Sense of Science

APH

ANIMALS

Sense of Science

ANIMALS

Project Director/Co-Author
Karen J. Poppe

Project Co-Authors
Emily Bowers
Katherine Robinson

Project Editors
Kristopher A. Scott
Rosanne Hoffmann

Project Assistants
Sarah Ballard
Tristan Pierce

Illustrators
Tactile Illustrator and Overlay Illustrator
Tom Poppe

Guidebook Illustrator
Susan Miller

Guidebook Graphic Designer
Bernadette S. Mudd

1839 Frankfort Avenue • P.O. Box 6085
Louisville, KY 40206-0085
Phone: (502) 895-2405 • Toll Free: (800) 223-1839
E-Mail: info@aph.org
Web site: http://www.aph.org

Sense of Science: Animals Kit Catalog Number: 1-08990-00
Large Print Guidebook Catalog Number: 7-08990-00

Table of Contents

Acknowledgements vii

Introduction 1

Animal Units

Backyard Buddies

Activity 1: Anatomy of an Ant 15
Activity 2: An Ant's Abode 19
Activity 3: Backyard Noises—Day and Night 23
Activity 4: Flashing Fireflies 27
Activity 5: House for a Mouse 31
Activity 6: Wiggling Worms 35
Activity 7: Feathered Friends 39

Wetland Critters

Activity 8: Busy Beaver 49
Activity 9: Isn't It Just Ducky? 53
Activity 10: Life Cycle of a Frog 57
Activity 11: Feast for a Frog 61
Activity 12: "POND-ering" Creatures 65
Activity 13: Super Shells 69

Desert Dwellers

Activity 14: Desert Dwellers 77
Activity 15: Some Like It Hot 81
Activity 16: Snake Traits 85
Activity 17: Feed that Snake! 89
Activity 18: Poisonous Patterns 93
Activity 19: Slithering Snakes 97

Woodland Wanderers

Activity 20: Circle of Life 107
Activity 21: Hibernation Time 111
Activity 22: Food for Thought 115
Activity 23: Making Tracks 119
Activity 24: Bird Identification 123
Activity 25: Bird Bills 127
Activity 26: Oh, Deer Me! 133

Rainforest Creatures

Activity 27: Layers of the Rainforest 141
Activity 28: Sluggish Sloth 147
Activity 29: Eight is Enough 151
Activity 30: Web Masters 155
Activity 31: Butterfly Symmetry 159
Activity 32: Life Cycle of a Butterfly 163

Ocean Life
Activity 33: Fishy Facts 173
Activity 34: How Do They Move? 179
Activity 35: Sea Mammals 183
Activity 36: Hear Ye! Hear Ye! 187
Activity 37: Caring for Marine Mammals 191
Activity 38: Ocean Treasures 195

Polar Pals
Activity 39: A Polar Bear's Coat 203
Activity 40: Super Seal Snacks 207
Activity 41: Penguins: Birds or Fish? 211

Appendix A: Culminating Activities 219

Appendix B: Suggested Activities for APH Animal Overlays 223

Appendix C: Simple Animal Activities for Home or School 229

Appendix D: Resources 231

Glossary 237

References and Further Reading 245

Acknowledgements

Thank you to co-authors, teachers Emily Bowers and Katherine Robinson, who contributed their creativity to this second module of *Sense of Science*. Also, thank you to Susan Miller, whose illustrations appear throughout this guidebook.

Sense of Science: ANIMALS was produced through the special talents and skills of the following APH staff:

Sarah Ballard, Project Assistant

Tristan Pierce, Project Assistant

Kristopher A. Scott, Project Editor

Tom Poppe, Tactile Illustrator and Overlay Illustrator

Bernadette S. Mudd, Guidebook Graphic Designer

In addition, many people at APH performed tasks necessary to produce and package **Sense of Science: ANIMALS**. To those of you who helped with silkscreening, thermoforming, die cutting, copy editing, printing and support services, thank you.

The following teachers of the visually impaired contributed their time, knowledge, and skill to the evaluation of the guidebook and accompanying overlays for **Sense of Science: ANIMALS:**

Janice Burdett, Teacher of the Visually Impaired, Royalview Elementary, Willowick, OH

Debra Davoulas, Teacher of the Visually Impaired, Rock Spring Elementary, Rock Spring, GA

Sister M. Elaine George, I.H.M., Librarian/Materials Assistant, St. Lucy Day School for Children with Visual Impairments, Upper Darby, PA

Michael Hayes, Teacher of the Visually Impaired, Belen Consolidated Schools, Vision Related Services, Los Lunas, NM

Catherine Hula, Teacher Consultant for the Visually Impaired, Ingham Intermediate School District, Mason, MI

Nancy Murdock, Itinerant Vision Teacher, Giles County, Pulaski, TN

Linda Ross, Vision Teacher, Virginia School for the Deaf and Blind and Multi-Disabled at Hampton, Hampton, VA

Karen Wells, Supervisor for Instruction, Trails West, Kansas City, MO

Introduction

Sense of Science: ANIMALS at a Glance

The purpose of **Sense of Science: ANIMALS** is to enable teachers to make the "world of science" related to animal life accessible, understandable, and enjoyable for young students who are visually impaired and for other students who may benefit from a multi-sensory approach to learning.

The guidebook presents easy-to-follow activities based on the fundamental classification of animals by habitat: desert, forest, rainforest, arctic, ocean, backyard, and wetlands. Students actively explore each concept. All learning activities comply with the 1996 National Science Education Standards, especially the three major areas of Life Science Standard C:

1. Understanding the characteristics of organisms
2. Understanding the life cycle of organisms
3. Understanding organisms and their environments

Sense of Science: ANIMALS includes a collection of visual and tactile overlays and two custom-designed trays. Although the

overlays and trays can be used as stand-alone materials, they are intended for use with the American Printing House for the Blind's Light Box and Mini-Lite Box.

The visual and tactile overlays aid in reviewing and reinforcing concepts taught through hands-on activities. This pairing of visual and tactile elements is especially useful for low vision students who need multi-sensory information. The tactile component helps students confirm what they perceive visually. Appendix B provides suggested activities for using the Animal Overlays to isolate parts of a bird, butterfly, fish, etc. Additional activities can be performed using the smaller overlays to review animal tracks and a growing spider web.

Reasons to Study Animals

Nature provides a tapestry of shapes, colors, smells, and tastes that children can experience and enjoy.

Nature is …

- Within reach and accessible.
- A common experience for all.
- Appealing because of its beauty.
- Filled with diversity.
- Interesting because it is both unpredictable and changing.

Nature is a motivating attribute game through which children can recognize likenesses and differences and can witness both constants and variables.

Exploring nature through hands-on animal activities encourages:

Logical thinking:
Making predictions, asking "What if…" questions, observing cause and effect

Organizational skills:
Matching, grouping, classifying, sorting

Scientific literacy:
Predicting, observing, recording, charting, measuring

Vocabulary building:
"Vertebrae," "hibernate," "warm-blooded," "venomous"

Communication skills:
Asking questions, verbally describing likenesses and differences

Manipulative skills:
Handling animals gently, measuring, grooming, brushing animals

Enhanced curiosity:
What is the largest mammal? Which animals hibernate?

Tactile discrimination:
Detecting differences in the textures of objects (turtle shells, butterfly wings, fish scales, animal fur), gleaning information from tactile models

Social responsibility:
How to care for pets, to keep our planet a clean and safe home for animals, and so forth

Self-esteem:
Confidence in communicating intelligibly about animals, group work, individual projects

Helpful Adaptations

As with any classroom activity, adaptations must continually be made to meet the needs of students. The following adaptations will help visually impaired students comprehend concepts presented through learning activities.

- Use real objects (feathers, fur, scales) that can be processed by different senses.
- Use realistic models if real objects are not available. Provide opportunities for students to create their own models using clay, paper, construction toys, APH's *Quick-Draw Paper* and *Picture Maker Diagramming Kit,* etc.

- Use pictures or other visual representations that are clear and uncluttered and that have bright colors and good visual contrast.
- Provide a well-lighted work area for students with residual vision.
- Provide materials in braille and large print, such as readable labels placed next to cages or aquariums, and adapted measuring devices.
- Allow extra time and verbal support as students explore real bugs, frogs, turtles, etc.
- Acquaint students ahead of time with the setup of the work area and the materials that will be used during the activity.
- Demonstrate the activity for the student in hand-over-hand fashion if necessary. Then have the student repeat the procedure independently.
- Teach concepts otherwise thought obvious. For example, not all dogs are the same size.
- Use field trips to enhance experiences and connect them to real life and natural habitats (ponds, forests, etc.).

How to Use the Animal Activities

The animal activities presented throughout the guidebook supplement traditional science curricula used to teach children in kindergarten through third grade. *The teacher should not feel compelled to use every activity or to use activities in the order presented.* Begin with the familiar—with those concepts about which students have some knowledge or obvious interest. The time of year will also dictate the order of presentation. A teacher might begin with the "Backyard" animals early in the year so they can spend time outside observing the animals located near the schoolyard.

Activities presented throughout the guidebook follow the same basic design and incorporate the following components:

Objective: The purpose of the activity and expected outcome.

Vocabulary: New vocabulary words encountered throughout the activity.

Materials: Supplies needed to carry out the main activity or procedure.

Inquiry: A question posed at the onset of the activity to set an investigative tone.

Procedure: A step-by-step outline of the suggested progression of the activity.

Extension: An activity that goes one step further for older or advanced students.

Visual Adaptation: Suggested way(s) to accommodate a student with visual impairments, such as providing good visual contrast, tactile experiences, and adapted educational materials. Appropriate APH Animal Overlays are recommended in this section as well. An "overlay" icon appears next to this section when APH Animal Overlays are available to review or reinforce a concept encountered in the activity.

Overlay Icon

Math Connection: A task that involves math skills such as measuring, counting, patterning, as related to the activity.

Language Connection: A task that involves reading and writing skills, such as journal writing and composition of stories or poems related to the activity.

Science Tidbit: An interesting or little known fact about animals, as related to the activity.

In general, the activities serve simply as a scaffold on which to build. The teacher's creativity will inspire extensions and modifications. The primary objective should be to instill in children with visual impairments a curiosity, wonderment, and love of science related to animal life. Try incorporating some of the following suggestions to enhance students' learning and enjoyment of the activities:

- Set a tone of excitement at the onset of an activity by modeling your own enthusiasm for science.
- Introduce a concept by reading a book or story that in some way embodies that concept. This is an excellent way to fire the students' imaginations and pique their interests. A list of "Suggested Children's Literature" is located at the end of each animal unit.
- Try a fun opening activity. Place an object that pertains to the unit (such as fake fur, a turtle shell, or a collection of feathers) inside a box or bag. Let students pass the box or bag around so they can experience the weight and shape of the hidden object. Then have them ask yes-or-no questions in order to determine the identity of the object. This activity promotes verbal and analytical skills. Once the object has been identified, pass it around so the students can explore it more closely.
- Encourage students to be investigators by asking an inquiry question at the beginning of each activity. Help them discover their own answers. The **KWL** technique can be used: **K** stands for what the students already know about the subject; **W** stands for what the students wish to learn; and **L** stands for what the students have learned. After the activity is complete, ask students to write about what they have learned. Students' write-ups can be placed in their science portfolios or folders.

- Incorporate performance tasks such as reports, plays, games, or journal keeping.
- Provide several hands-on experiences that are safe for the children and safe for the animals they hold or pet.
- Provide side-by-side presentations of objects that are thought to be the same but differ in some way. Explore variations in animals that have a lot in common but also have some differences, like a hamster and a mouse.
- Help students differentiate between real objects and models of real objects (such as models of animals versus stuffed animals versus real animals).
- Encourage students to use as many senses as possible when they examine animals: listen to the sounds that animals make, touch the fur coats of different types of dogs, etc.
- Provide lots of opportunities for students to classify items by size, shape, texture, and smell. This practice will help students make sense of the natural environment.
- Emphasize that parts make up a whole (wings, legs, antennae, head, abdomen, thorax) and that each part has a unique and important function.

- Compose letters to parents encouraging parental support, and attach a list of supplies needed.
- Make a list of jobs related to the study of animals, such as a zoologist, veterinarian, biologist, beekeeper, and entomologist. Invite these professionals to the class to talk about their jobs.

Community Connections

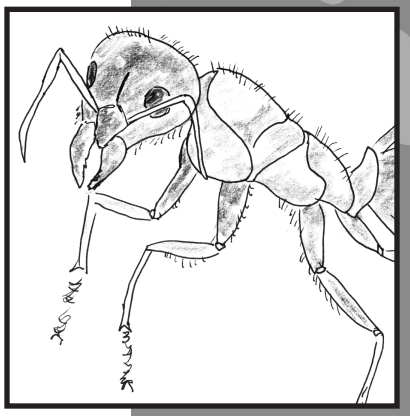
This section contains suggestions for helping children make real-life and concrete connections in the community. These community connections are also ideal suggestions for parents to consider in extending the child's learning to natural settings. Teachers may wish to include some of these suggestions in communications with parents and family members. Suggestions for community connections could include the following:

- Invite a local Forest Ranger to come in and discuss forest safety when camping or hiking. Each state has their own forest service to contact.

- As a class, adopt a marine mammal, such as a manatee. Students could collect their leftover change each day to care for their animal. To find out what animals are available for adoption, contact Center for Marine Conservation, 1725 DeSales Street NW, Suite 600, Washington, DC 20036, Phone: (202) 429-5609; Email: cmc@dccmc.org.
- Invite a taxidermist into your class to show students some of his stuffed, wild animals. This would be ideal for students interested in touching the animals instead of just catching a passing glimpse in the woods.
- As a class, visit a working farm. Find out if they also raise the food needed to feed the animals on the farm. Discuss the various animal habitats found within the farm. Research the food chains for the animals seen.
- Visit an aquarium, noting the color differences among saltwater and freshwater fish. If visiting an aquarium is not possible, set up an aquarium in the classroom, allowing students to help set up the aquarium and monitor it.

Backyard Buddies

Activity 1: Anatomy of an Ant



Objective:
To learn about the main parts of an ant's body.

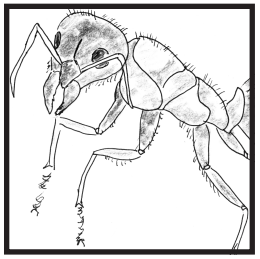
Vocabulary:
Ant, head, thorax, abdomen, antennae, mandibles, maxillas, compound eyes, jointed legs, exoskeleton

Materials:
APH Ant Overlay; bubble wrap packing material; insect models

Inquiry:
What are the main parts of an ant's body?

Procedure:

- Explain that ants, like other insects, have a hard, shell-like covering called an *exoskeleton*. Their skeleton is not covered by skin, muscles, or tissue like ours.
- Using the APH Ant Overlay, review the parts of an ant. Identify the three main parts: the *head*, the *thorax*, and the *abdomen*. Explain that all insects have these three main parts in common.



- Ask students to name the two parts attached to an ant's head *[Antennae]* and guess how these parts might be used by the ant. *[Ants use their antennae or "feelers" to touch, taste, smell, hear, and communicate with other ants.]*
- Show the position of the ant's eyes. Explain that an ant has a compound eye located on each side of its head. An ant's large eyes resemble the surface of bubble wrap material in that they are divided into small sections (many little lenses) through which the ant views the world; their eyes allow them to detect motion without turning their heads. In comparison, we have simple eyes located on the front of our face.
- Explain that ants have scissor-like jaws or mouth parts, including the *mandibles,* that move side to side and are used to bite, tear, dig, defend, and lift things (seeds, leaves, twigs, etc.). The inside jaws, the *maxillas,* are used for chewing.
- Review the location of the middle section of the ant, the *thorax.* What do the students notice about the thorax? Like all insects, ants have six jointed legs, three on each side of the thorax. These legs contain hooked claws that help ants climb. Wings also grow out of the thorax of some ants.
- Review the location of the ant's *abdomen.* The abdomen is where the ant's food is stored and digested. Some

of the food is for the ant itself and some of the food is stored (in the “crop”) and shared with the rest of the ant colony. Females of many ant species have stingers that grow from the end of their abdomens.

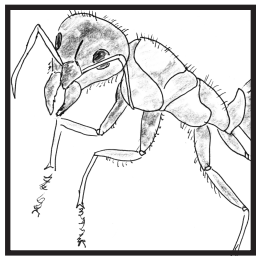
Extension:
Compare the ant’s body to the bodies of other insects (e.g., ladybug, grasshopper, fly, wasp) using 3-D models or pictures. The APH Butterfly Overlay can also be used to highlight the three main parts of an insect.

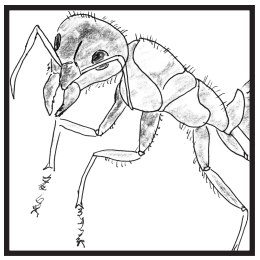
Go on an “ant hunt” in the school yard or at home. Where are ants likely to be found? Look on tree trunks, in cracks of pavement, near a garbage can, on the sides of a building, etc.

Affix bubble wrap material around a tennis ball to represent the structure of an ant’s compound eye. Each bubble represents a single lens.

Visual Adaptation:
The “actual size” of a real ant is shown on the APH Ant Overlay so that the student does not think a real ant is as big as the “enlarged” ant depicted on the same overlay. Intentionally teach students that ants are very different from one species to another. They can differ in color and size. Also remind students that some ants have wings that grow out their thorax.

Ask students if they have ever experienced a real ant crawling on their bodies. What did it feel like? Did it move quickly or slowly? Did it tickle or hurt?





Math Connection:
Some ants can pick up objects 20 times their body weight. Have students calculate how much they could carry if they were able to lift 20 times more than their body weight. What types of things could they lift if they were this strong?

Research and chart the length of various species of ants.

Language Connection:
Have students write a story called the "Perfect Picnic." In their stories they should pretend that they are an ant and write about the types of food that they would love to come across at a picnic: cookies, candy, fruits, etc.

Research and list the names of various species of ants: pharaoh ants, harvester ants, army ants, weaver ants, leaf-cutter ants, honeypot ants, driver ants, etc.

Invite an exterminator to talk to the class about how unwanted ants and other "pests" (e.g., termites, spiders) are removed from people's homes. Talk about how ants can be helpful and how they can be harmful.

Science Tidbit:
Ants have lived on Earth for more than 100 million years and there are over 20,000 species of ants on our planet.

Ant specialists are called *myrmecologists.*

Activity 2: An Ant's Abode

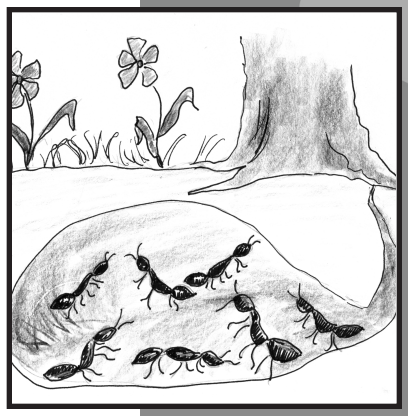
Objective:
To learn about ant colonies and the construction of ant homes.

Vocabulary:
Colony, underground tunnel, anthill, social, community, queen, workers, male, female, chamber

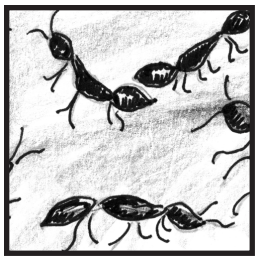
Materials:
Shoeboxes (5-6), empty paper towel rolls, miscellaneous items to represent each room of the underground tunnel (see "Procedure" for examples)

Inquiry:
What type of home do ants build for themselves?

Procedure:



- Divide the class into small groups and give each a shoebox with holes cut out of each side to allow for the insertion of an empty paper towel roll.
- Explain that ant colonies build underground tunnels that have separate rooms or chambers. These rooms serve different purposes.
- Assign each group a different "ant room" to build. Let them decorate and include items in their "room" that represent or



symbolize how the room is used. Although the anthill is not a room as such, a shoebox can be prepared that represents the dirt and waste that ants throw out of their homes (e.g., shredded newspaper, plastic bags, plastic bottle caps). Listed below are the various types of "ant chambers" that can be built and some content suggestions:

Queen Ant's Room or "Royal Chamber": small crown, a tiny throne or doll chair, rings, bracelets, beads, or jelly beans (to represent laid eggs), etc.

Nursery Room: pacifier, bib, baby bottle, etc.

Food Storage/Pantry: package of crackers, cookies, candies, small cereal boxes, etc.

Sick Room: tongue depressor, empty medicine bottle, bandaids, etc.

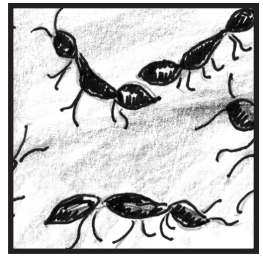
Winter home: mittens, scarf, ice scraper, hot chocolate package, etc.

- After each group has readied their ant room, have them share with the class the reasons they included the objects they did. Then have the students place their boxes on the floor in the arrangement of an ant tunnel (i.e., anthill on top, queen's nest near the middle, and the winter home near the bottom). Students can link

their homes with empty paper towel rolls. If available, a tiny ant model would be a fun item for students to move through the tunnels.

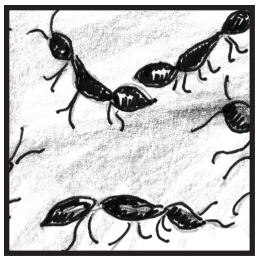
Extension:
Study the various "family members" of an ant colony and the roles and responsibilities they have. Each colony has one or two queens. A queen ant's primary job is to lay eggs that will make the colony grow bigger. She is the biggest ant in the colony. The male ants mate with the queen. Male ants live very short lives (less than a month). Most of the colony is made up of wingless worker ants; these workers are female and care for the young ants, search for food, and defend the nest.

Visual Adaptation:
If an APH *Picture Maker Diagramming Kit* is available in the classroom, use the Velcro® strips and textured shapes to build a tactile model of an ant home.



Math Connection:
Have students make a graph indicating the number and type of rooms in their own homes. Does everyone have a kitchen? A dining room? A basement? How many bedrooms do their homes have? How many bathrooms per house? Etc.

Language Connection:
Ants are often described as "social" creatures. Discuss how this word accurately describes ants: They form a community; they each have a special job to do; they work together as a team; they need each other to



survive, etc. Discuss other insects that live in colonies (e.g., wasps, termites, and bees).

Read Aesop's fable, *The Ant and the Grasshopper.* Look for this story at: www.pagebypagebooks.com/Aesop/Aesops_Fables

Read *Two Bad Ants* by Chris Van Allsburg, Houghton Mifflin, 1988.

Read *One Hundred Hungry Ants* by Elinor J. Pinczes and Bonnie MacKain (Illustrator), Houghton Mifflin, 1993.

Science Tidbit:
With the exception of army ants, all ant species have some type of nest; most of these nests are built underground.

Over a million ants live in an Army Ant colony.

Other "Ant" books to read:

Ant Cities (Let's Read-And-Find-Out Science Book) by Arthur Dorros, Ty Crowell Co., 1988.

The Ant Bully by John Nickle, Scholastic Trade, 1999.

Fascinating World of Ants by Angels Julivert, Marcel Socias (Illustrator), and Jose Maria Parramon, Barron's Juveniles, 1991.

Hey, Little Ant by Philip M. Hoose, Hannah Hoose, and Debbie Tilley (Illustrator), Tricycle Press, 1998.

It's an Ant's Life by Steve Parker, Tim Hayward (Illustrator), Robin Carter (Illustrator), and Adam Stower (Illustrator), Readers Digest, 1999.

Activity 3: Backyard Noises

Day and Night

Objective:
To identify and distinguish animal sounds heard during the day from those heard at night.

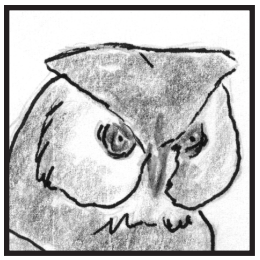
Vocabulary:
Backyard animal names (dog, rabbit, robin, owl, etc.), nocturnal, day, night

Materials:
Tape recorders; students' science journals; two hula-hoops; pre-brailled/pre-printed "backyard" animal name cards (dog, bird, cricket, etc.); "backyard" animal models

Inquiry:
Do we hear the same animal sounds at night as we hear during the day?

Procedure:

- Ask students which animal sounds they hear during the daytime. Make a list of their responses (dog, cat, birds, bees, geese, squirrels, etc.).
- Then ask students if they hear the same sounds at night. In some cases the sounds might be the same as those identified for the daytime.



New responses might include crickets, tree frogs, and owls. Make a separate list of the students' identifications of nighttime noises.

- Ask students to spend about 10-15 minutes at home recording in their science journals the animal sounds that they hear in their own backyards (during the day and at night). Have them share their observations with the class and compare with the lists that the class compiled at the beginning of the activity. Were any new sounds heard and identified? [**Note:** The teacher can pre-record some backyard animal noises and share with the class.]
- Divide the class into small groups and give each a tape recorder. Have each group record either "daytime animal" sounds or "nighttime animal" sounds by mimicking the noises they have heard (chirps, hoots, meows, barks, buzzes, honks, etc.). Let each group play their tape recordings for the class.

Extension:

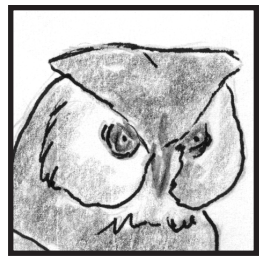
Although the human ear does not usually detect them, many animals are scurrying around us all the time—during the day and night. Have students identify some "quiet animals" that are moving about during the day (worms, butterflies, rabbits, squirrels, ladybugs, etc.) and

during the night (moths, bats, raccoons, spiders, beetles, etc.).

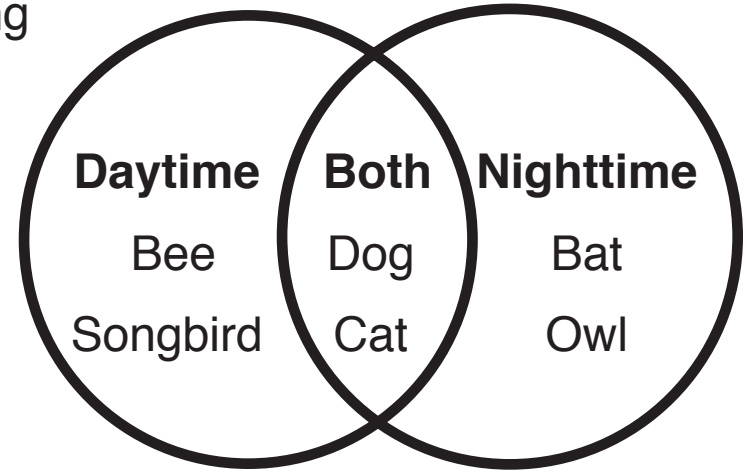
Discuss how animal sounds are very different during the winter months as compared to the spring and summer seasons.

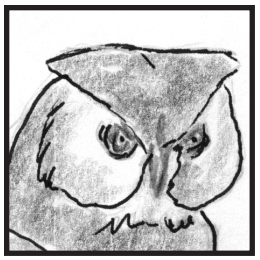
Visual Adaptation:
Collect animal models of the various backyard animals discussed and have students sort them into two groups—"nighttime animals" and "daytime animals." Students may wish to create their own clay models or draw a tactile picture using *Quick-Draw Paper* available from APH.

Math Connection:
Very small animals make some of the loudest noises we hear in our own backyards. Have students research the typical size of backyard animals (cats, dogs, crickets, owls, etc.) that make recognizable noises. Chart their findings and rank the animals from largest to smallest.



Using overlapping hula-hoops placed on the floor, create a Venn diagram to illustrate nighttime animals, daytime animals, and animals that are heard during both day and night. Cards with pre-brailled/pre-printed animal names or small animal models can be placed inside the appropriate "ring" section.





Language Connection:
Have students write a story or poem about an animal that moves about at night while everyone else sleeps.

Read Eric Carle's *The Very Quiet Cricket,* Philomel Books,1990.

Science Tidbit:
A cricket makes chirping noises by rubbing its two front wings together. A cricket's chirping rate increases as the air temperature rises.

Activity 4: Flashing Fireflies

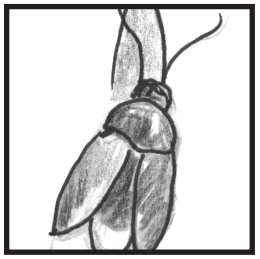
Objective:
To demonstrate the firefly's ability to track a mate.

Vocabulary:
Firefly, mate, light signals, lightning bug, female, male, bioluminescent

Materials:
Flashlights or glowsticks (8-10)

Inquiry:
Why do fireflies light up at night?

Procedure:
Note: The day before you plan to do this activity ask students to go outside that night and catch a few fireflies and place them in a jar with a damp paper towel. The jar should be covered with a hole-punched lid. Ask them to closely examine, with a magnifying lens, the fireflies and identify the head, thorax, and abdomen. Can they find the legs and the wings? Have students release the fireflies after they have had a chance to examine them. [Late spring/ early summer is the best time to collect fireflies.]



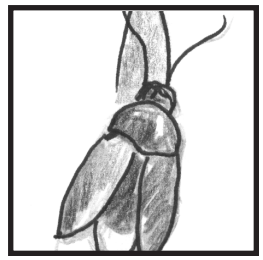
- In class, tell students that fireflies produce light to signal and attract mates so they can reproduce. Each firefly species has its own unique light signal or blinking code. Female fireflies on the ground flash their signals at flying males.
- Have students pretend to be fireflies and create their own special signals using flashlights or glowsticks. Divide the class into groups of 4-5 students. Have each group select one student to be the male firefly. Secretly assign each "male firefly" a unique light signal (e.g., one long flash followed by two short flashes, or two long flashes followed by one short flash). As the males practice their secret signals outside the classroom, select another student from each group to be the "female firefly." Show each female firefly a different light signal that will match one of the male firefly signals. Give the female fireflies a chance to practice their assigned signals.
- On cue, have the male fireflies enter the darkened classroom. All of the female fireflies should stand up and begin flashing their signals until the male firefly finds his mate.
- Repeat the procedure until everyone has had a chance to be either a male or female firefly.

Extension:
After students become familiar with the activity, let them create their own signals. Keep the signals limited to no more than four flashes.

Research other "bioluminescent" animals that generate their own light (e.g., squids, worms, angler fish).

Visual Adaptation:
Instead of using flashlights or glowsticks to make the special mating signals, have students use secret handshake signals (e.g., a 2-3 second long squeeze, followed by two one-second short squeezes). Have the students find their mates by shaking each other's hands using their secret codes.

Math Connection:
Compare and chart the life expectancy of a firefly with life spans of other insects.



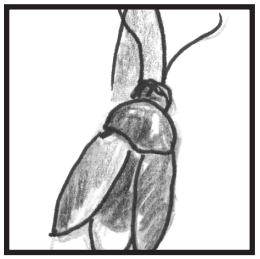
Language Connection:
Read some of the following:

The Very Lonely Firefly by Eric Carle, Putnam Publishing Group, 1995.

Fireflies! (Reading Rainbow Book) by Julie Brinckloe, Aladdin Paperbacks, 1986.

Fireflies in the Night (Let's Read and Find Out) by Judy Hawes and Ellen Alexander (Illustrator), Ty Crowell Co., 1991.

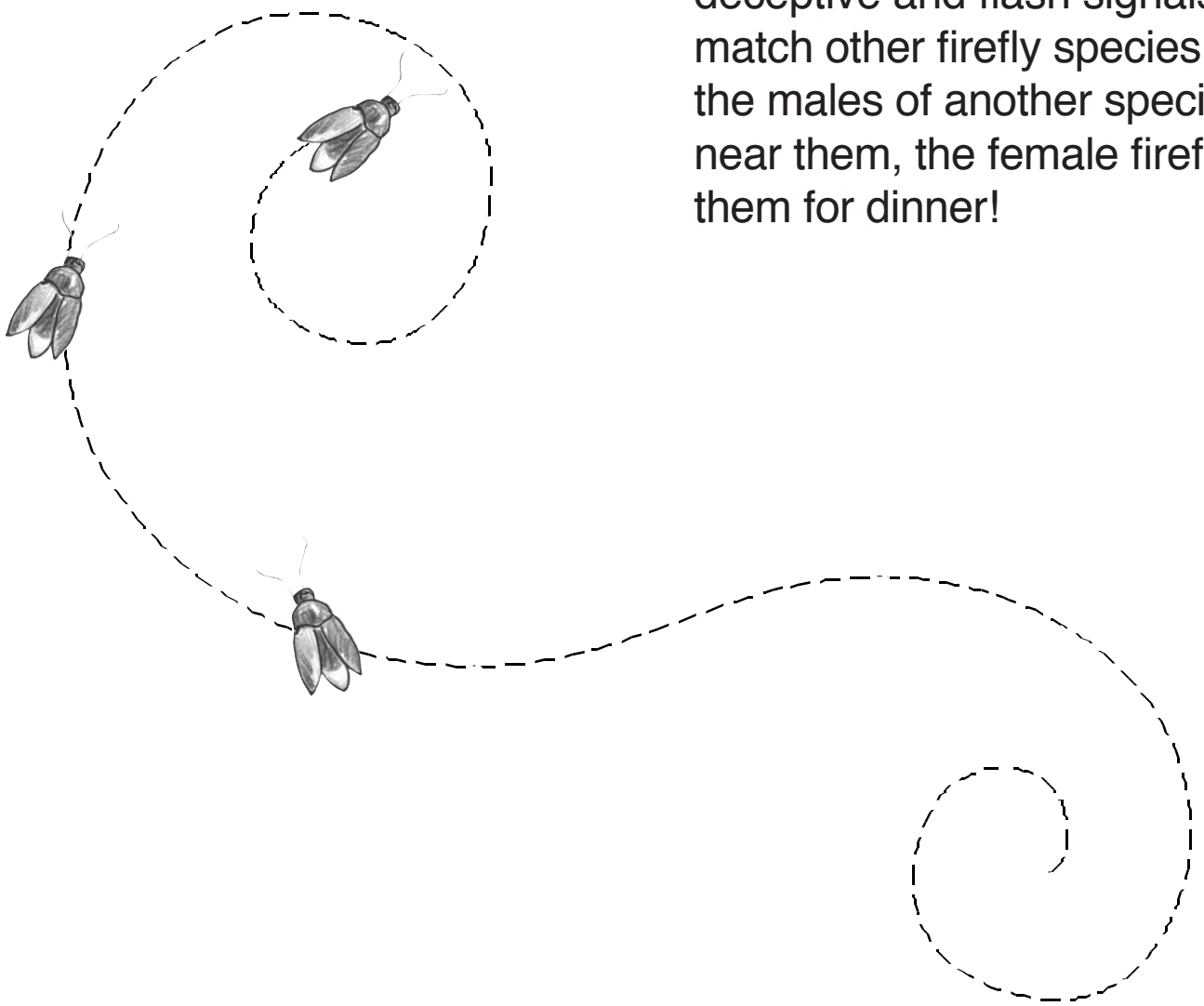
Ten Flashing Fireflies by Philemon Sturges and Anna Vojtech (Illustrator), North South Books, 1997.



Discuss how names of animals can sometimes be misleading. Fireflies are not flies at all—they are beetles.

Science Tidbit:
The adult male in many lightning bug species is the only one capable of flying.

Sometimes female fireflies are deceptive and flash signals that match other firefly species. When the males of another species land near them, the female fireflies eat them for dinner!



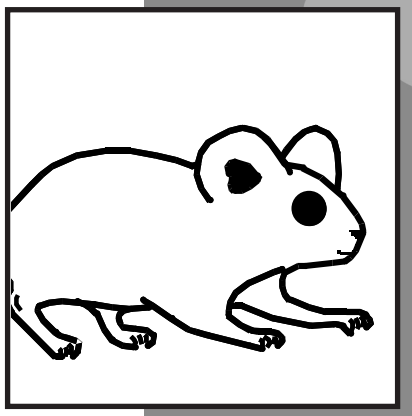
Activity 5: A House for a Mouse

Objective:
To create an appropriate habitat for a mouse (or other small rodent, such as a hamster, gerbil, or guinea pig).

Vocabulary:
Habitat, mammal, fur, mouse, rodent, whiskers, hamster, guinea pig, gerbil

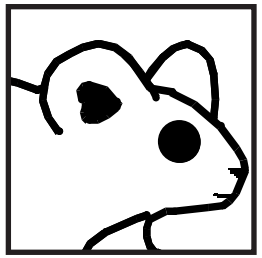
Materials:
Glass aquarium or cage; wood shavings; water bottle; food dish; mouse food (crushed seeds and small pieces of fruit); small box; real mouse or hamster (if allowed in the classroom)

Inquiry: How do we set up a habitat for a small mammal like a mouse?



Procedure:

- Ask students what type of animal a mouse is. (A mammal, classified as a "rodent.") Review the characteristics of a mammal.
- Ask students what features describe a mouse: fur, whiskers, tail (almost as long as the body), a pointed nose, sharp teeth, big eyes.
- Help students set up a habitat that would be ideal for a mouse. Place wood shavings



and a small box (for sleeping quarters) inside a clean, well-ventilated aquarium or cage. Add a water bottle and some mouse food to the habitat. Be sure to add toys such as an empty toilet paper roll or newspaper. Discuss the types of foods a mouse might like to eat.

Extension:
Research other types of rodents such as squirrels, gophers, beavers, guinea pigs, and porcupines. What physical characteristics do they all have in common?

Visual Adaptation:
Have students observe and handle (with adult supervision) a healthy mouse, gerbil, or hamster at a pet store.

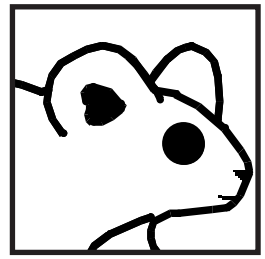
Use the APH Mouse Overlay to explore the parts of a mouse, including its ears, tail, legs, and body. Ask the students how the mouse shape on the overlay differs from the body of a real mouse. Is it about the same size? How is the texture different? Etc.

Math Connection:
Make a chart comparing the gestation period of various animals:

- 21 days for a mouse
- 30 days for a rabbit
- 63 days for a cat
- 40 weeks for a human
- 48 weeks for a horse
- 20 months for an elephant

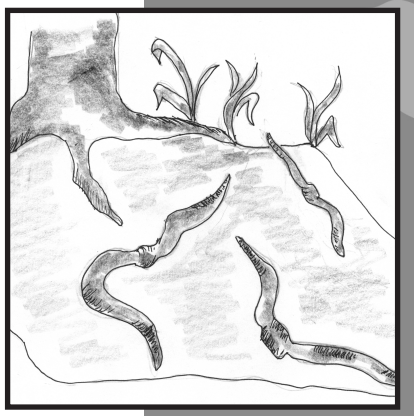
Language Connection:
Write about the adventures you would have in your own house if you were a mouse. Where would you hide? What would you eat? What would you do when everyone else is asleep? What dangers might be lurking (a family cat, a mouse trap, etc.)?

Research the meaning of "rodent." [Rodent means "to gnaw." Rodents have two large front teeth that they use for gnawing.]



Science Tidbit:
Mice live everywhere, including marshes, meadows, grasslands, forests, and deserts. In fact, mice live on every continent except for Antarctica.

Activity 6: Wiggling Worms



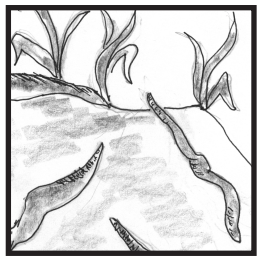
Objective:
To introduce students to worms and to observe if worms prefer moist or dry conditions.

Vocabulary:
Worm, damp, moist, dirt, movement, environment, dry, experiment, hypothesis, conclusion, test, results

Materials:
Worms (one for each pair of students), graphing chart, magnifying lens, shallow baking pan, two paper towels, water, timer. **Note:** Earthworms can be collected after a rain shower or bought at a bait store or a pet store. Night crawlers are usually the biggest of the available worms and easiest to acquire.

Inquiry:
How do worms move? Do they prefer a damp or dry environment?

Procedure:
Part 1: *Observation*
Begin by discussing respectful handling of worms. Tell the students that a



worm's skin is very sensitive and it must be treated gently. Have pairs of students lay a worm on a white paper towel sheet and observe how it moves. Have each student place a worm in the palm of her hand to feel how a worm wiggles and squirms. (Make sure students wash their hands after this activity.)

Part 2: *Experimentation*

Explain the purpose of experiments: When we want to find out something, we have to test it. If we want to know whether earthworms like a dry or moist environment, we can design a test to find out their preference. First we make a guess or hypothesis. Ask the students to predict which environment the earthworms will prefer. Record their answers on a chart or in their science journals.

Conduct the following experiment:

Place a wet towel and dry towel about a half an inch apart in a shallow baking pan. Then place 4-6 worms between the two paper towels. Observe the direction that the worms move. Do the worms move toward the wet towel or toward the dry towel? Have students record their observations in their science journals.

Extension:

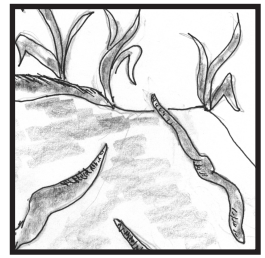
Conduct another experiment to determine if worms prefer a light or dark environment. Place a heap of dirt with worms in the center of the table in a well-

lighted area and observe how the worms burrow down into the dirt.

Discuss the purpose of worm composting; it is used to recycle food waste into a rich, dark, earth-smelling soil conditioner. Refer to *Worms Eat My Garbage: How to Set Up & Maintain a Worm Composting System* by Mary Appelhof and Mary F. Fenton (Illustrator), Flowerfield Press, 1997 and set up a worm compost in the classroom. Also visit the website www.magicworms.com for more information about composting.

Visual Adaptation:
The paper towel can be dampened with yellow food coloring to provide visual contrast against the worm's dark coloration.

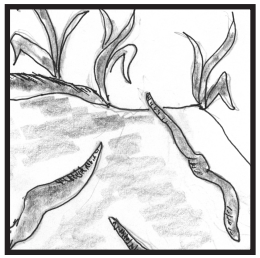
Allow the students to feel the worms after they have moved to the wet towel. Be sure to remind them that worms are fragile and must be touched gently.



Use the APH Snake Overlay. Does the student observe any similarities between the bodies of a worm and snake?

Math Connection:
"Clock" one worm at a time. How long does it take for each worm to find his moist, new home? Chart and compare the recorded times.

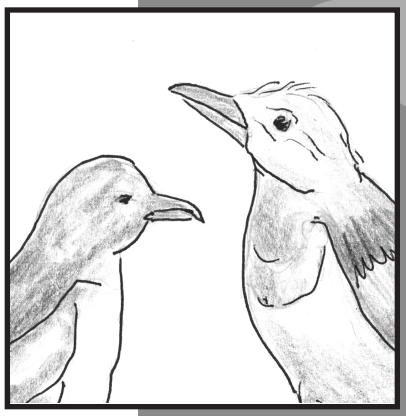
Language Connection:
Have pairs of students formulate and write an experiment (that includes a hypothesis, test, and conclusions) related to worms.



Science Tidbit:
One pound of earthworms (about 1,000 worms) eat one pound of garbage a day.

Earthworms belong to the "segmented" worm group. Each earthworm has 50-200 segments. They are among the most important animals on earth because they fertilize and aerate the soil, making it possible for plants to grow.

Activity 7: Feathered Friends



Objective:
To learn about the parts of a bird's body that enable the bird to fly.

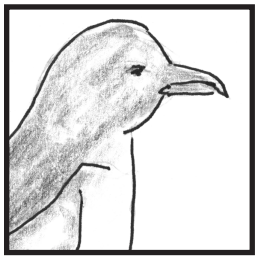
Vocabulary:
Bird, feathers, wings, light-weight, upstroke, downstroke, muscle, adaptation, wingspan, beak, tail, skeleton, hollow bones, down feathers, contoured feathers

Materials:
Real bird feathers; APH Bird Overlays (Side View and Top View); models of birds; cleaned chicken bones or turkey bones; access to window blinds

Inquiry:
How are birds' bodies specially adapted for flying?

Procedure:

- Start with the inquiry question and have the students guess why birds are able to fly and why people cannot.
- Explain that birds have a very *lightweight skeleton,* with strong, hollow bones and very few joints. How do human bones compare? [Our bones are very solid and heavy.]



Allow students to handle real chicken or turkey bones. chicken or turkey bones.

- Most of a bird's body weight (about one-third) is made up of its chest muscles. The bird uses these muscles to flap its wings. How do muscles of a human body compare? [Our strongest muscles are in our legs, which we use when we walk.]
- All birds have *feathers.* The number of feathers differs from one type of bird to the next. While a hummingbird has about 1000 feathers, a swan can have as many as 25,000 feathers. What are the special characteristics of feathers? [They are light-weight, durable, waterproof, and flexible.] What do humans have on their bodies instead of feathers? [Hair]

  Birds also have *strong beating hearts* because they need a lot of oxygen to fly. A bird's heart beats much faster than a human heart.

Extension:
Review how a bird uses its wings to fly. When a bird moves its wings upward, its feathers separate and create air pockets. When a bird makes a downstroke with its wings, its feathers close together and force down on the wind. The downstroke movement requires a lot of muscle strength. Use window blinds to simulate how bird feathers separate (open slats of window blinds) to allow air pockets and how they close

(close slats of window blinds) and overlap each other when a bird thrusts his wings downward.

While most birds can fly, some are flightless, such as ostriches, penguins, and emus. Research the physical characteristics that distinguish a flying bird from a flightless bird (e.g., longer feathers, rounded breastbone, more feathers).

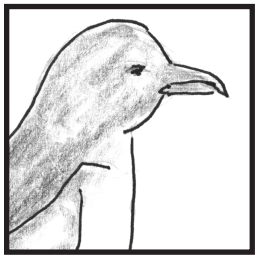
Discuss other functions of bird feathers beyond flight purposes (e.g., insulation, protection, camouflage).

Visual Adaptation:
Use both APH Bird Overlays to review the parts of a bird (beak, wings, tail, body, head, legs, and feet).

Fill a cardboard tube with playdough ("human bone") and leave another cardboard tube empty ("bird bone"). Have students feel the weight difference between a "human bone" and a "bird bone." Discuss the terms *hollow* and *solid.*

Allow students to handle and explore a variety of real bird feathers—small feathers from a songbird versus large peacock feathers...*down feathers* (small, fluffy) compared to *flight feathers* (located on wings and tail) and *contour feathers* (most colorful and found on wings, tail, and body). Point out the central shaft of a contour feather and the barbs on each side.

Explore how people have used bird feathers: writing quills, hat decorations, stuffing for pillows and coats, etc.



Use models of birds (in scale with the size of a real bird) to review the parts of a bird. Place the model at a side view to help the student transition to the tactile image encountered in the overlay.

Math Connection:

An albatross's wingspan can be 11-feet across! Use the APH Bird Overlay (Top View) to illustrate how a bird's wingspan is measured. Working in pairs, have students measure each other's arm span.

Depending on the species, a hummingbird can flap its wings 10 to 80 times a second! Have students calculate how many times a minute a hummingbird would flap its wings at a rate of 30 times a second...50 times a second...etc.

Language Connection:
Discuss the purpose of a "proverb" and have students guess the meaning of some very famous proverbs related to birds, such as "birds of a feather flock together," and "the early bird catches the worm."

Provide students with paper cutouts of feathers made from a heavy stock paper. In the center of a feather, have each student write/braille at least one fact they know about birds. Title the classroom bulletin board "Birds of a Feather" and decorate it with the students' "feather facts."

Read *Have You Seen Birds?* by Joanne F. Oppenheim and Barbara Reid (Illustrator), Scholastic Trade, 1990.

Science Tidbit:
Hummingbirds are the only birds that can fly straight up, backwards, and hover in one spot due to the design of their special wings.

Bats are the only mammals that can fly.

Scientists who study birds are called *ornithologists.*

Suggested Children's Literature

Allen, J., & Humphries, T. (2000). *Are You a Butterfly? (Backyard Books).* New York: Larousse Kingfisher Chambers.

Bernhard, E., & Bernhard, D. (1992). *Ladybug.* New York: Holiday House.

Brandt, K. (1986). *Insects (Creatures that Walk, Swim, or Fly).* Mahwah, NJ: Troll Associates.

Brenner, B., & Schwartz, C. (1997). *Thinking About Ants.* New York: MONDO Publishing.

Demuth, P. B., & Schindler, S. D. (1994). *Those Amazing Ants.* New York: Simon & Schuster.

Facklam, M., & Facklam, P. (1996). *Creepy, Crawly Caterpillars.* Boston: Little, Brown & Company.

Glaser, L., & Krupinski, L. (1992). *Wonderful Worms.* Brookfield, CT: The Millbrook Press.

Goor, R., & Selsam, M. E. (1991). *Backyard Insects.* New York: Scholastic Trade.

Greenberg, D. (1993). *Slugs.* New York: Little, Brown & Company.

Grossman, P., & Dawson, J. D. (1997). *Very First Things to Know About Ants.* New York: Workman Publishing Company.

Johnson, J. (1997). *Children's Guide to Insects and Spiders.* New York: Simon & Schuster for Young Readers.

Julivert, A., Socias, M., & Parramon, J. M. (1991). *The Fascinating World of Ants.* Hauppauge, NY: Barron's Juvenile Books.

Kalman, B., & Everts, T. (1994). *Bugs and Other Insects (Crabapples).* New York: Crabtree Publishing.

Kalman, B., & Everts, T. (1994). *Butterflies and Moths.* New York: Crabtree Publishing.

Llewellyn, C., Phillips, F., & Thompson, I. (1997). *Some Bugs Glow in the Dark (I Didn't Know That).* Brookfield, CT: Copper Beech Books.

Lovett, S. (1991). *Extremely Weird Frogs.* Santa Fe, NM: John Muir Publications.

Markle, S. (1999). *Outside and Inside Spiders.* New York: Aladdin Paperbacks.

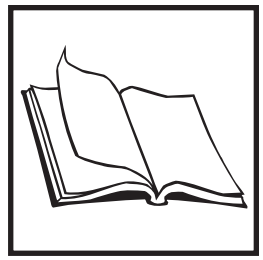
Morgan, S. (1996). *Butterflies, Bugs, and Worms.* New York: Larousse Kingfisher Chambers.

Pfeffer, W., & Keller, H. (1994). *From Tadpole to Frog.* New York: HarperCollins Children's Book.

Robertson, M. (2000). *Insects and Spiders.* Pleasantville, NY: Reader's Digest Children's Publishing, Inc.

Rockwell, A., & Halsey, M. (2002). *Becoming Butterflies.* New York: Walker & Company.

Silver, D. M., & Wynne, P. J. (1993). *Backyard (One Small Square).* New York: W. H. Freeman & Company.



Tagholm, S., & Kitchen, B. (1999). *The Barn Owl (Animal Lives).* New York: Larousse Kingfisher Chambers.

Additional story, resource, and reference books on backyard animals can be located at your local library and bookstore. You can also search for available large print and braille books on the Louis Database through the American Printing House for the Blind's Web site at www.aph.org. When searching for books on the Louis Database, keywords like "ants," "bees," or "insects" may be helpful.

Wetland Critters

Activity 8: Busy Beaver

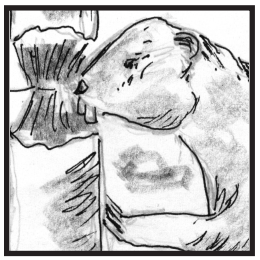
Objective:
To learn how the beaver changes the surrounding landscape to meet its personal needs.

Vocabulary:
Dam, lodge, beaver, mammal, build, rodent

Materials:
Twigs; toothpicks; clay; pebbles; mulch; picture or model of a beaver; shallow pan; trough (e.g., section of a gutter)

Inquiry:
Why do beavers make their lodges out of mud and sticks?

Procedure:
Show a picture of a beaver and ask students what they notice about it. [A beaver is a mammal (specifically a "rodent"); it has buck teeth, a scaly flat tail, webbed hind feet, and a furry body.] Explain that beavers build their homes, called "lodges," from toppled trees, broken branches, rocks, mulch, and trash. Often referred to as "dams," their dome-shaped lodges are built in shallow waters of ponds and streams. The upper half of the lodge is above water level;



inside is a chamber that leads to underground tunnels.

- As a class, build two small beaver lodges. Start by making one out of clay. Shape it like a beaver's lodge (dome-shaped) and then hollow out a room from the bottom.
- Build the second lodge, using plenty of twigs (or toothpicks), mulch, pebbles, and clay; mix and interweave them together. When the lodge is finished, hollow out a room at the bottom.
- Put the two lodges side by side in a shallow pan and push down on top of both of them. Which lodge is stronger? Why do beavers use both clay, rocks, and sticks to build its lodge?
- Explain that beaver dams back up the water flow in ponds and streams and, as a result, change the habitat of that area. To illustrate how dams prevent or slow waterflow, build a "dam" in a trough filled with water. Then tilt the trough and observe how it affects the waterflow.

Extension:
Research why people build dams: to gather drinking water; to create power and electricity from water; to keep areas from flooding; to bring farmers water; and to create lakes.

Discuss other types of rodents: rats, mice, squirrels, porcupines, voles, chipmunks, and hamsters. Rodents have chisel-like teeth for gnawing. How does this physical

characteristic assist beavers in building dams? [They use their teeth to gnaw trees and make them topple over.]

Visual Adaptation:
Take advantage of the tactile quality of this activity by allowing the students with blindness to get their hands messy and independently create their own beaver lodges.

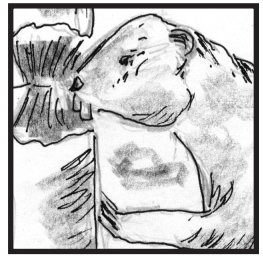
Math Connection:
Beavers weigh 45 to 65 pounds. Research and chart the average weight of other types of rodents.

Language Connection:
After hearing the story of *The Three Little Pigs,* have students write about which pig's house was most like a beaver's.

Science Tidbit:
Beaver dams create vital wetlands for other animals, such as fish, turtles, frogs, birds, otters, and ducks.

Beavers are the largest rodent in North America.

Beavers slap their tails on the water surface to scare away predators. They also use their tails as rudders.

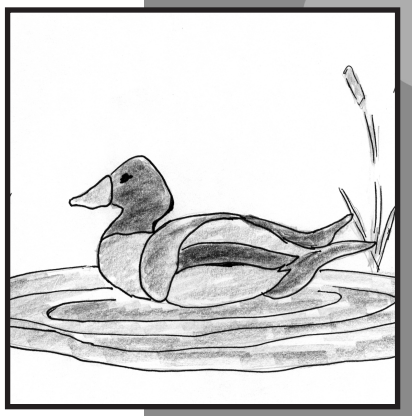


Activity 9: Isn't It Just Ducky?

Objective:
To determine the proper environment for ducks and if that environment is suitable for other birds.

Vocabulary:
Habitat, predator, duck, duckling, fowl, geese, turkey, chicken, swan, poultry

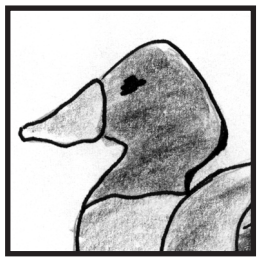
Materials:
Make Way for Ducklings by Robert McCloskey, New York: The Viking Press, 1941; pictures and models of ducks, swans, geese, turkeys, and chicken; three posterboards; ruled-line paper cut into large duck shapes (one for each student); APH Animal Track Overlays



Inquiry:
Do you think that chickens, ducks, turkey, swans, and geese could all live together in the same habitat since they are all birds?

Procedure:

- Read aloud *Make Way for Ducklings.* After reading the book, discuss with the whole class what the ducks needed for a suitable habitat. Make a list of the items and



record them on a large posterboard. Attach pictures of ducks.

- Divide the class into two groups. One group needs to research and discuss what kind of habitat is suitable for turkeys and chickens. The other group will research swan and geese habitats. Ask each group to list on their posterboard what is needed for their feathered friends' habitat. Drawings and pictures can be added.
- Meet back together and discuss what the different birds needed to make a good home. Use this time to emphasize that although all the animals studied were birds, they do not all have the same needs. Would any of the birds that the students researched be able to make their home with the mallard ducks? Which birds might be able to join them in the lake and which birds would decline the mallard's invitation to live at the lake?

Extension:
Research other types of birds and their preferred habitats.

Visual Adaptation:
Obtain a braille version of *Make Way for Ducklings.*

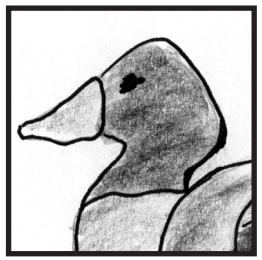
Compare the feet of waterfowl birds to those of land birds. Use APH Animal Track Overlays to examine the differences.

Math Connection:
In the story, Mrs. Mallard laid 8 eggs that hatched into 8 ducklings. Float 8 duck models in a bowl of water and have students create and solve math problems. For example: If two ducks left the group to go ashore, how many ducks would be left in the water?

Language Connection:
Have the class write a letter and reply to the invitation to join the mallard duck. Make sure to give a reason why the bird will or will not be able to accept the invitation.

> **Example:** The turkeys regret that they will not be able to join you. They do not fly well for long distances and prefer forested land, preferably with oak trees.

> **Example:** The swans will gladly accept your invitation. They love to dine on the vegetation that grows in shallow ponds.

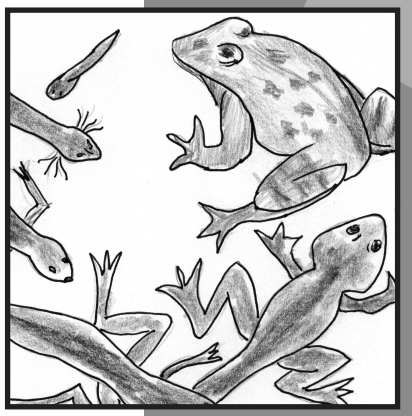


Have students write their letters on the "duck shape," ruled-line paper. After reading the letters aloud, post them on the classroom wall or bulletin board.

Discuss the meaning of *poultry*–birds (chickens, ducks, turkeys, geese) raised commercially or domestically for meat, eggs, and feathers.

Science Tidbit:
The largest waterfowl swan in North America is the trumpeter swan.

Activity 10: Life Cycle of a Frog



Objective:
To learn about the life cycle of a frog.

Vocabulary:
Frog, tadpole, polliwog, amphibian, adult, life cycle, eggs, hatch, gills, lungs, growth stages, metamorphosis

Materials:
APH Life Cycle of a Frog Overlay; [**Optional:** real frog eggs, aquarium, gravel, water plants]

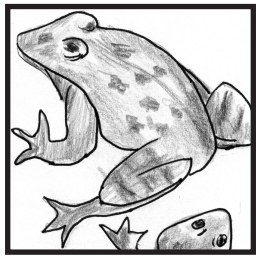
Inquiry:
How long does it take for a tadpole to change into a frog?

What changes take place in the tadpole as it becomes a frog?

Procedure:
Begin by asking students what characteristics make a frog an amphibian. [It is cold-blooded; it is a vertebrate; and it lives part of its life in the water and part of its life on land.]

Explain the stages of the life cycle of a frog:

1) Frog eggs are laid in the water and are protected by a jelly-like coating. Eggs will take



less than a month to hatch (depending on species and water temperature). Many eggs do not hatch because they are eaten by other animals (ducks, fish, insects).

2) A tadpole or polliwog hatches from a single egg and begins to swim in the water. It also breathes using external gills. At this stage the tadpole resembles a fish without scales. It eats algae and other vegetation.

3) As the tadpole grows, its gills disappear and lungs form; it can now breathe air. The hind legs develop first; the head becomes larger and the body elongates. Front legs are the last to form, and the tail starts to shrink.

4) The tadpole's tail disappears, and an adult frog emerges and hops out of the water and onto land.

   Note: Depending on the type of frog, weather conditions, and food supply, the length of complete metamorphosis can be fewer than 12 days or as much as a full year.

Extension:
If there is access to a pond where frogs are breeding in the spring, scoop up a few dozen eggs. Keep the eggs in pond water in a large bowl or aquarium. Add gravel and water plants. Keep the water temperature around 20 degrees Celsius. Observe the eggs and record when tadpoles appear.

Visual Adaptation:
Use the APH Life Cycle of a Frog

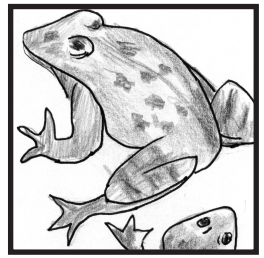
Overlay to review the metamorphosis from egg to adult frog.

Math Connection:
Using the "Extension" activity, have the students predict how many days it will take for the eggs to hatch into tadpoles and how many of the tadpoles they think will actually make the transformation into a frog.

A frog's back legs are longer than its front legs. Are our arms shorter or longer than our legs? Measure and find out.

Language Connection:
Read the book *Frogs* by Gail Gibbons, Holiday House, 1994.

Sometimes people use the words *frog* and *toad* interchangeably, but there are differences between these two amphibians, although they are closely related. Research and list the differences. [Frogs live in or near water; their skin is moist and smooth; their bodies are narrow; and they have upper jaw teeth. Toads live mostly on land; their skin is dry and rough (covered with warts); their bodies are broader and flatter; and they have no teeth.



Make a list of various frog types: bullfrog, wood frog, green frog, barking frog, etc.

Science Tidbit: The first frogs evolved during the early Jurassic Period—during the time of the dinosaurs!

Some tropical frogs lay their eggs under logs or dead leaves, and they never go through a tadpole stage.

Activity 11: Feast for a Frog

Objective:
To learn how frogs use their tongues to catch prey.

Vocabulary:
Amphibian, frog, tongue

Materials:
Double-sided tape; party blower for each student; plastic plates; many small pieces of colored paper or store-bought mylar confetti [Students can tear or cut paper pieces themselves.]

Procedure:

- Discuss the diets of adult frogs. They don't eat plants; they eat tiny animals. Their favorite foods are insects, spiders, and earthworms.
- Ask the students if they know how frogs catch their food? [They roll their long, flexible, sticky tongues out very quickly to catch their food and then swallow it whole.]
- Distribute party blowers and ask the students what part of

the frog the party blower reminds them of.

Have students uncurl party blowers and press a piece of double-sided tape on the underside end of the each blower. [Teachers can prepare blowers before the activity if necessary.]

Scatter small pieces of torn paper or confetti on a tabletop or plate. Have students try to catch the small pieces of paper, which represent insects, spiders, and earthworms. Each animal could be represented by a different paper color.

Note: Allow students to practice using their party blowers to catch "prey." To test the placement of the piece of tape, make sure that it reaches the surface of the table or plate when the party blower is fully extended.

Extension:
Set up a frog terrarium in the classroom so that children may observe a frog's eating habits.

Discuss the types of animals that eat frogs: snakes, lizards, birds, and other small animals. Create a "Frog Food Chain."

Visual Adaptations:
Gather brightly colored party blowers and use brightly colored paper or confetti against a white surface.

Give students an opportunity to tactually scan where the "prey" are scattered and then position the student at an ideal distance

for the blower to reach the paper pieces.

Math Connection:
Have each student sort their "animals" into piles and count them. Graph the number of "animals" caught.

Frogs can leap 20 times their length. Have students leap with their feet together and measure how far they can jump. Was it farther than their height?

Language Connection:
Read the following books (or other books about frogs):

All About Frogs by Jim Arnosky, Scholastic, 2002.

Fabulous Frogs by Linda Glaser and Loretta Krupinski, Millbrook Press Trade, 2002.

Science Tidbit:
Frogs use their eyes to help swallow food! A frog's eyes sink through openings in its skull and force food down its throat.

Frogs do not drink water—they absorb water through their skin.

Activity 12: "POND-ering" Creatures

Objective:
To learn about the types of animals that live near or in a pond.

Vocabulary:
Pond, wetlands, freshwater, pond animals (beaver, frog, turtle, duck, dragonfly, etc.), classify, carapace, shell, box turtle, snapping turtle

Materials:
Pictures, models, or tape recordings of animals that live near or in a pond; APH Turtle Overlay

Inquiry:
What are ponds like and what types of animals live in or near them?

Procedure:

- Ask the students to describe a pond. What sounds would they likely hear [croaking, chirps, buzzing]? What plants would be there [cattails, lily pads]?
- What animals would live in or near the water? Make a list of all the pond life that the students can identify on their own. Possibilities include the following: beaver, swan,

goose, muskrat, snail, toad, box turtle, crayfish, flamingo, duck, otter, dragonfly.

- Have each student or pair of students choose one of the pond animals listed. Have them record the following about their chosen animal: classification (fish, reptile, mammal, etc.); unique characteristics; movement; diet; life cycle; lay eggs or give birth to live young; life span; predators. Share their findings with the class.

Extension:
Focus specifically on pond turtles. A box turtle, for example, is a very common freshwater animal. Can students guess why it is called a "box" turtle? Is it because of the shape of its shell to protect itself? [A box turtle can lower its shell over its head and legs—it "boxes" up to protect itself against enemies.] Another pond turtle to study is the *snapping turtle*—a turtle with very strong jaws. Unlike the box turtle, a snapping turtle cannot pull its head under its shell; therefore it protects itself with powerful jaws.

Visual Adaptation:
Allow students to handle some pond creatures (frogs, turtles). Keep these animals in the classroom, if allowed, so students can observe their behavior and eating habits.

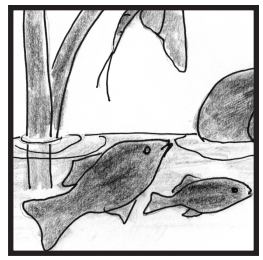
Use the APH Turtle Overlay to review the body structure of a turtle. Let the students

compare a real turtle shell to this tactile model or other turtle models. Be sure to explain that turtle shells have colorful patterns that are helpful for identification purposes. Introduce the word *carapace,* another name for the upper shell of the turtle.

Math Connection:
If available, have students measure various turtle shells.

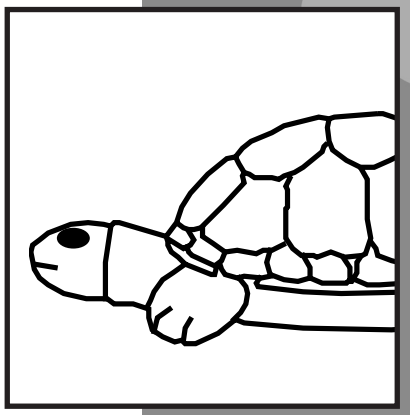
Language Connection:
Have the students, either individually or as a group, create an "Alphabet Book of Pond Creatures": A = ant; B = beaver; C = crayfish; D = dragonfly; E = earthworm; F = frog, etc.

Visit a freshwater pond and record the sounds. Have the students sketch a picture or write a narrative of their "pond" experience. Can students imitate some of the sounds they heard? Maybe let students form a "pond choir" made up of "croakers," "buzzers," and "chirpers" and "chirp" their favorite song.



Science Tidbit:
Most box turtles live about 40 years, but some have been known to live 100 years!

Activity 13: Super Shells



Objective:
To learn the parts of a turtle and purpose of its shell by creating a "box" turtle.

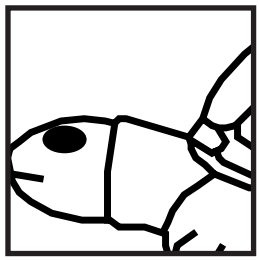
Vocabulary:
Turtle, box turtle, shell, claws, reptile, sea turtle, land/freshwater turtle, tortoise

Materials:
Real turtle shells; a small box with a lid for each student [or paper plate and bowl]; an assortment of "hard-feeling" and colorful craft materials (rhinestones, beads, dyed macaroni, etc.); glue; APH Turtle Overlay

Inquiry:
How does the turtle use its shell?

Procedure:

- Begin by asking students what type of animal a turtle is and why? [A turtle is a reptile because it is a cold-blooded vertebrate and has scaly skin.] Discuss where turtles can live [freshwater streams, ponds, marshes, on land, and



in the sea]. Turtles that live on land are sometimes called "tortoises."

- Have students explore real turtle shells, if available. Discuss how turtles use their shells. [Turtles use their shells as protection against predators such as raccoons. The land turtle simply pulls its head, legs, and tail under its shell when it is frightened. The shell protects the turtle's soft organs.]
- One type of turtle is the box turtle. The box turtle can actually close its top and bottom shells together and hide inside. Have each student decorate the lid of a small box with an assortment of hard and colorful items such as craft rhinestones, colorful beads, or dyed macaroni. Have them create unique patterns as they decorate their "box" turtles. Explain that the turtle's shell pattern can indicate the type of turtle it is.

  Variation: Staple paper bowls upside-down to paper plates to create "turtles."
- After decorating their boxes, have students place something special and that they treasure and want to keep safe (either at home or at school) inside of their "turtles."

Extension:
Mix all the "box" turtles on a table and see if each student can identify their own box turtle through touch only. Can they remember the pattern they created?

Research the differences between sea turtles and land/freshwater turtles [sea turtles have flippers—land/freshwater turtles have claws; sea turtles can't pull their heads inside their shells—land turtles can, etc.].

Visual Adaptation:
Use the APH Turtle Overlay to explore the parts of a land turtle (from both a top view and side view).

Give the visually impaired students an opportunity to feel a real turtle.

Math Connection:
The biggest sea turtle is called a leatherback. It can grow to be 8-feet long. Have students use nonstandard units to measure eight feet—how many chairs, shoes, desks, etc., does one need?

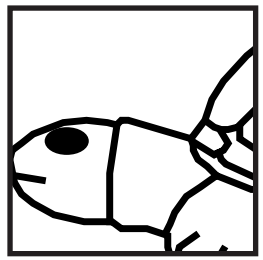
Language Connection:
Have students write a poem about a turtle.

Read a version of the Aesop fable, *The Tortoise and the Hare.*

Have each student pretend he is a turtle and write a party invitation to his friends.

Invite a herpetologist to talk to the class about reptiles.

Science Tidbit:
Turtles don't have teeth—only powerful jaws.



It's a Party!

Invited: Reptiles Only!

Where: Nearest pond or stream

Dress: Come as you are with scales and shells

Menu: Bugs, flies, slugs, and berries

Games: Hide-and-seek from coyotes, raccoons, and otters

Suggested Children's Literature

Arnosky, J. (1994). *All About Alligators.* New York: Scholastic, Inc.

Arnosky, J. (2000). *Beaver Pond.* Washington, DC: National Geographic Society.

Back, C., & Watts, B. (1990). *Tadpole and Frog.* Morristown, NJ: Silver Burdett Press.

Cone, M. (1996). *Squishy, Misty, Damp & Muddy: The In-Between World of Wetlands.* San Francisco: Sierra Club Books for Children.

Corrigan, P., & McGee, J. F. (1996). *Beavers for Kids (Wildlife for Kids Series).* Minnetonka, MN: NorthWord Press.

Davies, N., & Chapman, J. (2001). *One Tiny Turtle.* Cambridge, MA: Candlewick Press.

Falwell, C. (2001). *Turtle Splash: Countdown at the Pond.* New York: Greenwillow.

Ferri, V., & Bennett, A. (2002). *Tortoises and Turtles.* Westport, CT: Firefly Books Limited.

George, W. T., & George, L. B. (1989). *Box Turtle at Long Pond.* New York: Greenwillow.

Hirschi, R. (1994). *Save Our Wetlands.* New York: Delacorte Press.

Hirschi, R., & Kuhn, D. (1994). *Turtle's Day.* New York: Cobblehill Books.

Lovett, S. (1996). *Extremely Weird Frogs.* Santa Fe, NM: John Muir Publications.

Nayer, J., & Goldberg, G. (1992). *Reptiles at Your Fingertips.* New York: McClanahan Book Company.

Parker, N. W., & Wright, J. R. (1990). *Frogs, Toads, Lizards, and Salamanders*. New York: Greenwillow.

Pearce, Q. L., & Mazellan, R. (1992). *Why is a Frog Not a Toad? Discovering the Differences Between Animal Look-Alikes.* Los Angeles: Lowell House.

Pfeffer, W., & Keller, H. (1994). *From Tadpole to Frog.* New York: HarperCollins Children's Book.

Silver, D. M., & Wynne, P. (1994). *Pond (One Small Square)*. New York: WH Freeman & Company.

Silver, D. M., & Wynne, P. (1997). *Swamp (One Small Square).* New York: WH Freeman & Company.

Taylor, D. (1992). *Endangered Wetland Animals (Endangered Animal Series).* New York: Crabtree Publishing Co.

Weigelt, U., & Watts, B. (2002). *Old Beaver.* New York: North South Books.

Additional story, resource, and reference books on wetland animals can be located at your local library and bookstore. You can also search for available large print and braille books on the *Louis* Database through the American Printing House for the Blind's Web site at www.aph.org. When searching for books on the *Louis* Database, keywords like "wetlands," "frog," or "tadpole" may be helpful.

Desert Dwellers

Activity 14: Desert Dwellers

Objective:
To learn about deserts, their location, and the animals that live in these dry regions.

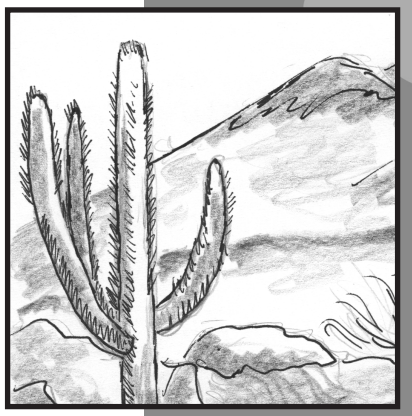
Vocabulary:
Desert, dry, sand, arid, desert animal names (e.g., sidewinder, bobcat, roadrunner, gray fox)

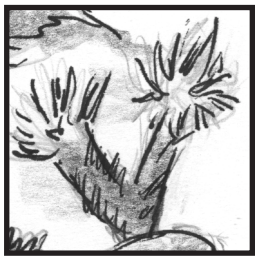
Materials:
Map of the United States (printed, embossed, or take-apart); pictures or models of desert animals

Inquiry:
What are deserts like and what types of animals live in them?

Procedure:

- Ask students what they already know about deserts. Possible answers include:
  - very hot and dry
  - receive little rain
  - have very few plants
  - have very little shade
  - very hot in the daytime
  - cool or cold at nighttime
  - wide range in temperature between day and night





- Using a map, review the location of deserts in the United States. Texas, Utah, Colorado, Wyoming, New Mexico, Nevada, California, and Arizona are states with desert ecosystems. The four major deserts in the United States are the Great Basin, the Mojave, the Sonoran, and the Chihuahuan.
- Ask students if they know of any animals that live in deserts. Make a list of the animal names given by students and group the animals into the following categories: mammal, reptile, amphibian, bird, insect, arachnid. Add to the list common desert animals that the students might not have thought of or known about.

Visit the following website for a complete listing of desert animals: www.desertusa.com

Extension:
Identify deserts in other continents. Discuss types of desert animals not found in North American deserts (e.g., camel, komodo dragon, dingo, armadillo, lizard).

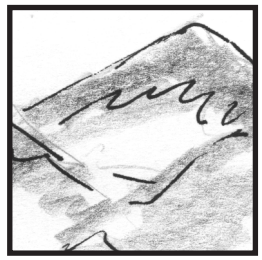
Visual Adaptation:
Use an embossed map or take-apart United States puzzle map to highlight desert regions. Insert or tactilely mark states that have deserts.

Braille and print the names of the desert animals discussed in class on separate cards. Have students sort the animal cards into separate piles (mammals, birds, reptiles, etc.). Animals

can also be grouped according to their "home" location (North America, Australia, etc.)

Math Connection:
Deserts receive fewer than 10 inches of rain each year. Research and chart the average rainfall per year in grasslands, rainforest, temperate deciduous forests, and tundras. Which habitat receives the least amount of rain? The most? [Actually collect and measure rainfall so students understand "inches of rain."]

Language Connection:
Have students work in pairs and select a "desert dweller" to research and report at least two interesting facts about the selected animal. Possible animals to research include: rattlesnake, scorpion, bobcat, roadrunner, kingsnake, coyote, vulture, cactus wren, chuckwalla, etc. Report their findings to the class.



Science Tidbits:
Deserts cover about one-fifth of the earth's land. The Sahara is the largest desert in the world and is located in North Africa.

The roadrunner is New Mexico's state bird.

Activity 15: Some Like It Hot

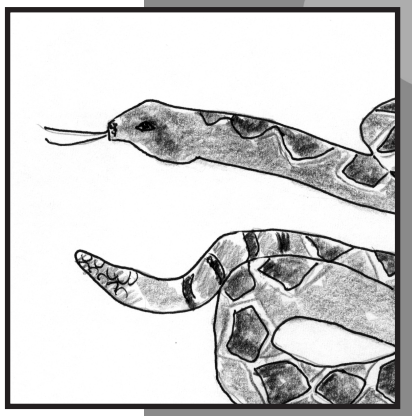
Objective:
To learn how reptiles change from hot to cold depending on the weather.

Vocabulary:
Cold-blooded, temperature, reptiles, snake, turtle, lizard

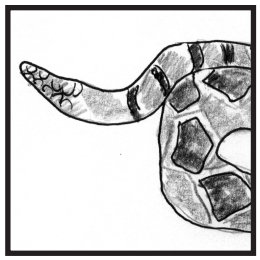
Materials:
Heavy aluminum foil; scissors; ice water

Inquiry:
What does “cold-blooded” mean?

Procedure:



- Explain that all reptiles are *cold-blooded.* This means that the animal’s body temperature changes with the temperature of the water or air around it. Reptiles, and all cold-blooded animals, lack an inner thermostat.
- Cut a snake, turtle, or lizard shape out of heavy aluminum foil. Place it in direct sunlight for a few minutes and have students feel its warmth.



Place the reptile cutout in a bowl of ice water for a few minutes. Take it out and let students feel it. Explain that real reptiles get hot or cold almost as quickly as the aluminum foil reptile.

- Explain that when it is too cold outside, reptiles cannot move quickly. During the winter these animals hibernate by going underground or building a place to rest.

Extension:
Review other characteristics of reptiles besides "cold-blooded." Reptiles are animals with backbones; they have rough, scaly skin; and they breathe through lungs. Have groups of students research and report on reptiles of their choice.

Visual Adaptation:
Have students record the day's temperature on the *Tactile Demonstration Thermometer* (if available). How does their own body temperature compare to the temperature outside?

Math Connection:
Have students describe the difference between the temperature of the reptile cutout placed in the sun and the temperature of the reptile cutout placed in ice water.

Language Connection:
Recite the following poem:

A turtle is a reptile; its home is on its back,

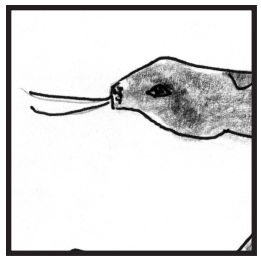
It never has to worry that someone will attack,

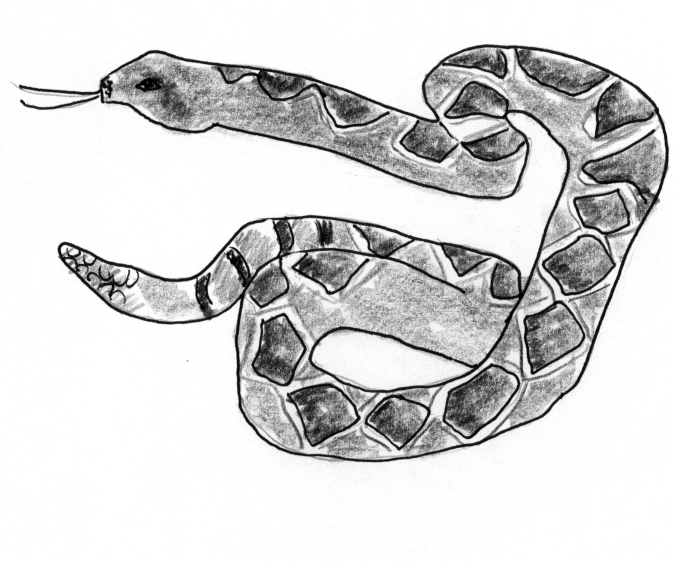
When it spies an enemy, what does it do so well?

It simply takes its head and feet and pops inside its shell.

Let students make up their own "reptile poem" and share it with the class.

Science Tidbit:
Most cold-blooded animals adjust their body temperature by moving into sunlight when they become too cool and moving into shade when they become too warm.





Activity 16: Snake Traits

Objective:
To make "snakes" and learn some "snakey facts."

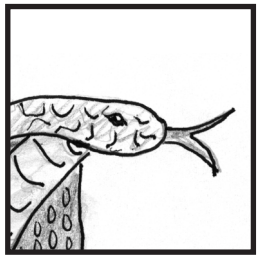
Vocabulary:
Snake, reptile, hibernate, molt, cold-blooded, scales, forked tongue, viper, poisonous, nonpoisonous, venom

Materials:
Crayola Model Magic®, Play-Doh®, or homemade modeling dough; items to make scaly texture/patterns on "snakes"; construction paper cut into the shape of a forked tongue (one for each student); two small craft eyes for each student; clear plastic wrap; APH Snake Overlay; pictures and models of snakes

Inquiry:
What are some interesting characteristics of snakes?

Procedure:

- After exploring models and pictures of snakes, give each student (or pair of students) some modeling dough. Demonstrate how to roll the dough into the shape of a long, slender snake.



- As the students make their snakes, share these facts:
  1) A snake is a reptile that has no legs, arms, or hands.
  2) A snake's forked tongue helps it gather smells and track animals. [Have each students add a forked tongue to their snakes.]
  3) A snake's eyes are always open and covered with clear scales; the scales keep the snake's eyes from drying out. [Have students add craft eyes to their snakes.]
  4) Hard scales cover a snake's entire body. [Have students texture their snakes by adding sequins or beads, rolling their snake on screenwire, poking patterns with the end of a straw, etc.]
  5) Snakes have no ear openings.
  6) Snakes are cold-blooded, and they cannot live where the ground stays frozen all year.
  7) Snakes molt, or shed their tight, old skin in order to grow new skin. [To demonstrate molting, have students wrap their snakes in clear plastic wrap and then peel it off; peel the plastic wrap, from "head" to "tail" so it ends up inside-out].
  8) Some snakes live in the water, and some live on land.

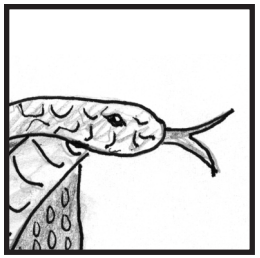
Extension:
Discuss the variety of places snakes live: deserts, forests, oceans, streams, and lakes. Have students make homemade habitats for their snakes. They can use shoeboxes as homes. On the outside of their snake's "shoebox" habitat, have students label the type of snake they pretended to make (see "Language Connection" for possibilities).

Use Play-Doh® to demonstrate the head shape of a poisonous snake (wide with blunt noses) compared to a nonpoisonous snake's head (elongated). Vipers have heart-shaped heads because their venom glands are located on each side of their heads. Also, illustrate the shape of most poisonous snakes' pupils (vertically slit) versus those of nonpoisonous snakes (round like those of humans).

Visual Adaptation:
Use the APH Snake Overlay to review the general shape and body parts of a snake.

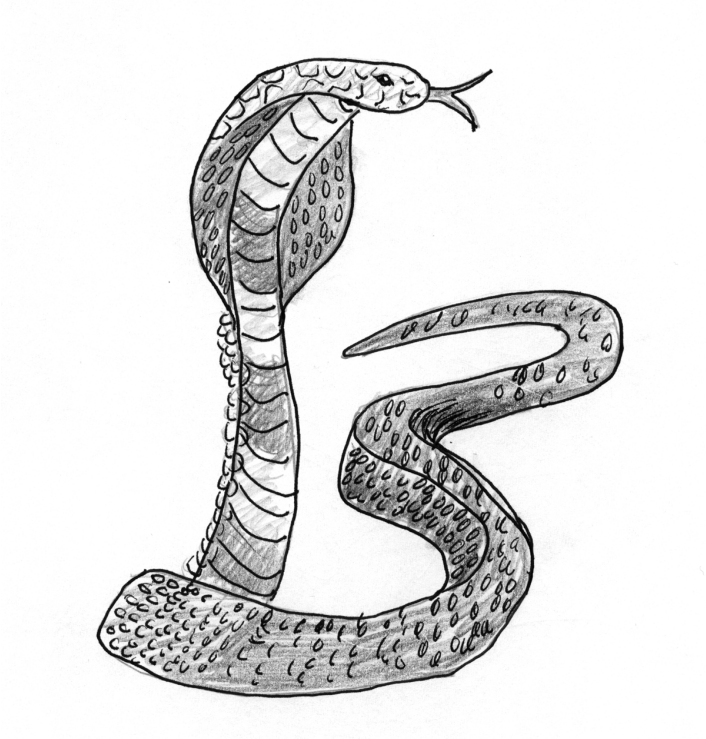
Math Connection:
Students can measure the snakes they created. Are some longer than others?

The anaconda of South America may grow to be 30-feet long. Have students pace off 30-feet to gain a better understanding of the snake's length. Research the lengths of various types of snakes and decide how many garter snakes, for instance, can fit inside an anaconda.



Language Connection:
Become familiar with names of various snakes: cobra, cottonmouth, garden, rattlesnake, copperhead, boa constrictor, water moccasin, coral snake, garter snake, etc.

Play "SNAKE Bingo" by making playing cards with snake names and/or snake traits (e.g., viper, fang, asp, cobra).

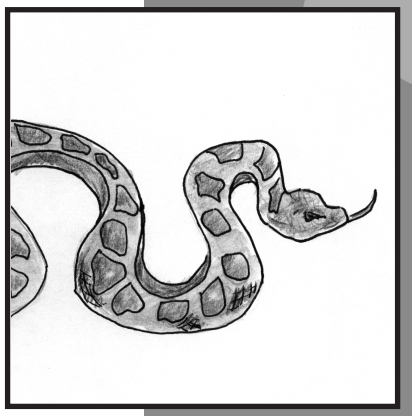


Science Tidbit:
Snakes make up the largest group of reptiles.

A North American rattlesnake may molt two or three times a year. Each time it sheds its skin, a new segment may be added to the rattle on the snake's tail.

Poisonous snakes have large, hollow teeth called fangs. Poison fills the fangs before the snake bites its prey.

Activity 17: Feed that Snake!



Objective:
To learn about the eating habits of most snakes and how snakes can swallow things bigger than their own heads.

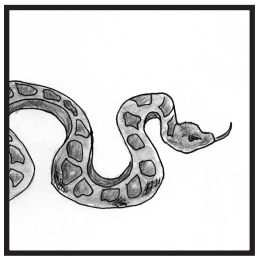
Vocabulary: Snake, venom, fangs, swallow, digest, poisonous, prey

Materials: Long, uninflated balloons to represent snakes; round beads or blocks (a little larger than the "snake's mouth" or opening of the balloon)

Inquiry:
What do snakes like to eat?

Procedure:

- Explain that snakes are meateaters and are able to swallow things that are wider or bigger than their own mouths, such as birds, frogs, mice, and even other snakes. They don't even chew their food, they just swallow it whole! Ask the students if it is possible for a person to swallow an entire pizza without chewing.
- Explain that a snake has pointed teeth that curve back toward its throat; these



curved teeth prevent the snake's prey from escaping as the snake swallows it alive. Poisonous snakes bite their prey with fangs and inject venom into the wound; the venom kills the animal before the snake even begins to swallow it.

- The jaws of most snakes are loosely connected to each other, allowing snakes to open their mouths extremely wide. To show students how a snake's body is able to stretch when it eats, use a balloon to represent the snake and a bead or block to represent the food. Put the balloon on a table and stretch the mouth of the balloon wide enough so that the bead or block can be squeezed inside. Then work the "food" down the "snake's stomach."
- Distribute enough balloons and beads/blocks so that students can try this experiment in pairs, each taking turns at being the "snake" and being the "food."

Extension:
Research types of snakes that actually squeeze their prey to death, such as anacondas, constrictors, and pythons.

Visual Adaptation:
Use brightly colored balloons with contrasting beads or blocks (e.g., a yellow balloon and a black bead).

If possible, arrange for a field trip to a zoo. Often there are classes offered in which children are able to touch snakes. Or, invite a herpetologist to class to talk more about snakes.

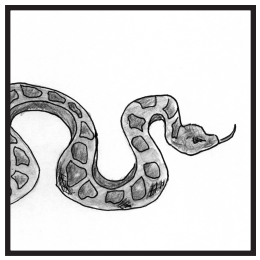
Math Connection:
Measure how much wider the bead or block is than the opening of the balloon.

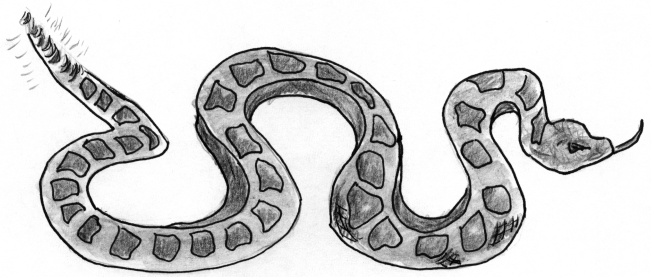
Language Connection:
Write a story about being a snake. Where would you go? Where would you live? What would you eat?

Science Tidbit:
Sometimes it takes a snake more than half an hour to swallow an animal. In order to keep breathing while eating, a snake's windpipe is pushed forward over the tongue and out of its mouth.

Some snakes eat only eggs and swallow them whole.

Snakes must spend some time in the warmth of the sun every day to aid in digestion.





Activity 18: Poisonous Patterns

Objective:
To learn how an animal's physical appearance can protect it from predators.

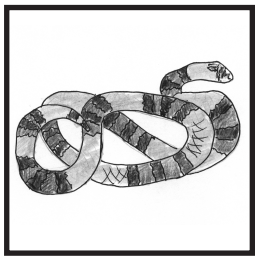
Vocabulary:
Coral snake, poisonous, coloration, Kingsnake, pattern

Materials:
Three different types of pasta noodles that can be strung together; yarn (cut in 12-inch strips – 2 per student); food coloring (color each type of noodle a different color – black, red, yellow); pictures or models of a coral snake and a kingsnake; APH Snake Overlay

Inquiry:
Can you identify a poisonous snake by its physical appearance?

Procedure:

- Explain that coral snakes, which are very poisonous, are marked with a pattern of brightly colored bands that are black, yellow, and red. Although some non-venomous snakes might have the same band colors, only the coral snake has red bands next to yellow or yellowish-white bands. Non-venomous snakes (e.g.,



Scarlet Kingsnake) with similar coloration as the coral snake are sometimes avoided by predators because they are mistaken as dangerous.

- Using pre-dyed pasta noodles (three different kinds – each type dyed a specific color), have students create "snake" necklaces in poisonous and non-poisonous patterns. The pattern of the "poisonous snake" should be yellow-black-yellow-red-yellow-black-yellow-red. The pattern of the "non-poisonous snake" should be red-black-yellow-black-red-black-yellow-black.
- Repeat each "snake" pattern at least three times when making the necklaces.

Variation: Different shaped/colored wooden beads can be used instead of pasta noodles to build "snakes."

Extension:
Using some of the snake necklaces that students made, place a "poisonous snake" inside a box with all "non-poisonous snakes." Without looking, can the students find the "poisonous snake" by its tactile pattern alone?

Visual Adaptation:
Have the blind student use braille letters to create poisonous and non-poisonous "snakes" on paper:

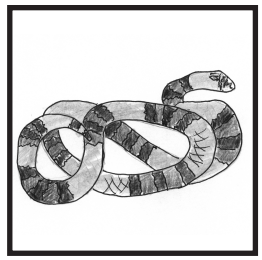
ybyrybyrybyr OR
rbybrbybrbyb.

Sighted students can do the same by writing print letters on paper in corresponding colors.

Use the APH Snake Overlay that depicts the colored bands of a coral snake.

Math Connection:
Coral snakes grow to be about two-feet long. Have students measure and identify objects in the classroom that are two-feet long.

Language Connection:
The phrase "red on yellow kills a fellow; red on black venom lack" helps people remember the poisonous pattern of a coral snake. Have students write a short rhyme that will help them remember something important about snakes.



Science Tidbit:
There are only four venomous snakes in the United States – the Coral Snake, the Copper-head, the Cottonmouth Water Moccasin, and the Rattlesnake.

Activity 19: Slithering Snakes

Objective:
To become familiar with how snakes move.

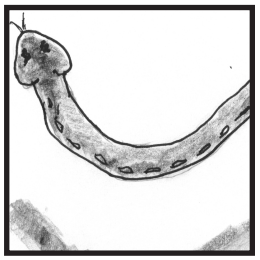
Vocabulary:
Slither, crawl, climb, sidewind, coil, wave-like motions, creep, wriggle, serpentine, concertina, movement, coil, caterpillar

Materials:
Fake snake(s) and modeling clay

Inquiry:
How do snakes move from place to place if they don't have legs?

Procedure:

- Explain to students that even though snakes don't have legs, they still have ways of moving around. The most common of four ways that snakes travel is by making horizontal wave-like or *"serpentine"* motions on the ground. The snake pushes its body against rocks or other hard objects to move. Have students demonstrate this type of movement by pulling a rubber snake along the floor in a wave-like fashion.



- Snakes that live in soft sand often *sidewind.* During sidewinding, the snake loops its body into an "S-shape" and, using its head and tail as supports, lifts the trunk of its body off the ground and throws it sideways. Using the rubber snake, imitate a sidewinding movement.
- Some snakes creep along, using a *"caterpillar-like"* motion. These snakes keep their bodies straight and travel only by moving the scales on their bellies forward and backward. Have students lie flat on their bellies. Is there any way they can move if they keep their bodies flat on the floor?
- The fourth way some snakes move is in a *concertina* fashion. This movement is good for a snake in tight spots; it first bunches its body up in loops and then uses its tail as an anchor as it pushes its head forward. Then it anchors its head and brings its tail forward. This process is repeated over and over. Again, have students use the rubber snake to model this type of movement. An accordion-folded strip of paper can also be used.

Extension:
Have students make slender, long "snakes" with modeling clay (see Activity 16: Snake Traits). Then have the students coil their snakes using upward, swirling motions. Have students search

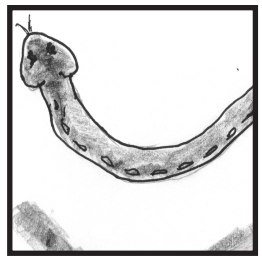
for other things that are coiled (a spring, a Slinky®, a pasta noodle, telephone cord, etc.).

Students can make a "human snake" by forming a straight line and holding onto the shoulders of the person in front of them. Have the leader of the line walk a wave-like pattern while those behind him follow along.

Visual Adaptation:
Make tactile patterns of snake trails with puff ink, yarn, or embossed lines on a piece of paper. Trails can consist of squiggly lines, loops, etc. Have students track the snake's path with their fingers.

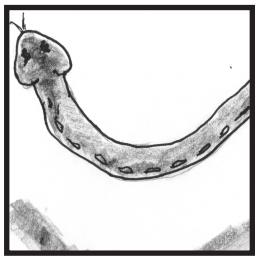
Let students create their own snake patterns on APH's *Quick-Draw Paper.*

Have students explore a real musical concertina or accordion to understand how a snake's movement can resemble the movement of the instrument when played.



Math Connection:
Measure the distance traveled in a straight path versus a twisty-turny path between two set points (e.g. two chairs, two people).

Compared to other animals, snakes don't move all that quickly. Pythons, for example, travel only one mile per hour. Have students investigate how swiftly other animals travel and make a chart of their findings.



Language Connection:

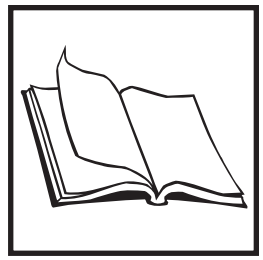
Have students create a list of all the verbs that describe how snakes move: creep, crawl, slither, climb, coil, sidewind, twirl, etc.

Have students write a story about places they could explore if they had no arms and legs and could fit into tight spaces.

Science Tidbit:

The African ball python protects itself by coiling into a tight ball with its head tucked in the middle.

Suggested Children's Literature



Albert, R., & Long, S. (1994). *Alejandro's Gift.* San Francisco: Chronicle Books.

Beifuss, J., & Turley, P. (1995). *Armadillo Ray.* San Francisco: Chronicle Books.

Baylor, B., & Parnall, P. (1993). *Desert Voices.* New York: Aladdin Paperbacks.

Broakel, R. (1982). *Snakes (New True Book).* Chicago: Children's Press.

Butterfield, M. (1999). *Animals in Hot Places (Looking At).* Austin, TX: Raintree/Steck-Vaughn Company.

Creagh, C., Greer, A. E., & Bowman, A. (1996). *Reptiles (Nature Company Discoveries).* San Francisco: TimeLife.

Darling, K., & Darling, T. (1997). *Desert Babies.* New York: Walker & Company.

Ethan, E. (1995). *Boas, Pythons, and Anacondas (Fangs! An Imagination Library Series).* Milwaukee, WI: Gareth Stevens Publishing.

Flanagan, A. K. (1996). *Desert Birds (New True Book).* New York: Children's Press.

Gibbons, G. (1996). *Deserts.* New York: Holiday House.

Gibson, B., & Urquhart, J. C. (1995). *Creatures of the Desert World (Action Books).* Washington, DC: National Geographic Society.

Irbinskas, H., & Spengler, K. J. (1994). *How the Jackrabbit Got His Very Long Ears.* Flagstaff, AZ: Rising Moon.

Johnston, T., & Young, E. (2000). *Desert Song.* San Francisco: Sierra Club Juvenile Books.

Landau, E. (1999). *Desert Mammals (True Book).* New York: Children's Press.

Ling, M., King, D., Greenaway, F., & Atkinson, M. (2000). *Snake Book: A Breathing Close-Up Look at Splendid, Scaly, Slithery Snakes.* London: Dorling Kindersley Publishing.

MacQuitty, M. (2000). *Deserts (Eyewitness Books).* New York: Dorling Kindersley Publishing.

Savage, S. (1997). *Animals of the Desert (Animals by Habitat).* Austin, TX: Steck-Vaughn Company.

Schnieper, C. (1995). *Snakes: Silent Hunters (A Carolrhoda Nature Watch Book).* Minneapolis, MN: Carolrhoda Books.

Siebert, D., & Minor, W. (1999). *Mojave.* New York: Econo-Clad Books.

Silver, D. M., & Wynne, P. (1995). *Cactus Desert (One Small Square).* New York: W. H. Freeman & Company.

Steiner, B. A., & Himler, R. (1996). *Desert Trip.* San Francisco: Sierra Club Books for Children.

Taylor, D. (1992). *Endangered Desert Animals.* New York: Crabtree Publishing.

Wallace, M. (1996). *America's Deserts: Guide to Plants and Animals.* Golden, CO: Fulcrum Publishing.

Whelihan-Scherer, C., & Quamme, A. (1998). *Coyote Concert on a Full Moon Night.* Minnetonka, MN: NorthWord Press.

Additional story, resource, and reference books on desert animals can be located at your local library and bookstore. You can also search for available large print and braille books on the *Louis* Database through the American Printing House for the Blind's Web site at www.aph.org. When searching for books on the *Louis* Database, keywords such as "snakes," "reptiles," or "deserts" may be helpful.

Woodland Wanderers

Activity 20: Circle of Life

Objective:
To create a "forest" food web and to understand how a break in a food chain affects the whole food web.

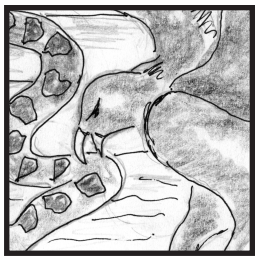
Vocabulary:
Food chain, food web, ecosystem, forest, producers, consumers, decomposers, herbivores, carnivores

Materials:
Ribbons of various colors/ textures (cut into about 3-4 ft. segments and knotted at one end); index cards; storybook(s) about forest animals

Inquiry:
What do forest animals eat?

Procedure:

- Begin by reading a story about forest animals and their diets. One such story is *Chipmunk Song* by Joanne Ryder, *Dutton Children's Books* 1987.
- Make a class list of all the plants and animals found in the book and other forest animals or plants that students can think of. Assign each student or pair of students a forest animal or



plant, and have them record the following information on an index card:

1) the name of the plant or animal;

2) what it eats; and

3) what eats it.

Examples include: black bear, chipmunk, fox, snake, mouse, owl, ant, butterfly, worm, turkey, berries, acorns, and ferns.

- Have students form a circle; each student should represent a different forest animal or plant. To observe how a food web works, ask each student who is an animal what types of food it eats. Then link a ribbon (with a knot tied at one end) from each "animal" to the food(s) it eats; the "consumer" should hold the knotted end of the ribbon (which represents an arrow, as shown in most visual displays of food webs). After all the "animals" have had their turn, discuss how the animals and food sources are interrelated.

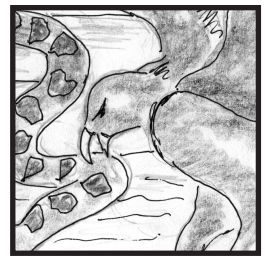
- Illustrate how the destruction of animals and plants harm the ecosystem of the forest and causes an imbalance in the food web. Randomly cut several ribbons. What happens to the food web? Is there as much food available as before? What will happen to the animals that depend on that plant or animal for food?

Extension:
Have students create separate food chains encountered in the larger forest food web. Use the available ribbon strands to create these chains. For example: Hawk eats the snake, the snake eats the frog, the frog eats the grasshopper, and the grasshopper eats grass.

Visual Adaptation:

Use contrasting colors and textures of ribbon. Allow the student to tactually explore the complexity of the "food web" (i.e., criss-crossing and branching of ribbons) that results between the students ("animals" and "plants").

If available, use APH's *Picture Maker* to demonstrate the structure of a food web by assigning tactile shapes as animals and plants and linking tactile strips from food source to food source.

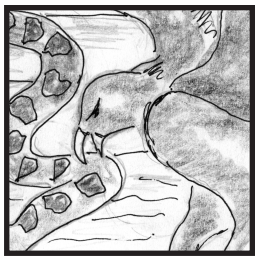


Grass ➧ Grasshopper ➧ Frog ➧ Snake ➧ Hawk

Math Connection:
Using the terms encountered in the "Language Connection," graph the number of primary consumers (i.e., herbivores) and secondary consumers (i.e., carnivores) that were part of the food web created by the students.

Language Connection:
Discuss the diffe rence between the terms *food chains* and *food webs* and recreate examples of each.

Members of the food web consists of the following:



1) **Producers** (all green plants)
2) **Consumers** (organisms that eat something else):
   - *primary consumers:* herbivores or animals that eat plants
   - *secondary consumers:* carnivores or animals that eat other animals
3) **Decomposers** (mainly bacteria and fungi that convert dead matter into gases)

Science Tidbit:
Omnivores eat the largest variety of foods (both animals and plants) and have the best chance to adapt to foods in a new environment.

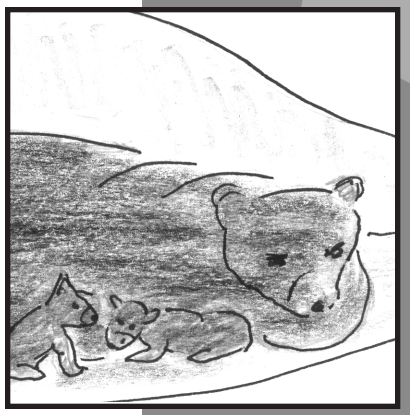
Activity 21: Hibernation Time

Objective:
To learn about animal hibernation by creating a place to "hibernate" in the classroom.

Vocabulary:
Hibernate, deep sleep, inactive, burrow, caves, cold-blooded, warm-blooded, temperature

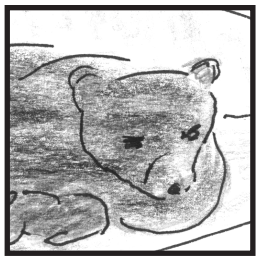
Materials:
Tables, blankets, boxes, desks, pillows (or any other available items that students can use to construct their "caves" and "underground burrows"); books about animals that hibernate; pictures/models of animals that hibernate

Inquiry:
Why do animals hibernate?



Procedure:

- Explain that some animals find or build places such as dens and burrows to hibernate where they won't be disturbed while they sleep during the winter. Ask students if they are aware of any animals that hibernate (ground squirrels, bears, rattlesnakes, etc.).
- Explain why some animals hibernate:



1. To protect themselves against the cold.
2. To reduce their need for food during the winter, when food is scarce.

- Have pairs or small groups of students choose a "hibernating animal" they would like to pretend to be. Choices might include grizzly bears, raccoons, skunks, chipmunks, ground squirrels, and groundhogs.
- Provide students with materials (e.g., pillows, boxes, blankets) they can use to construct a "cave," "underground burrow," and other types of cozy hide-outs.
- After the students are settled into their hiding places, distribute books in which they can read about the animals they have chosen to imitate.

Extension:
Discuss the hibernating behaviors of warm-blooded animals (chipmunks, ground squirrels, bears, hamsters) versus cold-blooded animals (lizards, snakes, frogs, turtles). A warm-blooded animal is able to wake itself from deep sleep at anytime; they do not sleep straight through the winter. A cold-blooded animal, in contrast, can only be aroused from hibernation when the environment warms up enough to heat the animal's body.

Visual Adaptation:
Provide braille and large type books about hibernating animals.

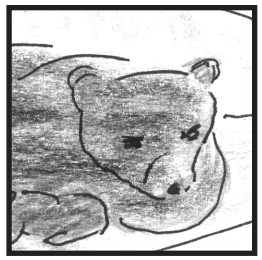
Math Connection:
Chart the types of "hibernating" animals that students pretended to be. Determine which animals were the most popular.

Explain that animals breathe much slower during hibernation and that their heartbeat slows down. Have each student feel her own pulse during a restful state. In one minute, how many times does her heart beat? Have the student feel her pulse rate after exercising. Does the rate increase or decrease?

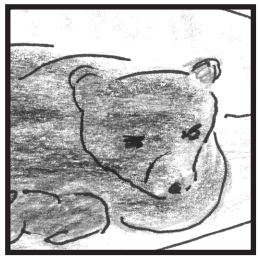
Using APH's *Tactile Demonstration Thermometer,* have students set and compare forest animals' normal body temperatures and "hiberating" temperatures:

For example:

	Normal	Hiberation
Squirrel	90ºF	40ºF
Groundhog	98ºF	38ºF

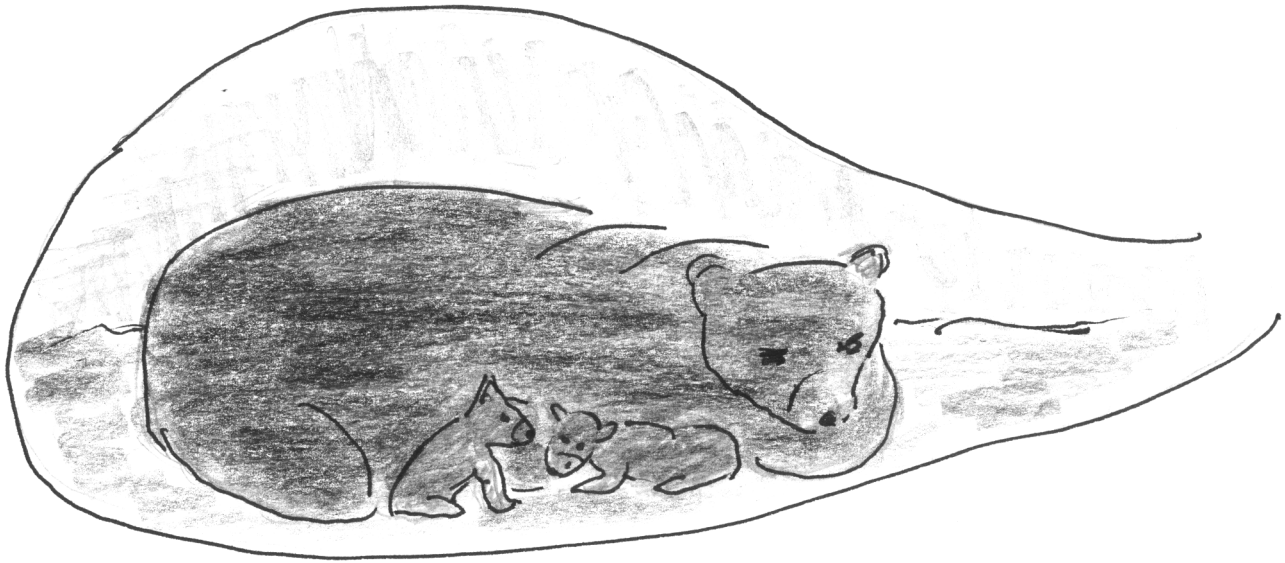


Language Connection:
Discuss how people deal with very cold weather: wear layers of clothing, heat their homes, drink and eat hot foods, cross their arms close to their bodies, exercise, and so forth.



Have students write a story about being cooped up in their homes all winter…What foods would they stock up on? What would they do for recreation? What things would they miss doing? Etc.

Science Tidbit:
During hibernation, the woodchuck only takes a breath every five minutes.



Activity 22: Food for Thought

Objective:
To learn about a raccoon's eating habits.

Vocabulary:
Mammal, raccoon, omnivore, nocturnal

Materials:
Pictures or models of raccoons; empty paper towel rolls; black construction paper; store-bought masquerade masks; (elastic bands if masks are homemade)

Inquiry:
What types of food do raccoons eat?

Procedure:

- Discuss the unique characteristics of raccoons:
  - they have a distinguishable "masked" face
  - they have a ringed tail
  - they are large, weighing as much as 35 pounds
  - they are nocturnal
  - they build their dens in hollow logs, stumps, or trees

- they are good swimmers
- they have flexible fingers

- Explain that raccoons are "omnivores," meaning they will eat a variety of foods, such as mice, frogs, bird eggs, fruits, berries, insects, acorns, seeds, and corn. Knowing what raccoons like to eat, what precautions should people take to keep raccoons (which are known to carry diseases) from taking residence in or near their homes? [Keep lids tight on garbage containers; bring pets' food bowls inside at nighttime; close garage doors; etc.]

- Have students make raccoon masks out of construction paper and elastic bands (or store-bought masquerade masks). On the outer side of their masks, have students attach a label or picture of a type of food that raccoons would love to eat. Have students put their masks on and then separate themselves into groups based upon the type of food they chose: naturally-occurring meats (e.g., frogs, mice), outside plants (e.g., berries, corn), household scraps (e.g., cookies, stale bread).
- Make a chart of the types of food reflected on the "raccoon masks." What type of food was most popular? Least popular?

Visual Adaptation:
Before separating into groups, be sure that all students read aloud the type of food they chose for their masks. Assign designated areas in the classroom for the separate food groups to meet together.

Math Connection:
Most raccoons have five to seven rings on their tails. Have students make "raccoon tails" by slipping rings made from black construction paper over empty paper towel rolls. Make number sentences using the "raccoon tails."

Example:
5 rings + 7 rings = 12 rings.

Language Connection:
Have the students work alone or in pairs to come up with a story about "How the Raccoon Got Its Mask" or "The Adventures of the Masked Bandit."

Read Jim Arnosky's *Raccoon on His Own,* Putnam Publishing Group, 2001.

Science Tidbit:
The Latin name for "raccoon" is *Procyon lotor.* "Lotor" means "washer." Raccoons, especially those in captivity, have a habit of dunking their food in water.

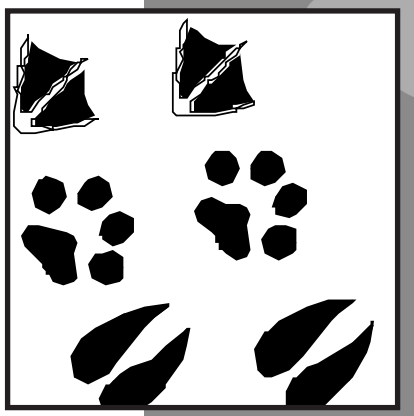
Activity 23: Making Tracks

Objective:
To make animal tracks and pair animals with their tracks.

Vocabulary:
Track, paw, print, imprint, webbed feet, claws, hoofs, path, stride, straddle, trail, gait

Materials:
Crayola Model Magic® or other modeling dough; molded imprints of a person's foot, cat's paw, and dog's paw; Play-Doh®; APH Animal Track Overlays

Inquiry:
What types of evidence do animals leave behind that let us know they were nearby?



Procedure:

- **Preparation:** Using Crayola Model Magic (which dries in 24 hours) or other modeling dough, imprint a human foot, a cat's paw, and a dog's paw. Press the paw or foot into the dough and lift after a good print is achieved; let the dough harden for a day.

- Ask students how they might be able to tell what kinds of animals have been in their yards, even if the animals are no longer there? Tell the students that tracks are what the animals leave behind when they move across dirt paths, snow covered ground, wet mud, and moist sand.
- Pass around previously-made molds and let students feel the imprints of the human foot, the cat's paw, and the dog's paw. Discuss the differences between all the prints.

Extension:
Discuss other "evidence" that animals leave behind to let us know they were around a specific area: nests, dens, scratches on trees, feathers, droppings, broken branches, bird eggs, dirt mounds, holes, gnawings, etc.

Make cardboard cut-outs of many different animal tracks (about 10 per animal). [The APH Overlay Tracks can be copied and used as templates.] Have students sort the tracks by animal type and then create animal trails on the floor using the cut-outs. Have students make sure the track prints are facing the right direction.

Visit the following websites for "animal track" information and games:

www.nwf.org/rangerrick/tracks4.html

www.geocities.com/Yosemite/Rapids/7076

Visual Adaptation:

Using a sheet of APH *Quick-Draw Paper,* have a student trace the outline of her foot with a bright colored marker.

Use APH's Animal Track Overlays to explore the tracks of other common animals, such as the cat, dog, duck, horse, crow, and deer. Describe how these tracks are very different. Which tracks would you likely find in your backyard? In the forest? Near a pond? On a farm? Which animals have claws? How many toes does each animal have?

Press the Animal Track "tactile" Overlays into Play-Doh® to make imprints of various types of animals tracks.

Make certain that students have an opportunity to explore the paws of real cats and dogs.

Let students make an imprint of their own hand or foot using modeling dough. Paint can be added for visual contrast.

Math Connection:
Measure the width and the height of the tracks encountered in the APH Animal Track Overlays. Report the measurements in centimeters and inches.

Make "Alien Tracks": Take odd-shaped wooden blocks and press them into clay. Note difference in the imprint if the "alien" walks on its head, jumps on its side, rolls at an angle. This activity allows students to understand the spatial concepts of top view, side view, and bottom view.

[This activity was suggested by field reviewer Sister M. Elaine George.]

Language Connection:
Discuss the meaning of various words related to animal tracks:

Stride: Length of each step

Straddle: Distance between each foot left to right (inside edge to inside edge)

Gait: Pattern of movements (e.g., walking, galloping, pacing, trotting, loping, jumping)

Read Jim Arnosky's *Crinkleroot's Book of Animal Tracking,* Simon & Schuster, 1989.

Science Tidbit:
Horses and deer can be classified as "tip-toers" because their hooves are like big toe-nails.

Activity 24: Bird Identification

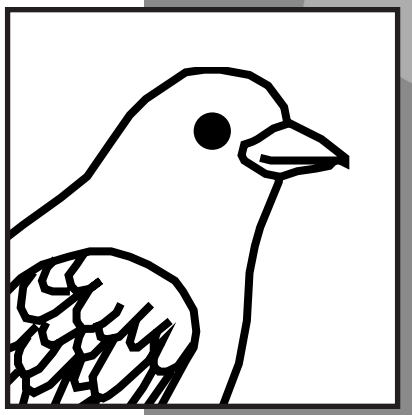
Objective:
To learn about the characteristics that help us identify a bird.

Vocabulary:
Identification, bird names (crow, robin, cardinal, etc.), classify

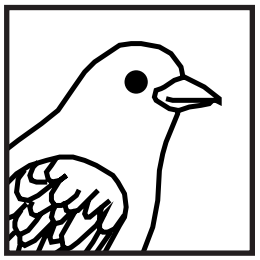
Materials:
Classroom chart or observation form; resource books; tape recordings of birds; models and pictures of birds; APH Bird Overlays

Inquiry:
Do all birds look alike? Sound alike? Fly alike?

Procedure:



- Develop an observation form or classroom chart that students can use to record information about birds of their choice.
- Have students work in pairs. Ask students to select a bird that they would like to research. Some possibilities include: robin, cardinal, blue jay, crow, woodpecker, hummingbird, mockingbird, dove, crane, hawk, pigeon, ostrich, wren, goose, and eagle.



- For each bird researched, have students record the following:

Bird Name
Northern Cardinal

Color
Male: Brilliant red
Female: Dull red

Size
8-inches long

Beak Type
Cone-shaped beak

Sound
"Pretty-pretty-pretty"*

Habitat
Backyard and woodlands

Diet
Fruit, seeds, insects

Special Fact
Mate for life and stay together year round.

*For "sound," have students assign a word phrase that sounds like the bird call (e.g., crows say "caw-caw-caw").

- Have students report their findings to the entire class.

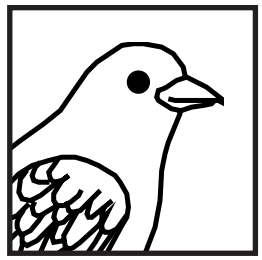
Extension:
Have students classify the birds researched by the class according to the following:

- Flying behavior (soars, glides, hovers, bounds, flightless, short flights from tree branch to tree branch)
- Habitat (forest, wetland, seashore)
- Bill type (short beak, sharp beak, long beak, etc.) See Activity 25: "Bird Bills."

Visual Adaptation:
Listen to tape recorded bird calls or bird songs found on the internet. Have students research the unique sounds of their favorite birds.

The bird illustrated in the APH Bird Overlays is a robin. How does this bird's feet differ from a duck's? [It doesn't have webbed feet.] How is its beak different from a pelican's? [The robin has a short beak because it doesn't eat fish.] How are the robin's legs different from a wading bird's? [A robin's legs are short because it doesn't walk through water to look for food.]

Math Connection:
Rank the sizes of the birds researched by the class from largest to smallest.

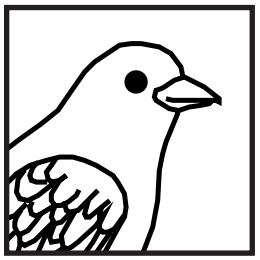


Language Connection:
A group of birds is usually referred to as a "flock." Research the group names of other birds (e.g., a "peep" of chickens, a "congress" of crows, a "gaggle" of geese).

Have students alphabetize the list of birds researched by the class.

Instruct students to write poems about birds using words that describe how birds communicate—chirps, tweets, honks, squawks, etc.

Research the state birds of the fifty U.S. states.



Science Tidbit:
Most birds are classified as "perching birds" because their toes lock onto branches. They are also called "song birds."

Activity 25: Bird Bills

Objective:
To demonstrate how various bird beaks are adapted to birds' diets.

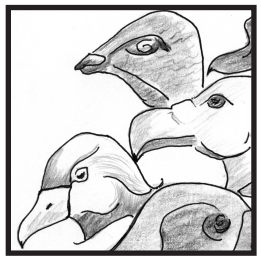
Vocabulary:
Bird, beak, bill, prey, probe, strain, scoop, spear, fish, insect

Materials:
Tweezers; clothespin; eyedropper; toothpick; spoon; fish tank net; gummy fish; string; small paper cup; food coloring; birdseed; small carpet square; shallow pan filled with water; gumdrops; velcro hook material; cut-out felt shapes of mice (about three)

Inquiry: What can we know about the food that a bird eats by looking at its beak?

Procedure:

- Explain to students that not all bird beaks are shaped the same. The shape of a bird's beak is adapted to the environment to allow the bird to catch and eat certain types of food/prey. Below are descriptions of different types of bird bills and examples of birds with these beak types:



Seed-eating bill: A short, thick bill for crunching seeds (e.g., finch, cardinal, sparrow)

Insect-eating bill: A slender, pointed beak for picking up insects (e.g., warbler, swallow, curlew, snipe)

Probing bill: A long, slender bill for probing for food in mud or flowers (e.g., hummingbird, flamingo)

Prey- or flesh-eating bill: A strong, sharp, hooked beak for tearing flesh of prey (e.g., owl, hawk, eagle)

Straining bill: A broad, flat bill for straining food from mud (e.g., duck, goose, swan)

Fish-eating bill: A long, sharp bill for spearing or that has a pouch (e.g., heron, pelican)

- Collect common utensils (clothespin, eyedropper, etc.) that resemble various types of bird beaks and how they function for catching food. First do the following:

  1) Float gummy fish in a shallow pan of water. "Food" can be caught with a fish tank net to represent use of *straining bills.*

  2) Place water in a paper cup and add food coloring to represent nectar or sap

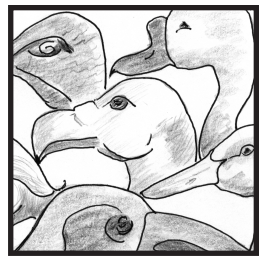
from plants. This "food" can be eaten with an eyedropper to represent the use of *probing bills.*

3) Sprinkle birdseed on a table. This "food" can be collected with a clothespin to represent the use of *seed-eating bills*.

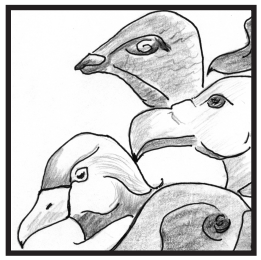
4) Place short pieces of string on a small carpet square to represent worms. This "food" can be collected by tweezers to demonstrate how *insect-eating bills* are used.

5) Place gumdrops in a bowl. This "food" can be pierced by a toothpick to represent how *fish-eating bills* are used. Gumdrops can also be scooped with a spoon to represent birds with pouches.

6) Place small, felt cut-outs of mice on a table. This "food" can be collected by using a piece of velcro hook material to demonstrate how *prey-* or *flesh-eating bills* are used.



- Then have students imagine that the tools are beaks of different birds. Have students predict which tool will be the easiest to use for picking up each type of "food." Allow students to experiment with the various tools to determine which is really best for gathering or picking up each kind of "food."



Extension:
Discuss other ways besides catching and eating prey that birds use their beaks.

Examples:

- to build and weave nests
- to attack predators
- to groom their feathers

Use other types of foods for the students to scoop, pierce, etc., such as peanuts, goldfish crackers, marshmallows, and small candies.

Place birdfeeders outside at home or at school to observe birds' eating behaviors.

Visual Adaptation:
Have the student examine the APH Bird Overlays. What type of beak does this bird [a robin] have and what types of food is it likely to eat [worms, seeds]?

Make tactile models from clay or construction paper to represent various types of bird beaks that the student can explore.

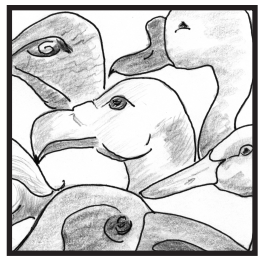
Math Connection:
Have the students set aside the "food" that they are able to gather with their various beaks and measure each amount of food gathered by each "beak."

Language Connection: Invite a bird watcher or bird specialist to the class to answer students' more specific questions.

Have each student complete this sentence: If I were a bird, I would like to have a ____ beak because _____. Have the students share their sentences with the class.

Science Tidbit:
Like human fingernails, the tip of a bird's beak is constantly renewed as it wears away.

Woodpeckers have chisel-like beaks for drilling into trees to find insects.



Activity 26: Oh, Deer Me!

Objective:
To illustrate through a game how a deer's predators (including man) can affect a deer's ability to gather food.

Vocabulary:
Survival, deer, habitat, vegetarian, injury, predator

Materials:
Various "food" pieces such as popped popcorn; adhesive bandages; rope or tape; paper bags

Inquiry:
What can affect a deer's ability to survive in the forest?

Procedure:

- When discussing the topic of the forest habitat, ask the students what type of food plant-eating (vegetarian) animals, such as deer, might seek [berries, nuts, grasses, clover, etc.]. What might prevent deer from finding the food they need to survive? [Injuries caused by hunters or predators.]
- Divide the class into four groups:
  1) Uninjured deer
  2) Injured in one leg

3) Injured in one arm ("front leg")
4) Injured in one leg and in one arm ("front leg")

- Have the injured "deer" put a bandage on their hurt part to remind them that they cannot use that leg or arm during the game.
- Rope or tape off an area in the classroom or playground and scatter popped popcorn. On the count of three, have all students pick up as much food as they can and place it in their bags. Give them two to five minutes to collect their food.
- After students have collected their food, have everyone dump their bags and count their popcorn pieces. Discuss which deer were able to gather the most food. Which deer would probably live the longest?

  Note: Remind students that this food is not to be eaten because it was on the floor or ground.

Extension:
After performing the "Math Connection" task, play the game again but appoint someone as the predator. While the other students are gathering their food, have the predator yell "wolf." The "wolf" has to skip to tag a deer for its food. The tagged "deer" then sits down where it was tagged. Then the wolf has to try to tag more deer before they get back to "safety" (their seats).

Visual Adaptation:
Scatter food that provides good

visual contrast against the floor or ground.

Pair students together—one gathers the food and the other student counts it.

Use the APH Animal Track Overlays to review the shape of a deer's hoof.

Math Connection:
After playing a round or two of the game, total the food (popcorn pieces) gathered by each deer group and graph the results on a bar graph.

Language Connection:
A female deer is called a "doe"; a male deer is called a "buck"; and a baby deer is called a "fawn." Have students research the male, female, and baby names of other forest animals.

Talk about the characteristics of deer that help them survive in their habitat:

- They have hoofs that can stomp or slash a predator.
- They have long, powerful legs for running.
- They have a very narrow, slender shape and light coloration that blends into the surroundings.
- They can swivel each ear independently to pick up sounds coming from different directions.
- They have large eyes to detect even the slightest movements.

Science Tidbit:
Only male deer, elk, and moose grow antlers.

Suggested Children's Literature

Arnosky, J. (1998). *All About Turkeys.* New York: Scholastic Trade.

Dutemple, L. A., & Staub, F. (1998). *Moose (Early Bird Nature Books).* Minneapolis, MN: Lerner Publications.

Fair, J., & McGee, J. F. (1995). *Raccoons for Kids.* Minnetonka, MN: NorthWord Press.

Feeney, K., Fredericks, A. D., & Evert, L. (2000). *Forest Animals.* Minnetonka, MN: NorthWord Press.

George, J. C. (1993). *The Moon of the Bears.* New York: HarperCollins Children's Books.

George, J. C., & Catalano, S. (1992). *The Moon of the Deer.* New York: HarperCollins Children's Books.

Green, J. (1999). *A Dead Log (Small Worlds).* New York: Crabtree Publishing.

Horton, C. (1996). *Eagles (Endangered).* New York: Benchmark Books.

Howker, J., & Fox-Davies, S. (1997). *Walk with a Wolf.* Cambridge, MA: Candlewick Press.

Jarvis, K., Holt, D. W., Leroux, L., & Couch, C. (1996). *Owls: Whoo Are They?* Missoula, MT: Mountain Press Publishing.

Jenkins, S., & Page, R. (2001). *Animals in Flight.* Boston, MA: Houghton Mifflin.

Markle, S. (2000). *Growing Up Wild: Bears.* New York: Simon & Schuster.

Miller, S. S. (1998). *Rodents: From Mice to Muskrats (Animals in Order).* New York: Franklin Watts.

Morris, N. (1998). *Forests.* New York: Crabtree Publishing.

Patent, D. H., & Munoz, W. (1994). *Deer Elk.* New York: Clarion Books.

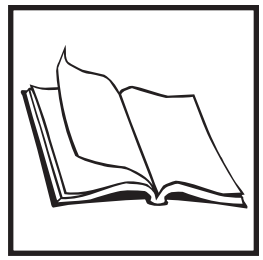
Silver, D. M., & Wynne, P. (1995). *One Small Square: Woods.* New York: McGraw-Hill Professional Publishing.

Swinburne, S. R., & Paley, J. (1999). *Unbeatable Beaks.* New York: Henry Holt.

Taylor, D. (1992). *Endangered Forest Animals.* New York: Crabtree Publishing.

Wood, A. (1997). Birdsong. NY: Harcourt Brace & Company.

Additional story, resource, and reference books on forest animals can be located at your local library and bookstore. You can also search for available large print and braille books on the *Louis* Database through the American Printing House for the Blind's Web site at www.aph.org. When searching for books on the *Louis* Database, keywords like "hibernation," "deer," or "bird" may be helpful.



Rainforest Creatures

Activity 27: Layers of the Rainforest

Objective:
To describe the layers of a rainforest and to research facts about rainforest animals.

Vocabulary:
Rainforest, tropical, layers, emergent, canopy, understory, forest floor, rainforest animals (e.g., orangutan, cuckoo, macaw, jaguar, etc.), jungle

Materials:
Reference materials (Internet, magazines, encyclopedias); materials to create a classroom rainforest (crepe paper for vines, real ferns, corrugated cardboard for tree trunks, tissue paper to make colorful flowers, etc.); vegetables to create a structure of a rainforest (celery, broccoli, carrot tops or parsley sprigs, and shredded lettuce); rainforest animal models or pictures; world map

Inquiry:
What is a rainforest and what kinds of animals live there?

Procedure:
Day 1: Ask the students what they think of when you say the word “rainforest.” [Humid, hot

and steamy, lots of rain, tall trees, warm throughout the year, abundant vegetation, always green, home to jungle animals, etc.]

Explain that the rainforest can be broken down into four layers and that the layers serve as homes for different animals. Discuss the characteristics of these layers from lowest to highest:

Forest Floor: The largest animals live in this very dark layer. The temperature here is very constant and many bushes, tiny trees, ferns, mosses, and fallen leaves compose this bottom layer.

Understory: A cool, dark layer where small trees, rarely above 15 feet tall, absorb much of the sunlight. Animals include many insects, arachnids, snakes, lizards, and small mammals. This layer has a larger number of insects than any other layer of the rainforest.

Canopy: This layer is like a thick green carpet or "umbrella" of trees that grow between 65-150 feet tall. The leaves on the canopy trees are pointed and allow water to drip down on the floor below. This layer catches most of the rain and sunshine, and blocks light to the lower layers. This layer also has the greatest population of animals. Plants include vines, mosses, lichens, and orchids.

Emergent: This layer consists of giant trees that are spaced far apart. These trees grow between 150-250 feet tall

and are home to many birds and insects. Strong winds, low humidity, and high temperatures characterize this layer.

Day 2: Before having students research a rainforest animal, have them create a rainforest in the classroom by using available materials. Divide the students into four groups and assign each group a rainforest layer to create.

Day 3: After creating a rainforest, have pairs of students select a rainforest animal to research. Below is a sample list:

Forest Floor: Gorilla, anteater, tapir, wild boar, chimpanzee, deer, insects (such as termites and cockroaches), tarantula

Understory: Jaguar, kinkajou, antbird, tree frog, hummingbird, tree boa

Canopy: Toucan, cuckoo, sloth, orangutan, bat, parrot, lemur, green tree python

Emergent: Scarlet macaw, eagle, morpho butterfly, bat, snake, toucan

After students research their rainforest animals, have them report their findings to the class. Be sure the students can report the layer(s) of the rainforest in which their animals live. Students can attach pictures, or place animal models, in the constructed classroom rainforest.

Extension: Locate tropical rainforests on a map or world globe (Amazon Rainforest, Congo Basin, Tongass National

Rainforest, Borneo Rainforest, etc.). Note that rainforests are located on both sides of the equator between the Tropic of Cancer and the Tropic of Capricorn. Illustrate how the rainforests form a band around the equator.

Have students group the rainforest animals that they researched by animal class, for example: *Amphibians* (Poison Arrow Frog, Pac Man Frog); *Birds* (Toucan, Parrot); Reptiles (Coral Snake, Iguana); *Insects* (Leaf Cutter Ant, Zebra Butterfly); *Mammals* (Puma, Orangutan); *Fish* (Amazon Stingray, Piranha).

Visual Adaptation: Use food to create the layers of a rainforest, arrange the following on a flat table: celery stalks can represent the tall emergent trees that are spaced out. Broccoli tops can be placed close together to form the dense canopy layer that blocks the sun from the medium-sized trees (parsley sprigs or tops of carrots) that grow in the dark understory. Shredded lettuce leaves can be arranged to form the forest floor (decomposing vegetation).

Take a field trip to a zoo that has a rainforest animal exhibit.

Use a tactual map or globe to locate the tropical rainforests of the world.

Have each student fold a sheet of paper into four sections. Label

each section, from top to bottom, in the order that the layers of the rainforest appear. Within each folded division, have students braille/print the names of animals that would live in each layer.

Math Connection:
Have students chart their researched rainforest animals by size.

Language Connection: Discuss the meaning of "endangered animal" and have students research and make a list of endangered rainforest animals.

Read some of the following books:

A Walk in the Rainforest by Kristin Joy Pratt, Dawn Publications, 1992.

Life in the Rainforest: Plants, Animals, and People (Discovery Readers) by Melvin Berger, Geoffrey H. Brittingham (Illustrator), and Gilda Berger, Ideals Childrens Books, 1994.

The Great Kapok Tree: A Tale of the Amazon Rain Forest by Lynne Cherry, Harcourt, 2000.

Here is the Tropical Rain Forest by Madeleine Dunphy and Michael Rothman (Illustrator), Hyperion, 1997.

Nature's Green Umbrella: Tropical Rain Forest by Gail Gibbons, William Morrow & Company, 1997.

Science Tidbit:
More species of amphibians, birds, insects, mammals, and reptiles live in tropical rainforests than anywhere else in the world.

Other Web sites to visit for more information about rainforests:

www.pbs.org/journeytoamazonia

www.rainforest-alliance.org

www.conservation.org

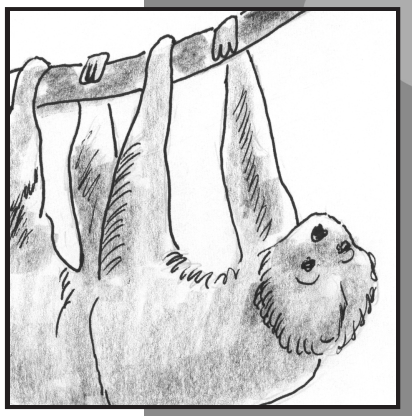
www.rainforest.org

www.animalsoftherainforest.com

www.enchantedlearning.com/subjects/rainforest/

www.rainforesteducation.com

Activity 28: Sluggish Sloth



Objective:
To learn about the sloth, a slow-moving mammal that lives in the rainforest.

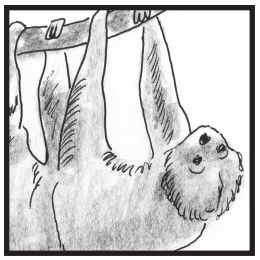
Vocabulary:
Sloth, algae, jaguar, harpy eagle, canopy, herbivore, diet, menu, food chain, rainforest, nocturnal, anaconda

Materials:
Hole-punched pictures of a sloth, a jaguar (or harpy eagle or anaconda), and a leaf; four strands of yarn or ribbon; clothes hanger

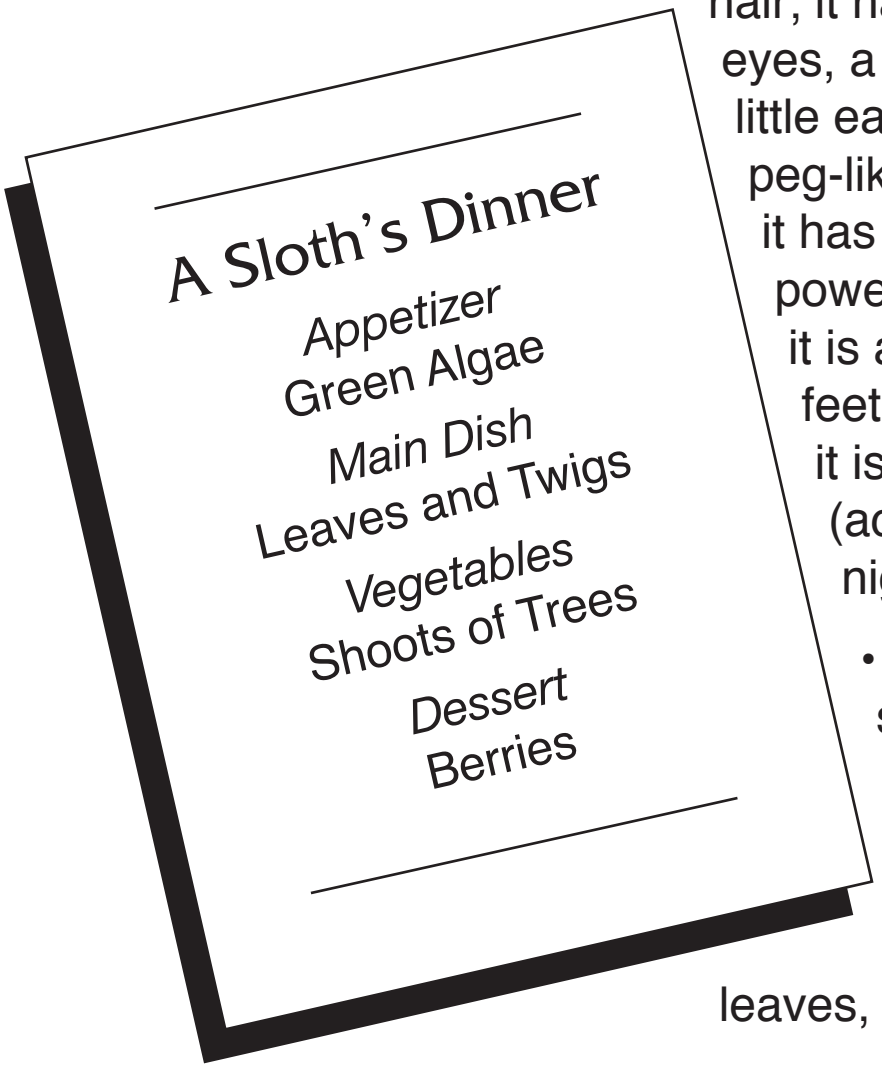
Inquiry:
What type of animal is a sloth? How does a sloth move? What does a sloth eat in the rainforest?

Procedure:
Ask students what type of animal a sloth is. [A mammal that lives in the canopy level of the rainforests of Central and South America.] If necessary, review the definition of a *mammal* and the location of the canopy level of the rainforest.

- Discuss and make a list of the unique characteristics of a



sloth: A sloth is the slowest moving mammal on earth; it lives most of its life hanging upside down from tree branches; it has long, coarse hair; it has large eyes, a blunt nose, little ears, and peg-like teeth; it has long, powerful claws; it is about two-feet long; and it is *nocturnal* (active at night).



- Discuss a sloth's diet. A sloth is a herbivore that lives mostly on leaves, berries, and shoots of trees. Green algae even grow on the sloth's fur; the algae are licked by the sloth as a way to get food and water. The algae also serve as camouflage for the sloth.
- Create a food chain by linking pictures of a sloth, jaguar (or harpy eagle or anaconda), and a leaf, in the order of "what eats what," starting with the one at the top of the food chain. Link the cards together with yarn and hang on a clothes hanger.

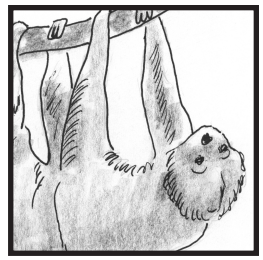
Extension:
Write a perfect dinner menu for a sloth. (See sample at left.)

Research the differences between two-toed sloths and three-toed sloths. Which has a tail? Which has larger eyes?

Visual Adaptation:
Add braille and large print labels to the picture cards, or cut the cards into the shape of the animal/plant (e.g., a leaf shape can indicate the food that the sloth eats).

Demonstrate the concept of *camouflage* to a totally blind child by mixing very similar socks together and asking him to sort them. Explain that because the socks are so similar to each other in appearance (size and texture) it is hard to find each matching pair. Similarly, if an animal's coloration or pattern allows it to blend into its surroundings, the animal will be more difficult for its enemies to find.

Math Connection:
The sloth is the slowest moving mammal on earth, moving about four feet per minute. Research, graph, and compare the speeds of various types of mammals. The cheetah, for example, is the fastest mammal; it can run up to 70 miles per hour.



Language Connection:
Write a story about how it would be to live in a tree most of your life. From which animals would you be safe? With which animals would you have to share your home?

Read *The Upside-Down Sloth* by Allan Fowler and Fay Robinson, Children's Press, 1994.

Science Tidbit: A sloth's metabolism is lower than all other known mammals in the world, taking up to a month to digest food.

A sloth sleeps upside down about 15 hours per day.

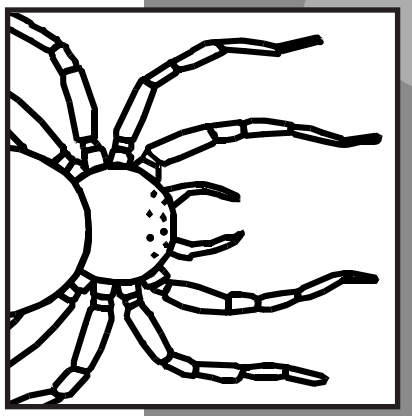
Activity 29: Eight is Enough

Objective:
To learn the parts of a spider and to understand physical differences between spiders and insects.

Vocabulary:
Spider, arachnid, arthropod, cephalothorax, abdomen, pedipalps, jointed legs, spinnerets, exoskeleton, fangs

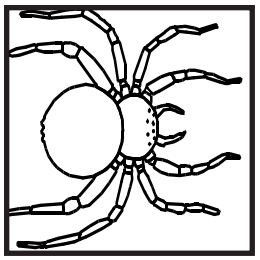
Materials:
APH Spider Overlays; other models and pictures of spiders

Inquiry:
How are spiders' bodies different from insects' bodies?



Procedure:
Discuss how spiders are different from insects:

- A spider has only two main body parts–the *cephalothorax* (fused head and thorax) and the *abdomen.* Insects have three main body parts–the head, thorax, and abdomen.
- A spider has eight hairy legs attached to its cephalothorax –four legs on each side. An insect has six legs attached to its thorax.



Spiders do not have wings; insects have at least one pair of wings.

- Spiders do not have antennae.
- All spiders have fangs that they use to capture animals. Fangs inject poison into the spider's prey, which is then paralyzed and liquefied.
- Spiders have silk glands and spinnerets.

Discuss how spiders are similar to insects:

- Spiders and insects are both classified as arthropods.
- Spiders and insects both have exoskeletons.
- Spiders and insects both molt/shed their exoskeletons.

Highlight special parts of a spider: *pedipalps* (a pair of jointed feelers located near the spider's jaws) and *spinnerets* (openings located at the end of a spider's abdomen through which silk flows).

Extension:
Research other types of arachnids: mites, ticks, scorpions, and daddy longlegs.

Only a few spiders are poisonous to humans. Research poisonous spiders such as black widows and brown recluses. Emphasize that spiders should not be touched.

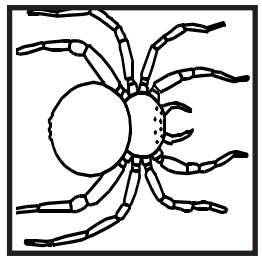
Visual Adaptation:
Use the APH Spider Overlay to review the parts of a spider. Point out the spinnerets located at the end of the spider's abdomen. Using other APH overlays,

compare the spider's body to the ant and butterfly. What differences are observed?

Let the students use APH's *Quick-Draw Paper* or *Picture Maker Diagramming Kit* (if available) to create a picture of a spider.

Math Connection:
If every student in the class had eight legs like a spider, how many legs would the class have altogether?

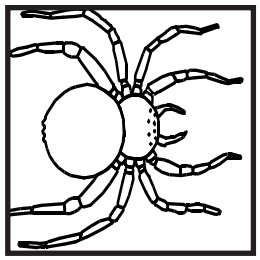
Research different types of spiders (tarantulas, black widows, wolf spiders, etc.) and make a data chart of the class findings. Record information such as life span, color, web shapes, size, diet, predators, habitat.



Language Connection:
All spiders are carnivores. Have each student write a grocery list for a spider: flies, butterflies, moths, crickets, grasshoppers, beetles, etc. List animals that would like to have spiders for "lunch": frogs, lizards, birds, wasps, etc.

Have students write a poem about spiders, for example:

Eight eyes, eight legs
Most spiders own,
Creepy, crawly critters
I hope they leave me alone!



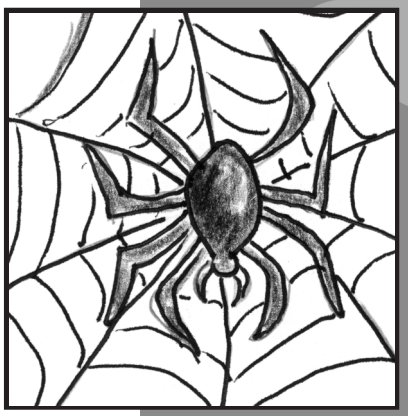
Make a list of interesting names of spiders:

- Purse-web spiders
- Bird-eating spiders
- Mouse spiders
- Spitting spiders
- Trapdoor spiders
- Water spiders
- Crab spiders

Then have students create a new name for a spider: What type of web would it spin? What would it eat? What would it look like?

Science Tidbit:
While most spiders have eight eyes, some have six, four, or two eyes. Cave spiders have no eyes at all.

Activity 30: Web Masters



Objective:
To create a spider web and to learn how a spider catches its food.

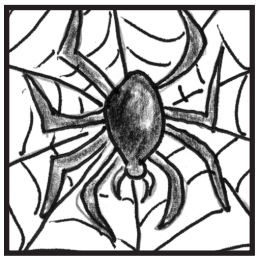
Vocabulary:
Spider, web, spinnerets, arachnid, silk, prey

Materials:
Black construction paper or posterboard; white yarn; neon puff ink; clay or Styrofoam balls (one larger than the other); pipecleaners; APH Spider Web Overlays

Inquiry: Why and how does a spider make a web?

Procedure:

- Talk about how spiders catch their prey. Using silk that comes out of the back of the bodies or their abdomens (from the *spinnerets),* spiders spin a web to trap insects and other "food." They can make part of the web sticky and part of it dry. The sticky strands trap the spider's prey. When the spider feels the web vibrate, it knows that an



insect has become trapped in the web.

- Using black posterboard or construction paper, neon puff ink, and white yarn, have students construct a large web. Have them use the yarn to make the spokes of the web (the dry and strongest strands of the web) and use the glue to make the circular parts of the web (that the insects get stuck in). After the glue dries, create and attach a spider made from clay or linked Styrofoam balls (as its body) and pipecleaners (for its eight legs).

Extension:
Discuss more specifically the tarantula. Some tarantulas live in the rainforest. A tarantula can grow to be 10-inches long and has been known to eat birds, snakes, frogs, mice, or lizards. However, it eats mostly insects, such as crickets and grasshoppers.

Research and discuss spiders that do not spin webs to catch their prey, but hunt their prey instead. For example, a wolf spider chases its prey, and a jumping spider leaps and lands on its prey.

Visual Adaptation:
Have students use the APH Spider Web Overlays to “build” a spider web. Sequence the visual and/or tactile cards from the beginning stage of a spider web to its most advanced stage. Explain that spider webs are anchored between two sturdy supports, such as tree branches or fence posts.

Intentionally teach that not all spider webs are the same shape as that shown in the overlays. The overlays depict a web that an orb weaver spider would create. Some spiders spin irregular shaped webs like the cobwebs we find inside our homes.

Ask students if they have ever walked into a spider web. What did it feel like? Where were they when it happened?

Explore corners, door frames, and windowsills for house cobwebs. Explain that they catch dust as well as the spider's prey.

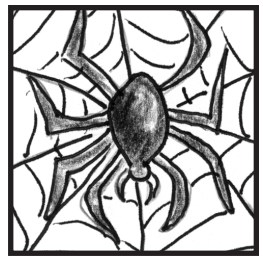
Show the students a bicycle wheel. Explain how the spokes of the wheel are similar to the dry spokes on a spider web.

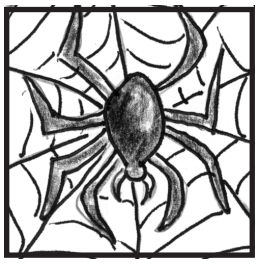
Math Connection:
A spider usually has 8 eyes. Have the students calculate the number of eyes there would be in the classroom if everyone had "spider" eyes. For example:

Twenty students x eight eyes = 160 eyes!

Language Connection:
The fear of spiders is called *arachnophobia.* What are the names of other fears that people have? Have students create a word for what they are afraid of–"foodaphobia" (fear of bad cafeteria food). Make a class book of their fears.

Read Eric Carle's *The Very Busy Spider,* 1995, New York: Philomel Books.



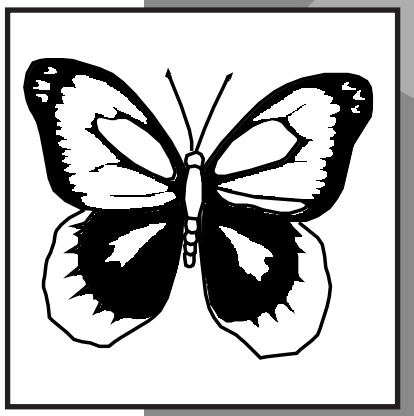


Science Tidbit: Spiders use their silk to travel as well as to trap food. A spider can travel by way of “ballooning”–it lets out a line of silk and the wind pulls the silk and the spider along together.

The triangle spider actually spins a triangular shaped web.

The South American Goliath Tarantula has a leg span the size of a dinner plate!

Activity 31: Butterfly Symmetry



Objective:
To learn about a butterfly's natural symmetry and recreate "butterfly symmetry" through an art activity.

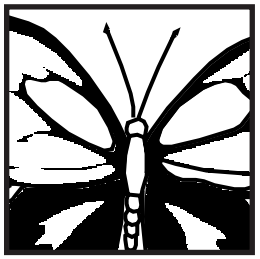
Vocabulary:
Symmetry, asymmetrical, balance, butterfly, wings, patterns, scales, antennae, head, thorax, abdomen, forewings, hindwings, proboscis

Materials:
Butterfly shapes made from construction paper (one for each student); various colors of puff paint; assorted items (buttons, tactile stickers, yarn, sequins, etc.) to glue to butterfly shapes; glue stick; APH Butterfly Overlay

Inquiry:
What is the meaning of "symmetry" and how are the wings of a butterfly symmetrical?

Procedure:

- Begin by defining the word *symmetry:* equal or balanced. As an introduction to the meaning of *symmetry,* take a piece of paper and fold it in half and then re-open. On one half, put several large



drops of colorful puff paint. Then fold the paper and press lightly, enough that some of the paint is transferred to the other half of the paper. Open the paper and let dry. Then have the students tactually explore the location of the paint on each side of the folded paper. Have them notice that the right side matches the left side.

- Explain that butterflies are one of nature's examples of *symmetry*. Provide each student with a pre-cut butterfly shape made from construction paper already creased in half. Have students decorate one side of their paper butterflies using puff ink, buttons, sequins, tactile stickers (e.g., APH *Feel 'n Peel "Point Symbol" Stickers),* yarn, etc., and then duplicate the design on the other side. Decorate the classroom with the students' beautiful butterfly creations.

Extension:

Discuss the purpose of a butterfly's colorful wings: Many butterflies blend into their surroundings because of their "protective coloration." The color of their wings sometimes blend in with tree bark, flowers, and other vegetation, thus protecting them from enemies such as birds and other insects.

Discuss the various parts of the butterfly: two forewings, two hindwings, head, a pair of antennae, thorax, and abdomen. Explain that a butterfly has a

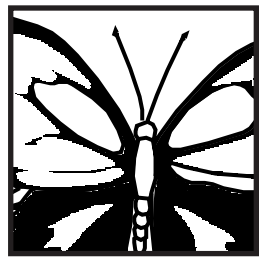
special mouthpart, called a *proboscis*, that looks like a curled straw/tube and is used by the butterfly to sip nectar.

Visual Adaptations:
Use the APH Butterfly Overlay to review the concept of symmetry apparent in the structure of a butterfly. Also review the various body parts of a butterfly. Compare its body to those of other insects: ants, dragonflies, beetles, etc.

Use tissue paper instead of construction paper to make the butterflies. After decorating, place the butterfly on top of a light box to make the colors more vivid, or hang in a sunlit window.

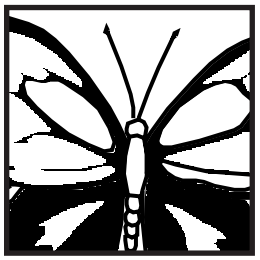
Visit a butterfly habitat garden at a local zoo or museum.

Ask questions that assess the child's accurate understanding of butterflies: Do butterflies sting or bite people? Can you hear a butterfly when it flies by you? Do all butterflies look the same? Etc.



Math Connection:
Have students work in pairs and research the colorful patterns of various kinds of butterflies. How many colors are present in each butterfly observed? Make a list of colors and the type of butterflies researched (e.g., monarch butterflies are mostly deep orange and black with white specks).

Research and chart the wingspans of various types of butterflies.



Discuss other shapes, letters (print and/or braille), and objects that are symmetrical and those that are asymmetrical.

Symmetrical examples:

Shapes: 

Print Letters: H, M, U

Braille Letters: ⠓, ⠍, ⠥

Objects: Orange, ball, CD, cassette tape

Asymmetrical examples:

Shapes: 

Print Letters: J, L, R

Braille Letters: ⠚, ⠇, ⠗

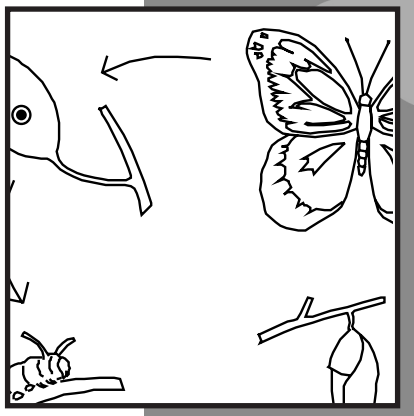
Objects: Some sculptures, a person's hand, a plastic knife

Language Connection:
Discuss further how the word *symmetry* is used to describe things around us. Beautiful faces are said to have symmetry, as well as certain architecture.

Read *The Butterfly Alphabet* by Kjell B. Sandved, Scholastic Inc., 1999. This book shows various photographs of butterfly wing patterns that form the entire print alphabet.

Science Tidbit:
A butterfly's wings are covered with tiny, flat scales that provide colorful patterns. These scales will rub off if the butterfly is handled or touched.

Activity 32: Life Cycle of a Butterfly



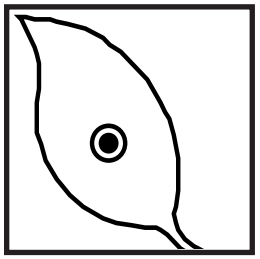
Objective:
To learn about the life cycle of a butterfly.

Vocabulary:
Life cycle, pupa, caterpillar, chrysalis, adult, butterfly, egg, metamorphosis

Materials:
APH Life Cycle of a Butterfly Overlay; for each student provide a small, dark-colored bean, a pipe cleaner, an uncooked pasta shell, and a 3 x 3 inch piece of construction paper pre-cut into a butterfly shape.

Inquiry:
How does a caterpillar change into a butterfly?

Procedure:
1) Read about or discuss the life cycle of a butterfly by using the APH Life Cycle of a Butterfly Overlay.
2) Have each student divide a paper plate into four quadrants. [Provide assistance if necessary.]
3) Paste a bean ("egg") in the upper-right quadrant of the folded paper plate and label it



"egg" in print/braille. Explain that a butterfly starts its life as an **egg** often laid on a leaf by an adult butterfly.

4) Coil a pipecleaner tightly around a pencil and paste in the lower-right quadrant and label it "Caterpillar." Explain that the **caterpillar** (also called **"larva"**) hatches from an egg and eats leaves or flowers almost constantly. The caterpillar molts (loses its skin) many times as it grows. The caterpillar will increase in size many times before turning into a pupa.

5) Glue an uncooked pasta shell with the label "Pupa" in the lower-left quadrant of the plate. Explain that when a caterpillar has eaten enough, it sheds one last time and turns into a motionless **pupa.** A **chrysalis,** a hard-shelled, protective covering forms over the pupa. This resting stage varies from a few days to months, depending upon the type of butterfly. A pupa needs no food at all.

6) Using some construction paper, draw and cut out the shape of a butterfly and bend its wings upward before pasting in the upper-left quadrant along with the word "Butterfly." Explain that the full-grown adult **butterfly** breaks free from the chrysalis and flies away after its wings stiffen and dry out. When that butterfly mates and lays eggs, the life cycle continues.

Extension:
Compare the life cycle of a butterfly with the life cycle of a moth–moths also go through four different life cycle stages.

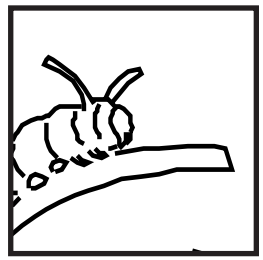
Research rainforest butterflies, such as the following:

- Goliath Birdwing butterfly
- Queen Alexander's Birdwing butterfly

Discuss ways in which moths differ from butterflies:

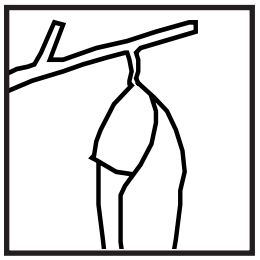
Butterflies

- Fly during the daytime
- Bodies are slender
- Antennae are long, thin and smooth with small knobs (or clubs) at the ends
- Land with wings folded together and pointed upward
- Wings are brightly colored



Moths

- Most fly at nighttime
- Bodies are chubby and hairy
- Have thick feathery antennae without knobs at the ends
- Land with wings open and pointing out flat from its sides
- Wings are duller in color



Visual Adaptation: Use the APH Butterfly Life Cycle Overlay to review the metamorphosis of a caterpillar into a butterfly.

Make sure that the items glued to the white paper plate provide good color contrast. Consider coloring or painting the plate to provide further visual contrast.

Observe real caterpillars and butterflies.

Math Connection:
"Butterfly Addition"–Cut out numerous butterfly shapes from construction paper. To reinforce symmetry, add the same amount of dots to each wing of a given butterfly. Dots can be applied with puff ink or glued-on sequins/buttons. [For the student with low vision, be sure to use a color that provides contrast to the wing color.] Working in pairs, have students add the number of "dots" on one butterfly to the number of "dots" on another. Number sentences can be written. This same activity can be used to practice subtraction, multiplication, and division.

Language Connection:
Have students act out the life cycle of a butterfly. Begin by having four students form a circle (sitting or standing) to reinforce the concept of "cycle."

Then have each student pull one of four labeled cards from a bag to indicate the role he/she will play ("egg," "caterpillar," etc.). If the students happen to be in the wrong order, have them shift positions to correctly represent the butterfly cycle and then hold hands once the cycle is completed.

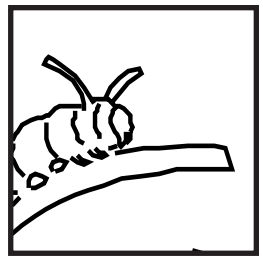
Read some of the following books:

The Very Hungry Caterpillar by Eric Carle, Putnam Publishing, 1984.

Waiting for Wings by Lois Ehlert, Harcourt Brace, 2001.

Research the names and unique characteristics of various types of butterflies:

- Swallowtail Butterfly
- Bird-Wing Butterfly
- Glasswing Butterfly
- Painted Lady Butterfly
- Owl Butterfly, etc.



Science Tidbit:
A butterfly never grows bigger after it emerges from its chrysalis.

Adult butterflies usually live for two weeks or less.

The Queen Alexander's Birdwing butterfly is the largest butterfly in the world, with a wingspan of 11 inches wide.

Suggested Children's Literature

Chinery, M. (2000). *Partners and Parents (Secrets of the Rainforest).* New York: Crabtree Publishing.

Chinery, M. (2000). *Plants and Planteaters (Secrets of the Rainforest).* New York: Crabtree Publishing.

Cunningham, A. (1993). *Rainforest Wildlife (World Wildlife Series).* Tulsa, OK: EDC Publishing.

Darling, K., & Darling, T. (1997). *Chameleons on Location.* New York: Lothrop, Lee & Shepard Books.

Darling, K., & Darling, T. (1996). *Rain Forest Babies.* New York: Walker & Company.

Dorros, A. (1990). *Rain Forest Secrets.* New York: Scholastic Trade.

Dunphy, M., & Rothman, M. (1997). *Here is the Tropical Rainforest.* New York: Hyperion Books for Children.

Greenaway, T. (2000). *Eyewitness: Jungle.* New York: Dorling Kindersley Publishing.

Harris, N. (1996). *Into the Rainforest.* San Francisco: TimeLife Books.

Horton, C. (1996). *Apes (Endangered).* New York: Benchmark Books.

Jenkins, M., & Shields, S. (1997). *Chameleons are Cool.* Cambridge, MA: Candlewick Press.

Kite, L. (1999). *A Rain Forest Tree (Small Worlds).* New York: Crabtree Publishing.

Landau, E. (1991). *Tropical Rain Forests Around the World.* New York: Franklin Watts.

Lasky, K., & Knight, C. J. (1997). *The Most Beautiful Roof in the World: Exploring the Rainforest Canopy.* San Diego: Gulliver Green.

Maynard, C., Maynard, T., & Rullman, S. (1996). *Rain Forests and Reefs: A Kid's Eye View of the Tropics.* New York: Franklin Watts.

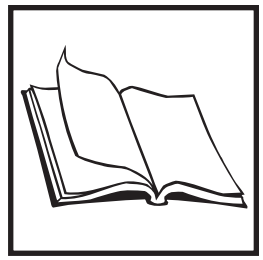
Nagda, A. W., & Buchs, T. (1997). *Canopy Crossing: A Story of an Atlantic Rainforest.* Norwalk, CT: Soundprints.

Petty, K., & Wood, J. (1993). *Rainforests (Around and About).* Hauppauge, NY: Barron's Educational Services.

Pratt, K. J. (1992). *A Walk in the Rainforest.* Nevada City, CA: Dawn Publications.

Riley, P. D., & Gerstein, S., Croucher, B., Edwards, B., & Coleman, B. (1999). *Nightwatch: Nightlife in the Tropical Rain Forest.* New York: Readers' Digest Children's Books.

Taylor, D. (1992). *Endangered Forest Animals (Endangered Animals Series).* New York: Crabtree Publishing.



Additional story, resource, and reference books on rainforest creatures can be located at your local library and bookstore. You can also search for available large print and braille books on the *Louis* Database through the American Printing House for the Blind's Web site at www.aph.org. When searching for books on the *Louis* Database, keywords like "butterfly" or "tarantulas" may be helpful.

Ocean Life

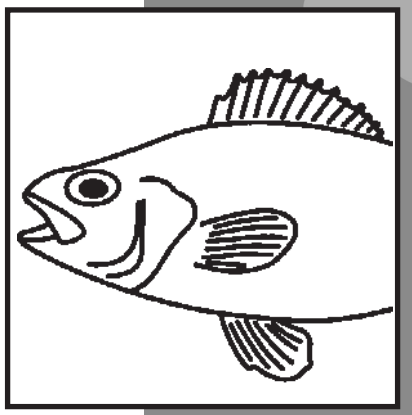
Activity 33: Fishy Facts

Objective:
To learn about the parts of a fish through an art activity.

Vocabulary:
Fish, scales, gill cover, fins, vertebrate, cold-blooded, ocean, freshwater, saltwater, food chain

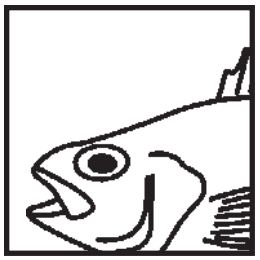
Materials:
APH Fish Overlay; fish models; pictures of fish; large sequins of various colors; craft foam sheet cut into fish shape (one for each student); craft eyes (2 for each student); corrugated cardboard or muffin liners; 2-inch pieces of braided cord or yarn for each student; glue; scissors

Inquiry:
What do most fish have in common?



Procedure:

- First ask students what they already know about fish. Where do fish live [some live in saltwater and some live in freshwater habitats]? Are they warm-blooded or cold-blooded animals [cold-blooded because their body temperature changes to the temperature of the water]? Are they classified as vertebrates or invertebrates



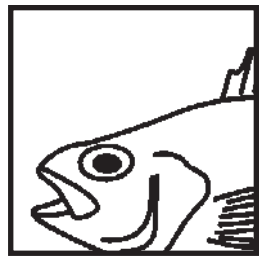
[vertebrates because they have a backbone]?

- Give each student the basic shape of a fish (minus the fins) cut from a craft foam sheet. [Note: The black outline card included in the APH Fish Overlay set can be used as a pattern.] Also provide a handful of large colorful sequins, two craft eyes, some corrugated cardboard, and a 2-inch piece of cord or yarn to each student. As you talk about the parts of fish, have students add to their fish.
- Explain that most fish have 2 *eyes* (without eyelids), one on each side of their heads. Have students glue the 2 craft eyes onto their fish. Point out how the fish's head blends in with the rest of its body; it has no neck.
- Fish also have *fins* on their bodies that help them to balance and steer as they swim. Have students use the corrugated cardboard or muffin liners to make fins for their fish and glue them on. [Fins can be pre-cut for younger students.]
- Fish also absorb oxygen from water using *gills*. Have students bend their pieces of braided cord to form the shape of the gill slit and glue it onto their fish.
- A fish's body is covered with *scales* coated with slime. These transparent plates protect the fish. Demonstrate

how to overlap colorful sequins to create scales by gluing them into place on the fish. Let students cover their fish with as many sequins as they wish. Display the students' fish on the classroom bulletin board.

Extension:
For the older student, explain that each fish fin has a specific name: The tail fin is called the *caudal fin*; the *pectoral fins* are behind the gill covers; the *dorsal fins* are the spiny fins on the top of the fish's back; the *pelvic fins* are towards the back of the fish's body but in front of the tail fin; and the *anal fin* is on the belly of the fish.

Review an example of an "ocean" food chain. Have students pull cards labeled sperm whale, giant squid, shark, large fish, small fish, and plankton. Ask the students to line up in the order of who devours whom.



Visual Adaptation:
Use the APH Fish Overlay to review the parts of a fish.

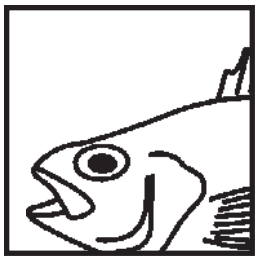
Have students touch the scales of a real fish.

Visit a local fish aquarium or pet store.

Keep a small fish aquarium in the classroom and have students share responsibility for feeding the fish.

Math Connection:

- Have students solve "fishy" word problems such as: If a fish laid 20 eggs and all 20 of



those fish grew up and laid 20 more eggs, how many fish would there be?

- Have students develop a Venn diagram that shows the characteristics that are unique to fish, characteristics that are unique to amphibians, and those that both groups share in common.

Fish

- Have fins
- Are covered with scales
- Live in saltwater or freshwater habitats
- Live only in water
- Breathe through gills

Amphibians

- Have legs
- Breathe through lungs and skin
- Live both on land and in water
- Live only in freshwater habitats
- Are not covered with scales

Both

- Cold-blooded animals
- Have backbones (classified as vertebrates)

Have students research and chart the swimming speeds of a variety of fish. Examples:

- Tunas swim 30 mph.
- Sailfish swim 68 mph.
- Salmon swim 25 mph.

Language Connection:
Read *The Rainbow Fish* by Marcus Pfister and J. Alison James and have students write what the Rainbow Fish learned about being a friend to others.

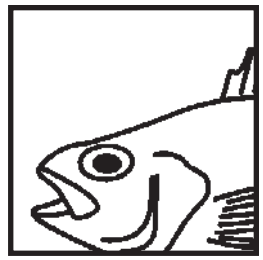
Have students write a haiku about fish to help them remember their important characteristics:

Example:
Fish have slimy scales
(five syllables)
And bony skeletons too
(seven syllables)
They swim in water
(five syllables)

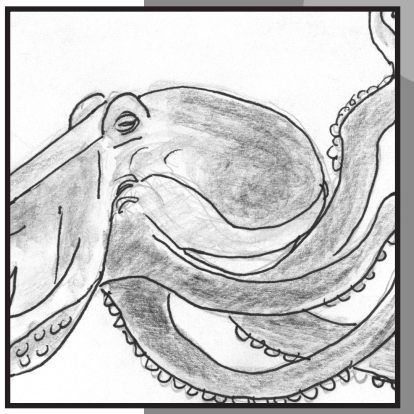
Science Tidbit:
Flatfish have both eyes on the same side of their heads.

Some fish, such as mudskippers, walk on land using their pectoral fins.

[Have students find and report on a strange, but true fact about any type of fish.]



Activity 34: How Do They Move?



Objective:
To learn through imitation how a variety of sea animals move in the water.

Vocabulary:
Movement, sea animal names (whale, squid, crab, etc.)

Materials:
Models of sea animals; tub or sink filled with water

Inquiry:
Do all sea animals move in the same way?

Procedure:

- Discuss various ways in which sea animals move:

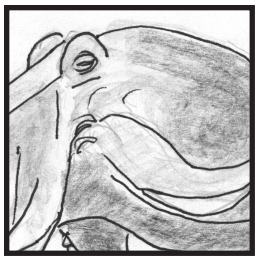
  Sharks—move their tails side to side as they swim

  Whales and dolphins—move their tails up and down

  Squids and octopuses—move backward

  Sea turtles—use their flippers like paddles

  Seals—scoot on their bellies (when on land)



Crabs—crawl sideways

Sea otters—float on their backs

Sea horses—glide forward in an upright position and bob up and down

Stingrays—flip and glide

- Divide students into "sea creature" teams. Each team should consist of three to four "sea creatures" such as a "squid" that must move backwards, a "crab" that must move sideways on all fours, and a "sea horse" that must move in an upright position and bob along. Conduct a relay race between two or three teams of "sea creatures."

Extension:
Classify sea creatures by their shape:

- torpedo/streamlined shaped (e.g., sharks, tuna)
- ribbon shaped (e.g., eels, wolf fish)
- flat shaped (e.g., stingrays, flounders)
- spherical (e.g., porcupinefish, spiny puffer)

Can students predict how a fish will move based upon its shape or guess how a fish's shape is especially helpful in its environment? For example, the thin ribbon shape of the eel allows it to navigate through tight spaces between rocks and coral.

Visual Adaptation:
Have students use sea animal models in water to demonstrate how each sea creature swims or moves through the water.

Using scrap materials from home, have students make homemade tactile models of sea creatures. For example, make an octopus by attaching 8 streamers to an inflated, round balloon.

Math Connection:
Solve "fishy" problems: If every student in the classroom had "octopus" legs, how many total legs would there be?

Language Connection:
Using the sea animal models, take the opportunity to practice spatial concepts. For example, "Place the whale *above* the crab"; "Place the shark *behind* the sea turtle."

Have each student write a riddle about a sea creature and have other classmates guess what it is.

Example:

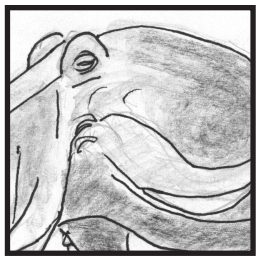
I don't trot or prance
or even run a race
I simply bob along
Can you solve this case?
[sea horse]

I don't have claws
or a shaggy mane
I'm a fish
Can you guess my name?
[lionfish]

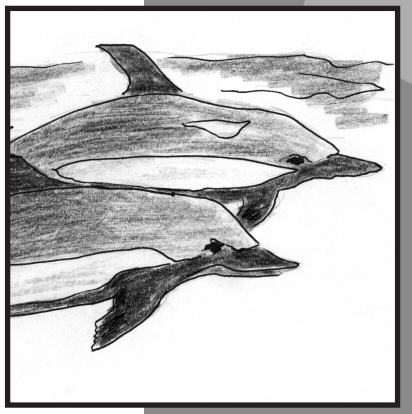
Read *How Fish Swim (Nature's Mysteries)* by Jill Bailey, Benchmark Books, 1997.

Science Tidbit:
A typical ocean fish gains extra swimming speed by pumping water through its gills.

Sea horses use their tails as anchors by wrapping them around seaweed.



Activity 35: Sea Mammals



Objective:
To learn the unique features and behaviors of sea mammals, particularly whales.

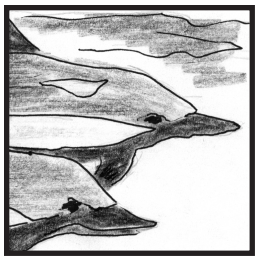
Vocabulary:
Whale, fish, mammal, walrus, sea otter, dolphin, porpoise, seal, sea lion, warm-blooded, cold-blooded, blubber, pinniped, cetacean, marine

Materials:
Models of various types of sea mammals (whales, dolphins, seals, etc.)

Inquiry: How is a whale different from a fish?

Procedure:

- Discuss the unique characteristics of whales:
  - Whales have a blowhole (one or two depending on the type of whale).
  - Whales come to the water's surface to breathe air.
  - Whales are warm-blooded.



- Whales have blubber (a thick fatty layer) under their skin to keep them warm.
- Whales give birth to live young.
- Young whales have some hair.
- Whales move their tails up and down.

• Discuss how whales differ from fish:

- Fish lay eggs.
- Fish are cold-blooded.
- Fish breath underwater.
- Fish breathe through gills.
- Fish have scales.
- Fish move their tails side to side.

Extension:
Discuss other types of sea mammals (sea lions, porpoises, walruses, manatees, sea otters, etc.). What are some unique characteristics of each of these animals and what characteristics do they have that classify them as mammals?

Visual Adaptation:
Use braille paper (or paper of similar weight) to cut out whale and fish shapes. Give each student a “whale” and a “fish.” Have students write or braille on each shape the unique characteristics of a whale (on the whale shape) and the characteristics of a fish (on the fish shape).

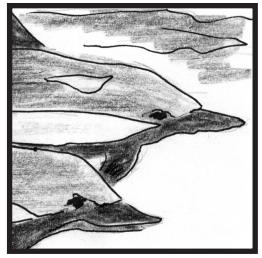
Math Connection:
Research the length and weight of various types of whales. Have students make a chart of their findings. The sizes and weights of various whales can be located at the following websites:

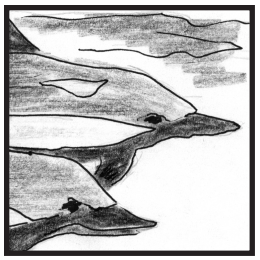
- www.enchantedlearning.com/subjects/whales
- www.seaworld.org/AnimalBytes/animal_bytes.html

Have students create a Venn diagram that compares and contrasts the characteristics and behaviors of whales and fish.

Language Connection:
Pinnipeds are a group of sea mammals that include seals, sea lions, and walruses. Research the meaning of "pinniped." What group do whales, dolphins, and porpoises belong to? *[Cetaceans]* How do these two groups differ from each other? [Unlike whales and dolphins, pinnipeds are dependent on land (e.g., they bask in the sun and give birth on beaches or sea ice).]

Have each student or groups of students select a kind of whale and research its size, habitat, scientific name, physical characteristics, etc. Possible whales to research include the following: blue whale, bowhead whale, gray whale, killer whale, sperm whale, humpback whale, beluga whale, and pygmy whale. Have students share their findings with the rest of the class.





Read *Whales* by Gail Gibbons, Holiday House, 1993.

Read *Do Whales Have Belly Buttons? Questions and Answers About Whales and Dolphins* by Melvin Berger, Gilda Berger, and Higgins Bond (Illustrator), Scholastic, Inc.,1999.

Have students create a “Marine Mammal” alphabet book:

A= Atlantic bottlenose dolphin

B= Beluga whale

C= Calf (baby whale)

D= Dolphin

Science Tidbit:
The blue whale is the biggest animal on Earth! Blue whales can grow to be 100-feet long and weigh over 80 tons.

Cetaceans are the only animals (other than the elephant) with a brain larger than a human’s.

Activity 36: Hear Ye! Hear Ye!

Objective:
To provide students a chance to use echolocation to track "food."

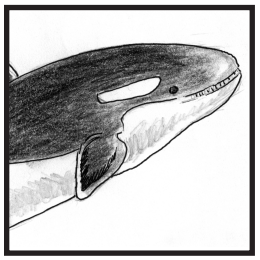
Vocabulary:
Echolocation, prey, tooth whale, baleen whale, sound waves, echo, vibrations, flukes

Materials:
Blindfold; two bells; two whistles; two toys that squeak; models of a whale and fish; hairbrush; small, torn pieces of paper; and water-filled bowl or pan

Inquiry:
How do whales find their food?

Procedure:

- Begin by asking students how whales find their food. Explain that toothed whales use *echolocation* to find their prey. First the whale makes a sound (e.g., a click, whistle, or squeak) and then the sound bounces off the surrounding objects or food. The whale uses these vibrations to locate its food and for underwater navigation.
- Select one student to be the "whale" and three students



to be the "prey." Assign each prey a different sound-making device (whistle, bell, or squeaky toy). Blindfold the "whale" and then ask each "prey" to move to a different place in the classroom or on the playground and to stay in that spot for the remainder of the game. The "hungry whale" begins by blowing his whistle. The "prey" with the whistle then "echoes" back and continues to do so whenever the "whale" blows his whistle and until the "prey" is caught. This procedure is repeated using the bell and the squeaky toy until all "prey" are located by the "whale."

- Repeat the game until all students have had a chance to be the "whale" or the "prey."

Extension:
Discuss other animals, such as bats and dolphins, that use echolocation to find their food.

Discuss real whales' diets, which include fish, squids, penguins, and sea turtles.

Visual Adaptation:
Listen to a tape recording of whales and examine the interesting sounds they make (squeaks, clicks, whistles, cries).

Whales also communicate by slapping water with their tails. Using models of a whale and a fish, illustrate to students how a whale's tail is horizontal and a fish's tail is vertical. Notice that the whale's tail is divided by a notch called a *fluke*.

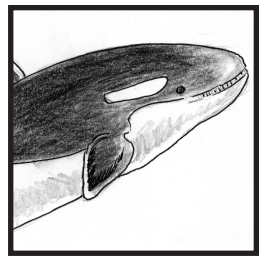
Unlike toothed whales, baleen whales catch their prey by

swimming with their mouths open and filtering krill or fish through baleen plates (huge fringed brushes inside their mouths). To demonstrate, have students drag a hairbrush with dense bristles through water containing small pieces of torn paper. The water will sift through the bristles and the paper (to represent krill) will be caught in the brush.

Math Connection:
Time how fast each "whale" obtains his "food" during the game. Graph the results.

Place four students at varying distances from the "whale," measuring out 15 feet, 30 feet, 45 feet, and 60 feet. How difficult was it for the whale to find the food farthest away?

Language Connection:
Have students write poems regarding what they know about whales.



Example:

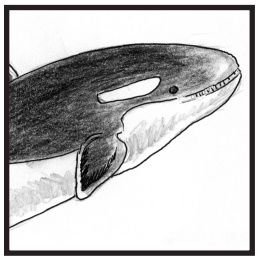
With whistles and squeaks
Whales have a skill
Of locating food
Like squids and krill.

Have students write tongue twisters about whales.

Example:

Willy the whale wails within the warm water.

Read *The Whale's Song* by Dyan Sheldon and Gary Blythe (Illustrator), Dial Books for Young Readers, 1991.



Science Tidbit:
Certain whales, such as sperm whales and killer whales, can actually stun their prey (e.g., squid) with the sound pulses they produce.

Activity 37: Caring for Marine Animals

Objective:
To understand how oil adversely affects fur and feathers of sea animals.

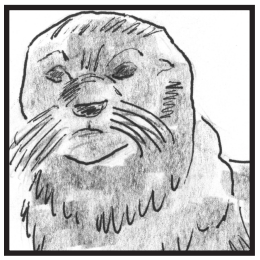
Vocabulary:
Mammal, sea otter, temperature, pollution, fur, feathers, oil

Materials:
Vegetable oil; large bowl; materials (feathers and fur) to drop into oil; materials to clean up oil (soap, cotton balls, water, sponge, paper towels).

Inquiry:
How does polluted water affect marine mammals and birds?

Procedure:

- Discuss the kinds of things that can pollute our ocean water. Explain that oil spills can be especially harmful to many animals that live in or need ocean food to survive.
- Ask students to estimate the temperature of ocean water [30 to 60 degrees Fahrenheit]. Explain that mammals have to maintain their body temperature or they will freeze.



- Explain that sea otters have incredibly thick fur that they clean constantly to keep waterproof. Their fur helps to keep them warm. If oil gets on a sea otter's fur, the fur becomes soiled and matted, making it insufficient for insulation against cold water. If cold water penetrates the sea otter's skin, the animal might die. The sea otter may also die by merely licking itself clean of the oil.
- Pour oil into a bowl, and let students observe what happens when feathers or fur are covered with oil. Then let the students clean the feathers or fur with soap. Have them record their observations in their science journals.

Extension:
What other "human" pollution/ dangers do sea animals experience?

- Manufacturing wastes/toxic chemicals
- Overfishing
- Free-floating drift nets
- Motor boats
- Noise pollution—obstructs whales' ability to communicate.

Visual Adaptation:
Use the APH *Tactile Demonstration Thermometer* to set the ocean water temperatures, or the body temperatures of various marine animals.

Darken the vegetable oil with food coloring and use on light-colored fur or feathers.

Math Connection:
Have students calculate how much warmer the healthy marine otter (with a body temperature of 60ºF) is than the ocean water (40ºF).

Example:
60º - 40º = 20ºF

The sea otter is 20º warmer than the ocean water. (Change the water temperature and calculate again.)

Language Connection:
Discuss the meaning of *endangered.* Then have each student report on an endangered sea animal and the reasons for endangerment (e.g., Florida manatees are endangered because of collisions with boats).

Science Tidbit:
The Exxon Valdez oil spill in Alaska in 1989 was the largest crude oil spill (to date) in U.S. waters. This accident killed many rare sea otters.

Activity 38: Ocean Treasures

Objective:
To discover the treasures that the various depths of the sea offer, such as seashells.

Vocabulary:
Oyster, pearl, sea shell, sand dollar, sea star, coral, sea sponge, crab, mollusks, invertebrates, classify

Materials:
Oyster, pearl, shell, sand dollar, sea shells, sea stars, treasure box, mollusk, sea sponge

Inquiry:
What are some of the special treasures that you might find in the ocean?

Procedure:

- Ask students what types of things they might find if they took a walk on the beach or what they might find during a swim in the ocean. If available, let students handle actual ocean "treasures": sea shells, sand dollars, sea stars, etc.
- Focus on seashells. Explain that seashells are the outer

protective skeleton, or "left-over armor" of mollusks (clams, oysters, scallop, and snails) that have soft and fleshy bodies. These animals are invertebrates.

- Using a large collection of seashells (including some that students bring from home), have students sort and classify the shells according to texture, shape, size, or color pattern. Have students assign their own classification names to their groupings such as "smooth shells," "ridged shells," "cone-shape shells," "two-part (bivalve) versus one-part shells (univalve)," etc. After they sort the shells, have students explain the manner in which they chose to classify them.

Extension:
In the science area, have a box filled with sea treasures (sea shells, sea stars, sea sponges, etc.). Fill the box with sand and bury the treasures. Add objects that are not found near the ocean. Have the students compile two lists in their science journals—"Ocean Treasures" and "Other Treasures"—as they search through the treasure chest.

Visual Adaptation:
If available, let students trace the outline of shells and sea stars on APH *Quick-Draw Paper* using various colors of water-based markers.

Visit a museum or nature center where students can handle a variety of sea shells.

Math Connection:
Using a variety of shells, measure their length and width; then arrange the shells from largest to smallest. Have students draw or trace the shells and then list measurements.

Language Connection:
Have students write a story about finding buried ocean treasure. What would be inside the treasure chest?

Write tongue twisters like the popular “She sells seashells by the seashore.”

Science Tidbit:
Mother-of-pearl is a shiny, smooth material that is obtained from oyster shells and used in jewelry.

Suggested Children's Literature

Arnold, C., & Hewett, R. (1999). *Baby Whale Rescue: The True Story of J. J.* San Diego, CA: Bridgewater Books.

Carle, E. (2002). *House for Hermit Crab.* NY: Aladdin Paperbacks.

Cole, J., & Wynne, P. (1986). *Hungry, Hungry Sharks.* New York: Random House.

Davies, N., & Maland, N. (1997). *Big Blue Whale.* Cambridge, MA: Candlewick Press.

Esbensen, B. J., & Davis, L. (1994). *Baby Whales Drink Milk.* New York: HarperCollins Children's Books.

Gibbons, G. (1993). *Sharks.* New York: Holiday House.

Grupper, J. (2000). *Destination Deep Sea.* Washington, DC: National Geographic Society.

Guiberson, B. Z., & Berenzy, A. (1996). *Into the Sea.* New York: Henry Holt.

Jenkins, P. B., & Classen, M. (1997*). A Safe Home for Manatees (Let's-Read-and-Find-Out Science).* New York: HarperCollins Children's Books.

Knight, L., & Talbot, Dr. F. H. (Ed.) (1995). *Under the Sea.* San Francisco: TimeLife Books.

Landau, E. (1999). *Sea Horses (True Books).* New York: Children's Press.

Lovett, S. (1992). *Extremely Weird Fishes.* Santa Fe, NM: John Muir Publications.

Markle, S. (1996). *Outside and Inside Sharks.* New York: Aladdin Paperbacks.

McMillan, B. (1992). *Going on a Whale Watch.* New York: Scholastic Trade.

Muzik, K., & Brown-Wing, K. (1992). *At Home in the Coral Reef.* Watertown, MA: Charlesbridge Publishing.

Pallotta, J., & Mazzola, F. (1986). *The Ocean Alphabet Book.* Watertown, MA: Charlesbridge Publishing.

Patent, D. H. (1989). *Humpback Whales.* New York: Holiday House.

Pfister, M., & James, J. A. (1998). *Rainbow Fish and the Big Blue Whale.* North South Books.

Pratt, K. J. (1994). *A Swim Through the Sea*. Nevada City, CA: Dawn Publications.

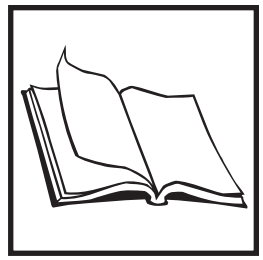
Simon, S. (1995). *Sharks*. New York: HarperCollins Children's Books.

Simon, S. (1992). *Whales.* New York: HarperCollins Publishers Children's Books.

Toft, K. M., & Sheather, A. (1999). *Neptune's Nursery.* Watertown, MA: Charlesbridge Publishing.

Troll, R. (2002). *Sharkabet: A Sea of Sharks from A to Z.* Portland, OR: Westwinds Press.

Walker, S. M., & Petruccio, S. J. (2000). Seahorse Reef. Norwalk, CT: Soundprints.



Wright-Frierson, V. (1999). A*n Island Scrapbook: Dawn to Dusk on a Barrier Island.* New York: Simon & Schuster Children's Publishing Division.

Additional story, resource, and reference books on ocean life can be located at your local library and bookstore. You can also search for available large print and braille books on the *Louis* Database through the American Printing House for the Blind's Web site at www.aph.org. When searching for books on the *Louis* Database, keywords like "manatees," "whales," and "sharks" may be helpful.

Polar Pals

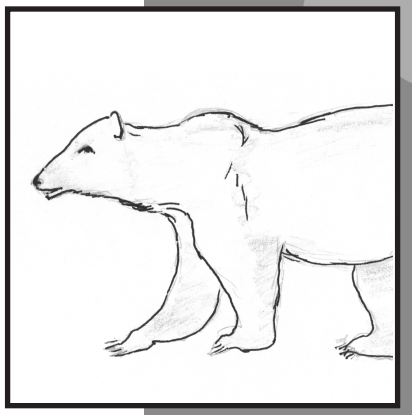
Activity 39: A Polar Bear's Coat

Objective:
To learn how polar bears keep warm in freezing temperatures experienced in the Arctic region.

Vocabulary:
Polar bear, Arctic, fur, coat, transparent, hollow, insulation, waterproof, undercoat, blubber

Materials:
Two sandwich-size plastic resealable bags; cotton balls (enough to fill one plastic resealable bag) or a cotton glove; two cloth-covered elastic bands; a two-gallon bucket filled with ice water; a picture or model of a polar bear

Inquiry:
How are polar bears adapted to survive the harsh Arctic environment and below-freezing temperatures?



Procedure:
Begin by showing students a picture or model of a polar bear. Explain that polar bears have two layers of fur that help protect them from the freezing Arctic temperatures. The undercoat is a thick, wooly layer, and the outer layer consists of thin, hollow, transparent tubes that trap light and heat against the bear's skin.

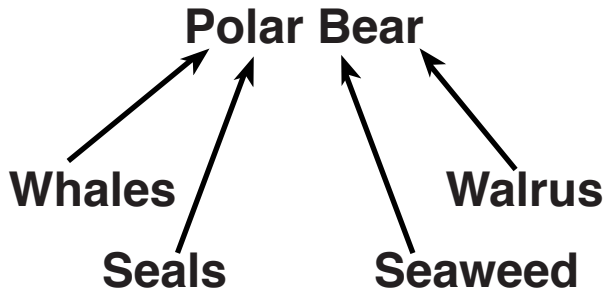
Because it is oily, the polar bear's fur does not freeze together. Polar bears also have a layer of blubber that serves as an insulating blanket. Most marine animals have this fatty layer below their skin.

To demonstrate how fur keeps a polar bear warm, fill a bucket with ice water and have students take turns doing the following:

1) Slip one hand into an empty resealable plastic bag that is secured to the wrist with a cloth-covered elastic band.
2) Slip the other hand into a resealable plastic bag that is filled with cotton balls and secured to the student's wrist with a cloth-covered elastic band. Make sure that the cotton balls fully surround the student's hand. [A cotton glove can be used instead of cotton balls.]
3) Dip both hands into the icy water for about 15-30 seconds. Which hand feels warmer in the cold water?

Extension:
Before conducting the procedure, have older students write this activity as an experiment including "hypothesis," "test procedure," and "results."

Create an "Arctic Food Web" showing the types of animals and plants that polar bears consume:

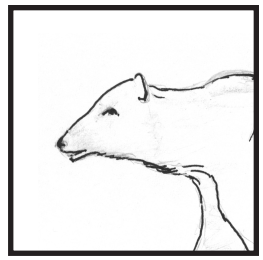


Discuss other physical characteristics, such as the following, that allow the polar bears to survive the Arctic:

- A long neck that allows them to swim with their heads above water
- Dense fur between their toes to help prevent slippage on ice
- Large, webbed paws that they use like paddles to swim
- Claws that provide additional traction on ice and help them catch prey

Visual Adaptation:
If available, allow students to use the APH Tactile Demonstration Thermometer to set temperatures experienced by polar bears in the Arctic region.

Using a tactile map, review the location of the five "polar bear" nations--Norway, Greenland, United States, Canada, and Russia.



Math Connection:
Polar bears can live to be 25-years-old. Research and chart the life span of other Arctic animals (e.g., walrus, narwhal, seal)

Language Connection:
Male polar bears are called "boars"; female polar bears are called "sows"; and baby polar bears are called "cubs." Research the male, female, and baby names of other animals.

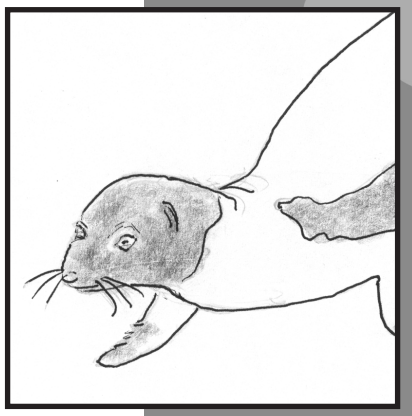
Read *Great Crystal Bear* by Carolyn Lesser and William Noonan (Illustrator), Harcourt Brace, 1996.

Read Polar Bears by Gail Gibbons, Holiday House, 2001.

Science Tidbit:
Polar bears are the only marine bears in existence. They are also the largest land carnivores.

A polar bear's skin is black; it is only its hair that reflects light to make the bear look white.

Activity 40: Super Seal Snacks



Objective:
To learn about the diets of seals, sea lions, and walruses.

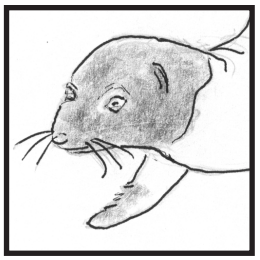
Materials:
Pretzel sticks, oyster crackers, goldfish crackers, gumdrops; black or white posterboard (background needs to contrast with food color); glue; pictures or models of seals, sea lions, and walruses

Vocabulary:
True seal, sea lion, walrus, Arctic, Antarctica, tusks, flippers, squid, fish, clams, sharks, pinnipeds, marine

Inquiry:
What types of food do you think seals, sea lions, and walruses eat?

Procedure:
Begin by discussing the unique physical characteristics of sea lions, true seals, and walruses.

- **Sea lions** and **fur seals** have small ear flaps and can use their flippers to travel on land as well as in water; their front flippers are wing-like and their hind flippers are like paddles; they make barking noises;



and they are very intelligent and playful.

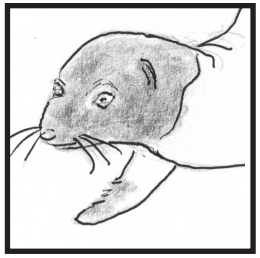
- **True seals** have tiny holes for ears and lack ear flaps; they have claw-like nails on their flippers; they are unable to rotate their hind flippers to travel on land and must flop along on their bellies; they are usually quiet.
- **Walruses** have long ivory tusks and bushy whiskers; they have wrinkled skin and thick rolls of blubber; they are able to use all four fins to walk on land; they have no external ears; they make a bell-like noise underwater, but bark, growl, and whistle above water.

Walruses, sea lions, and seals are similar in that they are all marine mammals that have hair, whiskers, layers of blubber, and four fins; they have streamlined bodies (tapered at both ends) that allow them to swim well; they are also classified as "pinnipeds" meaning "wing- or fin-footed."

After discussing similarities and differences, ask the "Inquiry" question. Tell students that they will be creating a "super seal snack."

Divide the class into four small groups. Assign each group one of the following sea mammals along with a description of their diet:

Sea Mammal	Daily Diet
California Sea Lion	26 lbs. of squid
Harbor Seal	13 lbs. of fish
Pacific Walrus	60 lbs. of clams
Northern Elephant Seal	75 lbs. of small sharks



- Provide each group with a picture of their mammal, a piece of posterboard, glue, and a bowl of snacks that symbolize each mammal's diet.

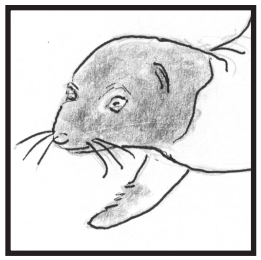
  Gumdrops = squids

  Goldfish crackers = fish

  Oyster crackers = clams

  Pretzel sticks = small sharks

- Ask students to glue their mammal's picture in the center of the posterboard. With the posterboard placed flat on the table or desk, have students surround the animal picture with the amount of "food" it eats. Tell them that one snack piece equals one pound of food.



Extension:
Rotate the posters so that each group gets an opportunity to "feed" each mammal. The food can be glued into place on the poster after each group has had a turn. Display the posters in the classroom.

Visual Adaptation:
Visit a zoo where sea lions, seals, and walruses can be observed and heard. Sea lions often perform a variety of tricks.

Math Connection:
Have students complete some math sentences. Example: How many more pounds of food did the northern elephant seal eat than the harbor seal?

Research and chart the typical weight of each marine mammal listed in the "Procedure." How did weight relate to amount of food intake?

Language Connection:
Have students write a poem about seals, sea lions, or walruses. For example:

Sea lions bark and roar,
the number of flippers they
have is four,
they're agile in the water,
but unlike a true seal,
they can walk on the shore.

Science Tidbit:
The Elephant Seal is the largest of all pinnipeds—it weighs up to four tons! Walruses are the second largest.

Activity 41: Penguins: Birds or Fish?

Objective:
To demonstrate that the body of a penguin is better designed for swimming than for flying.

Vocabulary:
Penguin, bird, fish, hollow bones, solid bones, buoyancy, feathers, Antarctica

Materials:
Dishpan filled with water; 2 empty 35mm film canisters; sand

Inquiry:
How do penguins' bones help them to swim?

Procedure:

- Tell students that a long time ago, when an explorer first saw penguins, he thought he had found a feathered fish. Ask students why the explorer might have thought this. [Penguins have wings that look like flippers; penguins can also swim under water and jump out of water like porpoises.]
- Explain that penguins are not fish at all, but flightless seabirds that are designed

to live most of their life (sometimes as much as 75%) in the water. In order for penguins to swim well, they use their wings as flippers and their webbed feet as paddles. Penguins have solid bones that help them overcome buoyancy and swim under water; other birds have hollow bones.

- Place a water-filled dishpan on the floor. Fill one film canister with sand and leave the other film canister empty. Ask the students why one floats lower in the water than the other.
- Compare the canisters to the bodies of a penguin and a bird. The penguin has heavy, solid bones, and the common bird has hollow bones.
- Push both canisters down in water at the same time. What happens? What would happen if a flying bird tried to dive down and get food out of the water? What would happen if the penguin tried to do the same?

Extension:
Allow the students to do this experiment for themselves at the science center and have them write an experiment including "hypothesis," "test procedures," and "conclusions."

Discuss diets of penguins. Their swimming ability allows them to catch and eat fish, squid, and plankton.

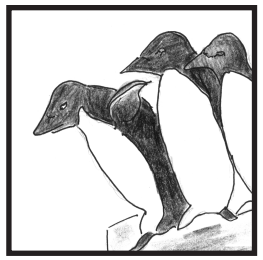
Visual Adaptation:
Label canisters with braille/large type “solid” and “hollow” labels.

Help students imitate the stance of a penguin:

- Stand upright
- Keep head hunched into shoulders
- Rest on heels with feet pointed upward (to reduce contact with icy surfaces)
- Keep arms close to one’s sides and point hands (wings) upward
- Waddle and take short hops

For added fun, place a lunch bag stuffed with newspaper on the “penguin’s” feet and have him walk with his “baby” (See “Science Tidbit” for more information).

Penguins live on the edges of the southern continents. Use a tactile map or globe to locate the habitats of various types of penguins: shores of Africa, Australia, New Zealand, and South America. Only Adelie penguins and Emperor penguins live all their lives on the continent of Antarctica.



Math Connection:
Refer to “Science Tidbit” for an explanation of how penguins stay warm. Using plastic bowling pins, show how 10 penguins would form a triangular shape and rotate to allow each penguin a chance to stand in the center to keep warm.

Language Connection:
Creative writing assignment: If a group of penguins were to come

live in your house, what kind of habitat would you create for them?

Have groups/pairs of students research various types of penguins (Emperor, King, Adelie, Gentoo, Fairy, Chinstrap, etc.) and give a report to the class on interesting characteristics of each penguin.

Read *Antarctic Antics: A Book of Penguin Poems* by Judy Sierra, Jose Aruego (Illustrator), and Ariane Dewey (Illustrator), Harcourt Brace, 1998. Ask students to write their own poems about penguins.

Read *Little Penguin's Tale* by Audrey Wood, Harcourt Brace, 1993.

Science Tidbit:
During the freezing winter months, penguins work together to stay warm. To help stay warm, they huddle together with their backs to the wind. Ever so often, they rotate positions so that each penguin gets a turn to be in the center of the group, where it is the warmest.

Penguins have more feathers than most other birds. Their feathers are closely packed together giving the appearance of fur.

After a female Emperor Penguin lays an egg, the male places the egg on his feet and incubates the egg with his feathered stomach. The male carries the egg on his feet for about two months until it hatches. A baby Emperor Penguin will ride on his father's feet during the first weeks of life.

Suggested Children's Literature

Berger, M., Berger, G., & Bond, H. (2001). *Do Penguins Get Frostbite? Questions and Answers About Polar Animals.* New York: Scholastic Reference.

Darling, K., & Darling, T. (1996). *Arctic Babies.* New York: Walker & Company.

DuTemple, L. A., & Staub, F. (1997). *Moose.* Minneapolis, MN: Lerner Publications.

Gibbons, G. (1999). *Penguins.* New York: Holiday House.

Gibbons, G. (2001). *Polar Bears.* New York: Holiday House.

Guiberson, B. Z., & Paley, J. (2001). *The Emperor Lays an Egg.* New York: Henry Holt.

Hess, P. (2001). *Polar Animals.* New York: Zero to Ten Childrens Books.

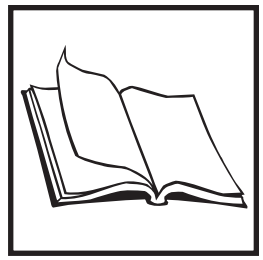
Kalman, B. (1988). *Arctic Animals (Arctic World Series).* New York: Crabtree Publishing.

Markert, J. (1991). *Arctic Foxes.* Chanhassen, MN: The Child's World.

McDonald, M. A. (1998). *Reindeer.* Chanhassen, MN: The Child's World.

Miller, D., & Van Zyle, J. (1997). *A Polar Bear Journey.* New York: Little, Brown & Company.

Patent, D. H., & Wertheim, A. (1999). *Great Ice Bear: The Polar Bear and the Eskimo.* William Morrow & Company.



Pinkwater, J., & Pinkwater, D. M. (1997). *Young Larry.* New York: Marshall Cavendish Corporation.

Radcliffe, T., & Butler, J. (1996). *Cimru the Seal.* Viking Childrens Books.

Resnick, J. (1994). *All About Seals, Sea Lions, and Walruses (Sea World Book).* Third Story Books.

Silver, D. M., & Wynne, P. (1994). *One Small Square: Arctic Tundra.* New York: W. H. Freeman & Company.

Staub, F. (1999). *Walruses (Early Bird Series).* Minneapolis, MN: Lerner Publications.

Taylor, B. (1995). *Eyewitness: Arctic and Antarctica.* New York: Dorling Kindersley Publishing.

Woodard, J. (1997). *Seals (Endangered).* Tarrytown, NY: Benchmark Books.

Additional story, resource, and reference books on artic animals can be located at your local library and bookstore. You can also search for available large print and braille books on the *Louis* Database through the American Printing House for the Blind's Web site at www.aph.org. When searching for books on the *Louis* Database, keywords like "seals," "polar bears," or "arctic" may be helpful.

Appendices

Appendix A: Culminating Activities

The suggested culminating activities give students opportunities to apply their knowledge about animals. Students can complete these activities individually or as a group.

Are You For Real?
Have the student(s) read a storybook about an animal and then write a list of the animal's physical characteristics, behaviors, its home, the food it ate, etc., as illustrated and/or discussed in the storybook. Did any dialog or information in the story indicate that the animal was not completely like the real animal (e.g., it could talk; it danced; it made friends with natural predators; it wore clothes; it lived in houses like ours) that made it more of a make-believe animal? Have the students list these "not-so-real" traits.

Fur, Feathers, and Scales, Oh My!
Have the student(s) explore various textures of animal coverings such as turtle shells, bird feathers, and snake skins. For each animal covering explored, have each student record the following information:

- To which animal it belongs
- How the covering helps the animal
- If the animal is a mammal, reptile, fish, amphibian, bird, or insect
- Adjectives to describe the covering (soft, warm, dry, rough, prickly, bumpy)

Real Estate for Sale
After studying each animal habitat, perform this activity to assess the student(s') understanding of which animals live in particular habitats. First read aloud some samples of real estate ads from the newspaper. Then list several animals from each habitat being studied. Have the student(s) create a real estate ad for one of the animals listed.

Example:
FOR SALE: A cozy hole in an old tree located in a forest. Many acorns can be found on the forest floor.

Example:
GREAT LANDSCAPING: A generous backyard has so many bushes for nibbling and fruit trees for snacking. Lots of red foliage to hide your red and black wings.

Have the students read their ads aloud and let the other students guess which animal is best suited for the described habitat.

Mirrored Images?
Have the student(s) select two animals that resemble each other but have unique characteristics that make them distinguishable. Compare the two animals; outline the important differences on a large posterboard, and attach pictures if available. Examples of similar animals include the following:

- butterflies and moths
- frogs and toads
- alligators and crocodiles
- whales and porpoises
- poisonous snakes and nonpoisonous snakes

To Eat or Not to Eat…
Using pictures, models, words written/brailled on paper chain links, etc., have the student(s) illustrate in a creative way an example of a food chain for each animal habitat studied.

Example:
"Forest Food Chain": Grass is eaten by a cricket; the cricket is eaten by a frog; the frog is eaten by a snake; the snake is eaten by an owl.

Example:
"Ocean Food Chain": Plankton is eaten by a fish; the fish is eaten by a penguin; the penguin is eaten by a seal.

Heads or Tails?
Cut pictures of animals so that each animal's head is on one half and its tail is on the other half. Mix the "heads" and "tails" together and place in separate shoeboxes. Have the student(s) match the heads with the tails to form all of the animals correctly. Photocopies of the APH Animal Overlays (snake, fish, turtle, bird, and mouse) can be made and cut for this activity. First trace the photocopied images with puff ink, let dry, and cut each picture in half.

Create a Critter
Have the student(s) create their own critter by blending two animals together. What unique features would it have? How would it move? What sounds would it make? Etc.

Example:
An alligator mixed with a kangaroo would be called a "alliroo" or a

"kangigator." This animal would be part mammal and part reptile; it would have a pouch to incubate its laid eggs; it would have a mixture of fur and scales; and it could swim in swamps and hop on land; etc. After the students describe their "created critter," they could draw a picture or make a clay image of its physical features.

Provide A Nice Home

Because animals are greatly affected by their environment, have the student(s) choose an area around the school to keep clean. If there is not an area conducive to an animal habitat near the school, ask the student(s) to find an area around their homes to keep clean for animals. Have the student(s) document in their science journals what they had to do to make the area more appropriate for animals and what exactly they had to do to keep the area clean.

Appendix B: Suggested Activities for APH Animal Overlays

The APH Animal Overlays were designed to be used with either the APH Light Box or APH Mini-Lite. The overlays help reinforce the animal concepts encountered throughout this guidebook. Visual contrast and tactile elements make the overlays ideal for use with students who have visual impairments, but all students can enjoy them.

This section includes activities for using the animal overlays to review parts of a bird, a butterfly, turtle, snake, ant, spider, fish, and mouse. There are also overlay activities for reviewing life cycles of a butterfly and frog, and for examining animal tracks, and spider web construction.

A complete list of the APH Animal Overlays follows. Please note that two overlay trays are included:

I. Animal Part Overlays

A. Bird (Side View) [8 cards]
B. Bird (Top View) [7 cards]
C. Butterfly [8 cards]
D. Snake [6 cards]
E. Ant [7 cards]
F. Fish [6 cards]
G. Spider [6 cards]
H. Mouse [7 cards]
I. Turtle [6 cards]

II. Life Cycle Overlays

A. Life Cycle of a Butterfly [6 cards]

B. Life Cycle of a Frog [7 cards]

III. Exploded Overlays

Each Animal Part Overlay and Life Cycle Overlay listed in sections I and II have corresponding visual and tactile "Exploded Overlays."

IV. Animal Track Overlays

A. Duck [4 cards]
B. Deer [4 cards]
C. Dog [4 cards]
D. Horse [4 cards]
E. Cat [4 cards]
F. Crow [4 cards]

V. Spider Web Overlays [12 cards]

VI. Trays

A. Tray to hold 8.5 x 11 inch overlay cards

B. Compartmentalized (2 x 3 array) Tray to hold Spider Web and Animal Track overlays

VII. Six Translucent Yellow Cards

These cards can be inserted into the compartments of the 2 x 3 tray to provide visual contrast when using Animal Track or Spider Web Overlays.

Animal Overlays: Suggested Activities

Animal Part Overlays

The following activities demonstrate how the APH Animal Overlays can be used to learn about parts of a turtle. Similar types of overlay activities can be used to study parts of a bird, snake, ant, butterfly, fish, spider, and mouse. The overlays are best used with the APH Light Box or the APH Mini-Lite. However, the enclosed trays, designed to slip snugly under a light box ledge, can also be used alone. Simply insert a white 8.5 x 11 inch sheet of paper into the tray before applying overlays. The 8.5 x 11 inch tray will provide a secure work area for manipulating the Animal Overlays.

Explore Parts of a Turtle

Place the OUTLINE card in the 8.5 x 11 inch tray. Isolate parts of the turtle for the student by positioning various "part overlays" on top of the OUTLINE card. The name of the part and part itself will be visible. Adding the TACTILE card on top of the "part overlay" helps to confirm what the student perceives visually.

Build a Turtle

Begin by placing the OUTLINE card of the turtle in the 8.5 x 11 inch tray. Then have the student add each "part overlay" until all overlays are added and a complete colored image of the turtle emerges. Placing the TACTILE card on top will add the finishing "touch."

Name that Part

Place the OUTLINE card in the 8.5 x 11 inch tray. Place one of the "part overlays" on top of the OUTLINE card. Conceal the name of the part with your hand or opaque paper. Ask the student to identify the highlighted

part. The more advanced student may be able to describe the function of each part as well. The TACTILE card can be applied for additional sensory information.

Color a Turtle

Make a paper copy of the OUTLINE card and outline the turtle with puff ink. The student can enjoy coloring the raised image of the turtle with crayons and markers. Students with no vision can use *Quick-Draw Paper* (available from APH) to draw a turtle using the tactile image as a guide.

Make a Book about Turtles

Use a photocopier to make paper copies of the OUTLINE card of the turtle. Make as many copies as there are "part" overlays. Have the student color a different "turtle" part (e.g., shell, head, legs, tail) on each copy. The student may also like to print or braille the name of the colored part on the paper, as well as what he knows about the highlighted part. Make a cover page for the book by creating a raised line and colored image of the whole turtle, along with the date and student's name. The student might also like to write a story about a turtle and then add their drawing or tactile design as the front cover.

Trace a Turtle

If a light box is available, a student with some functional vision may enjoy tracing the OUTLINE image of the turtle using a sheet of tracing paper. The creation could be used for the student's "Turtle Book."

A Touchable Turtle

If a student is a tactile learner, use a real turtle (if available), or a model of a turtle, along with the thermoformed

image of the turtle to examine its external body structure. Compare and contrast the real turtle, model of a turtle, and the raised picture of a turtle. Ask the student to describe each and explain how they are alike and different.

Life Cycle Overlays

Overlays are provided to enhance activities related to the life cycle of a frog and the life cycle of a butterfly. The stages of each life cycle are briefly described or named on the overlay cards. First insert the OUTLINE card showing the entire life cycle. Then insert each overlay card to highlight each specific stage (e.g., pupa, adult).

Exploded Overlays

Corresponding visual and tactile "Exploded Overlays" are included with each Animal Part Overlay and Life Cycle Overlay. These overlays allow students, especially those without vision, to independently isolate and identify separate parts of the animal or life cycle. For example, the student can tactually examine the left forewing of the butterfly in the "exploded" overlay and then locate that same forewing in the tactile picture of the whole butterfly with little or no assistance from the teacher. This exercise is especially helpful in preparing young students for systematically exploring and interpreting tactile graphics. The teacher might also choose to use the Exploded Overlays as assessment tools. Simply cover or mask the braille and/or print labels with paper strips taped temporarily into place and then quiz the student's recognition and identification of each animal part or life cycle stage.

Spider Web Overlays

Have the student sequence the Spider Web Overlays (tactile, print, or both) from beginning to end. The compartmentalized

(2 x 3 array) tray can be used for this activity. Assign the top row compartments as steps 1 through 3 (left to right), and the bottom row compartments as 4 through 6 (left to right). Help the student locate the spider in each overlay. Emphasize that a spider attaches its web between fence posts, tree limbs, porch posts, etc. The overlays depict only the "growing web" and the spider itself in an effort to reduce tactile and visual clutter. Use these overlays to enhance the "Web Masters" activity.

Animal Track Overlays

The Animal Track Overlays depict the prints of a duck, cat, dog, crow, deer, and horse. For each animal, a NAME card, OUTLINE card, COLOR card, and TACTILE card are provided. Use these cards for matching activities in which the student is expected to match the name of the animal with its print. The OUTLINE cards can serve as a way to check for accuracy. The student can also sort all the related cards of one animal into one of the compartments of the provided compartmentalized (2 x 3 array) tray.

Appendix C: Simple Animal Activities for Home or School

- Search for bugs and worms under rocks, near flowers, around trees, in puddles, etc.
- Look for animal tracks in the backyard, along a hiking trail, or near a pond.
- Explore abandoned bird nests to learn about homes of birds.
- Help keep the environment clean for animals by picking up litter.
- Visit the library and check out books about animals. Decide if the animals in the books are real or make-believe.
- Take care of a neighbor's pet dog or cat.
- Learn more about animals that assist people for mobility purposes (e.g., guide dogs).
- Visit a farm, zoo, pet store, wooded area, nature center, or local aquarium to learn about a variety of animals.
- Talk with the child about how one should approach a strange or unfamiliar animal in the neighborhood, park, etc.
- Practice gently petting dogs, cats, rabbits, etc.

- Talk about various types of “animal-related” careers: biologist, park ranger, herpetologist, biologist, oceanographer, etc.
- Learn the names of animal babies.
- Take a walk outside and collect items that birds might use to build their nest (twigs, string, etc.).
- Make bird feeders to hang in backyard trees.
- Make “critter” creations from scrap craft materials.
- Explore a collection of animal models. Talk about how the model is different from or the same as the real animal.
- Go on a fishing trip.
- Become knowledgeable about endangered animals–what can we do to protect them?
- Watch popular children’s movies about animals.
- Talk about myths associated with animals (e.g., toads will give you warts).
- Listen to recorded bird calls/songs.
- Visit a butterfly garden.
- Make up “animal” jokes.
- Donate items to animal shelters.
- Visit animal-related Web sites on the Internet.
- Read newspaper articles that address how people are helping or damaging animals’ habitats.
- Explore or collect a variety of seashells.
- Make castings of animal tracks.
- Read, read, read books about all sorts of animals!

Appendix D: Resources

Agencies and organizations to contact for more "animal" information:

American Association of Zookeepers
AAZK Administrative Offices
3601 S.W. 29th, Suite 133
Topeka, KS 66614
www.aazk.org

(Offers *Junior Keepers' Forum,* an interactive publication for children ages 8-12 who are interested in animals and their conservation.)

Carolina Biological Supply Company
2700 York Road
Burlington, NC 27215-3398
Tel: (800) 334-5551
Fax: (800) 222-7112
www.carolina.com

(Provides supplies, educational resources, and lab aids to science and mathematics teachers.)

Delta Education
P.O. Box 3000, 80 Northwest Blvd.
Nashua, NH 03061-3000
Tel: (800) 258-1302
www.delta-education.com

(Provides hands-on life science, earth science, and physical science materials and programs.)

Edmund Scientific
60 Pearce Avenue
Tonawanda, NY 14150-6711
Tel: (800) 728-6999
www.edsci.com

(Provides a variety of science materials including ant farms and earthworm farms.)

Fish and Wildlife Service
U.S. Department of the Interior
1849 C Street NW
Washington, D.C. 20240
Tel: (202) 208-3100
www.fws.gov

(Provides information about endangered animals and wildlife conservation issues.)

Insect Lore
P.O. Box 1535
Shafter, CA 93263
Tel: (800) LIVE-BUG,
(800) 548-3284
Fax: (661)746-0334
www.insectlore.com

(Provides science related activities for the classroom.)

Lakeshore Learning Materials
2695 E. Dominguez Street
Carson, CA 90810
Tel: (800) 421-5354
Fax: (310) 537-5403
www.lakeshorelearning.com

(Provides school supplies, educational products, and learning materials for children of all ages.)

National Association for Humane and Environmental Education (NAHEE)
Humane Society of the United States
P.O. Box 362
East Haddam, CT 06423-0362
Tel: (860) 434-8666
www.nahee.org

(Publishes *KIND News*, a newsletter for students in elementary grades that highlights the importance of treating people, animals, and the environment with kindness and respect.)

National Wildlife Federation
11100 Wildlife Center Drive
Reston, VA 20190-5362
Tel: (703) 438-6000
www.nwf.org

(Offers magazines and activity books, such as *Ranger Rick* and *Your Big Back Yard*, for children.)

Rainforest Action Network (RAN)
221 Pine Street, Suite 500
San Francisco, CA 94104
Tel: (415) 398-4404
Fax: (415) 398-2732
www.ran.org

(Provides animal fact sheets about rainforest animals.)

Rainbow Education Media
4540 Preslyn Drive
Raleigh, NC 27615
Tel: (800) 331-4047
Fax: (919) 954-7554
www.rainbowedumedia.com

(Provides videos for children in grades K-8.)

Summit Learning
755 Rockwell Avenue
P.O. Box 755
Fort Atkinson, WI 53538-0755
Tel: (800) 777-8817
Fax: (800) 317-2194
www.summitlearning.com

(Provides educational science materials.)

Wildlife Conservation Society
2300 Southern Boulevard
Bronx, NY 10460
Tel: (718) 220-5100
www.wcs.org

(Visit WCS's kid site at www.kidsgowild.com for interesting animal facts.)

World Wildlife Fund
1250 24th Street, N.W.
Washington, D.C. 20037
Tel: (800) CALL-WWF
Fax: (202) 293-9211
www.worldwildlife.org
www.wwf.org [International]

(Offers information about animals, endangered species, and rainforests.)

Web Site Resources

www.animalsoftherainforest.com

www.buschgardens.org

www.desertusa.com/animal.html

www.discovery.com

www.ecoworld.com

www.educationplanet.com

www.enature.com

www.explor.com/animals

www.infowest.com/life/aants.htm

www.insectia.com

www.kidsplanet.org

www.lpzoo.com/tour/tour.html

www.nationalgeographic.com/kids

www.pbs.org/oceanrealm

www.pbs.org/neighborhoods/nature

www.seaworld.org

www.sheddnet.org

www.theaviary.com

www.wildsanctuary.com

www.yahooligans.com

Glossary

A

Abdomen
The rear part of an insect's body.

Adaptation
A characteristic to fit different environmental conditions that increases the ability of an animal to survive.

Amphibian
A cold-blooded vertebrate animal that can live both on land and in water.

Antennae
Two long, movable feelers that extend from the head of an insect. The insect uses its antennae to smell and taste.

Arachnid
An invertebrate animal (e.g., spider) that has simple eyes and eight legs.

Arthropods
A group of invertebrate animals; all of which have jointed legs and no backbones.

B

Bioluminescence
The production of light by living organisms.

Bird
A warm-blooded vertebrate animal with feathers and a beak.

Blubber
An insulative layer of fat just below the skin of most marine mammals and penguins.

C

Camouflage
An adaptation (e.g., coloration) that helps an animal blend in with its surroundings.

Carapace
The upper shell of a turtle.

Carnivore
An animal that eats other animals.

Caterpillar
The larva of a butterfly or moth.

Cephalothorax
A single part of an animal (e.g., spider) that is a combination of the head and thorax.

Chrysalis
The hard, protective shell that forms over a pupa.

Cocoon
A silky case which larvae of certain insects spin around themselves during the pupa stage of metamorphosis.

Cold-blooded Animal
An animal whose body temperature changes with the temperature of the water or air around it.

Colony
A group of ants, bees, wasps, or termites that live and work together.

Compound Eye
An eye that is made up of many small lenses.

Consumers
Living things that get their energy from green plants or from animals that eat green plants.

E

Ecosystem
The interacting community of plants and animals and the surroundings in which they live.

Echolocation
A way of locating an object from sound waves that echo back from that object.

Endangered Animal
An animal species that is in danger of becoming extinct due to human-caused or natural changes in the environment.

Environment
All the surrounding things, conditions, and influences affecting the growth of living things.

Exoskeleton
The hard, supporting structure on the outside of an invertebrate's body.

Extinct Animal
An animal species that has died out and can no longer be found on earth.

F

Family
A scientific grouping of related animals.

Fangs
Long, hollow teeth through which poisonous snakes inject their prey with venom.

Fish
A cold-blooded animal that lives in water and takes in oxygen through gills.

Food Chain
A straight-line diagram that shows "who eats who" in an ecosystem.

G

Gills
Thin, feathery structures filled with blood and used for breathing by some animals that live in water.

H

Habitat
A place where an animal naturally lives or grows.

Herbivore
An animal that eats grass and other plants.

Hibernation
An adaptation for winter survival in which an animal's body functions slow down.

I

Insect
An invertebrate animal with six jointed legs and three main body parts: the head, thorax, and abdomen.

Invertebrate
An animal without a backbone.

K

Kingdom
The largest unit of classification of living things.

L

Larva
A stage of metamorphosis when the insect is wingless and worm-like.

Life Cycle
The sequence of changes that each living thing undergoes which progresses from juvenile to adult forms.

M

Mammal
A warm-blooded vertebrate animal with a bony internal skeleton and skin covered with hair or fur.

Mandible
The lower jaw of vertebrates.

Metamorphosis
The series of changes that take place in some insects' development from egg to larva to pupa to adult.

Migration
Long-distance, often seasonal travel by certain groups of animals.

Molting
The process of shedding an old skin, feathers, hair, or other outer covering of the body and replacing with a new layer.

Mollusk
An invertebrate (e.g., clam or snail) with a soft body and usually a hard shell.

N

Nocturnal
Active at night.

O

Omnivorous
Both flesh-eating and plant-eating.

Organism
A living thing.

P

Pinniped
An animal (e.g., seal or walrus) that has fin-like feet or flippers.

Predator
An animal that hunts and kills other animals for food.

Prey
An animal that is hunted by another animal for food.

Proboscis
A long, flexible snout on an animal. A butterfly uses its tube-like proboscis to suck nectar.

Producers
Green plants that change the sun's energy into a form that can be used by other living things.

Pupa
An insect in the nonfeeding and "resting" stage of development between the larval and adult forms.

R

Reptile
A vertebrate animal with dry, scaly skin and a bony skeleton.

Rodent
A gnawing mammal (e.g., mouse, beaver).

S

Scales
Small, thin, plate-like pieces that cover the bodies of reptiles and fish.

Species
The smallest group into which living things are classified.

Spinneret
The structure from which spiders secrete the silk threads used to form webs or cocoons.

T

Tadpole
A young frog that resembles a fish.

Thorax
The middle section of an insect's body, located between the head and abdomen.

Trait
A distinguishing feature.

Tropical
Hot climates found near the equator.

V

Venom
A poisonous liquid that some animals (e.g., snakes) inject into their prey.

Vertebrate
An animal with a backbone.

W

Warm-blooded Animal
An animal that controls its body temperature from within.

Wildlife Refuge
A place where wild animals are safe.

References and Further Reading

Borror, D. J., & White, R. E. (1998). A *Field Guide to Insects: America North of Mexico (Peterson Field Guides).* New York: Houghton Mifflin Company.

Bright, M. (2001). *The Encyclopedia of Endangered and Extinct Animals.* Brookfield, CT: Copper Beech Books.

Bright, M. (1998). The *Encyclopedia of Awesome Animals.* Brookfield, CT: Copper Beech Books.

Center for Environmental Education, Center for Marine Conservation. (1989). *The Ocean Book: Aquarium and Seaside Activities and Ideas for All Ages.* New York: John Wiley & Sons.

Dewey, J. O. (1993). *Spiders Near and Far.* NY: Dutton Children's Books.

Doolittle, B., & Maclay, E. (2001). *Reading the Wild.* Shelton, CT: Greenwich Workshop.

Dumont, J-M, Marion, R., & Desbordes, F. (1998). *On the Trail of Whales.* New York: Barron's Educational Series.

Epstein, S., Epstein, B., & Gaffney-Kessell, W. (1989). *Bugs for Dinner? The Eating Habits of Neighborhood Creatures.* New York: Macmillan Publishing Company.

Farndon, J. (2001). *Butterflies and Moths (Nature Fact File).* New York: Anness Publishing Inc.

Feeney, K., MacPherson, W., & Fredericks, A. D. (2000). *Wild Animals.* Minnetonka, MN: NorthWord Press.

Few, R. (2001). *Animal Watch: Protecting Our Planet.* New York: Dorling Kindersley Publishing.

Fischer-Nagel, H., & Fischer-Nagel, A. (1987). *Life of the Butterfly.* Minneapolis, MN: Carolrhoda Books.

Ganeri, A. (1996). *Bizarre Beasts and Other Oddities of Nature.* New York: McClanahan Book Company.

Ganeri, A. (1995). *Creatures that Glow: Discover the Way that Nature Lights Up in the Dark.* New York: McClanahan Book Company.

Ganeri, A. (1995). *Prickly and Poisonous: A Closer Look at Dangerous Animals and Plants.* New York: McClanahan Book Company.

Gardner, R., & Webster, D. (1987). *Science in Your Backyard.* New York: Julian Messner.

Grolier Educational Corporation. (1994). *The Grolier Illustrated Encyclopedia of Animals.* Danbury, CT: Grolier Educational Corporation.

Halfpenny, J., & Biesiot, E. (1986). *A Field Guide to Mammal Tracking in North America.* Boulder, CO: Johnson Publishing Company.

Hanly, S. (1997). *The Big Book of Animals.* New York: Dorling Kindersley Publishing.

Hanson, J., & Hanson, R. (2001). *Animal Tracks (Basic Essentials).* Guilford, CT: The Globe Pequot Press.

Hickman, P., & Mogensen, S. (1999). *The Night Book: Exploring Nature after Dark with Activities, Experiments, and Information.* Buffalo, NY: Kids Can Press.

Kaner, E., & Stephens, P. (1999). *Animal Defenses: How Animals Protect Themselves.* Buffalo, NY: Kids Can Press.

Khanduri, K. (1992). *Polar Wildlife (Usborne World Wildlife).* London: Usborne Publishing.

Kneidel, S. (1999). *Classroom Critters and the Scientific Method.* Golden, CO: Fulcrum Publishers.

Johnson, J. (1996). *Children's Guide to Insects and Spiders.* New York: Simon & Schuster.

Johnson, J. (1995). *Creepy Crawlies: A Closer Look at the World's Tiny Creatures.* New York: McClanahan Book Company.

Llewellyn, C. (1998). *The Best Book of Bugs.* New York: Larousse Kingfisher Chambers.

Lobb, J., Utton, P., & Savage, A. (2001). *Feather and Fur! What Makes Cats Purr?* New York: Larousse Kingfisher Chambers.

Mattison, C. (1998). *Snakes of the World.* New York: Sterling Publishing Company.

Mitchell, R. T., Durenceau, A., & Zim, H. S. (2001). *Butterflies and Moths: A Guide to the More Common American Species [Golden Guide].* New York: St. Martin's Press.

Mound, L. (2000). *Eyewitness: Insect.* London: Dorling Kindersley Publishing.

Papastavrou, V., & Greenaway, F. (2000). *Eyewitness: Whale.* London: Dorling Kindersley Publishing.

Parker, S., King, D., & Keates, C. (2000). *Eyewitness: Fish.* London: Dorling Kindersley Publishing.

Pipe, J. (1998). *The Giant Book of Bugs and Creepy Crawlers.* Brookfield, CT: Copper Beech Books.

Preston-Mafham, R., & Preston-Mafham, K. (1999). *Butterflies of the World.* London: Blandford Press.

Puckett, K. (Ed.). (1999). *My World: Weird and Wonderful Wildlife.* New York: Kingfisher.

Ricciuti, E. R., & Simpson, W. (1993). *Fish (Our Living World).* Woodbridge, CT: Blackbirch Press.

Ricciuti, E. R., & Simpson, W. (1993). Birds *(Our Living World).* Woodbridge, CT: Blackbirch Press.

Rice, D., & Calvert, T. (1999). *Do Animals Have Feelings Too?* Nevada City, CA: Dawn Publications.

Robertson, M. (2000). *Insects and Spiders (Reader's Digest Pathfinders).* Pleasantville, NY: Reader's Digest Children's Books.

Settel, J.S. (1999). *Exploding Ants: Amazing Facts About How Animals Adapt.* New York: Atheneum Books for Young Readers.

Sibley, D. A. (2000). *The Sibley Guide to Birds.* New York: Alfred A. Knopf.

Simon, H. (1975). *Frogs and Toads of the World.* Philadelphia: Williams & Wilkins Publishers.

Singer, M., & Vojtech, A. (2001). *Tough Beginnings: How Baby Animals Survive.* New York: Henry Holt & Company.

Still, J. (1991). *Amazing Butterflies & Moths (Eyewitness Juniors, No. 9).* New York: Alfred A. Knopf.

Thorton, S, & Gray, S. (2001). *Ocean (DK Eye Wonder).* New York: Dorling Kindersley Publishing.

Waldbauer, G. (1998). *The Handy Bug Answer Book.* Detroit, MI: Visible Ink Press.

Wexo, J. B. (1997). *Snakes.* Mankato, MN: Creative Education.

Wild, E. (Ed.). (2001). *Mammals (Question Time).* New York: Larousse Kingfisher Chambers.

Wilkes, A. (2001). *The Seashore (Question Time).* New York: Larousse Kingfisher Chambers.

Wilsdon, C., Twinney, D., & Barber, J. (2000). *Far Out! Exploring Nature with Binoculars.* Pleasantville, NY: Reader's Digest Children's Books.

Sense of Science: Animals invites active exploration of the "world of science" related to animal life. Using this set of materials, students with visual impairments and multisensory needs can learn about mammals, reptiles, amphibians, fish, birds, and insects.

The materials include

- an easy-to-use guidebook with numerous hands-on activities,
- tactile and overlays designed for APH light boxes, and
- two accompanying trays to hold provided overlays.

AMERICAN PRINTING HOUSE
FOR THE BLIND, INC.

1839 Frankfort Avenue • Louisville, KY 40206 USA
Phone: 502-895-2405 • Toll Free: 800-223-1839 • Fax: 502-899-2274
E-mail: info@aph.org • Web site: www.aph.org

Sense of Science: Animals
Complete Kit Catalog Number: 1-08990-00
Print Guidebook Catalog Number: 7-08990-00