THE REPTILES

TEACHER'S GUIDE

Lizards!

Turtles and Tortoises!

Alligators and Crocodiles!

Snakes!

NATURE is produced for PBS by Thirteen/WNET New York.
NATURE is made possible in part by Park Foundation. Major corporate support is provided by Canon U.S.A., Inc., Ford and TIAA-CREF. Additional support is provided by the nation's public television stations.

PARK FOUNDATION

Dear Teachers:

Park Foundation continues its commitment to fostering excellence in education and quality television. Therefore, once again we are pleased to support NATURE, whose programs reveal the dramatic diversity and complexity of life on Earth.

This season's Teacher's Guide accompanies *The Reptiles*, a NATURE miniseries that explores the fascinating qualities of the four reptile groups: alligators and crocodiles; lizards; snakes; and turtles and tortoises. The four-part series, together with the lessons in this Guide, can help your students learn more about these remarkable creatures, many of which first appeared 200 million years ago. We also hope that *The Reptiles* will help students gain a deeper appreciation for the challenges of survival these animals face and a recognition that we share the world with many different creatures.

We appreciate your efforts to inspire your students to investigate natural history and to discover the profound role it plays in their lives.

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Canon

Canon U.S.A., Inc.
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Dear Educator:

For the thirteenth consecutive year Canon U.S.A., Inc. is pleased to sponsor the NATURE series that brings you this wonderful Teacher's Guide.

NATURE's *The Reptiles* series presents a compelling look at the four reptile groups and the important role they play in an ever-changing ecosystem. This Teacher's Guide offers exciting lessons and projects for educators and students to use as they learn how alligators and crocodiles, lizards, snakes, and turtles and tortoises have adapted for survival.

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Canon is honored to help provide you with this valuable tool for teaching America's children the importance and wonder of the natural world.

Sincerely,

Kinya Uchida
President & CEO
Canon U.S.A., Inc.
Please visit our Web site at *www.usa.canon.com*

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Dear Educator:

Once again TIAA-CREF is delighted to be a national sponsor of NATURE, and to help bring its award-winning educational programs and teaching materials to you and your students.

This Teacher's Guide gives students and teachers the opportunity to use the NATURE miniseries, *The Reptiles*, to gain an understanding of reptiles and the mutually beneficial relationship they can share with humans. We hope these educational materials help you and your class to appreciate the complex adaptations that these creatures have made in order to survive over many millenia.

For over eighty years, TIAA-CREF has recognized the crucial role of the teacher in our society. We are dedicated to providing pension, investment, and insurance products that help build financial security for those who choose careers in education and research.

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Ford Motor Company

William Clay Ford, Jr.
Chairman of the Board
Ford Motor Company
One American Road
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Dear Educator:

I am pleased that Ford Motor Company is bringing you this Teacher's Guide for NATURE. Teaching young minds about the environment is a vitally important task. As we celebrate our 100th anniversary in 2003, making the world a better place is an important part of Ford's view of the world, and that includes educating the next generation about society's role in the global ecosystem.

This Guide accompanies the four-part NATURE miniseries, *The Reptiles*. These programs distinguish the four reptile groups from one another and offer insight into the complicated — and often surprising — circumstances in which reptiles can thrive or simply survive. This Teacher's Guide provides stimulating lessons and activities for teachers and students to use as they learn more about reptile development.

The NATURE series, with its focus on wildlife and natural habitats and their preservation, is an inspiring and exciting way for children to encounter the environment in the classroom. We are proud to be associated with it.

On behalf of all of us at Ford Motor Company, I salute your work and hope you find these NATURE materials a useful tool.

Sincerely,

William Clay Ford, Jr.

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INTRODUCTION

This Teacher's Guide focuses on the NATURE miniseries *The Reptiles*.

Filmed at seacoasts, on mountains and in deserts and forests around the world, *The Reptiles* divides its explorations into four categories, each covering a separate group of reptiles: alligators and crocodiles, snakes, lizards, and turtles and tortoises.

Lessons in the guide use the programs as a starting point for teaching more about each of these groups. Teacher's Pages include a list of program highlights, discussion questions, before- and after-viewing activities and relevant science standards. Student Activity Master pages include activities and vocabulary words.

Using NATURE Videos in the Classroom

You may wish to use questions on the Teacher's Page to spark discussion about each episode of ***The Reptiles***. By posing these questions to students **before** they watch the program, you can help focus their viewing experience. You might stop the video periodically, so students can discuss the subject matter while it is fresh in their minds.

If you are going to use ***The Reptiles*** in school, **please pre-screen each program** to find the segments you'd like to use. Please be aware that some segments of the miniseries show reptiles killing other animals or the physical effects of venom, which may be disturbing to younger children.

Videotaping Rights

You have the right to tape the programs and play them for instructional purposes for one year after the programs are broadcast.

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Program Schedule

Most PBS stations are broadcasting *The Reptiles* on the dates below. Broadcast times and dates vary in some areas. Please check your local TV listings to confirm when your PBS station will show the miniseries.

The Reptiles Broadcast Dates

Alligators and Crocodiles	February 2
Snakes	February 9
Turtles and Tortoises	February 16
Lizards	February 23

NATURE Web Site

Look for more information about NATURE on the Web at *www.pbs.org/nature*.

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TEACHER'S PAGE 1

ALLIGATORS and CROCODILES

Broadcast Date: February 2, 2003 **Viewing Time: One hour** (brief video segments may also be used)

At a Glance

Theme: It is no accident that alligators and crocodiles have been among the most successful predators in the animal kingdom for more than 200 million years. Their size, strength and hunting skill make them powerful reptiles. When humans and crocodiles compete for the same territory, watch out!

Program Highlights

- By closely observing crocodile behavior, Rob Briedl has learned that the behavior of these mighty reptiles is surprisingly predictable. He shows how he can swim gently very close to crocodiles and they will ignore him. But as soon as he splashes the water — CHOMP! — they attack in seconds.
- As Florida's human population increases, the alligator's habitat shrinks. This sometimes leads to alligators living near people's homes. When this happens, Todd Hardwick, who runs a business called Pesky Critters, comes to the rescue. He captures smaller alligators and relocates them to non-residential areas. The larger alligators aren't so lucky: They are sold for their meat and skin.
- To help the declining crocodilian population in India, Rom Whittaker breeds crocodiles in captivity and then re-stocks them in the wild. In this segment, he describes the challenge of trying to find a suitable mate for a 15-foot salt water crocodile named Jaws.

Before Viewing the Program

To help students understand how much longer than humans alligators and crocodiles have been on Earth, create this timeline in your classroom using 10 feet of rope (or string). Unravel the rope and ask students to think of it as a timeline. Ask two student volunteers to hold each end of the rope and pull it taut. Have one student hold a sign that says "200 Million Years Ago" and another student hold a sign that says "Today." Explain that, based on fossil evidence, scientists think that the first alligators and crocodiles existed on our planet about 200 million years ago. Ask several students to pinch the rope where they think the first fossil evidence of humans appeared.

Once several students have made predictions, reveal the answer in the following manner. Explain that if the entire rope stands for 200 million years then half of the rope is 100 million years. Put your finger on the middle of the 10-foot rope. Then say that the distance between your finger and "Today" (the other end of the rope) is now 50 million years. Continue halving the distance of the rope from 50 million to 25 million to about 12 million to about 6 million to about 3 million to about 1 million to 500,000 to 250,000 to 125,000. At this point, you'll be almost at the "today" end of the rope. Explain that, based on fossil evidence, this point (100,000 years ago) is around the time when the first humans lived on Earth.

Discussion Questions

In what ways are alligators and crocodiles similar? How are they different?

How do alligators and crocodiles use their watery environment to hunt their prey?

How do crocodilians regulate their body temperature?

If all the crocodiles suddenly died out in a particular area, how might this affect the ecosystem? What problems might this raise for the nearby human population?

ENDANGERED REPTILES

NATIONAL SCIENCE EDUCATION STANDARDS, GRADES 5–8
http://books.nap.edu/html/nses/html/6d.html
LIFE SCIENCE: Content Standard C — Populations and Ecosystems
SCIENCE AND TECHNOLOGY: Content Standard E — Design a Solution or Product
SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES: Content Standard F — Populations, Resources and Environments

Objectives

Activity Time: 1 to 2 class periods

Students will:

- **discuss the conservation efforts that saved the American alligator from extinction**
- **investigate a current endangered reptile species, and develop an action plan for protecting it**

What You'll Need

- a few photographs of the American alligator, either from library books or printed from the Internet
- copies of the Student Activity Master (page 11) for each student
- books on the American alligator, such as: *The American Alligator* by Steve Potts (Mankato, Minn.: Capstone Press, 1998) and Web sites on the American alligator bookmarked, such as: *species.fws.gov/bio_alli.html*

Procedure

1. Show a photograph of the American alligator and explain that over a 100-year period between 1870 and 1970 an estimated 10 million alligators were killed by humans. Ask students to suggest reasons so many of these alligators were killed. Write their suggestions on the board. Some answers might include: killed for their meat; killed for their skin (used to make shoes, belts, handbags, etc.); killed for sport.

2. Explain that, due to the dramatic drop in the American alligator population, the U.S. government (Fish & Wildlife Service) in 1967 passed a law making the American alligator an endangered animal. Have students discuss what it means for an animal species to be endangered (the species has a high risk of becoming extinct). As a result, the U.S. Fish & Wildlife Service and state wildlife agencies in the South prohibited alligator hunting. They also set up programs to keep track of the American alligator population. Ask students: What do you think happened as a result of these actions? After a brief discussion, tell students that just 20 years later, in 1987, the American alligator was no longer in trouble so it was taken off the endangered species list, and is now considered a threatened species. Discuss with students what challenges might have been involved with trying to enforce the law prohibiting the killing of the American alligator.

3. Explain to students that there are still many other endangered reptiles in the world. For this project, every student is going to select an endangered snake, lizard, turtle, crocodile, or alligator. After researching some basic information about the species, each student will write a proposal for ways that people might help save this reptilian species from extinction.

4. Distribute copies of the Student Activity and explain that there are a number of ways students can find the name of an endangered reptile. They can go to the U.S. Fish and Wildlife Service's Web site *endangered.fws.gov*. They can also use an Internet search engine (such as *www.google.com* or *www.yahoo.com*) and type in: "endangered species" and "snakes" (or whatever type of reptile they are interested in).

Extension Activity

Graph It: **Students research the data for a specific reptile population over a period of time. Then they generate graphs from this data and propose hypotheses for any of the fluctuations.**

TEACHER'S PAGE 1

SNAKES

Broadcast Date: February 9, 2003 **Viewing Time: One hour** (brief video segments may also be used)

At a Glance

Theme: Even though most snakes are not lethal to humans, many people are still terrified of these slithering reptiles. This program illustrates how venomous snakes bite humans only in self-defense and would much rather not confront us. Snakes also provide a valuable service by controlling the rodent population.

Program Highlights

- In Australia, a snake called an Inland Taipan hunts its usual prey, a rat. By quickly sinking its venom-filled fangs into the rat, thus paralyzing it, the snake is then able to safely approach the rat and slowly swallow it.
- Segments of the program show how different kinds of snakes move through their habitats, including crawling, "side-winding" through the desert and stiffening their bodies to help them travel from tree branch to tree branch.
- In South Africa, Don Strydom removes venomous snakes from residential areas. In this program, he skillfully captures a black mamba snake from inside a bungalow.
- A herpetologist in Florida named Bill Haast has survived 168 bites from venomous snakes. His secret of survival is that for more than 50 years, he has been immunizing himself with a mixture of diluted snake venom.
- In the rainforest of Venezuela, an anaconda, the largest snake in the world, coils its body around a capybara, the largest rodent in the world.

Before Viewing the Program

Ask students to brainstorm a list of adjectives that describe snakes, and write them on the board. Explain that the class will return to this list at the end of the lesson, to make any additions or changes. Then show students ten color photographs (from books or printed from the Internet) of snakes that pose no threat to humans. For example: king snake, ringneck snake, brown water snake, etc. Number each photograph from 1 to 10.

Hold up the ten photos, one at a time, and have students write the numbers of snakes that they think are "venomous" (see the vocabulary section on the student page for definition), and some brief notes on why they think so. Then reveal — surprise, surprise — that NONE of the snakes are venomous.

Explain that of the approximately 2,500 species of snakes in the world, only about 270 are venomous. Have students discuss why some people are scared of all snakes, even though most species are harmless to humans. Caution students that it isn't wise to get too close to any snakes they see in the wild. Even though most snakes are not poisonous, it's smart to play it on the safe side.

At the end of the entire lesson, you can ask students to look over the adjectives they wrote on the board and make any changes, deletions or additions.

Discussion Questions

How is it possible for a snake to swallow an animal larger than its head?

How are a snake's senses different than a human's?

Why do you think snakes are often villains in legends and folklore (and in films)?

Even though snake scientist (herpetologist) Bill Haast has been bitten more than 150 times by poisonous snakes, he's alive today. How is this possible?

S-S-S-S-S-S-STEREOTYPES & S-S-S-S-S-S-SUPERSTITIONS

NATIONAL SCIENCE EDUCATION STANDARDS, GRADES 5–8
http://books.nap.edu/html/nses/html/6d.html
SCIENCE AS INQUIRY: Content Standard A — Identify Questions That Can Be Answered Through Scientific Investigations; Use Appropriate Tools and Techniques to Gather, Analyze, and Interpret Data.
LIFE SCIENCE: Content Standard C — Diversity and Adaptations of Organisms

TEACHER'S PAGE 2

Objectives

Activity Time: 1 to 2 class periods

Students will:

- **write survey questions to assess students' attitudes about snakes**
- **create persuasive materials to help educate others about snakes**
- **research and contrast two snakes that live in the area**

What You'll Need

- photocopies of the Student Activity Master (page 12) for each student pair
- paper, pencils, pens
- a list of books and Web sites that students can use to research snake species in your state

Procedure

1. Arrange students in pairs or small groups. Explain that this activity has two parts. In the first part, they will be taking a poll to learn about attitudes about snakes. For example, they might ask: "On a scale of 1 to 5, how scared are you of snakes? (with 5 being the most scared)." Remind students what a poll is, ask if they've ever created polls before, and, if so, what did they investigate. In the second part, each pair or group will pick two snakes that live in your state and research them. You may provide students with a list of snakes in your state, or even write down the names of snakes on slips of paper and have each group pick two pieces of paper.
2. Have students write their poll questions and show them to you before they start asking students and teachers about their attitudes about snakes. (As an alternative, once the student groups have decided upon their questions, they could conduct this poll at home, or in their neighborhood.) After each pair or group finishes asking their poll questions to at least 20 people, have them summarize the results. If their results are numerical, they can summarize their findings as a graph or a spreadsheet.
3. Bring the class together to share results and see if any common themes emerge. Do people in your school have stereotypical attitudes about snakes? Are there any superstitions about snakes that aren't supported by the facts?
4. Have students create a book, poster or multimedia presentation (using PowerPoint or HyperStudio) that educates others in your school about snakes. What harmful snakes live in your area, and how can you recognize them? What are some of the helpful snakes and how do they benefit your area?
5. Have students use library resources to fill in the chart on the Student Activity page that contrasts two snakes that can be found in your state.
6. At the end, each pair or group selects one of the snakes they learned about and gives a one-minute oral presentation about it to the rest of the class. Students should focus on the details that make the snake they selected unique.

Extension Activity

Myths, Legends and Folklore: Snakes have played fearsome roles in many myths and legends, as well as in various religions. In ancient Greek mythology, for example, mortal men were turned to stone by simply looking at Medusa, whose beautiful hair was changed into hissing serpents. Students can research some of these snake stories from folklore, then write and illustrate their own versions in a book.

TEACHER'S PAGE 1

TURTLES and TORTOISES

Broadcast Date: February 16, 2003 **Viewing Time: One hour** (brief video segments may also be used)

At a Glance

Theme: Due to centuries of overexploitation by humans, many turtle species have become extinct or endangered. To reverse this trend, some naturalists are taking action to protect endangered turtles from poachers and predators.

Program Highlights

- Why is the desert tortoise population declining? To find out, Dr. Jeff Lovage from the U.S. Geological Survey uses radio-tracking devices that monitor these tortoises on a wind farm in California.
- A tiger shark attacks a loggerhead turtle as it feeds in shallow waters. The turtle uses its strong jaws to fight back and fend off the shark.
- In the wild, giant tortoises face many obstacles that threaten their survival. Scientists at the Charles Darwin Research Station at the Galapagos Islands hope to help giant tortoises breed in captivity.
- When it's nesting season for Olive Ridley sea turtles, as many as 200,000 turtles may emerge from the sea at night to lay their eggs on the beach. To ensure that predators or poachers don't interfere, concerned biologists, such as Randall Arauz, protect the eggs.
- Countless sea turtles were once ensnared in the nets used by shrimp fishermen. Thanks to a clever invention called the Turtle Excluder Device, the shrimp traps now give the sea turtles a means of escape.
- Watch as terrapin turtles plan submarine attacks on unsuspecting birds. Once a turtle has grabbed a bird, other turtles swarm in to join the feast.

Before Viewing the Program

Show students some photographs of sea turtles. Ask the class to think of some ways that humans might endanger the survival of these turtles. Responses may include: polluting their habitat, accidentally catching them in fishing nets, hunting them for food, and taking their eggs when they nest on the beach. Then invite students to brainstorm some ways that humans might positively affect the survival of sea turtles. Responses may include: rescuing injured turtles, establishing laws to reduce the amount of hunting, and teaching others about the ecological importance of these animals. Explain that in the video, they will meet some scientists who are devoting their lives to helping sea turtles. To help orient students to some of the locations mentioned in the video, you could ask them to use a world map to find the Galapagos Islands and Costa Rica.

Discussion Questions

How have attitudes about turtles changed over the last 100 years?

What are some of the different habitats where turtle species live?

Why do you think there are so many folktales and legends that involve turtles?

What adaptation helps the alligator snapping turtle catch its prey?

Thousands of pet turtles are released into the wild each year. In what ways might these released turtles compete with native animals?

If you had the opportunity to interview one of the turtle experts on this program, whom would you select and why?

A KEY FOR UNLOCKING TURTLE MYSTERIES

National Science Education Standards, Grades 5–8
http://books.nap.edu/html/nses/html/6d.html
LIFE SCIENCE: Content Standard C — Diversity and Adaptations of Organisms

TEACHER'S PAGE 2

Objectives

Activity Time: 1 to 2 class periods

Students will:

- use a dichotomous key to help identify turtle species
- create their own dichotomous key

What You'll Need

- photocopies of the Student Activity Master (page 13) for each pair of students
- bookmarked Web pages for different kinds of turtles, representing an assortment from the twelve turtle families

Procedure

1. Ask students to recall the rules of the game "20 Questions." In this game, a player thinks of a famous person or a familiar object, then another player asks 20 "yes/no" questions in order to figure out the person or object. Explain that scientists use a similar technique when they are trying to identify an unfamiliar plant or animal. This technique is called a "dichotomous key."

2. To introduce this concept, create a dichotomous key for six students in your class. Have students brainstorm a list of dichotomous questions that could help a stranger visiting the class identify any of the six students. Start with broad yes/no questions, such as "Is the student a boy?" then work toward more specific ones, such as "Is the student's birthday in March?"

3. Hand out copies of the Student Activity Master. Review the directions and answer any questions about this activity. After all student pairs have completed the task, ask a volunteer to read the names of the six turtles.

4. For the second part of the activity, each pair of students creates a dichotomous key for six other turtle species they've researched on the Internet or in books.

Extension Activities

Talking about Turtles: Have students role play various community viewpoints in a mock town meeting about the local "turtle problem." For example, conservationists want to close the beach during turtle nesting season. Some local business people are opposed because they depend on the beach traffic to bring in business. Others suggest that the town can develop an "eco-tourist" business to attract people to watch the turtles nest and hatch. Local natives say that eating turtles and their eggs is part of their cultural heritage. What are the different viewpoints of fishermen, scientists, eco-activists, and so on?

Turtle Conservationists, Come Out of Your Shells: After viewing this program, some students may want to learn about how they can help with turtle conservation. Here are some possibilities they can pursue:

- Students can write to their representatives in Congress to support legislation that protects endangered turtles. (The following Web site provides some useful letter-writing tips: *http://www.globalresponse.org/yea_index/yea1098.html.*)
- Students can raise funds to send to a non-profit organization that fights for turtle conservation.
- Students can develop an educational campaign that urges other students to keep a turtle as a pet only if they agree to care for it for its lifetime.
- Students who live near the ocean can organize a "beach cleanup" to prevent trash from ending up in the stomachs of marine creatures.
- Students may read and discuss the award-winning novel *The View from Saturday* by E. L. Konigsburg, in which sea turtle conservation is a subplot.

TEACHER'S PAGE 1

LIZARDS

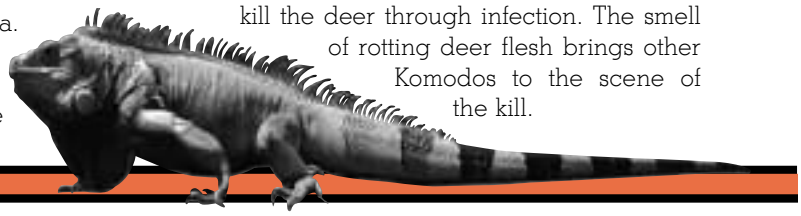
Broadcast Date: February 23, 2003 **Viewing Time: One hour** (brief video segments may also be used)

At a Glance

Theme: Lizards are among the most successful reptiles on our planet, having existed for at least 170 million years. Today, there are about 4,000 kinds of lizards living in a variety of habitats including the ocean, the desert and in people's homes.

Program Highlights

- A Californian named Henry is so enthusiastic about lizards that he actually changed his last name to Lizardlover. To make a living, Henry sells humorous photographs of his pet lizards posed in human-like settings. (NOTE: In one scene in the program, Henry Lizardlover kisses one of his pets. Please point out to your students that this is NOT a good idea because of the risk of contracting salmonella!)
- In Arizona, a venomous lizard known as the Gila monster shares territory with a residential area. Although these reptiles won't bite unless they are provoked, the homeowners are frightened. They hire a private fire company to capture the Gila monster and relocate it to a nearby desert.
- Each year, Lovington, New Mexico hosts "The World's Greatest Lizard Race." Kids in the area eagerly search for a speedy lizard in hopes of winning this contest.
- In Indonesia, a mighty Komodo dragon stalks a deer, then slashes the deer's leg with its teeth. The Komodo's saliva is full of toxic bacteria, which kill the deer through infection. The smell of rotting deer flesh brings other Komodos to the scene of the kill.



Before Viewing the Program

Ask students to list some characteristics that all reptiles have in common. Then, on another section of the board, write the following animal names and present a photograph of each: IGUANA, CHAMELEON, GILA MONSTER, GECKO, SKINK, KOMODO DRAGON. (Photographs of these animals can be found in the books and Web sites listed in the Resources section on the back cover.) Tell students that each of these reptiles have something in common — what is it? Explain that all of these animals are lizards.

Draw a Venn diagram to show that lizards are a subgroup of reptiles. Specifically, circle the list of lizards on the board and label the circle "lizards." Then draw a larger circle labeled "reptiles." Ask students to suggest animals that belong in the reptile circle but **not** in the lizard circle. Some correct answers would be snakes, dinosaurs, turtles, etc. (NOTE: Although the word "dinosaur" means "terrible lizard," dinosaurs are not lizards.)

Tell students that scientists have identified about 4,000 different kinds (species) of lizards. Ask students to look at the pictures again, and use what they know about lizards to brainstorm a list of some of the physical characteristics that lizards have in common. Some answers may include: claws, scaly skin, long tails, (most species) lay eggs, and large eyes. Other answers might include: cold, slimy, ugly. Accept all answers, and if there's time at the end, come back and revise the list based on new understandings developed through watching the video.

Tell students that most lizards — like other reptiles — spend many hours each day basking in the sun. Ask them to give a reason for this behavior. After listening to some suggestions, emphasize that lizards spend time in the sun in order to warm their blood and to give them energy. Like other reptiles, lizards are cold-blooded. (See vocabulary section on the Student Activity Master (page 14) for a definition of "cold-blooded" to share with students.)

Discussion Questions

Chameleons have swiveling eyes that can move in opposite directions. How does this help them to survive?

What about the gecko's toes makes it possible for it to climb up a glass window?

What are some different natural habitats where lizards live?

What adaptations do different lizards have to survive their particular habitat?

Would you ever want a lizard as a pet? Why or why not?

THAT'S A LOT OF LIZARDS!

National Science Education Standards, Grades 5–8
http://books.nap.edu/html/nses/html/6d.html
LIFE SCIENCE: Content Standard C — Diversity and Adaptations of Organisms
HISTORY AND NATURE OF SCIENCE: Content Standard G — Science as a Human Endeavor

TEACHER'S PAGE 2

Objectives

Activity Time: 1 to 2 class periods

Students will:

- research and synthesize information about two lizard species
- compare different lizards' diet, habitat, and behavior

What You'll Need

- five index cards per student
- a shoebox
- paper
- colored markers, crayons, pencils, pens
- several library books on lizards
- Web pages on different kinds of lizards
- copies of the Student Activity Master (page 14) for each student

Procedure

1. As homework the day before, each student should come prepared with the names of five different kinds of lizards — each written on a separate index card. Students can find the lizard names in an encyclopedia, in a book on reptiles, or on the Internet. Remind them that, at this stage, all they need to find are the common names of the lizards. Encourage students to pick unusual lizards that they have never heard of before.
2. Have all the students place their index cards into a shoebox and mix them up. Each student then removes a card from the box and reads the lizard name aloud. If a student happens to pick a lizard name that's already been mentioned, ask the student to select another card. The goal is for each student to have a different lizard card.
3. Divide the class into pairs. Explain that the goal of this project is for the students to work together in comparing the two lizards. In what ways are they the same? How are they different? Finally, they will be asked to imagine if the lizards switched environments, would each survive? Why or why not?
4. Hand out a copy of the Student Activity Master (page 14). Explain that each student will be answering some questions about his or her two different lizards. They also will be drawing color pictures of each kind of lizard, based on photographs they research.
5. Once each student has drawn his or her lizard and completed the information on the activity sheet, you may wish to compile these sheets into a book for your classroom library, design a bulletin board based them, or scan them into a Lizard Web site.

Extension Activities

Lizard Silhouettes: Students work in pairs or small groups to create a life-size silhouette profile of a type of lizard. Depending upon the size of the lizard selected, the silhouette can be created with construction paper or butcher-block paper. Next to each silhouette, students post an index card with some basic facts about the lizard including its common name, its scientific name, its prey, its predators, its diet, and any unusual adaptations.

Should Lizards Be Pets?: More than 10 million iguanas were exported as pets in the last eight years. While pet lizards bring pleasure to the lives of many human owners, there is a negative side to this situation. Students can research the current trends in lizards as pets, and create a book or poster that might make a child think twice before adopting a lizard. In particular, students could find out how the pet lizard industry is affecting the lizard population in the wild.

ALLIGATORS and CROCODILES

NATURE

FUN FACT: After a big meal, a large crocodilian can survive almost a year without eating again. (Remember that reptiles get lots of energy from basking in the sun.)

ENDANGERED REPTILES

What do the blue racer snake, the Monito gecko and the blunt-nosed leopard lizard have in common (besides cool animal names)? They are all endangered reptiles.

The American alligator was once endangered, too. Scientists estimate that between 1870 and 1970 about 10 million American alligators were killed for their meat, skin and for sport. In an effort to save this species from extinction, the U.S. government passed a law making it illegal to kill these reptiles. In just 20 years, the American alligator rebounded. Today, there are millions of these creatures in the southern states, such as Florida.

If the American alligator can return from the brink of extinction, then perhaps other endangered reptiles can be helped as well.

Directions
Your mission is to select a snake, lizard, turtle, crocodile, or alligator that is endangered today, research it, then propose some ways that it might be saved.

THE REPTILE YOU SELECTED:

SCIENTIFIC NAME:

HOW DO YOU KNOW THAT IT IS ENDANGERED?
(List the specific sources in which you read this information.)

HABITAT:

DIET:

PREDATORS (including humans):

SOME REASONS THAT IT IS ENDANGERED:

WHAT STEPS MIGHT BE TAKEN TO HELP INCREASE THE POPULATION OF THIS ENDANGERED REPTILE?

WHAT WOULD BE SOME CONSEQUENCES IF THIS ENDANGERED REPTILE BECAME EXTINCT?

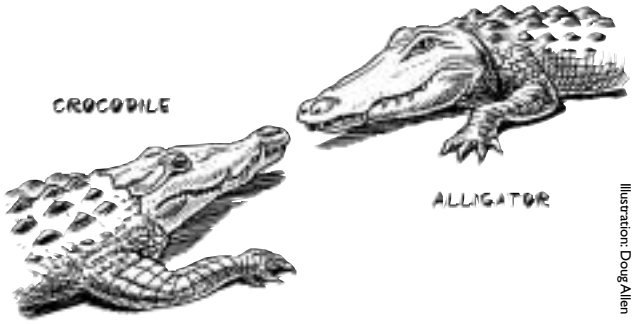


Illustration: Doug Allen

WHAT'S THE DIFFERENCE BETWEEN AN ALLIGATOR AND CROCODILE?

- Alligators have a rounded snout, while crocodiles have a triangular snout.
- In alligators, the fourth lower tooth fits into a socket in the upper jaw. In crocs, this tooth can be seen when the mouth is closed.
- Alligators can tolerate colder weather than crocodiles.

vocabulary

caiman crèche: a gathering of young crocodilians in a river which appears, to other animals, to be one larger predator

crocodilian: describes the group of reptiles that includes alligators and crocodiles

binocular vision: involving both eyes at the same time; having two eyes arranged to produce vision that can estimate the distance of an object

food chain: a transfer of energy from one organism to another in an ecosystem; a system of predator and prey in which each animal eats the next animal "lower" on the food chain

healthy genetic stock: a population of animals with diverse DNA

predator: an animal that kills other animals for food

state of torpor: a state of inactivity that helps an animal conserve energy when it lowers its metabolic rate

These materials were made possible by Park Foundation, Canon U.S.A., Inc., Ford, and TIAA-CREF.

S-S-S-S-S-S-STEREOTYPES & S-S-S-S-S-S-SUPERSTITIONS

In this two-part activity, you'll first take a poll at your school to investigate attitudes about snakes. Try to find out why many people are afraid of snakes. Is the fear based on experience, or on snakes' reputation in movies and folklore? Based on your findings, you will create a presentation to educate others about the benefits that snakes bring to your area. For your project, you will research two snakes that live in your state.

STEP 1: TAKE A SNAKE SURVEY

Directions

With a partner, write three survey questions that will help you investigate other students' attitudes about snakes. For each question, you may want to offer several choices so that you can easily compare the answers. Here are some sample questions:

- What kinds of snakes are you most scared of?
- There are about 2,500 different snake species in the world. How many of these do you think are poisonous? A) more than a 1,000 B) about 500 C) about 250
- When was the last time you saw a snake in our area (not at the zoo)? A) in the last month B) in the last year C) never
- Once you are pleased with your three questions, ask them of at least 20 people, separately, in your school, including students and teachers. Ask each person, so that people aren't persuaded by others' answers.
- Total and summarize your findings. Organize your results as a bar graph, table, pie chart, or spreadsheet. What about your results surprised you?
- Create a poster, booklet, or multimedia presentation about some helpful snake species in your area. Your goal is to persuade other students and teachers that all snakes shouldn't be feared, and that they provide many benefits.

STEP 2: RESEARCH TWO SNAKES IN YOUR AREA

Directions

Use the library or the Internet to research two very different snakes that live in your state. Use the information you find to fill in the chart below.

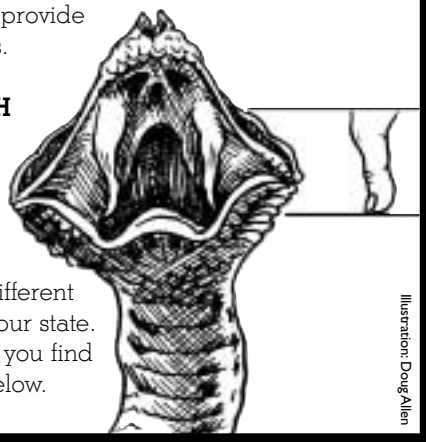


Illustration: Doug Allen

COMPARING TWO SNAKES THAT LIVE IN OUR STATE

	SNAKE A	SNAKE B
Common Name/Scientific Name		
Identifying Features		
Habitat		
Diet		
How does it capture its prey?		
Venomous or non-venomous?		
How does this snake help humans?		
Interesting fact about this kind of snake		

vocabulary

anti-venom: a special fluid prepared by scientists that contains chemicals to neutralize the venom from a snakebite
camouflage: the disguise of protective coloring that helps an animal blend into its surroundings
dilute: to make weaker or less concentrated by adding a neutral liquid such as water
frequency: the rate of vibration of a sound; pitch. "Squeaks" are high frequency sounds and "rumbles" are low frequency sounds.
venomous: having the ability to produce a poison used for hunting and self-defense

FUN FACT: The Gaboon viper has the longest fangs of any snake in the world. Each fang is almost as long as an adult human thumb.

These materials were made possible by Park Foundation, Canon U.S.A., Inc., Ford, and TIAA-CREF.

STUDENT ACTIVITY MASTER

TURTLES and TORTOISES

NATURE

FUN FACT: Turtles and tortoises are the oldest living group of reptiles — they first appeared on Earth in the Triassic period, about 200 million years ago.

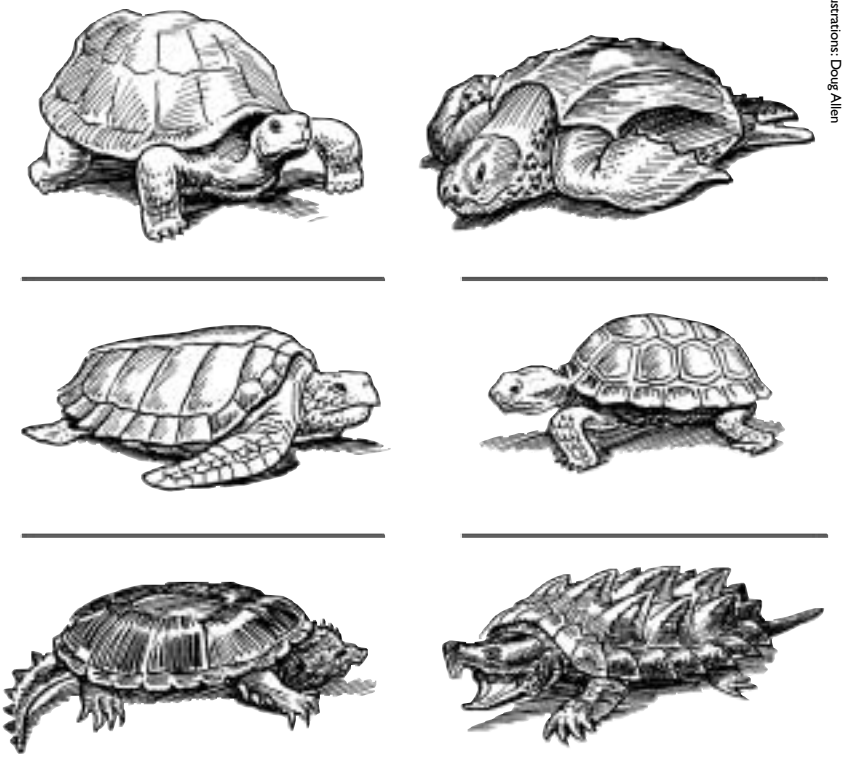
A KEY FOR UNLOCKING TURTLE MYSTERIES

With more than 250 kinds of turtles and tortoises in the world, identifying a particular turtle species can be a challenge. Generally, the difference between turtles and tortoises is that turtles have webbed feet and smooth shells that help them while swimming, while tortoises are land animals with bigger feet and shells that help them walk. However, these generalizations aren't always true. That's why turtle biologists sometimes use a tool called a dichotomous key. To arrive at a turtle's identity, scientists ask a series of questions. Each question offers two choices based on its physical appearance or behavior. It's kind of like playing the game "Twenty Questions."

STEP 1: USE A DICHOTOMOUS KEY

Directions

First, use the dichotomous key below to identify six kinds of turtles. Then, make up your own dichotomous key for different group of turtle species.



Illustrations: Doug Allen

DICHOTOMOUS KEY

1.	**a.** limbs are flipper-shaped	go to 2
	b. limbs are not flipper-shaped	go to 3
2.	**a.** backs covered with leathery skin	leatherback turtle
	b. backs covered with scutes (spiked plates)	loggerhead turtle
3.	**a.** webbing between toes	go to 4
	b. no webbing between toes	go to 5
4.	**a.** fishing lure on base of mouth	alligator snapping turtle
	b. no fishing lure on base of mouth	common snapping turtle
5.	**a.** long neck	Galapagos giant tortoise
	b. neck not especially long	desert tortoise

STEP 2: MAKE YOUR OWN DICHOTOMOUS KEY

Directions

Now it's your turn. Use library resources to find the names and pictures of six other kinds of turtles. Jot down a list of characteristics that some of the turtles have in common (such as living in the ocean or having a long tail). Also, make notes about the ways that the turtles you selected are different. Once you've created your dichotomous key, create pictures of the six turtles. Then try your dichotomous key on a friend to see if it works. Remind students that the object of the key is to make the identification process easy, not to stump their friends.

vocabulary

captivity: a wild animal's state of living when it has been captured and kept by humans
carapace: the upper shell on a turtle's back
extinction: when a plant or animal species dies out everywhere on Earth
nesting: when animals lay their eggs; such as when sea turtles lay their eggs on the beach
overexploitation: overuse of a natural resource
serrated: with jagged edges
terrapins: turtles that live in fresh water

These materials were made possible by Park Foundation, Canon U.S.A., Inc., Ford, and TIAA-CREF.

THAT'S A LOT OF LIZARDS!

What do iguanas, chameleons, and geckos have in common? They are all kinds of lizards. Did you know there are about 4,000 different kinds of lizards in the world? In this activity, you will work with a partner to research and compare two of them.

- Komodo Dragon
- Marine Iguana
- Gila Monster
- Spiny Tail Iguana
- Basilisk
- Three-Horned Chameleon
- Frilled Lizard
- Chinese Water Dragon
- Cape Dwarf Chameleon
- Western Blue-Tailed Skink
- Alligator Lizard
- African Armadillo
- Girdled Lizard

What lizards have you and your partner selected? (common names)

Directions
Use books, the Internet and other resources to help you fill in the rest of the information about the lizard you chose. Create a chart to answer the following questions.

BIOME:

SIZE AS AN ADULT:

WHAT'S A COMMON OBJECT THAT'S ABOUT THE SAME SIZE AS THIS LIZARD (anything from a paper clip to a see-saw)?

WEIGHT AS AN ADULT:

DIET:

HOW DOES IT HUNT ITS FOOD?

WHEN IS IT ACTIVE (daytime, nighttime, dawn/dusk)?

PREDATORS:

WHAT ADAPTATIONS PROTECT IT FROM PREDATORS?

WOULD THIS LIZARD BE ABLE TO SURVIVE IF IT WERE RELEASED IN YOUR NEIGHBORHOOD?

WHY OR WHY NOT?

KOMODO DRAGON · FRILLED LIZARD · BASILISK · GREEN ANOLE · GILA MONSTER · AFRICAN ARMADILLO GIRDLED LIZARD · CAPE DWARF CHAMELEON · SPINY TAIL IGUANA · WESTERN BLUE-TAILED SKINK

Use several photographs to help you make a sketch of your lizard. Create an original drawing (don't trace!). Don't worry about getting it perfect. Just try to capture some of the key features of the lizard you selected.

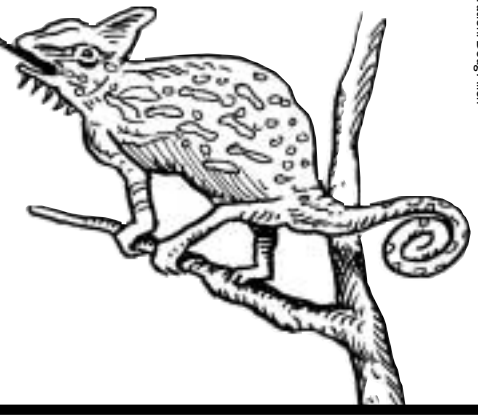


Illustration: Doug Allen

FUN FACT: A chameleon's tongue is one-and-a-half times the length of its body.

vocabulary

antidote: a remedy to counteract the effect of poison
camouflage: an animal's appearance that allows it to blend into its environment
clutch: a nest of eggs
cold-blooded: having a body temperature that's not regulated internally, but by the environment
poacher: one who kills or steals wildlife illegally
terrarium: a glass tank in which plants and small animals are raised

These materials were made possible by Park Foundation, Canon U.S.A., Inc., Ford, and TIAA-CREF.

RESOURCES

ALLIGATORS AND CROCODILES

Books

Behler, John and Deborah. *Alligators & Crocodiles*. Stillwater, Minn: Voyageur Press, 1998.

Petty, Kate. *Crocodiles Yawn to Keep Cool: And Other Amazing Facts about Crocodiles and Alligators*. Brookfield, Conn.: Millbrook Press, 1998.

Sloan, Christopher. *Supercroc and the Origin of Crocodiles*. Washington, D.C.: National Geographic Society, 2002.

Web sites

Crocodilians: Natural History and Conservation
www.flmnh.ufl.edu/natsci/herpetology/brittoncrocs/cnhc.html

NOVA: Crocodiles *www.pbs.org/wgbh/nova/crocs/*

National Geographic World of the Crocodilians
www.nationalgeographic.com/crocmap/

SNAKES

Books

Cooper, Paulette. *277 Secrets Your Snake Wants You to Know:* Berkeley, Calif.: Ten Speed Press, 1999.

Mattison, Chris. *Snake: The Essential Visual Guide to the World of Snakes.* New York: DK Publishing, 1999.

McNamee, Gregory, ed. *The Serpent's Tale: Snakes in Folklore and Literature*. Athens, Ga.: University of Georgia Press, 2000.

Web sites

Venomous Reptiles on the Net *www.venomousreptiles.org/*

NATURE: Victims of Venom — The Serpent's Tooth
www.pbs.org/wnet/nature/victims/serpent.html

American Museum of Natural History: Snakes and Lizards
www.amnh.org/exhibitions/hall_tour/spectrum/21.html

TURTLES AND TORTOISES

Books

Coburn, John. *Turtles Today: A Complete and Up-to-Date Guide*. Broomall, Pa.: Chelsea House, 1997.

Lasky, Kathryn. *Interrupted Journey: Saving Endangered Sea Turtles*. Cambridge, Mass.: Candlewick Press, 2001.

Lepthien, Emilie U. *Sea Turtles*. Chicago: Children's Press, 1997.

Miller, Sara Swan. *Turtles: Life in a Shell*. Danbury, Conn.: Franklin Watts, 1999.

Web sites

The Turtle Puddle — Kids' Questions About Turtles
www.turtlepuddle.org/kidspage/questions.html

The Turtle Hospital (Marathon, Florida) *www.turtlehospital.org*

Herp Hut: Turtles in Folklore *members.aol.com/gonyosoma/folklore.html*

The Charles Darwin Research Station (Galapagos Islands)
www.darwinfoundation.org/research.html

LIZARDS

Books

Flank, Lenny, ed. *The Essential Iguana*. New York: John Wiley & Sons, 1999.

Manning, David. *Keeping Lizards: A Practical Guide to Caring for Unusual Pets*. Hauppauge, N.Y.: Barron's Educational Series, 2000.

Trueit, Trudi Strain. *Lizards (True Books: Animals)*. Chicago: Children's Press, March 2003.

Web sites

Natural Science Center of Greensboro: Lizards, General Characteristics
www.greensboro.com/sciencecenter/ Reptiles%20Real%20Web/reptileweb/RRR2002/lizards.htm

NATURE Schedule, February – March, 2003

February 2	***The Reptiles*: Alligators and Crocodiles**
February 9	***The Reptiles*: Snakes**
February 16	***The Reptiles*: Turtles and Tortoises**
February 23	***The Reptiles*: Lizards**
March 2	**John Denver: Let This Be a Voice**
March 9	**Jane Goodall's Wild Chimpanzees**
March 16	**Wisdom of the Wild**
March 23	**The Secret World of Sharks and Rays**
March 30	**Walking with Giants: The Grizzlies of Siberia**

VIDEO ORDERING INFORMATION
The entire miniseries *The Reptiles* is available on home videocassette. To order, call 1.800.336.1917.

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