, most smaller lizards are adapted to hunt insects. For example, chameleons have sticky tongues adapted for snaring insects.

All snakes are carnivores. Most snakes feed on small animals, such as mice, but some eat large prey. If you did the Discover Activity, you learned that a snake's jawbones can spread wide apart. In addition, the bones of a snake's skull can move to let the snake swallow an animal larger in diameter than itself. Snakes capture their prey in different ways. For example, some snakes have long, curved front teeth for hooking slippery prey. Other snakes, such as rattlesnakes and copperheads, have venom glands attached to hollow teeth called fangs. When these snakes bite their prey, venom flows down through the fangs and enters the prey.

Movement While lizards walk and run using their legs, snakes cannot move in this way. If you've ever seen a snake slither across the ground, you know that when it moves, its long, thin body bends into curves. Snakes move by contracting, or shortening, bands of muscles that are connected to their ribs and their backbones. Alternate contractions of muscles on the right and left sides produce a slithering side-to-side motion. Instead of slithering, sidewinder snakes, like the one shown in Figure 22, lift up their bodies as they move.



FIGURE 22

A Sidewinder Snake

This sidewinder snake lifts loops of its body off the desert sand as it moves along. Only a small part of its body touches the sand at one time.



How do lizards move?

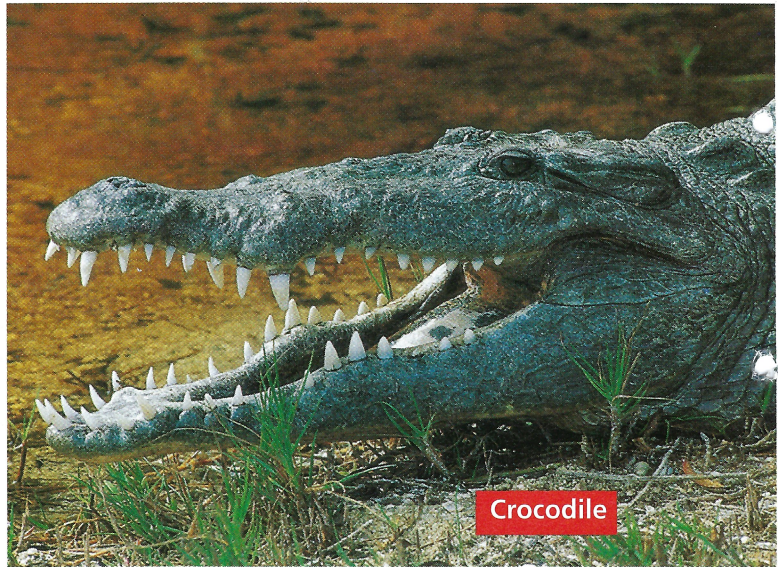


FIGURE 23

Alligator and Crocodile

Alligators and crocodiles are the largest reptiles still living on earth. They are similar in many ways, including appearance.

Comparing and Contrasting How can you tell the difference between an alligator and a crocodile?

Alligators and Crocodiles

If you walk along a lake in Florida, you just might see an alligator swimming silently in the water. Most of its body lies beneath the surface, but you can see its large, bulging eyes above the surface. Alligators, crocodiles, and their relatives are the largest living reptiles. **Both alligators and crocodiles are large, carnivorous reptiles that care for their young.** So, how do you tell an alligator from a crocodile? Alligators have broad, rounded snouts, with only a few teeth visible when their mouths are shut. In contrast, crocodiles have pointed snouts, with most of their teeth visible when their mouths are shut.

Obtaining Food Alligators and crocodiles are carnivores that often hunt at night. They have several adaptations for capturing prey. They use their strong, muscular tails to swim rapidly. Their jaws are equipped with many large, sharp, and pointed teeth. Their jaw muscles are extremely strong when biting down. Although alligators will eat dogs, raccoons, and deer, they usually do not attack humans.

Reproduction Unlike most other reptiles, crocodiles and alligators care for their eggs and newly hatched young. After laying eggs, the female stays near the nest. From time to time, she comes out of the water and crawls over the nest to keep it moist. After the tiny alligators or crocodiles hatch, the female scoops them up in her huge mouth. She carries them from the nest to a nursery area in the water where they will be safer. For as long as a year, she will stay near her young until they can feed and protect themselves.



Fishes, Amphibians,
and Reptiles

Video Preview

▶ Video Field Trip

Video Assessment



When do alligators and crocodiles hunt?

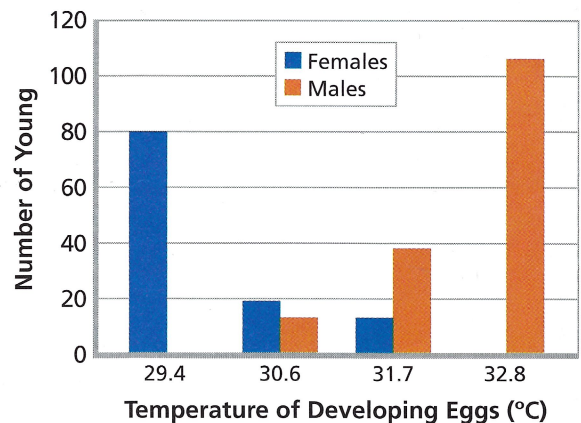
Math Analyzing Data

The Sex Ratio of Newly Hatched Alligators

The temperature of the developing eggs of the American alligator affects the sex ratio of the young. (Sex ratio is the number of females compared with the number of males.) The graph on the right shows the numbers of young of each sex that hatched from eggs in which the young developed at different temperatures.

1. **Reading Graphs** At which temperature(s) did only females hatch?
2. **Drawing Conclusions** What effect does the temperature of developing eggs have on the sex of the baby alligators?

Sex Ratio of Newly Hatched Alligators



3. **Calculating** If 100 eggs developed at 31.7°C, about how many of the young would be male?

Turtles

Turtles live in the ocean, in fresh water, and on land. Turtles that live on land are commonly called “tortoises.” **A turtle is a reptile whose body is covered by a protective shell that includes the ribs and the backbone.** The bony plates of the shell are covered by large scales made from the same material as the skin’s scales. Some turtles have shells that can cover the whole body. Most turtles can draw the head, legs, and tail inside the shell for protection. Turtle shells may be hard or as soft as pancakes.

Turtles feed in a variety of ways, but all have a sharp-edged beak instead of teeth for tearing food. Some turtles are carnivores, such as the largest turtles, the leatherbacks. Leatherbacks feed mainly on jellyfishes. Their tough skin protects them from the effects of the stinging cells. Other turtles, such as the Galápagos tortoise, are herbivores. They feed mainly on cacti, using their beaks to scrape off the prickly spines before swallowing the cactus.



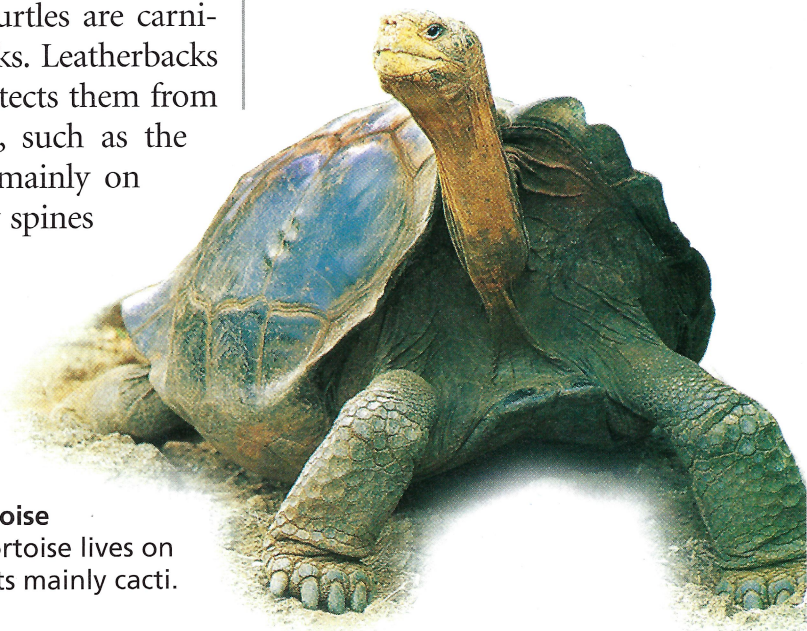
Reading
Checkpoint

What are turtles that live on land called?

FIGURE 24

A Galápagos Tortoise

The Galápagos tortoise lives on land, where it eats mainly cacti.



Extinct Reptiles—The Dinosaurs

Millions of years ago, huge turtles and fish-eating reptiles swam in the oceans. Flying reptiles soared through the skies. Snakes and lizards basked on warm rocks. And there were dinosaurs of every description. Unlike today's reptiles, some dinosaurs may have been endothermic. Some dinosaurs, such as *Brachiosaurus* in Figure 25, were the largest land animals that ever lived.

Dinosaurs were the earliest vertebrates that had legs positioned directly beneath their bodies. This adaptation allowed them to move more easily than animals such as salamanders and lizards, whose legs stick out from the sides of their bodies. Most herbivorous dinosaurs, such as *Brachiosaurus*, walked on four legs. Most carnivores, such as the huge *Tyrannosaurus rex*, ran on two legs.

Dinosaurs became extinct, or disappeared from Earth, about 65 million years ago. No one is certain why. Today, it's only in movies that dinosaurs shake the ground with their footsteps. But the descendants of dinosaurs may still exist. Some biologists think that birds descended from certain small dinosaurs.



Reading Checkpoint

Give an example of a dinosaur that ran on two legs.

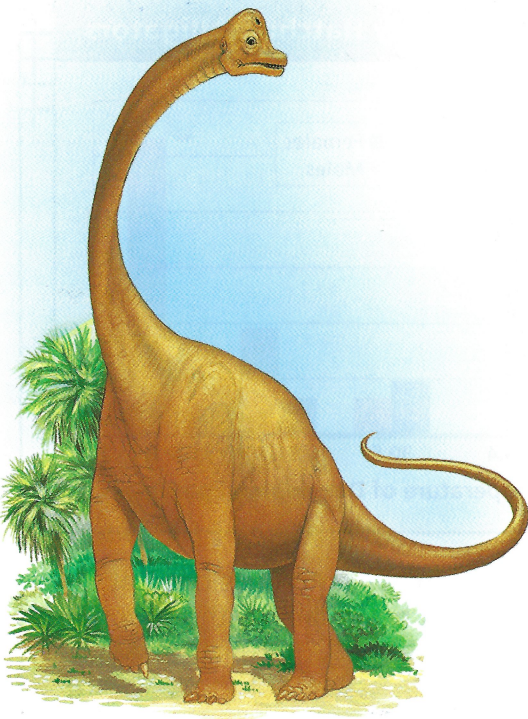


FIGURE 25

Brachiosaurus

Brachiosaurus grew to be more than 22.5 meters long—longer than two school buses put together end to end. **Inferring** What advantage did a long neck give *Brachiosaurus*?

Section 4 Assessment



Target Reading Skill **Identifying Main Ideas**

Use the information in your graphic organizer to help you answer Question 1 below.

Reviewing Key Concepts

- Defining** What is a reptile?
 - Explaining** What are three adaptations that allow reptiles to survive on land?
 - Predicting** What might happen to a reptile egg if part of its shell were removed?
- Identifying** What are the three main groups of reptiles?
 - Classifying** A gecko is a small reptile that has no shell protecting its body. It uses its legs to climb trees. Into which reptile group would you classify the gecko?
 - Comparing and Contrasting** Compare and contrast how alligators and turtles obtain food.

- Reviewing** When did the dinosaurs become extinct?
 - Interpreting Diagrams** What adaptation did the dinosaur in Figure 25 have that helped it survive?
 - Inferring** What advantage might a dinosaur that was an endotherm have had over other reptiles?

Writing in Science

Product Label Write a "packaging label" that will be pasted onto the eggshell of a reptile. Include on your label a list of the contents of the shell and a one-paragraph description of the egg's ability to survive in a dry environment.