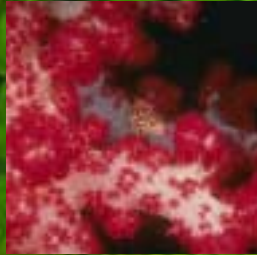


ocean
rain forest
sea ice
desert
mountains
swamps
coral reefs
plains
steppes

There's no place like **home**



The Body Changers



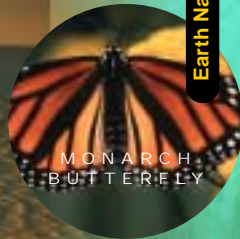
PLANKTON

The Secret World of Sharks and Rays



BLUE SHARK

Earth Navigators



MONARCH BUTTERFLY

Springs Eternal



MANATEE

Great White Bear



POLAR BEAR

Obsession with Orchids



ORCHID

NATURE

Teacher's Guide



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 Motor Company, and TIAA-CREF. Additional support is provided by the nation's public television stations.



Dear Friends of NATURE:

Park Foundation is dedicated to education, so we support television programs that are informative and enriching. We are also deeply concerned about our environment. It is for these reasons that we are delighted to sponsor NATURE, the public television series that reveals the beauty and complexity of life on our planet. NATURE gives teachers and their students the opportunity to learn more about the many forms of life existing in our world.

This season's education package offers lessons, activities and research projects to accompany six NATURE programs—"Obsession with Orchids," "Earth Navigators," "Great White Bear," "The Body Changers," "Springs Eternal: Florida's Fountain of Youth," and "The Secret World of Sharks and Rays." These programs show how life forms from butterflies to sharks have adapted to a wide variety of ecosystems. In supporting NATURE, our goal is to heighten your students' appreciation and understanding of the world's wildlife. We hope that the programs, together with the lessons in this Guide, will help them see things from a naturalist's point of view.

Please know we continue to be grateful for your work and are pleased to help support it.

Trustees
Park Foundation

Park Foundation Inc., P.O. Box 550, Ithaca, New York 14851



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.

We hope the accompanying Teacher's Guide will prove stimulating as you and your students participate in NATURE's exciting programs on how living things adapt and thrive in changing environments.

These programs feature a variety of ecosystems and climates, from "Great White Bear," which shows a year in the life of polar bears in the Arctic, to "The Secret World of Sharks and Rays," which gives students a chance to learn more about diversity and adaptation among these ocean dwellers.

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.

TIAA-CREF salutes you and your colleagues for your commitment to educating our youth.

Visit our Web site at www.tiaa-cref.org to learn more about how TIAA-CREF is ensuring the future for those who shape it, or call 1-800-223-1200 for further information.



Canon U.S.A., Inc.
One Canon Plaza
Lake Success, NY 11042-1113

Dear Educator:

For the tenth consecutive year Canon U.S.A., Inc. is pleased to be a sponsor of the NATURE series and bring you this Teacher's Guide.

NATURE brings the wonders of the natural world into our homes in a way that is both compelling and eye-opening. The six NATURE programs in this Guide will give you and your students new insights into the ways that animals and plants cope with their surroundings. They show that some creatures survive for millennia in one place, while others migrate, travelling long distances to reach hospitable environments.

Canon is a company well known for investment in new technology. However, some of our most important research and development projects have nothing to do with our products. We invest in "future generations" through the support of a wide variety of programs reaching today's children and protecting tomorrow's environment. It is our belief that a successful business should do more than make a profit; it should make a difference as well.

Through our Clean Earth Campaign, we work to preserve our natural lands with programs such as "Expedition Into The Parks" through the National Park Foundation. Additionally, our "Cartridge Recycling Program" keeps millions of toner cartridges out of landfills, while our line of office equipment is designed to use less energy by exceeding the Environmental Protection Agency's ENERGY STAR guidelines. Canon also sponsors the "Canon Envirothon," a nationwide high school curriculum and competition that helps students develop an early sense of environmental responsibility.

We hope this Teacher's Guide provides you with tools to assist your teaching of the world around us. We salute your efforts and deeply respect your commitment to America's "future generations." We are honored to play a part in providing you with materials you may wish to use in preparing your students to better understand NATURE.

Sincerely,

Kinya Uchida
President & CEO
Canon U.S.A., Inc.

Visit our Web site at www.usa.canon.com



William Clay Ford, Jr.
Chairman of the Board

Ford Motor Company
The American Road
P.O. Box 1899
Dearborn, Michigan 48121-1899 USA

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. 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.

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.

For information on vehicles Ford Motor Company has developed to make driving easier on the world around us, call 1-877-ALT-FUEL (1-877-258-3835, Monday-Friday, 8:00 a.m. to 5:00 p.m. EST), or visit our Web site at www.ford.com.



INTRODUCTION

Living things have adapted to the environment in remarkable ways. Orchids use unusual methods of pollinating which help them survive in a variety of climates—from rain forests to deserts. Some animals, like frogs and butterflies, metamorphose as they mature; others migrate for thousands of miles when the seasons change. This Teacher’s Guide has been developed for use with six programs from the public television series NATURE—“Obsession with Orchids,” “Earth Navigators,” “Great White Bear,” “The Body Changers,” “Springs Eternal: Florida’s Fountain of Youth,” and “The Secret World of Sharks and Rays.” These programs show the many ways animals and plants have adapted to ecosystems around the world, from the snow-and-ice-covered Arctic to the coral reefs of the Caribbean.

The Educational Materials

This guide has been designed to help you and your students use the public television series as a starting point for active participation in the study of nature. Students are encouraged to view the programs as a naturalist would, observing animals in a variety of habitats, noting their behavior, and drawing conclusions.

Each lesson in the Teacher’s Guide includes:

Program Overview, which gives background information and a brief synopsis of the program to be viewed;

Objectives, which provide measurable goals;

Before Viewing Activity, familiarizing students with the subject and allowing them to set purposes for viewing;

Vocabulary, which provides definitions of unfamiliar words used in each program;

Discussion Questions that help students assess the main points of the program;

Suggested Resources for students who may want to learn more about the topic; and

Student Worksheet (Naturalist’s Guide), to be duplicated and distributed in class. This worksheet contains activities that will help students gain a better understanding of animal behavior, natural phenomena, and other subjects discussed in NATURE programs. The worksheets encourage family viewing and contain a number of creative activities.

While these materials encourage home viewing, you may choose to focus on segments of a program in class. If you use this approach, we recommend that you tape and preview the program to find segments that relate to the discussion questions and student worksheet.

Creating a Naturalist’s Diary (You may wish to share the following with your students):

Naturalists keep diaries to record their observations. Students may be interested in making diaries of their own. Students may set aside part of their science notebook, or they may choose to make a separate booklet for this purpose. Diaries may include news clippings, drawings, photos, maps, charts, graphs, and other information, as well as records of observations. Students may share their diaries with others or use their entries to develop a bulletin board display that reflects what they have learned.

Program Scheduling

Programs are scheduled to be broadcast on the dates indicated below. Broadcast dates, however, may vary slightly from area to area. Please check local listings for any scheduling changes.

Program Broadcast Dates

Obsession with Orchids	April 16
Earth Navigators	April 23
Great White Bear	April 30
The Body Changers	May 7
Springs Eternal	May 14
The Secret World of Sharks and Rays	May 21

NATURE Web Sites and wNetSchool

Look for more information about NATURE on the Web at www.pbs.org or at www.thirteen.org. These lessons can also be found on wNetSchool (www.thirteen.org/wnetschool).

Videotaping Rights

You may assign programs to your students for viewing when they are first broadcast, or you have the right to tape the programs and play them for instructional purposes for one year after the original broadcast.

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With over 20,000 species, orchids are one of the largest groups of plants on Earth. They grow in virtually every habitat, from mountain peaks to rain forests, from deserts to meadows. When it comes to unusual pollination methods, orchids possess remarkable flower power.

For orchids to reproduce, pollen from the male part of one flower must reach the female part of another flower. Unlike most plants, where the pollen is dust-like and freely released, in orchids, pollen is located in pollen sacs. Delivering these sacs to another flower requires the help of insects and other animals. For example, moths are attracted by the pyramidal orchid's bright colors. When the moth drinks the orchid's sugary nectar, the flower's pollen sacs attach themselves to the insect's tongue. Amazingly, the only thing that can remove the pollen sacs from its tongue is another pyramidal orchid.

In the forests of Central America, some orchids use fragrant oils to attract insects. Male euglossine bees, for example, need an orchid's unctuous perfume to attract female bees. When the male bees land on these flowers, they slip on the slimy oil and must crawl out through the flower's mouth. As the bee escapes, the orchid's pollen sacs become attached to its body. They will not be removed until this bee falls into another orchid of the same kind, and then climbs out.

This program also explores the human fascination with orchids, and to what lengths people will go to possess them. In addition, it shows how we have learned the art of hybridization—crossing the color and/or shape of one flower with that of another.

THEME: Orchids flourish in tremendous variety throughout most of the natural world because they have clever adaptations for pollination.

Obsession with Orchids

BROADCAST DATE APRIL 16, 2000

BEFORE VIEWING THE PROGRAM

Ask students if they or their relatives are allergic to pollen, and, as a result, spend much of the springtime sneezing. Help students understand what pollen is (see Vocabulary) and the role it plays in flower reproduction. If possible, let students observe pollen on an actual flower. You may wish to point out the similarities between the words "pollen" and "pollination."

Explain that, unlike most animals, each orchid has both male and female reproductive organs. In order for flowers to reproduce, the pollen from one flower needs to reach another of the same type of flower. Since flowers can't walk (except, of course, in science-fiction movies), they need to trick insects or small birds to deliver the pollen for them.

Encourage students to brainstorm a list of some of the different ways that a flower might attract an insect. Write all suggestions on the board. Tell students that one type of flower — orchids—is unusually well-adapted for attracting insects and birds. Explain that scientists estimate there are over 20,000 kinds of orchids in the world. Show some strikingly different photographs of orchids. Orchids' thriving numbers stem from their diverse and successful methods of pollination.

Distribute the Student Worksheet (Naturalist's Guide)

Photocopy and hand out the student worksheet (Naturalist's Guide) on the opposite page, and preview it with students. As they watch the program, ask them to look for examples of how orchids attract insects and other creatures to help in pollination.

AFTER VIEWING THE PROGRAM

Encourage students to discuss the program and share their observations. The following questions may be used for discussion.

1) What are some ways that orchids attract animals to help them pollinate?

(Orchids use different "advertisements" to attract their partners in pollination. Some orchids have bright colors, others resemble insect species, while still others emit odors that insects find irresistible. Some orchids have elaborate traps containing pools of slimy liquid. As an insect escapes this liquid, the flower's pollen sacs become attached.)

2) What is special about orchid pollen?

(Most flowers' pollen is loose, sticky dust released into the air. In the case of orchids, the pollen is usually in two small sacs, each of which contains millions of pollen grains.)

3) How do orchids reproduce?

(An insect or another small animal accidentally picks up the pollen from the male part of one orchid, and then accidentally delivers it to the female part of another orchid. The insects, unaware of what they're doing, are attracted to the flower in hopes of consuming its nectar or getting another reward.)

4) Why have orchids evolved in such diversity?

(There are over 20,000 species of orchids because these flowers are able to adapt to a wide variety of environments, from rain forests to high mountains, from meadows to deserts.)

OBJECTIVES

Students will:

- understand the basics of pollination, the process by which flowers reproduce
- observe how some orchids have adapted to attract various animals in order to be pollinated
- discuss how humans have learned to hybridize orchids

VOCABULARY

fungi: (pl. of fungus): plants that have no leaves, flowers, or roots; mushrooms, for example

hybridization: when someone artificially "mates" one type of flower with another, creating a new type of flower that combines the parent flowers' colors and shapes

pollen: tiny grains in a flower that contain the plant's male reproductive cells

pollination: the process by which flowers are fertilized; to transfer the pollen from the stamen (male flower part) to the pistil (female flower part), so seeds can be produced

propagate: to reproduce a species of plant or animal

SUGGESTED RESOURCES

Books

Pridgeon, Alec. *The Illustrated Encyclopedia of Orchids*. Portland, Oreg.: Timber Press, 1992.

Schoser, Gustav. *Orchid Growing Basics*. New York: Sterling Publishing, 1993.

Web Sites

The American Orchid Society
<http://www.orchidweb.org/welcome/about.html>

The Orchid Weblopedia
<http://conbio.bio.uci.edu/orchid>

The Orchid Photo Page
<http://www.orchidworks.com>

Linda's Orchid Page – A Guide to Anatomy
<http://www.orchidlady.com/anatomy.html>

Orchid Mania's Virtual Greenhouse (raises money for AIDS organizations)
<http://www.orchids.org>

Orchid Forum – message board for orchid-related topics
<http://www.gardenweb.com/forums/orchids>

STUDENT WORKSHEET *Obsession with Orchids*

a Thirteen NATURE program

Complete the first activity and one other activity of your choice.



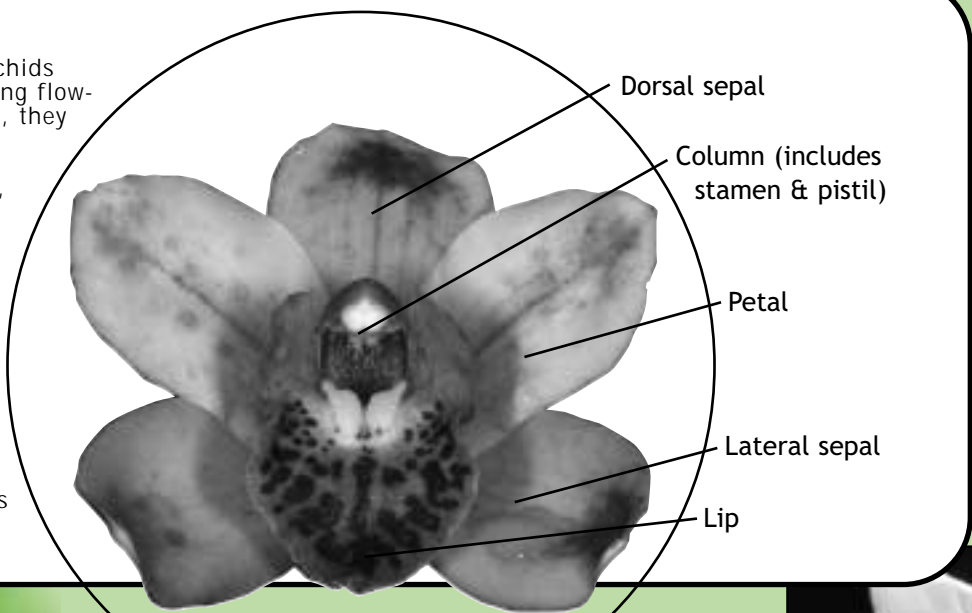
1

ANATOMY OF AN ORCHID

This program features dozens of attractive orchids from around the world. Although these stunning flowers come in many different colors and shapes, they all share some common features.

All orchids have three **petals**. The lower petal, called a **lip** or **labellum**, serves as a platform for insects who unintentionally deliver pollen from one flower to another. Orchids also have three petal-like **sepals**, which are actually the remains of the flower bud. In the center of an orchid is a finger-like part called the **column**. The column carries the flower's male and female reproductive organs, the pollen-producing **stamen** (male) and the egg-producing **pistil** (female).

Find three photographs of different orchids. See if you can label the parts of these flowers using the information from this orchid.



TO THE FAMILY

You are invited to watch NATURE. After you watch this program, visit a botanical garden or floral shop in your community to observe and compare a variety of flowers. See if you can find the pollen on these flowers.

2

VISIT A BOTANICAL GARDEN

It's one thing to study orchids on video or in a book. It's quite another to see real ones close-up. Use library resources or a phone book to find a botanical garden or florist in your area. Help organize a class field trip. As an alternative, contact the botany department of a local university about inviting a guest speaker to come to your class to discuss how their scientists study orchids and other flowers.



3

WHAT IF THEY MATED?

A horticulturist is someone who studies the art and science of growing plants and flowers. Some horticulturists have learned to create new kinds of orchids using a process called hybridization. On the "What if they Mated" Web site, www.orchidworks.com/orchids/what_if/intro.htm, you can virtually experiment combining different kinds of orchids with each other.



Each year, as Earth orbits the Sun, the seasons change.

These changes affect climate and food supply and cause various animals to migrate from one part of the globe to another. Some animals, such as wildebeests and salmon, travel for most of their lives.

This program follows the yearly migrations of four animals: a bird, a mammal, an insect, and a fish.

The program begins on the first day of spring in the northern hemisphere. In the mountains of Mexico, millions of monarch butterflies prepare to fly north, across the United States to Canada. This journey takes these butterflies several generations to complete. Each generation instinctively knows where to fly next. In Alaska, sockeye salmon hatch. The rivers swell and these salmon are swept downstream toward the Bering Straits between Alaska and Siberia. Also during spring, in the marshlands of Norfolk, England, numerous whooper swans get ready to fly northward toward the Arctic.

During the summer in Africa, as the wet season ends in the Serengeti, herds of wildebeest travel in order to find fresh grazing. Their migration takes them in a giant, clockwise circle, during which they will face many predators, such as lions and crocodiles.

How do these animals travel to migratory destinations thousands of miles away and not get lost? Scientists hypothesize that the animals, through evolution, know how to read nature's signals, such as the changing positions of the Sun during the day and the stars at night. Scientists also think that some animals can tell direction by sensing Earth's magnetic field.

THEME: In response to Earth's changing seasons, different animals have adapted with migratory behaviors that help them survive.

BEFORE VIEWING THE PROGRAM

Ask students: "What causes the change in seasons?" After some discussion, explain that the change in seasons has to do with Earth's annual trip around the Sun.

Use a large beach ball and a globe to represent the Sun and the Earth. Ask a student to hold the beach ball (Sun). Have another student hold the globe perpendicular to the plane of Earth's orbit around the Sun (with the North Pole pointing directly up to the ceiling). Ask the student holding the globe to walk slowly in a small circle around the Sun, spinning the globe and keeping the Earth's axis straight. Explain that if Earth's orbit were like this, there would be no seasons—everyplace on Earth would always have 12 hours of sunlight and 12 hours of darkness.

Explain that Earth's axis is always tilted at an angle of approximately 23°, so depending on the time of year, the different hemispheres get different amounts of daylight. During winter in the northern hemisphere, the Sun sets earlier and it gets colder than in other seasons, even though the Earth is actually closer to the Sun than it is in summer. What makes it so cold, then? During winter, rays from the Sun reach the northern hemisphere at an angle, making the temperature colder than in summer, when the rays are direct.

Before watching the program, make sure students understand the meaning of the word "migration" and can think of at least one example of a migratory animal. Tell students that many animals move from one place to another in response to seasonal changes, such as the amount of sunlight in a day. Point out that migration is an important behavioral adaptation.

Distribute the Student Worksheet (Naturalist's Guide)

Photocopy and hand out the student worksheet (Naturalist's Guide) on the opposite page, and preview it with students. As they watch the program, encourage them to compare the migration behaviors of different animals presented in the program.

AFTER VIEWING THE PROGRAM

Encourage students to discuss the program and share their observations. The following questions may be used for discussion.

1) Why is it so important that young whooper swans imprint on their parents?

(Young swans that successfully imprint automatically follow their parents on the migration route, so they won't get lost and will learn the route themselves.)

2) When the winds blow a monarch butterfly to England, why does the program's narrator predict that it won't survive?

(Monarch butterflies rely on the milkweed plant to survive. Unfortunately, the milkweed plant doesn't grow in England.)

3) According to biologists' theories, what are some of the methods that the animals in this program use to navigate across great distances?

(Whooper swans instinctively use the position of the Sun and the stars to fly to and from the Arctic. Salmon are able to locate the gravel beds in which they were born by smelling and tasting the water. Many scientists believe that butterflies, gray whales, and other creatures somehow use Earth's magnetic field to help them reach their destinations.)

OBJECTIVES

Students will:

- observe how the change in seasons causes some animals to migrate
- recognize that migration is an evolutionary adaptation for survival
- compare the migration behaviors of different animals

VOCABULARY

imprinting: an instinctual bond that forms rapidly between some baby animals and their parents (or a substitute)

instinct: an inborn pattern of behavior

migration: moving annually or seasonally from one location to another in search of food or to reach breeding areas

Earth Navigators

BROADCAST DATE APRIL 23, 2000

spring equinox: usually March 20, one of two times each year when everywhere on Earth gets exactly 12 hours of daylight

summer solstice: usually June 22, the longest day in the northern hemisphere and is when the Arctic has continual sunlight

autumnal equinox: usually September 23, one of two times each year when everywhere on Earth gets exactly 12 hours of daylight

winter solstice: usually December 22, the shortest day in the northern hemisphere

SUGGESTED RESOURCES

Books

Riha, Susanne. *Animal Journeys: Life Cycles and Migrations*. Woodbridge, Conn.: Blackbirch Press, 1999.

Simon, Seymour. *They Swim the Seas: Mysteries of Animal Migration*. San Diego: Browndeer Press, 1998.

Stone, Lynn M. *The Wildebeest's Great Migration*. Vero Beach, Fla.: Rourke Corp., 1991.

Web Sites

Journey North
<http://www.learner.org/jnorth>

Monarch Butterfly Watch
<http://www.monarchwatch.org>

For the Sake of Salmon - Teacher Materials
http://www.4sos.org/teach_mat/teachers.html

Animal Bytes: Wildebeest
http://www.seaworld.org/animal_bytes/wildebeestab.html

STUDENT WORKSHEET *Earth Navigators*

a Thirteen NATURE program

Complete the first activity and one other activity of your choice.

1

MAKE A MIGRATION MAP

Imagine you have been hired to create an exhibit for a children's science museum that teaches other kids about animal migration patterns. Draw a large, simplified map showing the monarch butterfly's migratory path, and on separate pieces of paper, draw, color, and label small pictures of the butterfly. Then put Velcro dots or strips (or tape loops) behind each of the drawings so that they stick to the map but can easily be moved. Write instructions that ask visitors to guess where the butterfly lives during different seasons.



2

ON THE GO

Create a large poster chart that will help other students in your class compare the different migration behaviors presented in "Earth Navigators." Across the top of the chart, list the names of animals from this program. Along the side of the chart, write the following questions:

- What do they eat?
- What seasonal changes trigger their migration?
- How often do they migrate?
- How do they navigate to where they're going?
- How long does their migration journey take?



3

GET THOSE BINOCULARS!

Find out what wildlife migrates through your area each year. To help your research, contact a conservation organization such as the National Audubon Society [700 Broadway; New York, NY 10003. Phone: (212) 979-3000; fax: (212) 979-3188; <http://www.audubon.org>].

You can also help a group called Journey North track species as they migrate across the northern hemisphere. By identifying migratory animals, you can help scientists study how seasons influence wildlife. This organization also provides online images of animals as they migrate. Their Web address is www.learner.org/jnorth. You may also contact your state Fish and Wildlife Department for state and regional migration counts.

TO THE FAMILY

You are invited to watch NATURE together as a family. As you view this program, you may wish to point out that seasonal changes cause some humans to travel, too, but for different reasons. Contact a local wildlife organization to find out what animals travel through your area.

Despite its reputation as an icy wasteland, the Arctic goes through seasons. In the winter darkness, bitter cold temperatures cause the ocean surface to freeze. During summertime, continual sunlight melts the ocean's pathways. Changes in climate naturally affect

how Arctic animals search for food. This program follows the struggles and successes of the polar bear, the world's largest land carnivore, over the span of a year.

This program starts in the spring, as a mother polar bear and her cubs emerge from hibernation in search of food. As she searches for seals to feed her family, the mother must be wary of the larger adult male polar bears that could easily harm her pups. Polar bears are excellent hunters, due to their acute sense of smell, keen eyesight, strength, stealth, and swimming skill. In fact, the polar bear spends so much time in the ocean that it can be considered a sea mammal.

Young cubs live with their mother for two and a half years. During this time, they learn important survival skills, such as hunting, fighting, and scavenging. Although polar bears are skilled hunters, when food is scarce, they rely on a remarkable adaptation. In lean times, polar bears have the ability to reduce their metabolism in order to save energy. To supplement a diet of marine animals, polar bears sometimes consume plants, such as seaweed and berries.

THEME: In the Arctic, the polar bear's search for food adjusts in response to the seasons.

BEFORE VIEWING THE PROGRAM

Announce that the program students will be seeing is about the largest land carnivore in the world. After clarifying what a carnivore is (see Vocabulary on this page), invite them to guess what animal the show is about. Write all hypotheses on the board. As you give the answer, point to the photograph of the polar bear on the poster that accompanies this guide. Many students will probably be surprised to learn that the largest land carnivore doesn't live in Africa but in the Arctic. (Remind students that while elephants are larger than polar bears, they are herbivores, not carnivores.) Explain that the adult male polar bear can become as heavy as 1,500 lbs.

Ask students to identify the Arctic on a globe. Once students clarify what climate means, help them predict what the Arctic climate is like in different seasons. To start, you may wish to ask students to use what they know about climate changes in your area during the different seasons. Do they think the climate in the Arctic is the same year-round? Encourage them to support their arguments based on what they know about earth science (e.g., Earth's tilted axis and orbit around the Sun).

Discuss a polar bear's diet. Explain that except when pregnant females are in hibernation, polar bears are almost always searching for food. Ask students to guess what a polar bear's favorite meal is. (See photo and caption about the ringed seal.) Invite students to make predictions about the different ways polar bears hunt in the winter (when there's 24 hours of darkness) and in the summer (when there's continual sunlight, and much of the ice melts into the ocean).

Distribute the Student Worksheet (Naturalist's Guide)

Photocopy and hand out the student worksheet (Naturalist's Guide) on the opposite page, and preview it

with students. As they watch the program, encourage students to pay special attention to information about the polar bear's anatomy and search for the answers to the questions posed on the worksheet.

AFTER VIEWING THE PROGRAM

Encourage students to discuss the program and share their observations. The following questions may be used for discussion:

1) What are some of the different methods polar bears use to hunt for food?

(Hunting methods include: sneaking up on prey both in water and on land, sniffing out prey from up to a mile away, hiding behind snow, then pouncing on prey, swatting prey with their paws.)

2) What skills do young polar bear cubs need to learn in order to survive in the Arctic?

(In order to survive as adults, cubs need to learn how to stalk seals hiding in snowdrifts. Male cubs need to "play fight," so that they can safely determine the pecking order in their group, and avoid serious injury during an actual battle.)

3) Why can the polar bear be considered a sea mammal?

(Polar bears are extremely well-adapted for life in the water. Their mighty arms and legs, webbed feet, and "waterproof" fur enable them to swim for over fifty miles at a time in the chilly ocean.)

4) What time of year do you think it is hardest for polar bears to find food? Why?

(In the summer, when the ice melts, it is a challenge for polar bears to hunt seals, their favorite meal. At such times, they sometimes get by eating bird carcasses and plants.)

OBJECTIVES

Students will:

- observe the interdependence of plants and animals of the Arctic
- analyze how the polar bear's anatomy helps it survive
- observe how polar bears catch their prey
- discuss how seasonal changes affect wildlife in the Arctic

VOCABULARY

adaptation: a physical characteristic or behavior in animals or plants that helps their survival; caused by millions of years of evolution

carnivore: an animal that eats mostly meat

carcass: the body of a dead animal; what scavengers look for

climate: typical weather pattern for a certain area of the world

metabolism: the process by which food is converted into energy in a living body

predator: an animal that hunts other animals for food

prey: an animal that is hunted by a predator for food

SUGGESTED RESOURCES

Books
Kenny, David et al. *Klondike and Snow: The Denver Zoo's Remarkable Story of Raising Two Polar Bear Cubs*. Niwot, Colo.: Roberts Rinehart, 1995.

Patent, Dorothy Hinshaw. *Great Ice Bear: The Polar Bear and the Eskimo*. New York: William Morrow, 1999.

Web Sites
Arctic Wildlife Portfolio (Smithsonian Institution)
<http://www.mnh.si.edu/arctic/html/wildlife.html>

Polar Bears Alive
<http://www.polarbearsalive.org>

STUDENT WORKSHEET *Great White Bear*

a Thirteen NATURE program

Complete the first activity and one other activity of your choice.

1

BUILT FOR THE ARCTIC

Answer as many of these questions as you can on a separate sheet of paper.

The hairs that make up the polar bear's fur are hollow. Why does this keep the bear warmer than if these hairs were solid?

How does the polar bear's weight change during the summer? How does the bear's body shape help it swim?

Why is it important for a polar bear to fatten up as winter arrives?

How are polar bears' feet adapted for swimming long distances? How do their paws prevent them from slipping on the ice?

What is the advantage of polar bears having small ears?

How are the bear's eyes adapted for the Arctic Sun?

How far away can a polar bear smell?



Did You Know?



The polar bear's favorite prey, the ringed seal, lives mostly beneath the Arctic Ocean. To breathe, it creates small holes in the ice with its strong claws, and uses its snout to re-open these "breathing holes" when they freeze over. While raising their pups, mother seals usually hide in the shelter of snowdrifts. But sometimes polar bears can still sniff them out!

2

DONALD BEAR?

Polar bears and ducks both have webbed feet, a useful adaptation for swimming quickly. Bears share adaptations with other animals, too. Make a chart with at least three columns. At the top of each column, list another bear adaptation, such as hollow fur hairs, keen sense of smell, and so on. Then, below each adaptation, write the names and sketch pictures of other animals that share a similar adaptation.



3

TRY YOUR HAND AT "POLAR-TRY"

Write a poem about observing animals in the Arctic during the spring, summer, fall, and winter. Using observations from the program, as well as research in the library, describe some of the sights as if you were in the Arctic at different times of the year. For example, in your poem, you could tell about a young polar bear learning to hunt seals from its mother.

Your poem can be playful, but make sure the animal behavior you describe is accurate. The poem can be a haiku, a limerick, a series of couplets, or in free verse. A haiku is three lines of poetry with a certain number of syllables in each line: 5-7-5. A limerick is a rhymed, humorous poem of five lines. Couplets are pairs of rhyming lines, and free verse is a poem that has no particular pattern or rhyme.

TO THE FAMILY

You are invited to watch NATURE. As you watch this program on polar bears, discuss how these magnificent animals search for food in the Arctic. If possible, go to a nearby zoo to observe a polar bear close-up. Discuss the ways that a polar bear's life in captivity is different than in the wild.

Caterpillars, tadpoles, and salamanders all share an important trait.

At some point during their lives, their bodies transform. Through an almost magical metamorphosis, they change shape, color, and/or behavior. This program explores a variety of animal

transformations and proposes theories for why they occur.

Through "morphing" animation, viewers can observe an amazing transformation—a tadpole turning into a frog. When environmental factors change quickly, such as when a pond evaporates, tadpoles are able to accelerate their transformation process. If necessary, they can go from tadpole to frog in less than a week!

When the caterpillar (larva stage) becomes a pupa inside a chrysalis, some organs dissolve as new ones are built. When the transformation is complete, an adult butterfly emerges. In an equally dramatic switch, a dragonfly changes from a slick, tadpole-eating nymph into a flying insect that, ironically, is sometimes eaten by adult frogs.

Mammals' bodies change, too, although not as radically as those of insects. Each year, for example, as the male caribou's velvety antlers grow, they harden into bony spikes that later help it in ritual fights with other males.

Other transformers in the program include male redwing blackbirds, which undergo a change in brain size in springtime; cichlids, which change in size and color when they take control of new territory; salamanders, which can regrow limbs that are bitten off by predators; and sockeye salmon, which radically change body shape and coloration during their last year of life.

THEME: The life of every living creature is the story of change.

BEFORE VIEWING THE PROGRAM

Show students ten different close-up photos taken from a family album or from magazines (one person per picture, a wide range of ages). Ask two student volunteers to arrange the photos in order from youngest to oldest. As a class, discuss whether these students' proposed order is correct. Why or why not? What physical clues inform how old a person is? What characteristics differentiate a baby and an 80-year-old?

Explain that some animals change so much from baby to adult that they seem to be entirely different. Show a picture of a butterfly. Ask students to identify what this animal probably looked like soon after it was born. Most students will know the butterfly used to be a caterpillar. Then show a picture of a frog and its earlier stage, a tadpole. How are they alike and different? Explain that the video they'll be seeing, "The Body Changers," shows a number of animals that change their appearance, shape, and behavior. Discuss: What do you think are some reasons animals transform? How do these changes benefit their survival?

Distribute the Student Worksheet (Naturalist's Guide)

Photocopy and hand out the student worksheet (Naturalist's Guide) on the opposite page, and preview it with students. As they watch the program, encourage them to use the chart to help them compare the transformations of the different animals in the program.

OBJECTIVES

Students will:

- compare the human life cycle with that of butterflies, frogs, and other metamorphic creatures
- observe different ways that different species transform
- identify different types of plankton
- recognize the changing relationships between organisms at different stages of their lives

VOCABULARY

chrysalis: a hard shell covering the pupa; shaped like an upside-down teardrop

hormones: chemicals produced by certain glands that affect growth and development

The Body Changers

BROADCAST DATE: MAY 7, 2000

AFTER VIEWING THE PROGRAM

Encourage students to discuss the program and share their observations. The following questions may be used for discussion.

1) How does changing color, shape, and behavior help some animals?

(These changes help different animals in different ways. For example, physical transformations can help them find food, travel to other territories with more food or a better climate, or appear more appealing to a mate. The changes can also help them communicate better, and hide from predators.)

2) In the Arizona desert, how do ants and caterpillars help each other? How does this relationship change once caterpillars become butterflies?

(The ants and caterpillars in this program both live in acacia trees. The ants serve as bodyguards for the caterpillars. In turn, the caterpillar feeds these ants droplets of sugary food that its body secretes. Once a caterpillar transforms into a butterfly, the same ants will now devour it unless it can quickly fly.)

3) How do male caribou's antlers change every year?

(When caribou's antlers first grow, they are made of living tissue, filled with blood vessels. However, in summer, in preparation for when male caribou will compete with other males to determine a pecking order, their antlers slowly die and become bony spikes.)

larva: the second stage of metamorphosis, during which insects look like a worm. *example:* caterpillar

metamorphosis: a series of changes that certain animal species go through as they develop from eggs to adults

plankton: tiny, assorted plants and animals that drift or float in oceans or lakes; from the Greek meaning "floating creatures"

pupa: the third stage of metamorphosis, between larva and adult, when animals are encased in a chrysalis or cocoon

SUGGESTED RESOURCES

Books

Cole, Joanna. *The Magic Schoolbus Goes Upstream: A Book about Salmon on Migration*. New York: Scholastic, 1997.

Halfmann, Janet. *Dragonflies*. Mankato, Minn.: Smart Apple Media, 2000.

Mitchell, Robert T. and Herbert S. Zim. *Butterflies and Moths: A Guide to More Common American Species*. New York: Golden Press, 1987.

Smith, Mark Phillip. *Lake Tanganyikan Cichlids*. Hauppauge, N.Y.: Barron's Educational Series, 1998.

Web Sites

Children's Butterfly Site
<http://www.mesc.usgs.gov/butterfly/Butterfly.html>

Monarch Butterfly Metamorphosis Photos
<http://www.milkweedcafe.com/photos.html>

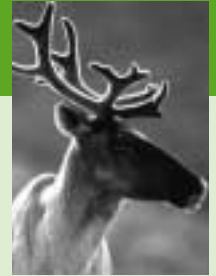
Greenwich Bay Plankton
http://seagrant.gso.uri.edu/G_Bay/plankton.html

Plankton Gallery
<http://members.aol.com/iq3d2/plankton2/plankton.htm>

Friends of Frogs
<http://cgee.hamline.edu/frogs>



STUDENT WORKSHEET *The Body Changers* a Thirteen NATURE program



Complete the first activity and one other activity of your choice.

1

PRESTO CHANGO
As you watch this program, fill in this chart that compares the ways different animals transform. Note: Some of the categories do not apply to all the animals on this chart.

WHAT CHANGES HAPPEN IN THESE ANIMALS?			
	Appearance (color and shape)	Locomotion	Diet
caterpillar			
tadpole			
cichlid			
redwing blackbird			
dragonfly			
salmon			

TO THE FAMILY
You are invited to watch NATURE together as a family. As you view this program, you can compare the ways that humans change from infancy through adulthood.

2

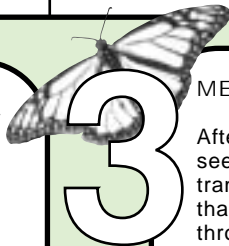


PLANKTON PARTY
Many marine animals, including crabs, shrimp, and sea slugs, start off as tiny organisms floating in the ocean. Together, all these different tiny creatures are called plankton.

To study plankton up close, you can catch it using a special net. For instructions, see this Web site:
http://seagrants.gso.uri.edu/G_Bay/plankton_net.html.

Once you've gathered enough plankton in your net, use a magnifying glass to observe what you've caught. If you don't live near an ocean or lake, your school can order slides or videos of plankton from the Carolina Biological Supply Company 800-334-5551. You can also find photographs of plankton on the Web at:
http://seagrants.gso.uri.edu/G_Bay/plankton.html

After you've seen some examples of plankton, draw some "BEFORE" and "AFTER" pictures of plankton that show what they look like in the early and late stages of development.



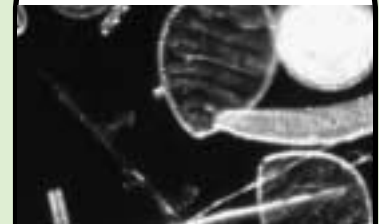
3

MEET THE TRANSFORMERS

After watching this program, you have seen a variety of ways that animals transform. Write and illustrate a book that describes different animals that go through dramatic changes in shape, color, and behavior. Include short chapters about tadpoles (frogs), dragonflies, caterpillars, and salmon. Use science books and Web sites to help you research these animals and draw accurate pictures.

During the spring and summer, you can also raise butterflies at home. To order a butterfly kit containing live caterpillars and food, you can call Insect Lore at 800-LIVE-BUG or Carolina Biological Supply at 1-800-334-5551, or visit their Web sites at www.insectlore.com or www.carolina.com.

Did You Know?



Many marine animals, including crabs, shrimp, and sea slugs, start off as tiny organisms floating in the ocean. Together, all these different tiny creatures are called plankton. Plankton plays an essential role in the ocean's ecosystem and provides food for many larger animals, such as whales.

Below Florida's bedrock lurks a mysterious maze of limestone waterways that are older than the dinosaurs.

These waterways are known as the Floridian Aquifer. Centuries ago, explorers traveled to these warm, mineral-rich waters in search of the fabled Fountain of Youth. In

this program, students vicariously follow divers as they investigate the diverse animals that live in this vast labyrinth and in the waters above.

Scientists speculate that the minerals in Florida's springs benefit the local wildlife. A creature known as the blind cave crayfish can live for more than 100 years—twenty times longer than its cousins near the surface can. Deep in the aquifer, there is no sunlight, so there is no photosynthesis. The foundation of the food chain in the darkness of the caves is a type of bacteria that gets its energy from the sulfur in the water.

Every day in Florida, hundreds of millions of gallons of groundwater are pumped for crops, lawns, and golf courses. When used water returns to the aquifer, it carries nitrate pollutants that can cause "red tides" — harmful algae that can decimate some plant and animal species, as well as damage the drinking water. Manatees are vanishing in large numbers due to injuries caused by powerboats and red tides. The program alerts viewers that the future of the wildlife in Florida's springs depends on care and conservation.

THEME: The mineral-rich Floridian Aquifer creates hundreds of beautiful springs that are habitats for a variety of wildlife.

BEFORE VIEWING THE PROGRAM

Explain that the video is about the diverse wildlife that lives in—and beneath—the state of Florida. Have students locate the state of Florida on a map or globe. Point out that it got its name from a Spanish explorer named Juan Ponce de Leon, who arrived there in the early 1500s, and called it "Florida" for either the holiday Pascua Florida or for the lush assortment of flowers that grow there. According to legend, Ponce de Leon came to Florida in search of the Fountain of Youth—a natural spring that supposedly had rejuvenating powers.

Scientists have discovered that below Florida's bedrock there is a long, winding maze of rocky tunnels, now known as the Floridian Aquifer. The mineral-rich water from these tunnels bubbles upward into springs and supports diverse, unusual wildlife. Ask students what they know about animals that live in caves and other places with no sunlight, such as the sulfite chimneys along the ocean floor (nicknamed "black smokers"). Have them compare and contrast the animals that live in those environments with ones they think may be found in the Floridian Aquifer. (For more on black smokers, visit: www.wnet.org/archive/savageearth/hellscrust/html/sidebar2.html)

Ask students to brainstorm a list of other animals that they think live in Florida and describe the different habitats in which they are found. Write their suggestions on the board. Some of Florida's animals to possibly include on the list: alligators, manatees, pelicans, egrets, parrots, ducks, eagles, sharks, porpoises, panthers.

Distribute the Student Worksheet (Naturalist's Guide)

Photocopy and hand out the student worksheet (Naturalist's Guide) on the opposite page, and preview it with students. As they watch the program, ask them to pay special attention to the different habitats in Florida. In addition, encourage them to study and compare the various hunting methods used by predators.

AFTER VIEWING THE PROGRAM

Encourage students to discuss the program and share their observations. The following questions may be used for discussion:

1) What causes Florida's natural springs?

(The layer of limestone that lies under most of Florida has absorbed huge amounts of water. As the pressure builds, springs bubble upward—some spewing millions of gallons per day.)

2) Why do mother alligators have so many offspring?

(Many baby alligators will die from disease or will be eaten by other creatures, so in terms of evolution and survival of this species, it is beneficial for the mother alligator to give birth to lots of offspring.)

3) How do microscopic bacteria that live below Florida's bedrock survive without sunlight?

(These bacteria are able to get their energy from sulfur and other minerals in the water. These bacteria are the basis for the food chain in these dark, underwater caves.)

OBJECTIVES

Students will:

- observe some animals that live in Florida's spring system
- compare and discuss the hunting methods of creatures such as the alligator, bald eagle, and alligator snapping turtle
- think about solutions for ecological problems

VOCABULARY

aquifer: a layer of underground, porous rock in which water collects

bedrock: the solid layer of rock below the soil and loose rock

extinction: when a plant or animal species dies out

fry: recently hatched fish

photosynthesis: the chemical process by which green plants make their food. Plants use energy from the Sun to turn water and carbon dioxide into food.

rookery: a breeding ground of birds

shoal: a large group of fish

stalactites: thin pieces of rock, shaped like icicles, that form on the roof of a cave when minerals within drops of water slowly solidify

SUGGESTED RESOURCES

Books

Crewe, Sabrina. *The Alligator*. Austin, Tex.: Raintree/Steck-Vaughn, 1998.

Hancock, James. *Hérons and Egrets of the World: A Photographic Journey*. San Diego: Academic Press, 1999.

Silverstein, Alvin. *The Manatee*. Brookfield, Conn.: Millbrook Press, 1995.

Stamm, Doug. *The Springs of Florida*. Sarasota, Fla.: Pineapple Press, 1998.

Web Sites

National Audubon Society
<http://www.audubon.org>

Save Our Springs, Inc.
<http://www.saveourspringsinc.org/>

Sierra Club - Florida Chapter
<http://www.sierraclub.org/chapters/fl>

Save the Manatee Club
<http://www.savethemanatee.org>

S.T.A.R.T. - Solutions to Avoid Red Tide
<http://www.start1.com/rtide.htm>

STUDENT WORKSHEET Springs Eternal: Florida's Fountain of Youth

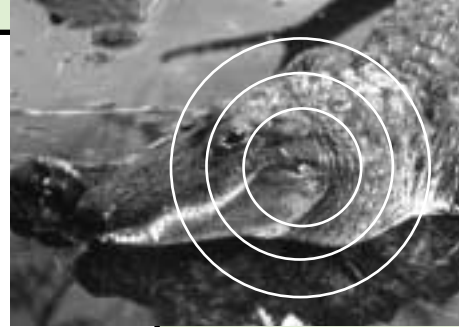
a Thirteen NATURE program

Complete the first activity and one other activity of your choice.

1

SUPPORT THE ENVIRONMENT

As you saw in this NATURE program, human actions can have a profound effect—both positive and negative—on the environment. Find out what environmental issues are being discussed and debated by your state or the national government, and see how you can help support the causes that concern you. A great resource to help your research is the National Audubon Society. In your school or at the library, check out their Web page called "Desktop Activist Guide" (<http://www.audubon.org/campaign/fh/dagmenu.htm>). It provides fact sheets, links, and step-by-step instructions for contacting your Representatives and Senators. You can also contact the National Audubon Society at their toll-free number, (800) 274-4201, or write to P.O. Box 52529, Boulder, CO 80322.



TO THE FAMILY

You are invited to watch NATURE. After you watch this program, you can discuss how water gets to your home. Is it from a reservoir or a well? What laws protect the water supply from pollutants? Are there additional ways to prevent water pollutants from reaching local waterways?

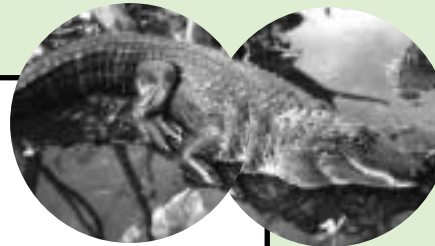
2



MANATEE MURAL

Work with another student to create a large mural about Florida's peaceful mammals, the manatees. Around the border of the mural, write a series of cards with questions such as "What do manatees eat?" and "Why are manatees facing extinction?" Below the questions, write a short answer and identify the library resource where you found the information. Include a description of red tides and how they affect manatees.

3



ON THE HUNT

The animals in this program rely on different methods of hunting. Write and illustrate a report that compares the ways that various Florida predators get their meals. Some animals to include in your report are the bald eagle, the osprey, the alligator, and the alligator snapping turtle.

Did You Know?



Manatees, nicknamed "sea cows," swim in the warm Florida waters. These gentle, herbivorous mammals can weigh up to 3,000 lbs. In recent years, manatees have become endangered due to injuries inflicted by powerboat propellers and an increase in red tides, caused by harmful algae. Naturalists are working to save the manatee from extinction.

The Secret World of Sharks and Rays

BROADCAST DATE: MAY 21, 2000

Many people think of sharks as ferocious predators, mindlessly killing any creature that gets in their way. Although the great white may sometimes violently attack its prey, this behavior is by no means true for most of the hundreds of species of sharks and rays. Sharks come in a wide range of sizes and shapes, and display a variety of temperaments. To challenge shark stereotypes, this program presents their diversity and analyzes the different adaptations that have helped sharks survive on Earth for about 400 million years. (In contrast, the first humans evolved less than two million years ago.)

This program presents sharks as they really are — intelligent, persistent hunters who patiently conserve their energy until they find suitable prey. To combat the misconception that sharks are invincible predators, “The Secret World of Sharks and Rays” presents a suspenseful encounter between a tiger shark and a heavily armored loggerhead sea turtle. During their battle, the line between predator and prey becomes blurred when the turtle fights back. To counter the myth that all sharks must continually swim to stay alive, viewers are shown how whitetip sharks can rest on the ocean floor, using muscles in their mouth to move water over their gills.

Rays share some characteristics with sharks, their skeletons being made of flexible cartilage rather than bone. In contrast to sharks, though, rays are so flat that their gills are located under their bodies. To help catch their prey and protect themselves, some rays have the ability to emit electric shocks; others can sting their victims with venom.

THEMES: Sharks and rays are a diverse group of predators, so well adapted for life in the ocean that they have remained nearly the same for millions of years. The shark’s worst predators are humans, who often hunt them for just a few parts (fins, cartilage for medicinal purposes), then toss the rest of their carcasses away.

BEFORE VIEWING THE PROGRAM

Using photographs from library books, show students pictures of some different sharks (such as the great white, sand tiger, hammerhead, whale shark, angel shark, and sawshark). Write the common (non-scientific) names of the sharks on the board. For each shark, ask students to discuss the following:

- Do you think the shark is well named? Why or why not?
- What would you guess the shark eats? Why?

Then, point out that sharks have been in the oceans for 400 million years—about 200 million years before the dinosaurs. Ask students to look at the different sharks and suggest some hypotheses for why these creatures have survived for so long while other animals have become extinct. During the discussion, define the term “adaptation” (see Vocabulary on this page), and explain that the theory of evolution states that, over millions of years, different animal and plant species change in response to changes in the environment.

Students may also make a list of the differences between sharks and other fish. Using photographs and encyclopedia or Internet articles, compare their body shape, teeth, fins, tails, sense organs, electricity sensors, liver, and bladder. By observing examples of shark adaptations, students can understand why these species have survived so long.

Distribute the Student Worksheet (Naturalist’s Guide)

Photocopy and hand out the student worksheet

(Naturalist’s Guide) on the opposite page, and preview it with students. As they watch the program, encourage them to look for examples of adaptations that have helped sharks to survive. Also, explain that the program will also feature some shark relatives, a group of sea creatures called rays. Ask students to look for ways that rays and sharks are similar and different.

AFTER VIEWING THE PROGRAM

Encourage students to discuss the program and share their observations. The following questions may be used for discussion:

1) How do we know that sharks and rays are related?

(Sharks and rays share physical characteristics and behavior. Unlike bony fish, sharks and rays have skeletons made of a flexible material called cartilage. Since these animals lack a bony skeleton, they are unable to swim backwards. In contrast to many fish, sharks and rays both reach maturity after a number of years, and some sharks only bear a few young at a time.)

2) What are some examples of how camouflage helps sharks?

(Since the angel shark’s coloring blends in with the ocean floor, it can wait for its prey to come close before it attacks. The Wobbegong shark’s mouth has unusual attachments that resemble seaweed. So, when a smaller fish is looking for a patch of seaweed to hide in, it might accidentally become a Wobbegong’s dinner. In another example of camouflage, when the female horn shark lays her eggs, they are released in a case that resembles seaweed.)

OBJECTIVES

Students will:

- compare some ways in which sharks and rays are similar and different
- observe how camouflage helps sharks and rays catch their prey and protect themselves
- discuss the dramatic decline in the world’s shark population and propose solutions for reversing this trend

VOCABULARY

adaptation: an evolutionary change in a species that improves its chances for survival

camouflage: behavior or protective coloration that enables wildlife to hide from predators or that hides predators while they are stalking their prey

parasite: an animal or plant that gets its food by living on or inside another living thing

placebo: a fake pill or substance that sometimes brings about physical changes in a patient even though there is no medical explanation for such changes

plankton: small, floating organisms found in oceans and lakes

SUGGESTED RESOURCES

Books

Allen, Thomas B. *The Shark Almanac*. New York: The Lyons Press, 1999.

Berman, Ruth. *Sharks*. Minneapolis, Minn.: Carolrhoda, 1995.

Markle, Sandra. *Outside and Inside Sharks*. New York: Atheneum, 1996.

Simon, Seymour. *Sharks*. New York: HarperCollins, 1995.

Taylor, L.R. et al. *Sharks and Rays: Nature Company Guide*. Alexandria, Va.: Time Life, 1997.

Web Sites

Sharks and Their Relatives
<http://www.seaworld.org/sharks/pageone.html>

The National Aquarium in Baltimore
<http://www.aqua.org/animals/species/sharks.html>

Zoom Sharks
<http://www.enchantedlearning.com/subjects/sharks/all>

STUDENT WORKSHEET *The Secret World of Sharks and Rays*





a Thirteen NATURE program

Complete the first activity and one other activity of your choice.

1

WHY SHARKS SURVIVE

Long before the first dinosaur appeared on Earth, sharks lived in the oceans. In this program, you'll learn some fascinating reasons why sharks have survived for so long. Not only are many sharks' bodies adapted for hunting, sharks are also very persistent. Fill in the chart below as you watch the program. For further information, consult an encyclopedia or the Web.

Shark	What it Looks Like	Adaptations (What physical features help this kind of shark survive?)
Whale Shark		
Hammerhead Shark		
Wobbegong Shark		
Sawshark		

TO THE FAMILY
You are invited to watch NATURE. Have a family discussion about how movies and horror books have created exaggerated and often inaccurate portrayals of sharks, bats, and snakes. Afterward, get the facts about these animals, using the Internet and the library to help your research.

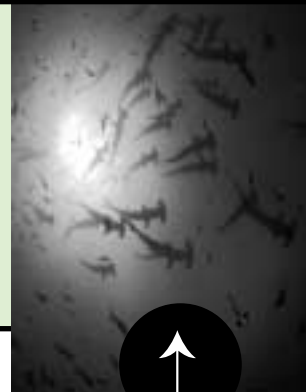
2



SHOCKS AND STINGS

Research, write, and illustrate a report about electric rays and stingrays. These two groups of rays have concealed weapons for hunting and protection. Electric rays can send out an electric shock of more than 200 volts. Stingrays have barbs on their tails that can release a painful poison. In your report, include where these creatures live, what they eat, and what sea creatures eat them.

3



SHARK PRODUCTS: PANACEA OR PLACEBO?

The worldwide shark population is in danger. In Japan, sharks are hunted for their fins, which are made into a soup that some people believe has medicinal benefits. In the U.S. and Europe, shark-cartilage pills are popular items in health-food stores. Look in health magazines, on health-store brochures, or, if possible, on the Internet for advertisements for such shark-related products. What claims do these ads make? Then use the library to find articles that talk about scientific studies that have been done on the effects of such products. Present your findings to the class.

Did You Know?



Some of the largest marine animals feed on the smallest creatures in the sea. Both the whale shark and the manta ray consume enormous quantities of plankton as they swim forward, using a process called filter feeding. The whale shark has small, non-functional teeth, while manta rays have no teeth at all. In contrast, the smallest shark, the dwarf shark, is only seven inches long.

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NATURE Schedule, April-June, 2000

Obsession with Orchids	April 16, 2000
Earth Navigators	April 23, 2000
Great White Bear	April 30, 2000
The Body Changers	May 7, 2000
Springs Eternal: Florida's Fountain of Youth	May 14, 2000
The Secret World of Sharks and Rays	May 21, 2000
Elephant Men	May 28, 2000
The NATURE of Sex	June 4, 2000
The NATURE of Sex	June 11, 2000
The NATURE of Sex	June 18, 2000
The NATURE of Sex	June 25, 2000

NATURE continues throughout the summer. Check local listings.

Video Ordering Information

"Obsession with Orchids," "Earth Navigators," "The Body Changers," "Springs Eternal: Florida's Fountain of Youth," and "The Secret World of Sharks and Rays" are available from Thirteen by calling 1-800-336-1917. "Great White Bear" is available from PBS Video by calling 1-800 PLAY PBS.

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