

launch, is pretty luxuriously, or down, to the, August, looking
offal. But the main business proceeds on. The flesh is taken
off from the ribs, & hung down from where the bones begin
to the big neck, and the stump itself is thus destroyed, for
the fungus you see here of course, to the same base, when
it's covered with fish and it is cooked in this way and so

SMITHSONIAN

IN YOUR CLASSROOM

FALL 2006

Introduction to the
NATURE JOURNAL

Contents

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Introduction to the

NATURE JOURNAL

Never trusting to memory, he recorded every incident of which he had been the eyewitness on the spot, and all manner of observations went into his journal. . . . He noted the brilliant grasses and flowers of the prairie, the sound of the boatman's horn winding from afar, the hooting of the great owl and the muffled murmur of its wings as it sailed smoothly over the river.

VAN WYCK BROOKS ON JOHN JAMES AUDUBON

The lessons address the following standards:

NATIONAL LANGUAGE ARTS STANDARDS, GRADES K–12

Standard 6

Students apply knowledge of language structure, language conventions, and genre to create, critique, and discuss print and nonprint texts.

Standard 7

Students gather, evaluate, and synthesize data from a variety of sources.

Standard 8

Students use a variety of technological and information resources to create and communicate knowledge.

NATIONAL SCIENCE EDUCATION STANDARDS, GRADES K–12

Content Standard A

As a result of activities, students develop an understanding of scientific inquiry and abilities necessary for scientific inquiry.

Content Standard C

As a result of activities, students develop an understanding of life science.

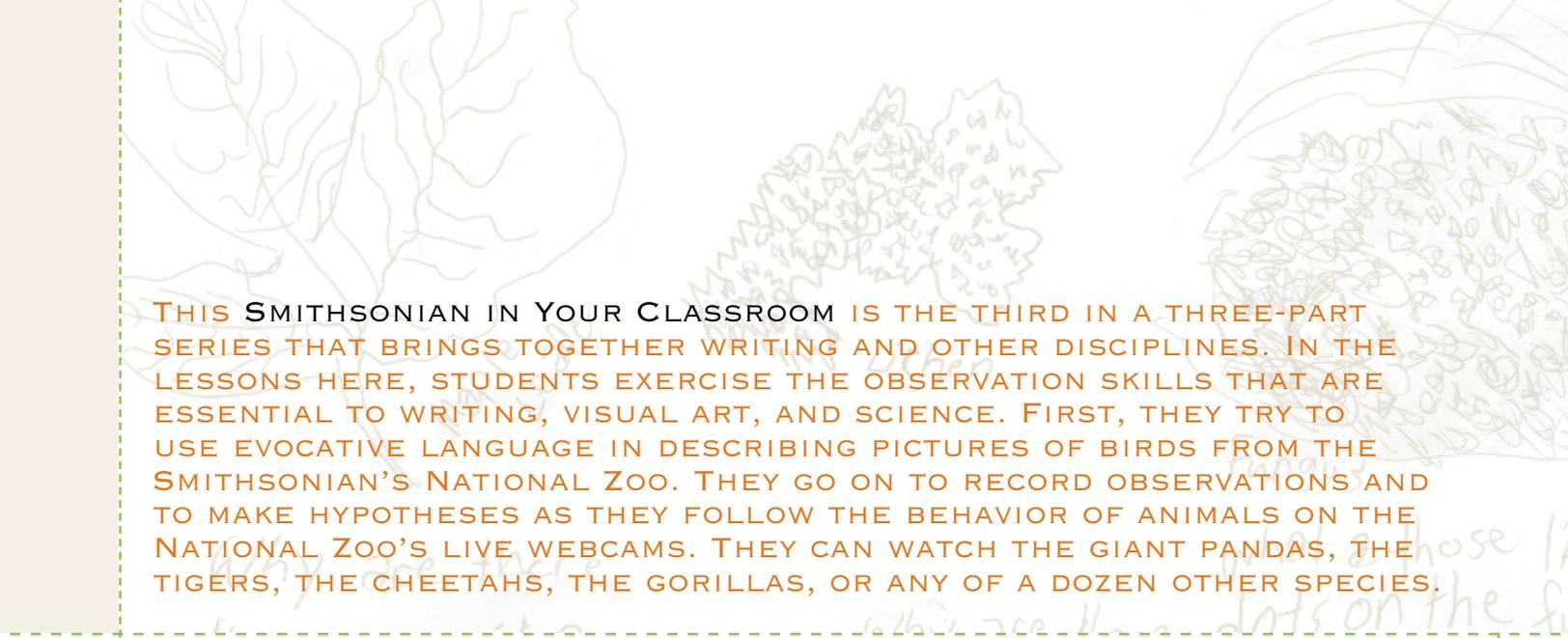
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ILLUSTRATIONS

Cover: Detail from *Cardinal Grosbeak* by John James Audubon, 1811, Smithsonian American Art Museum. Audubon journal page, 1843, Beinecke Rare Book and Manuscript Library, Yale University. **Page 1:** Student journal pages, courtesy of Brad Cogdell, Camp Friedenswald, Cassopolis, Michigan. **Page 2:** Photo of Janet Draper by Dudley M. Brooks, ©2003 The Washington Post, reprinted with permission. **Page 3:** William Healey Dall photo and Dall journal, Smithsonian Institution Archives. William Duncan Strong journal, National Anthropological Archives, Smithsonian Institution. **Page 7:** Roseate spoonbill and pinyon jay photos by Jessie Cohen, peregrine falcon by J'nie Woosley, mallard by Ann Batdorf; National Zoological Park, Smithsonian Institution. **Page 8:** Northern cardinal by Ann Batdorf. **Page 11:** Tiger cubs by Jessie Cohen. **Page 12:** Joe Marshall journal page, National Museum of Natural History. Marie Magnuson and tiger cub photo by Jessie Cohen. **Page 13:** Bruce Beehler photo by Stephen Richards, courtesy of Bruce Beehler. Carole Baldwin photo by Kimberly Wright. Inside front cover and pages 1, 2, 4, 6, 9, 10, 12, and 13: Images by The Pepin Press, www.pepinpress.com.

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THIS SMITHSONIAN IN YOUR CLASSROOM IS THE THIRD IN A THREE-PART SERIES THAT BRINGS TOGETHER WRITING AND OTHER DISCIPLINES. IN THE LESSONS HERE, STUDENTS EXERCISE THE OBSERVATION SKILLS THAT ARE ESSENTIAL TO WRITING, VISUAL ART, AND SCIENCE. FIRST, THEY TRY TO USE EVOCATIVE LANGUAGE IN DESCRIBING PICTURES OF BIRDS FROM THE SMITHSONIAN'S NATIONAL ZOO. THEY GO ON TO RECORD OBSERVATIONS AND TO MAKE HYPOTHESES AS THEY FOLLOW THE BEHAVIOR OF ANIMALS ON THE NATIONAL ZOO'S LIVE WEBCAMS. THEY CAN WATCH THE GIANT PANDAS, THE TIGERS, THE CHEETAHS, THE GORILLAS, OR ANY OF A DOZEN OTHER SPECIES.

These classroom activities are intended as a preface or complement to a project increasingly popular in elementary and middle schools—the keeping of nature journals, whether on class outings or when the students are on their own. Included in the issue are words of advice for students from journal-keeping Smithsonian naturalists.

The term *nature journal* seems to resist definition until we realize that the broadest definitions all apply. In *Keeping a Nature Journal*, the most popular recent book on the subject, Clare Walker Leslie puts it simply: “whereas a diary or personal journal records your feelings toward yourself and others, a

nature journal primarily records your responses to and reflections about the world of nature around you.”

With a subject as great as all outdoors, nature journals lend themselves to a wide range of expression. Sketches are often the most immediate way to capture the way things look. Deeper, written observations can be the basis for all kinds of creative writing.

Electronic versions of the previous issues in this series, “Portraits, Visual and Written” and “The Music in Poetry,” are available for free download at www.SmithsonianEducation.org/Educators.

Background

In student nature journals, the outdoors is the stimulus for responsive writing and artwork. But the subject matter, of course, also matters. In form and purpose, student nature journals are not very different from field journals kept by naturalists in the “real world,” including the Smithsonian.

Since its founding in 1846, the Smithsonian has devoted itself to research into the natural world. Today’s Smithsonian comprises not only museums and the National Zoo, but also extensive gardens and woodlands and such facilities as the Conservation and Research Center in Front Royal, Virginia, and the Smithsonian Tropical Research Institute in Panama. Field journals, in one way or another, have always been an important part of the Smithsonian’s collections and ongoing work.

THURSDAY

JOURNAL AS TOOL OF A TRADE

Though she doesn’t think of herself as a journal keeper, Smithsonian horticulturist Janet Draper uses what is sometimes called a *phenology journal*, a daily account of natural changes in a specific place. In the squares of a calendar notebook, she enters brief descriptions of her work in the two gardens in Washington, D.C., that are in her charge. She notes weather conditions, the first blooming of flowers, the duration of blooms, and the relationships of growth rates between different kinds of plants.

These notes serve as a “gauge” for the work of the next year. The date of the last killing frost gives her an indication of when it is safe to begin planting. Records of the growth spurts of hedge shrubs tell her the safest times for pruning. Records of human events—yearly festivals and rallies on the National Mall—help her plan her work around these times when there is a lot of foot traffic through the gardens.

“When I look at the bare months of the calendar, I think, ‘I can get so much done!’” Draper says on a rainy day in June, flipping through her notebook to the blank pages of July. But a glance at last year’s book shows all



Janet Draper in the Smithsonian’s Ripley Garden

FRIDAY

SATURDAY

of the obstacles to big projects—three weeks of ninety-degree July heat and no rain, for instance, which had her watering constantly.

“I’ve noticed that most people who work in an office always know what day of the month it is,” she says. “Gardeners lose track. Days and weeks and months start blending together. When I give tours of the garden, people will ask, ‘When does the larkspur first bloom? How long do the tulip magnolias stay in bloom?’ Just writing it down makes it all clearer to me.”

JOURNAL AS SCIENTIFIC RECORD

“When we talk about a museum-quality plant or animal specimen,” says Smithsonian Archives historian Pam Henson, “it is not just the specimen alone. It is the object plus documentation—written records of the time it was collected, drawings or photographs of it in its natural habitat.”

Much of this information is contained in archived field journals. Journals that are decades or even more than a century old are still consulted by scientists. Journals from nineteenth-century Smithsonian expeditions to the West, for instance, have been used in “ecological reconstruction” projects.

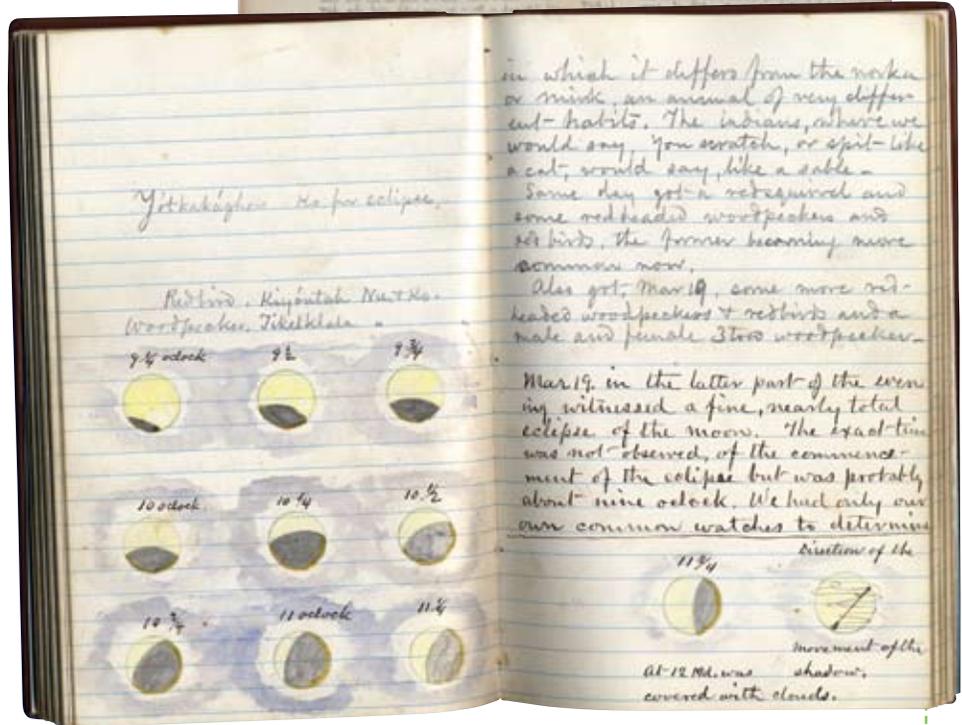
“When the Nature Conservancy recently took over a western ranch,” says Henson, “they wanted to restore it to what it was before it was ranch. They had to know what plants, what organisms, were there, and what was not there. They had to go back to those historical records to know.”

Joe Marshall, a retired Smithsonian ornithologist also noted for studies of the gibbons of Southeast Asia, says that rigorous journal keeping was a part of his training. He studied at the University of California under Joseph Grinnell, who developed what is known as the *Grinnell-style field journal*.

“In this kind of journal, in addition to lists of species, you write of the environment and everything you did that day,” says Marshall. “We would take a field trip every Saturday. You got graded on how you characterized the activities of the birds. You got graded, really, on the kind of essay you wrote.”

In a time when technology allows for views of any part of the world from any other part of the world, the journal is still vital to scientific work, Marshall believes.

“You still have to make interpretations. It’s part of the scientific method. Science is about meaning.”



JOURNAL AS PERSONAL HISTORY

As with student nature journals, scientific field journals can take on importance for what they tell us about their keepers. Two of the most valued journals in the Smithsonian’s holdings are those kept by naturalist William Healey Dall on an expedition to Alaska and by anthropologist William Duncan Strong on an expedition

to Honduras. Dall was an expert on mollusks with a lifelong love of anything invertebrate. He was one of a team of scientists accompanying the Western Union Telegraph Expedition of 1865–67. Strong went to Honduras in 1933 for archaeological studies of the cultures of the remote northeastern region of the country. In neither

journal does the writer feel obliged to stick to any one subject.

Dall, the mollusk expert, devoted many pages to the lives of the Alaska Indians, and was moved to record the phases of a lunar eclipse by making drawings every fifteen minutes. “It is a pity there is no good astronomer here,” he wrote wistfully that night.

The anthropologist Strong could not help describing and drawing the birds he saw in Honduras. At the site of an archaeological dig, he took time to note that two red macaws tried to chase him away, “like reincarnated Maya priests.”

If our interests are a large part of who we are, the journals reveal much about these famous scientists. We see that their success in specialized fields stemmed from a general sense of curiosity, and that their general curiosity was sharpened by their specialized training. They were, it seems, interested in everything.



William Healey Dall in 1865

Opening Discussion

To give students a look at a scientist's field journal, and to provide a model for their own work, hand out copies of the William Duncan Strong journal on the opposite page.

Before revealing any background, ask questions that will draw students into a close examination of the object:

What sort of book is this?

What sort of person wrote in this book?

Who would find these records useful?

If students see the book as a diary, ask them to consider:

In what ways, exactly, is it like a diary?

In what ways is it different from a personal diary you would keep?

What kinds of things does the writer describe?

After discussing some of the uses of a field journal like Strong's, call the class's attention to the sketch of the hawk and the accompanying notes.

Is a visual representation—a drawing or a photograph—the best way of making a record of something like this bird?

What are the advantages of writing about the bird as well?

What kinds of things would you write about in such a journal?

The hawk, unfortunately, did not pose patiently in profile for this sketch. If students read all of the text, they will discover, perhaps with some alarm, that Strong shot the bird. For Strong in the early twentieth century, as for John James Audubon in the early nineteenth century, this was the only way to study a bird closely. Today's technology, mainly better photographic equipment, allows for study without taking a bird as a specimen. You might follow the lead of naturalists by incorporating photography, or even podcasting, into a journal project.

On pages 12 and 13 are words of advice for journal-keeping students from three contemporary Smithsonian professionals: zookeeper Marie Magnuson, marine biologist Carole Baldwin, and ornithologist Bruce Beehler, a vice president of the group Conservation International and a research associate at the Smithsonian's National Museum of Natural History. Hand out copies or read their tips aloud to the class.

Lesson 1

WORDS FOR BIRDS

In this introduction to descriptive writing in a nature journal, each student tries to use vivid yet concise language to portray one of the birds on the opposite page: 1) the roseate spoonbill, 2) the peregrine falcon, 3) the pinyon jay, or 4) the mallard. At the end of the lesson, the class comes together to consider a question: How can we describe what all of these creatures have in common? In other words: What is a bird?

Color copies of the page are not necessary. Black-and-white images, in fact, might work better. Students will not rely on the most obvious descriptions, such as blue for the pinyon jay.

STEP ONE

Give each student a blank index card and a copy of the page. Explain the assignment:

Each will choose one bird to describe. Each will use the blank side of the card for a brainstorming list of whatever descriptions come to mind, and then edit those thoughts by writing a complete sentence or two on the lined side of the card.

The goal is to give such telling details that a classmate will be able to identify the bird by the description. Students should ask themselves: *How can I say the most about this bird in this small space?* The only stipulations are that they cannot give the name of the bird, if they know it, or describe any characteristic not found in the photograph (e.g., the quack of the mallard).

Encourage them to use simile and other figurative language in their descriptions. Let them know that the common names for many birds derive from similarities to the human world. While the St. Louis Cardinals take their name from the bird, for example, the bird takes its name from the vestments of ecclesiastical cardinals. And it is no coincidence that the bill of the roseate spoonbill looks a lot like a spoon.

STEP TWO

Allow a set time for the exercise—five or ten minutes. Ask students to write their names or initials in a corner of the card when they are done.

Collect the cards and redistribute them at random, so that each student has another's card. Everyone will now try to deduce which bird the assigned card describes.

Ask students to circle the words or phrases on the card that seem especially descriptive.

STEP THREE

Go around the room and ask each student to read the description on the lined side of the assigned card and to announce his or her guess of the bird in question. In a discussion, have students confirm or correct the guesses of their classmates. Ask those who guessed correctly: *What were the words that best described the bird?* If a guess was incorrect: *What other words might have been helpful?*

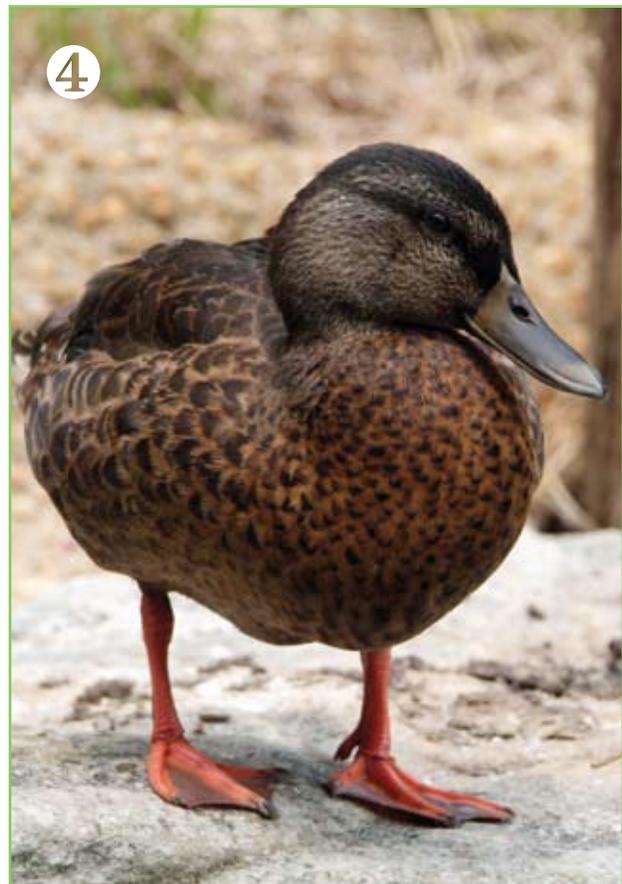
STEP FOUR

Conduct a class brainstorming session in which students suggest words and phrases that describe all of the birds. Record the responses on the board. Use the brainstorming list to compose, as a class, a paragraph that answers the question *What is a bird?*

EXTENSION

Because birds are likely things for students to describe in a nature journal, we've included, on page 8, a brief introduction to the body parts and adaptations of birds. Share the page with students when the lesson is completed.

The lesson can be applied to any set of different things within one category: pictures of trees or living trees in a park; pictures of flowers or living flowers in a garden; rocks or insects in a natural history museum; landscape paintings in an art gallery. If you go looking for pictures online, try the site of the Smithsonian's United States National Herbarium, which contains a bank of 17,000 plant images, searchable by scientific and common name. You'll find it at www.nmnh.si.edu/botany.

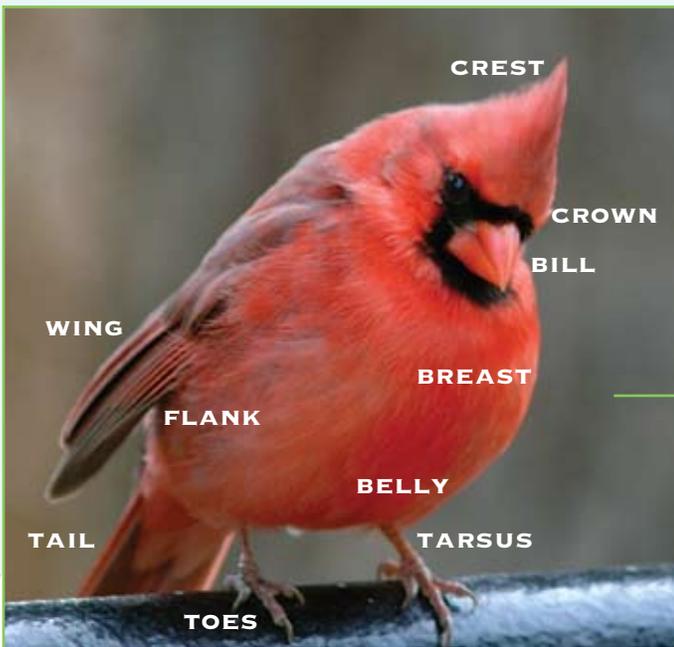


Student Handout

BIRD PARTS

You probably saw big differences in the feet and bills of the four birds. Such differences, or “adaptations,” tell us a lot about the lives of birds.

THIS NORTHERN CARDINAL IS A SEED EATER. IT CRACKS THE SEEDS IN ITS SHORT, STURDY, CONE-SHAPED BILL.



THIS ROSEATE SPOONBILL IS A WADING BIRD. IT USES ITS LONG, FLAT BILL TO SCOOP UP FISH, SNAILS, AND OTHER SMALL CREATURES FROM THE WATER. IT STRAINS WATER AND MUCK FROM THIS FOOD IN THE ROUND END OF THE BILL.

THE SPOONBILL’S WIDELY SPREAD TOES ALLOW IT TO WALK LIGHTLY ACROSS THE SOFT BEDS OF RIVERS AND LAKES.



THIS PEREGRINE FALCON IS A BIRD OF PREY. IT SHREDS THE MEAT IT EATS WITH ITS RAZOR-SHARP, HOOKED BILL.

BIRDS OF PREY USE THE HOOKED CLAWS OF THEIR POWERFUL FEET TO SNATCH SMALL ANIMALS FROM THE GROUND AND FISH FROM THE WATER. CAN YOU GUESS WHY THEY HAVE SUCH BIG EYES?

THIS PINYON JAY, LIKE THE CARDINAL, EATS SEEDS. IT ALSO EATS INSECTS AND POKES INTO THE EGGS OF OTHER BIRDS. THE ALL-PURPOSE BILLS OF JAYS AND CROWS HAVE BEEN CALLED “SWISS ARMY KNIVES.”

THE JAY IS A PERCHING BIRD. ITS LONG BACK TOES HELP IT GRASP BRANCHES TIGHTLY. CAN YOU FIND ANOTHER PERCHING BIRD ON THIS PAGE?



LIKE THE SPOONBILL, THIS MALLARD STRAINS ITS FOOD THROUGH A FLAT BILL, THOUGH THE BILL IS MUCH SHORTER. MALLARDS DON’T HAVE AS FAR TO REACH FOR FOOD.

WHY DON’T THEY HAVE FAR TO REACH? MALLARDS SWIM AND DIVE FOR THEIR FOOD. THESE WEBBED FEET WORK LIKE A SCUBA DIVER’S FLIPPERS.



Each bird on this page has all but one of the features pointed out on the northern cardinal. Try to find the part missing from the other birds.

Lesson 2

NATURE IN MOTION

In this lesson, students follow the behavior of one of the species on the National Zoo’s webcams, all of which are at NationalZoo.si.edu/Animals/Webcams. The zoo has cams at the exhibits of its Asian elephants, cheetahs, crocodiles, ferrets, flamingos, giraffes, golden lion tamarins, gorillas, kingfishers, kiwis, naked mole rats, orangutans, pandas, sloth bears, and tigers.

While the lesson can be completed in one class period, as a one-time activity, we recommend using it as an introduction to journal keeping. By returning to one scene over a period of time, students will have a record of many kinds of change: differences in the behavior of the animals from day to day, differences in their own views of the scene, and the growth of their writing and drawing skills.

STEP ONE

Introduce the class to the webcams. Explain the lesson and allow students to choose the animals they would like to observe. They might conduct the observations on their own, or you might ask the class to get into small groups to form the Panda Team, the Tiger Team, etc.

Encourage students to go through the entire menu of webcams before deciding on a species. Most of the cams are stationary and the frequency of the animals’ appearance on them varies greatly. An inside tip: the Panda Cam, the Flamingo Cam, and the Naked Mole Rat Cam (as unappealing as that might sound) rarely disappoint.

STEP TWO

Give each student a copy of the observation form on page 10. Explain that they will be doing something very similar to the procedure of the previous lesson. During an observation session—in class or at home—they will use the space under *Notes* to write whatever comes to mind: descriptions of the animals’ behavior, interpretations of what they see, and general thoughts about the scene. After the observation session, they will use the space under *My paragraph on what I saw* for a more polished summary of the experience.

Encourage them to make sketches, too, during the observation, using the blank space at the bottom of the page.

STEP THREE

After the first observation session, hand out copies of page 11, which contains excerpts from “Tiger Cub Diary” by National Zoo animal keeper Marie Magnuson, an online account of the birth and growth of a litter of Sumatran tigers.

As a class, look for instances in “Tiger Cub Diary” of 1) pure description of fact; 2) inferences, or the writer’s interpretations of those facts; and 3) the writer’s feelings and personal thoughts on the subject.

For young students, you might call attention to passages that contain both observation and inference. For example: “Rokan is always very happy to see his children [inference] . . . they rub heads through the mesh that separates them and make the tiger greeting noise called ‘chuffing’ [observation on which the inference is based].”

STEP FOUR

In a class discussion, have students look at their own writing for pure observation and for such inferences as *The cheetahs were tired* or *The pandas were hungry*.

Consider these questions: *Are my thoughts on the reasons for behavior based on good evidence? Did I state what the evidence is? Would my writing be stronger if I learned more about this species? Where could I go to learn more?*



JOURNAL

ANIMAL OBSERVED	
DATE	
Starting & Ending TIMES	

Notes

Handwriting practice area with horizontal lines and a large, faint background illustration of a bird.

My paragraph on what I saw

Handwriting practice area with horizontal lines and a large, faint background illustration of a bird.

Sketches



TIGER CUB DIARY

On May 24, 2006, one of the National Zoo's Sumatran tigers, Soyono, gave birth to a litter of three cubs. Keeper Marie Magnuson follows the growth of the cubs in this diary. You can continue to follow the story at NationalZoo.si.edu/Animals/GreatCats/TigerCubDiary2.



The first birth was at about 2:45 in the afternoon, when all the keepers were in the office at Great Cats. We just happened to be looking at the monitor at that moment and couldn't believe it! Tigers usually prefer to give birth in the "wee small hours of the morning" when everything is quiet, and they are sure to be alone.

Each cub was big and healthy, and we found out that we had two girls and a boy. Soyono and Rokan had had two litters before, and all four cubs from those litters had been boys, so we were very happy to finally have some girls.

*

Often, now, when their handsome father, Rokan, comes inside in the evening, Soyono has the cubs in the enclosure next to his, so they can all say "Hi!" In the wild, tiger mothers raise their young alone, without any help from the father. We are often asked why we keep the tigers separate, and it is because it would be unnatural for them to live together. Rokan is always very happy to see his children (and their mother!), and they rub heads through the mesh that separates them and make the tiger greeting noise called "chuffing" to each other. But Rokan might not be willing to put up with the cubs climbing on him and biting his tail and just generally being cubs. Sometimes we feel sorry for Soyono when we see her on the cub cam trying to sleep with a cub chomping on her ear but she's a patient mom and doesn't seem to mind.

*

The two girls weigh 13 and 14 pounds each, and the boy weighs 16.1 pounds. Obviously, Soyono is keeping her family very well fed!

The cubs are getting more confident. At first when mom went outside, they would all find a quiet corner together and sleep until she came back, but now they wander around when she is outside and we see them on the cub cam wrestling and playing. This is how they develop the strength and coordination they will need to be predators. Most tiger games are hunting games and you might see a cub stalking and pouncing on Soyono's tail!

*

At last Thursday's exam, everything looks good and everybody is gaining weight. The girls are 14.8 pounds and 16.8 pounds each, and the boy is 19.6 pounds. We think the boy is going to have his father's build. Rokan has a beefier build than most Sumatran tigers, which are the smallest of the tiger subspecies. To use human athletes for comparison, most Sumatran males are built like swimmers, while Rokan is built more like a wrestler. Since tigers are "stalk-and-pounce" hunters (just like your house cat), they have most of their power up front and Rokan just has a little more than most. Soyono thinks he is very handsome, and we agree.

Student Handout

SMITHSONIAN JOURNAL KEEPERS

Meet three naturalists who have some thoughts for young nature journalists.

ZOOKEEPER

MARIE MAGNUSON



Marie Magnuson is one of the lucky people who have a job they would do for free. She is a graduate of the Culinary Institute of America and worked for many years in restaurants. On a visit to the National Zoo in 1992, she saw a sign asking for volunteer “interpreters” at the sea lion and seal exhibit. She joined up. For the next seven years she was a volunteer interpreter, guide, and assistant keeper, working with animals great and small, from the elephants to the naked mole rats. Seven years ago, she was hired as a staff member. She is now a keeper of the zoo’s great cats.

Marie had these thoughts for students keeping a journal of animal behavior:

- ◆ Learn all you can about the species you are observing. You need to know many things to accurately interpret the behavior you are seeing. For example, if a tiger is sleeping a great deal, that is normal behavior. If a naked mole rat is sleeping a great deal, that is not normal!
- ◆ On the other hand, don’t assume that your readers know as much as you do. If you use a scientific term, give a brief explanation. For example: “Bats are nocturnal, which means they are active at night.”
- ◆ If you don’t understand something you observe, don’t be afraid to say so in your journal. You can offer possibilities for the reasons behind behavior, but offer them as theory, not as fact.
- ◆ Always remember that animals are not people. I’ve heard visitors at the zoo say about a tiger, “He’s bored!” People have asked me, “Are tigers mean?” Animals do what they do for their own reasons. They might not have the same reactions to situations that we do.

ORNITHOLOGIST BRUCE BEEHLER

Bruce Beehler was a leader of a team of scientists who made news in 2005 with an expedition to Indonesian New Guinea. Dropped by helicopter into the Foja Mountains, a range nearly untouched by humanity, the team discovered animal and plant species new to science: five new palm trees, four new butterflies, more than twenty new frogs, and a new bird belonging to the honeyeater family. Bruce was especially excited by the discovery of two birds that had been “lost” to science: a bowerbird and a bird of paradise, both of which had been described by naturalists but were never seen again.

Bruce is a constant journal keeper, whether on an expedition or at home in a suburb of Washington, D.C. He is now working on a book based on notes from his travels.



He offered these tips for journal writing in the field:

- ◆ Include found objects in the journal. A feather or a leaf, for example, can be taped to a page. These can only make your journal more interesting.
- ◆ Try to make repeated observations of birds or animals. By comparing data from different viewings, you can begin to generalize about behavior.
- ◆ Never depend on your memory. Write your observations down at the moment of observation. Check your watch and note the exact time of any event. Write down the exact location. Imagine that you’re writing for someone trying to piece together your experiences two decades in the future.
- ◆ Write about anything of interest that happens on an outing. Record the names of the people you work with or meet. Try to capture the general “flavor” of the place: sights, sounds, smells, what you had for lunch. It’s amazing what comes in handy later, if you decide to write a book on the subject!

MARINE BIOLOGIST CAROLE BALDWIN



A few years ago, the Smithsonian’s Carole Baldwin went to the Galapagos Islands, the site of Charles Darwin’s great discoveries, to take part in the production of a 3-D IMAX movie, *Galapagos*. Projected onto screens eighty feet high, the movie is our most spectacular visual record of the starkly beautiful island chain off the coast of Ecuador. Yet Carole

still kept a running record of the expedition in just the way that Darwin did—in a journal.

Her thoughts:

- ◆ Try to write something every day, even if it’s just a line or two; otherwise, days and events get mixed up. Some days on the Galapagos expedition, I was so tired at night that I just couldn’t write before going to bed, but I found that writing the next morning about the previous day’s events worked well.
- ◆ I like to “think out loud” when I’m writing my journal. It’s fun to go back years after a trip and read what I wrote at the time. It sometimes feels as though I’m reading someone else’s mind!
- ◆ Writing a journal is an excellent way to practice good descriptive writing. It takes more practice than you’d think to put observations and activities into prose that is so clearly written that others who read it feel as though they’re seeing or doing exactly what you saw or did.

Like Bruce Beehler, Carol knows that it is still a big world out there, and that there is still much to be explored. The observation and recording of nature, she thinks, are skills that will become more and more valued.

“This is especially true in the ocean,” she says. “The ocean covers about 70 percent of the surface of Earth. By some estimates, less than 5 percent of the ocean has been explored! We finally have the technology that will allow exploration at all depths of the ocean, and I believe the next few decades have the potential to be *the* age of exploration.”

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