ACADEMY

FRONTIERS

The member magazine of the Academy of Natural Sciences of Drexel University

WINTER 2013

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Academy Frontiers is a quarterly publication of the Academy of Natural Sciences of Drexel University, 1900 Benjamin Franklin Parkway, Philadelphia, PA 19103.

Academy membership includes a subscription to *Academy Frontiers*, free admission to the museum, discounts in the Academy Shop and Academy Café, invitations to special events and exhibit openings, and much more.

For information about Academy membership, call 215-299-1022 or visit ansp.org/membership.

On the cover: *Students from Drexel's new Department of Biodiversity, Earth and Environmental Science visited the New Jersey Pine Barrens during a pre-term field excursion in September. Our scientists helped them identify some of the area's fauna and flora, including three lichens (left to right:* Cladonia cristatella *Tuck.,* Cladonia ochrochlora *Flörke, and* Cladonia dimorphoclada *Robbins). More on page 8. Photo by Paul Overbeck/ANSP*

Greetings From the Academy

Although we haven't yet closed the books on our bicentennial year, the Academy already is looking toward our third century. Since October 2011, our Board of Trustees, Academy and Drexel leadership, staff, and external experts and stakeholders have been developing a five-year Sustainable Strategic Plan to guide the Academy into the future. We have reshaped our mission—*to advance research, education, and public engagement in biodiversity and environmental science*—so that it more accurately reflects our goals. We are also refining our vision for the future to emphasize experiential learning and interaction with our natural world. With every new initiative comes a conversation about how potential improvements align with the Academy's focus on sustainability.

In this issue of *Academy Frontiers*, we explore the ways in which interaction with our changing environment is central to our new partnership with Drexel University. This fall, Academy and Drexel professors welcomed our first students into the new Department of Biodiversity, Earth and Environmental Science. Before the students began their work in the classroom, they joined our scientists in the field for several days of immersive, hands-on learning. The students' energy and enthusiasm illustrate the promise of our Drexel partnership in shaping a new generation of scientists and environmental advocates. I'm truly grateful to be able to share news of this new venture with you as it develops.

As you turn the pages of *Academy Frontiers*, I ask that you consider starting your new year with a donation to the Academy's annual fund. With your tax-deductible gift, you will be supporting relevant, critical research into today's most significant questions in biodiversity and environmental science. Your gift will help us to preserve our priceless collections, provide education and outreach to Philadelphia schoolchildren, and offer intriguing public programs and exhibits.

To those of you who have supported us for years and to those who are new to the Academy and eagerly learning about our exciting work, thanks for your encouragement. Your commitment enables us to advance our research, promote education, and engage learners of all ages for years to come.

All the best,

George W. Gephart, Jr.
President and CEO

Academy Frontiers

Winter 2013

Contents

Join us for these upcoming events!

JANUARY

Botany Collection Behind-the-Scenes Tours
Thursdays through Mondays, 11 a.m. and 2 p.m., Ages 8 and up (M)

Our Water, Our Health: Are we in danger?
Featuring Sandra Steingraber
Tuesday, January 15, 5:30 p.m. ($) (phone)

Botany Discovery Weekend
Saturday through Monday, January 19–21, 10 a.m.–5 p.m. (M)

Last day to see *James Prosek: Ocean Fishes*
Monday, January 21, 10 a.m.–5 p.m. (M)

FEBRUARY

Vertebrate Paleontology Collection Behind-the-Scenes Tours
Thursdays through Mondays, 11 a.m. and 2 p.m., Ages 8 and up (M)

Tiny Tot Explorers
Wednesdays, February 6–March 20, 11 a.m.–Noon ($) (phone)

Friends and Family Safari Overnight
Friday, February 8, 6:30 p.m.–Saturday, February 9, 9 a.m. ($) (phone)

Mega-Bad Movie Night
Thursday, February 14, 6:30 p.m. ($) (phone)

Paleopalooza
Saturday and Sunday, February 16–17, 10 a.m.–5 p.m. (M)

MARCH

Academy Explorers Spring Break Camp
Weekdays, March 20–April 2, 9 a.m.–4 p.m.
Ages 5–12, Before- and after-care available ($) (phone)

Friends and Family Safari Overnight
Saturday, March 16, 6:30 p.m.–Sunday, March 17, 9 a.m. ($) (phone)

Town Square: Green City, Clean Waters
Thursday, March 21, 5:30 p.m. ($) (phone)

Last day to see *The Academy at 200*
Sunday, March 24, 10 a.m.–5 p.m. (M)

APRIL

Mega-Bad Movie Night
Thursday, April 4, 6:30 p.m. ($) (phone)

Museum Closed for Orchid Show Setup
Thursday, April 11

International Orchid Show and Sale
Friday, April 12, 12–8 p.m.
Saturday and Sunday, April 13–14, 10 a.m.–5 p.m. (M)

(M) Free for members ($) Fee (phone) Registration required

Unless otherwise noted, all events held at the Academy are free with museum admission.

Visit ansp.org for more information and to register.

On Exhibit

The Academy at 200: The Nature of Discovery

Special Exhibits Gallery
Open through March 24, 2013

A toothy Freshwater Vampire Fish skull. A Burmese python. The 215-million-year-old jaw of an ancient crocodile-like reptile. Come face-to-face with these amazing specimens and more in a one-of-a-kind exhibit at the Academy. Experience science as you never have before by dressing the part of a scientist, assembling a dinosaur skeleton in the bone lab, and wading through a marsh. Step into our shoes (literally!) and experience your favorite natural history museum in a whole new way at *The Academy at 200: The Nature of Discovery!*

Greg Benson Photography

Drawn to Dinosaurs: Hadrosaurus foulkii

Art of Science Gallery
February 2–June 9, 2013

The Academy of Natural Sciences was the first in the world to create a mounted dinosaur skeleton for display, and to this day the Academy is known as "the dinosaur museum." *Drawn to Dinosaurs: Hadrosaurus foulkii* is an intimate exhibit that reveals the science and art of visualizing a living animal based on fragmentary fossils. The centerpiece is a full cast of the plant-eating duckbill dinosaur *Hadrosaurus foulkii*, discovered in 1858 in Haddonfield, N.J., by an Academy member and later reconstructed by the artist Benjamin Waterhouse Hawkins based on Academy research.

International Orchid Show and Sale

Special Exhibits Gallery
April 12–14, 2013

For the first time, an International Orchid Show will transform the Academy of Natural Sciences of Drexel University into a spectacular world of orchids. See thousands of orchids from all over the globe, and purchase plants from vendors from as far away as California, Ecuador, Brazil, Japan, Malaysia, and Taiwan. View blooming yellow lady's slipper orchids from right here in Pennsylvania. Whether you're a novice or an expert, learn valuable botanical information during talks and activities.

The International Orchid Show is presented in collaboration with the Southeastern Pennsylvania Orchid Society (sepos.org). For more information call 215-299-1000 or visit ansp.org/orchidshow.

Bob Sprague

Mary Alice Hartsock/ANSP

AJA CARTER: GROWING UP WITH DINOSAURS

It was her first day at the Academy, and 13-year-old Aja Carter was dressed to impress. Having loved dinosaurs since early childhood, she had decided the Academy was the perfect place to volunteer. But first she had to brave what she thought would be a challenging interview.

"I had read up on my dinosaurs, worried about what questions the Academy was going to ask me," Carter remembers. "I was in a button-up shirt, and I walked around Dinosaur Hall saying, 'Yes, that's a *Tyrannosaurus rex*' and being very know-it-all-ish," she laughs.

Seven years later, Carter rolls her eyes at that memory, recalling how shaky her dinosaur knowledge actually was. She started out "hiding" in the Academy's fossil dig, where maps and signage helped her guide visitors. At the urging of Dinosaur Hall Manager and Fossil Prep Lab Coordinator Jason Poole, she agreed to answer visitors' questions by memory in Dinosaur Hall. Then she joined the Fossil Prep Lab, where she began to overcome her fear of making a mistake.

"With Jason, it was always, 'We can fix that, and try this next time.' It gave me the confidence to ask questions."

Carter found her niche in the Fossil Prep Lab, answering young visitors' questions with increasing eagerness.

"I can't explain the joy when you explain something and the light goes on, and their eyes go wide, and they understand the immensity of the world," she says.

Those faces pressed against the glass have had a profound effect on Carter, yet she has influenced them even more. Parents have thanked her for being a role model for their daughters. One family said that, after seeing Carter in the lab, their daughter enrolled in a science academy.

If you meet Carter today, you will find no trace of the nervous teenager she once was. Paleontological terms slide off her tongue eloquently. Now a Drexel biology major with a concentration in paleontology, Carter is completing research on a Cretaceous crocodile from New Jersey with her advisor, Dr. Ken Lacovara. She helps other students conduct research, access museum collections, and ask for help from experts.

As a member of Drexel's Students Tackling Advanced Research (STARS) program, Carter prepared a vertebra of a super-massive 66-million-year-old dinosaur (uncovered in Argentina by Lacovara's crew) in the Academy's lab last summer. Now her work is being studied at Drexel.

"Seeing that I did my job well enough that people can learn from it is still so touching to me," she says.

As she makes plans for graduate school, Carter continues to prepare fossils in the Academy's Fossil Prep Lab, participate in Paleopalooza (the Academy's annual festival celebrating all things fossil), and even dress up as the Academy's T-rex mascot, Eddie. It doesn't really matter what she's doing, she says, as long as it has something to do with dinosaurs.

"This is home," Carter says of the Academy. "During my downtime, I'm here. When I need someone to cheer me up, I'm here. Sometimes just sitting beneath the *T-rex* is awesome. Awe inspiring, in the purest sense of the word." *~Mary Alice Hartsock*

Academy Abbreviated

DISCOVERY WEEKENDS


Will Klein

Join the Academy this January and February as we continue to celebrate our Bicentennial with exciting collection-themed weekends.

Get ready for a three-day celebration of plants! Botany Discovery Weekend will take place Saturday, January 19, through Monday, January 21, from 10 a.m. to 5 p.m. Budding botanists and curious plant-lovers can meet the scientists and staff, ask questions, and view some of the oldest and most important plant collections in the Americas. Visit our Special Exhibits Gallery to see specimens collected by Meriwether Lewis during the Lewis and Clark Expedition. Participate in hands-on activities and demonstrations and make a special take-home craft.

Paleopalooza, a two-day festival of gigantic proportions, features rarely seen specimens from the Academy's world-famous fossil collection. It will be held Saturday and Sunday, February 16–17, from 10 a.m. to 5 p.m. See real dinosaur fossils, and learn what it's like to reconstruct the past using fossils, imagination, and sound science. Chat with Academy scientists and members of the Delaware Valley Paleontological Society. Have fun with hands-on activities and interactive presentations.

Mark your calendars—Botany Discovery Weekend and Paleopalooza are free for members and with museum admission! *~B.B.*

LEIDY MEDAL AWARDED


Mike Servedio/ANSP

During the Academy's Bicentennial Scientific Symposium in October, we bestowed our prestigious Leidy Medal upon Douglas J. Futuyma, distinguished professor of ecology and evolution from the State University of New York at Stony Brook. Futuyma has made a significant impact on studies of evolution and biology. The naturalist was recognized for his outstanding research on speciation and the evolution of interactions between species.

Established in 1923, the Leidy Medal was created in honor of the Academy's former president and curator, Dr. Joseph Leidy. His diverse contributions to paleontology, parasitology, and anatomy, among other fields, helped shape the direction and development of scientific study in the 19th century. The award carrying his name is presented to honor exceptional publications, discoveries, explorations, and research in natural science today.

Futuyma received his Ph.D. from the University of Michigan in 1969. In addition to his numerous editorial, presidential, and scholarly commitments, he has also written textbooks focused on evolutionary biology and ecology. His contributions have shaped the constantly evolving world of science. *~B.B.*

BEHIND THE SCENES


Conrad Erb Photography

The Academy is celebrating its Bicentennial and offering limited-time, behind-the-scenes tours of its world-renowned collections—normally open only to researchers.

Featured in January, the Botany Collection contains almost 1.5 million specimens, including algae, fungi, mosses, lichens, vascular plants, and fossils from all over the world. See our specimen-mounting and curation lab, and watch a demonstration of specimen scanning to create digital images. View dried and pressed specimens of plants, including some samples that are important to medicine.

February's focus, the Vertebrate Paleontology Collection, has more than 22,000 unique fossil specimens. See Ice Age mastodons and giant ground sloths, Devonian fossils recently collected in Pennsylvania, and new species of fossil fish from the Nunavut Territory of Arctic Canada.

These tours will take place Thursdays through Mondays at 11 a.m. and 2 p.m. Sign up at the Academy's Admissions Desk on the day of the tour. Tours are free for all participants and are for visitors ages 8 and up, with a maximum of 10 people per tour. You won't want to miss these special opportunities to talk with our scientists and see some of our treasures. *~B.B.*

Mary Alice Hartsock/ANSP

SEASONAL SPECIALS AT THE ACADEMY CAFÉ

Stop by and see what's cooking at the Academy this winter! Warm up with some hearty, homemade meals by 12th Street Catering at the Academy Café, located on the ground level across from the Live Animal Center. Our chefs are creating delicious specials, soups, stews, made-to-order sandwiches, and salads every day from 9 a.m. to 4:30 p.m. on weekdays and 10 a.m. to 5 p.m. on weekends.

Start your day with a homemade muffin or hot breakfast sandwich made-to-order. Try our specials, such as some wholesome vegetarian chili with jalapeño corn bread or a roasted turkey breast salad with cranberry orange relish and pumpernickel croutons. Even the kids can enjoy a grilled cheese, pizza, or some chicken fingers! Our menu changes daily so be sure to check out our specials! *~Brigette Brown*

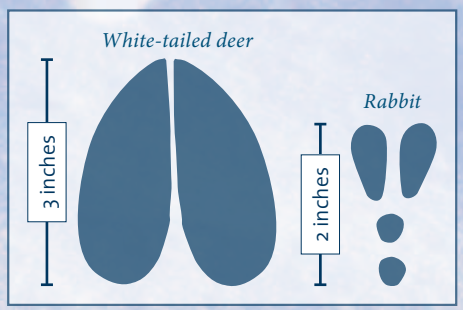
Get Connected

TRACKING THE STORY LEFT BEHIND

Anyone can be a naturalist. In each issue of *Academy Frontiers*, our scientists and experts share their knowledge to help you explore the natural world around you. In this issue, Academy Director of Education and Lifelong Learning Timshel Purdum offers some creative ways to find signs of wildlife in the dead of winter.

After snowfall, the world may seem quiet and almost lifeless. But Purdum insists that there are plenty of signs of life if you know how to look. The tracks that animals leave behind provide the perfect evidence to learn about their habitats. Recognizing the distinctions among track patterns is crucial to identifying what animals live in your backyard.

Deer and small mammals are very common inhabitants in the northeast, so be on the lookout for their prints. Deer tracks can be found near brush and low-hanging branches. Look for halved, heart-shaped impressions about 3 inches long.



Squirrel and rabbit tracks have many similar features, which create quite a challenge in distinguishing their differences. Both of these woodland creatures have larger hind feet that land in front of smaller forefeet. This movement is called galloping. The tracks will look like four ovals, two larger and two smaller, in a row. To figure out which animal left the tracks, pay attention to the location in which you discovered them. Squirrel prints most likely will be left near trees, while rabbit prints can be found in underbrush and grassy fields.

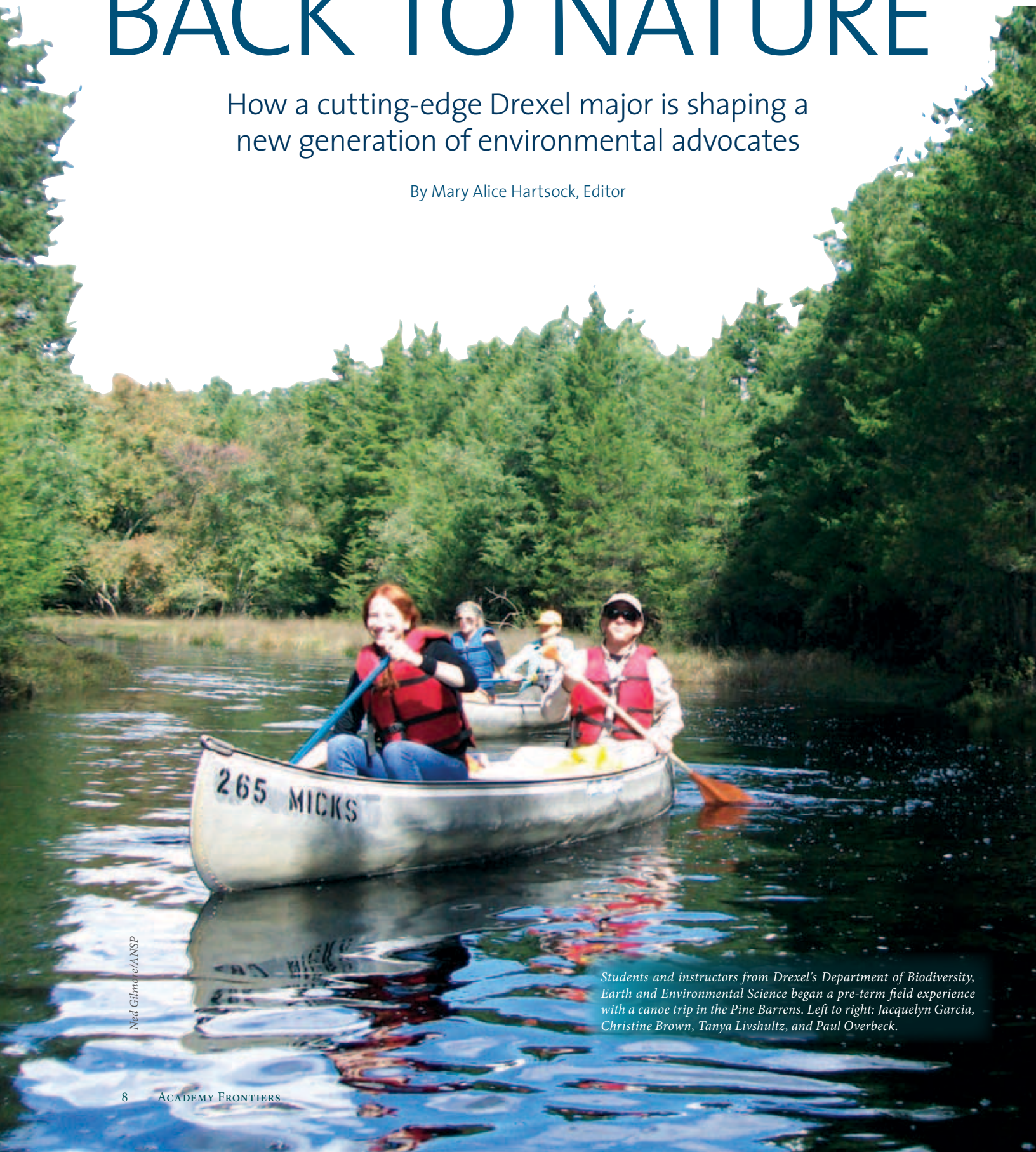
To find fresh prints, naturalists should investigate on the morning after a snowfall. Many animals are nocturnal or shy, so they often search for food when people are sleeping. Purdum encourages you to get out and explore your local parks and familiar forests, but make sure to obey any posted rules and regulations and stick to trails you know well.

As you explore, ask yourself where the tracks will end. Bring a camera or journal to record your findings and a responsible adult for company. Exploring the natural world around you is a great inspiration for creative writing. Share your stories over a cup of hot chocolate! *~Brigette Brown*

BACK TO NATURE

How a cutting-edge Drexel major is shaping a new generation of environmental advocates

By Mary Alice Hartsock, Editor



Ned Gilmore/ANSP

Students and instructors from Drexel's Department of Biodiversity, Earth and Environmental Science began a pre-term field experience with a canoe trip in the Pine Barrens. Left to right: Jacquelyn Garcia, Christine Brown, Tanya Livshultz, and Paul Overbeck.

Drexel University sophomore Alex Leszczynski has always liked squishy, slimy things. In September, she got her hands into plenty of grit and grime during a field trip to the Barnegat Bay Field Station in Ocean Township, New Jersey. She waded through a marsh, collected plants in the nearby Pine Barrens, plunged into the bay to sample crabs, and even held a squirming shark.

Leszczynski is one of 10 environmental science majors who spent their first days of the academic year far away from the pre-term campus festivities. As members of the first cohort to enter the University's new Department of Biodiversity, Earth and Environmental Science (BEES), she and her colleagues are already benefiting from the program's determination to situate the field at the center of students' learning.

A product of the affiliation of the Academy of Natural Sciences and Drexel, BEES provides students a comprehensive understanding of the environment through interdisciplinary scientific education and research. The department is offering an undergraduate environmental science major, as well as master's and doctoral degrees, through Drexel's College of Arts and Sciences.

Led by Department Head and the Vice President of Academy Science Dr. David Velinsky, BEES professors offer expertise in everything from systematic biology and paleontology to ecology, microbial biology, and conservation. Joined under the motto, "field experience, early and often," these scientists are working to cultivate environmental advocates at a crucial time in our planet's history.

We must only look as far as the recent changes in weather patterns and increases in natural and manmade disasters in the United States and around the world to see the critical need for a program that investigates climate change, biodiversity, and the environmental consequences of human activities.

According to Dr. Susan Kilham, a specialist in aquatic ecology and climate change who has been teaching at Drexel for more than 20 years, the demand for environmental specialists will grow as the world's population increases and continues to tax our natural resources.

"Our world is in dire condition," she says. "I'm convinced of the necessity for people becoming much more well-informed and wiser about the kinds of decisions we make having to do with the organisms that share our planet with us."

Roger Thomas/ANSP

Alex Leszczynski

Already, overfishing and runoff from urban and agricultural areas are altering aquatic ecology. Development and industrial activities are changing the natural habitats of the animals we depend upon for food, medicines, and other materials. The burning of fossil fuels for electricity, heat, and transportation produces greenhouse gas emissions that have been linked to climate change.

Changes in our climate and temperature patterns have a strong effect on our ecosystems, forcing animals to relocate to survive and driving other species to extinction. Temperature changes also contribute to sea level rise, which may provoke similar habitat changes or cause saltwater flooding into bodies of freshwater or onto land. Environmental changes, increases in pollution, and changing temperature patterns may pose threats to human health just as they endanger our ecosystems.

If our growing population is rapidly disconnecting from the natural systems that sustain us, what steps can we take to ensure that our resources survive for future generations? That's where BEES comes in. Courses and fieldwork will teach students how to classify and study the planet's organisms and their natural relationships. The professors also will guide students to understand the interconnectedness of living things and the ecosystems in which they live. In fact, the three-day field excursion already has made the students view their own relationships to the environment in an entirely different way.

"Seeing yourself as a consumer of plants and animals and a producer of waste, and seeing yourself as an organism that is part of the whole biosphere makes you feel much more valuable," notes Emily Johnson, a sophomore environmental science major already planning to pursue an accelerated master's degree in the field. "I think people need to pay attention to that and realize that you're also a much different organism from other ones, and you're much more damaging and harmful."

Leszczynski, too, is becoming more aware of her surroundings. During the Barnegat Bay trip, she noticed extravagant homes being built right atop former marshes, forcing those habitats into smaller areas.

"It's really important to see what is threatening different habitats and find out how we as a population can work to balance ourselves with our environment," she says.

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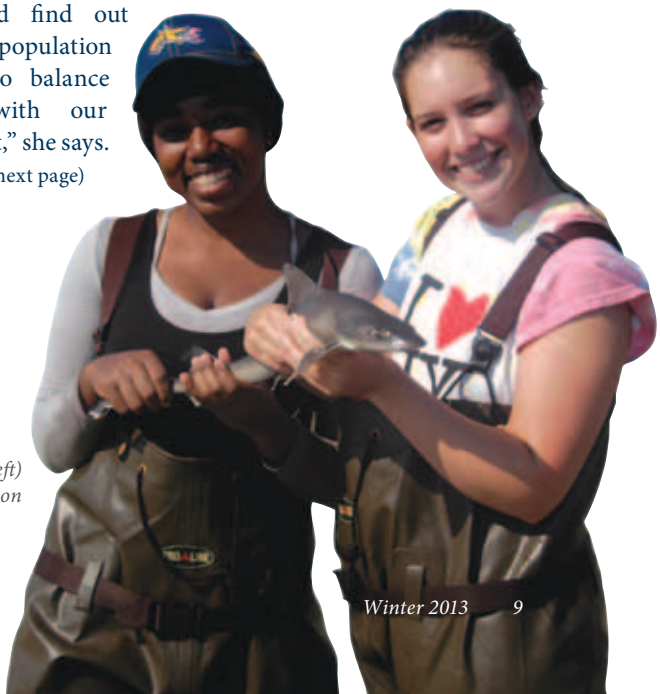

Clementine Sraha (left) and Emily Johnson

Paul Overbeek/ANSP

Eastern Mudminnow

(continued from page 9)

CONNECTING WITH NATURE

The BEES Department is teaching environmental science majors who have never known a world without computers and cellphones about the amazing things they will discover when they immerse themselves in the natural world.

According to Dr. Richard Horwitz, Academy senior biologist and full professor in the BEES program, understanding the environment and being able to visualize the organisms that populate our ecosystems is "fundamental to ecology." That's why he and his colleagues coordinated the trip to the Barnegat Bay Field Station, located at the Lighthouse Center for Natural Resource Education, which is owned by the New Jersey Department of Environmental Protection's Division of Fish and Wildlife.

Horwitz believes field experiences provide the basic context for understanding the environment and formulating questions about ecosystem processes. He says that fieldwork is an important way to help his students understand why the theoretical concepts they learn in the lab are relevant. In fact, the department has made fieldwork an important element of the majority of the required environmental science courses.

"We have so many concepts that we want to teach in courses, but we don't want students to be so busy trying not to fall behind that they don't take the time to get out in nature and observe," he explains. "You drive through the Pine Barrens and it can be the most boring-looking thing, but if you get out and look around at the variety of plants that are there, you really see how wonderful things are."

For Johnson and Leszczynski, having been knee-deep in a bog and surrounded by forest makes the theoretical information covered in their environmental science classes pertinent.

"Knowing even a little bit about nature around you just makes the world seem so much more interesting, so much more vast," Leszczynski says. "Everyone who's not really exposed to this just goes by in life with a blur of green. But on this trip I saw hundreds of different kinds of plants, and each one is very special. I'm not even a plant person, and I still am amazed by the diversity that's in our world."

While holding a shark caught during the seining macrofauna activity, Johnson exclaims, "This is the best day of my life!" Later, she explains that the shark isn't the only thing that made her experience memorable.

Roger Thomas/ANSP

"I've never done any water ecology or fieldwork at all, and seeing wetlands for the first time and working in them has been really exciting."

IN THE FIELD

For the incoming class of BEES majors as well as the sophomores who transitioned into the department upon its creation this year, the September trip provided the opportunity to try out many of the field methods they will be required to use in their classwork and research—without the pressure of being graded, explains Horwitz.

Most freshmen spend their first week learning the ropes of the residence hall, finding their favorite eating spots, and maybe even feeling homesick. For Kerry Rugenstein and Raffaela Marano, these concerns were far from their minds.

Immersing themselves into their new major so quickly, say Marano and Rugenstein, is allowing them to get a head start. Not only do they understand some of the field methods that their professors will be referring to in class; they also are getting a feel for the dynamics and tone of the program.

Rugenstein certainly didn't expect that he would be canoeing down the Delaware by his third day of college. Hands-on is how he learns best, and being able to touch live specimens as his professors describe their characteristics assures him that he has chosen the appropriate field of study.

Marano, too, is soaking in the real-world learning. Adorned with clumsy rubber waders from toe to shoulder, she didn't hesitate to "take the deep end" as the group used enormous nets to gather seaweed, fishes, crabs, and other organisms from the bay. She already knows how the waders feel when they compress with the waves as she walks waist-deep in the water.

The trip was just the first step in preparing the students to tackle the environmental questions they will be wrestling with throughout college and their careers. In addition to the salable skills they can add to their resumes, the students will learn to think and analyze, take notes, write clearly, and, most importantly, slow down and observe the world around them, says Horwitz. Some of the students may go on to advanced science degrees or careers in environmental consulting or advocacy, where these skills will be important assets.

"This department, the hands-on, the expertise of the professors, and the field experience—the access we have to field stations across the country and all over the world—it's just really amazing," Leszczynski says. "It's so broad and open, and I feel like I can do anything going forward."

Dr. Rich Horwitz (left) teaches students (left to right) Alexandra Khan, Zak Cirelli, and Jacquelyn Garcia how to use a seine net to capture fish and crabs.

LANTERN SLIDES IN THE ARCHIVES

By Bridget Arthur Clancy, M.S.L.S., Cataloging and Serials Librarian

Images: ANSP Archives/Coll. 2009-013

Visitors and researchers to the Academy Library and Archives are often amazed by the treasures in our holdings—personal papers from notable figures in American science, rare books, photographs, and even a buckskin jacket that belonged to John James Audubon. Another surprise is the collection of glass lantern slides held in the Archives.

What are they, and why would the Archives have them?

Introduced in 1849, lantern slides, which were 4-by-3-inch panes of glass with an image sandwiched in between, allowed photographs to be projected and viewed by large audiences. This meant photography could be used for education and entertainment as well as for sharing among small groups.

In the 1840s, the Langenheim brothers of Philadelphia had begun to experiment with the display of transparent photographic images using a device called the Magic Lantern, which had been introduced during the 17th century to project images from glass plates. Following on the work of French inventor Niepce de St. Victor, who had discovered that one could adhere a light-sensitive solution onto glass and generate a negative image, the Langenheims used the negative to print onto another sheet of glass. They produced the desired transparent image, projectable without loss of quality.

After lantern slides became more common, inventors developed an easier technique that allowed amateur photographers to construct their own lantern slides using kits. The negative image and the glass were placed into a camera, the glass was exposed to light, and the positive image was developed using special chemicals. Photographers added detailed hand coloring or tinting after the plate dried. After a mat and glass cover were added and the enclosure sealed, the slide was ready to be viewed on a wall or screen using a projector.

Lantern slides remained popular through the 1930s, when smaller 2-by-2-inch transparencies became readily available. Once Kodachrome color reversal film was devised, creating 35 mm slides became relatively cheap compared to making lantern slides. Shortly thereafter, most lantern slide production ceased.

The Academy Archives has several magnificent lantern slide collections illustrating people, places, and things that were seen on Academy-led expeditions. Although these slides were first created so that many people could see them simultaneously, today they serve as the perfect tool for individual researchers wanting to experience the world just as the explorers saw it long ago. Often corresponding to details and written descriptions found in field notes, the slides allow us to catch a glimpse into the scientific discoveries of the past.

The Pennell-Pilsbry Expedition to Mexico, 1934 (ANSP Coll. 2009-013, pictured on this page) was a joint botanical and malacological expedition. The lantern slides in this collection—some black-and-white, many hand-colored—show specimens, topography, and native people. The colors remain as vibrant as when the slides were first created.

ANSP Archives/Coll. 49

This vintage photograph shows a 15-foot-long librarian's desk in the old Academy Library at the turn of the 20th century. The Library was located in what is now Dinosaur Hall. Thanks to an Academy staff member who spotted the piece in our second-floor Library this fall, the desk and some other antique furniture pieces are being restored today.

While conducting mammalogy research in the Library, Curatorial Assistant Drew Lynford noticed the antique desk, easily 100 years old, and he thought that it needed some TLC. Doors were held closed with paper shims, and handles and hardware were either missing or dysfunctional. These antiques provided Lynford a unique opportunity to apply his furniture-building and repair skills. So far Lynford has cleaned the pieces, ordered and installed new hardware, and fixed the desk's six dovetailed drawers. He is attempting to restore the luster of century-old original shellac finish through professional restoration techniques. He hopes to restore the furniture so that the Library staff can fully utilize the pieces and visitors may continue to enjoy their beauty. *~Clare Flemming, M.S., C.A., Interim Director of the Library and Archives and Brooke Dolan Archivist*

Sustainability Matters

PROMOTING SUSTAINABILITY: IT'S COMPLICATED

By Roland Wall, Senior Director, Environmental Initiatives

Almost everyone would agree that sustainability—working to build systems that provide for the present without depriving us in the future—is, in theory, a very positive idea. Sustainability in practice, however, is often much more complicated.

In many cases, practicing sustainability requires difficult choices and changes in behavior. It also impacts the economy, challenges social values, and tests political power. The result can be real controversies and sometimes-heated conflicts.

For the Academy, promoting sustainability is the direct outgrowth of a decades-long commitment to environmental stewardship and to the use of science to improve the health of our natural world. As a key player in Philadelphia's sustainability community, the Academy has often been asked to provide expertise to guide environmental-management decisions.

Science may have the ability to shape public conversations surrounding food, water, and energy, however, social and political opinions often overwhelm scientific arguments. When scientific research isn't answering our questions quickly enough, public perceptions tend to govern discussions about the environment. Addressing controversial environmental issues often is challenging for a nonprofit, science-based institution like the Academy because we must base our perspectives on lengthy scientific research.

The Academy is also committed to convening discussions on critical environmental issues. We work to highlight a variety of opinions while expanding the range of scientific knowledge through our research.

For example, in Pennsylvania, the extraction of natural gas from shale formations using hydraulic fracturing has created a torrent of political, environmental, and economic questions. Our researchers are working to understand whether natural gas extraction is impacting the ecology of the region's major watersheds. At the same time, our public programming has featured, and will continue to feature, a broad range of views on this topic.

Our goal is not to direct public opinion—the Academy takes no position on specific practices—but instead we strive to act as a conduit for consensus while providing a scientific foundation for decision-making. In this way, we will continue to serve as a source of authoritative science while providing a public forum for discussion of sustainability and helping to protect the planet.

CARYL WOLF: A HALF CENTURY OF SUPPORT

Mary Alice Hartsock/ANSP

Caryl Wolf with one of her welded sculptures

IT WAS A HUMID SUMMER EVENING MORE THAN TWO DECADES AGO, and Caryl Wolf was conversing with Academy Entomology Curator Dr. Dan Otte and Senior Fellow Bob Peck at her home on St. John Island. Otte, a leading expert on grasshoppers and crickets, had traveled to the Caribbean to search for locusts that had flown across the Atlantic in 1988. Peck had accompanied him to conduct research for a related *Smithsonian* magazine article. The trio was relaxing on a deck surrounded by the cascading, purple-flowered vines of a petria tree when a single cricket voice emerged over the chatter of countless insects.

Otte, who uses sound to identify crickets, locusts, and katydids, was captivated by that song, Wolf remembers. He collected a pretty green cricket in the garden below and promised he would name it after her if it was found to be a member of a new species.

It turned out the cricket was already known, as *Orocharis vaginalis*, but Otte discovered that it was a member of a new genus. He called the genus *Carylla*, in honor of Caryl Wolf.

Standing in the kitchen of her Conshohocken, Pennsylvania, home in October 2012, Wolf points out Otte's watercolor illustration of the cricket. As a welder, Wolf has filled her home with her own artworks and unique pieces from around the world, but she is especially proud of this one.

"I have a genus named after me! Not just a species—a genus!" Wolf exclaims, beaming.

Wolf bursts with stories of her days at the Academy. She remembers hearing the plans of Asia Center Director Dr. Clyde Goulden as he prepared for his first trip to Mongolia in 1994. She chuckles fondly at the memory of ornithologist and Curator Dr. Frank Gill leading a group of Women's Committee members, including Wolf, on several birding expeditions during the 1980s. And she recalls her conversations with her colleague Dr. Ruth Patrick, whom she calls her hero, with equal clarity.

Wolf, who worked as a microbiologist early in her career, became acquainted with many Academy scientists during the 1960s and 1970s while working as assistant to the institution's president. She relied on the scientists to provide behind-the-scenes tours to prospective supporters and to recommend and serve as speakers for regular programming. During that time, she also headed a program that brought natural science lessons to Philadelphia students.

Wolf ended her formal employment at the Academy in 1973 to spend more time with her family, and soon after, she was invited to join the Academy's Women's Committee. She worked with the Committee to arrange events that benefited the Academy, including Super Sundays, block parties that stretched up the Parkway from Logan Square to the Art Museum area. The Committee also coordinated evening parties such as Dinosaurs After Dark and an auction in which Academy staff, scientists, and supporters sold everything from Catesby prints to a real taxidermy chimpanzee.

Wolf joined the Academy's board during the 1980s. Her familiarity with the institution's culture as well as her knowledge of the needs of the scientists and staff had prepared her to interpret and negotiate some of the board's complex decisions.

Over the years, Wolf and her late husband, Robert Wolf, supported the Academy's Annual Fund, the Library, ornithology, and entomology, contributing consistently and generously at the leadership level. The couple also funded the creation of the Wolf Rare Book Room in the Library and Archives.

Wolf continues to keep the Academy in her life through her financial support. Being a leadership circle donor grants her special access to the Academy's collections and scientists, many of whom she holds dear.

"The Academy is my second home," Wolf says. "I support it because I love the work that they do, whether it's their research or their effect on the community. And I just love being there." *~M.A.H.*

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A charitable gift annuity is a wonderful way to increase your annual spendable cash, cut your taxes, and make a significant gift to the Academy of Natural Sciences of Drexel University. Why not convert a maturing taxable bond or CD to a charitable gift annuity? It's simple and provides lasting benefits, such as:

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LEARN MORE

Everyone's situation is unique. For more information about estate planning or to make a planned gift, please contact Amy Marvin, vice president of Institutional Advancement, at 215-299-1013 or marvin@ansp.org.

Mike Servedio/ANSP

Christine Danowsky (right) demonstrates a squid dissection during the Philadelphia Shell Show and Festival.

Academy Support

On behalf of the Academy's Board of Trustees, we wish to recognize and thank those who have contributed to the Academy between **September 1** and **November 30, 2012**. Your generosity helps to fund the Academy's many programs of research and education, and we are tremendously grateful for your support.

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An herbarium sheet from the Academy's Botany Collection of almost 1.5 million specimens. Be sure to join us for Botany Discovery Weekend on January 19–21!

The Academy would like to give special recognition to those who have joined or renewed their support in the Academy's Leadership Circles of Giving between **September 1** and **November 30, 2012.**

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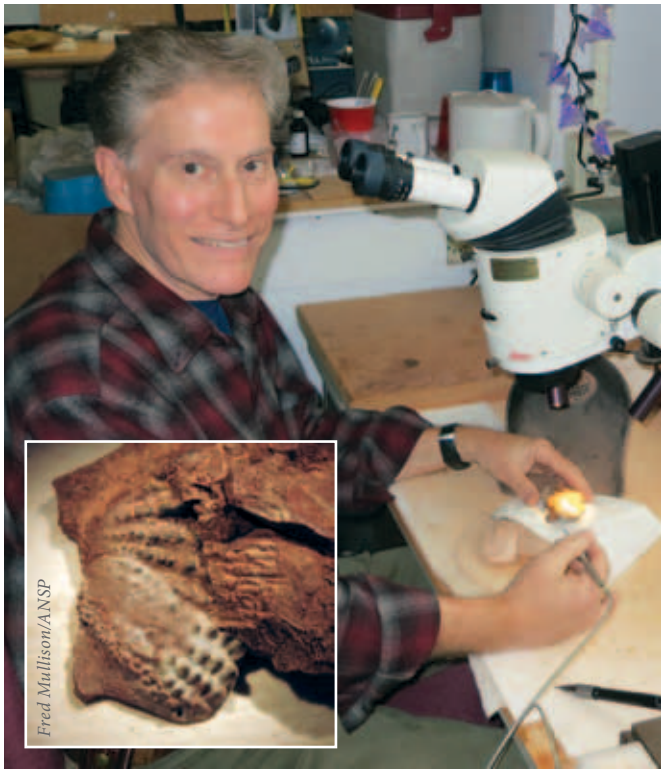
Snapshots

IN THE FIELD

In this photograph, Diatom Herbarium Curator Marina Potapova collects diatoms (single-celled algae) from a lake in the Siberian Arctic. She traveled to the area in summer 2012 to study the geographic distribution of diatoms in Beringia, the region that stretches from Northeastern Siberia to Alaska and included a land bridge between Asia and North America during the Pleistocene Ice Ages.

Potapova braved freezing temperatures to examine the degree to which the distribution of diatoms throughout the region has been shaped by the physical features of the landscape. Specifically, she is investigating whether the land bridge facilitated the spreading of diatoms during the Pleistocene and whether the Bering Strait prevents dispersal of diatoms today. Sampling diatom communities in Siberia and Alaska and using scientific modeling to predict how certain diatom species scattered across the land over time will help her answer these questions.

Eugene Potapov



Mary Alice Hartsock/ANSP

BEHIND THE SCENES

Academy Fossil Preparator Fred Mullison gets ready to use a pen-like instrument called a pin vise to extract a fossilized lungfish palate from rock. His high-powered microscope magnifies the fossil, which measures about 3-by-5 centimeters. Mullison has been mastering this crucial phase of Academy fossil research for the past 17 years.

The Academy's Dr. Ted Daeschler and Dr. Neil Shubin of the University of Chicago uncovered the 375-million-year-old lungfish fossil in 2008 during an expedition to the Nunavut Territory of Arctic Canada. A member of the sarcopterygian group of fishes, the lungfish is a relative of tetrapods (limbed animals). The team discovered *Tiktaalik roseae*, a fossil sarcopterygian fish that shares many features seen only in tetrapods, in the same area in 2004. Detailed preparation and study of these fossils provides important evidence of the earth's biological diversity during the late Devonian Period.

JUST FOR KIDS

WELCOME to the *Academy Frontiers* page for kids, one of the many great ways you can participate in the Academy's Kids Club!

C	P	W	N	O	A	D	I	I	E	X	I	M
J	E	I	E	I	Y	N	A	T	O	B	U	S
D	W	D	M	C	X	V	P	X	F	I	Y	F
P	J	I	I	F	R	Z	E	U	R	W	R	L
P	L	A	C	A	R	L	N	A	G	S	I	O
Q	I	K	E	Z	D	G	B	B	L	W	P	R
V	C	G	P	S	U	R	P	I	C	A	E	A
M	H	S	S	S	E	Y	S	O	Y	L	T	U
W	E	Q	S	H	P	S	D	Z	L	Z	A	M
B	N	T	F	O	O	H	R	F	D	L	L	V
F	A	A	F	F	M	O	N	D	E	G	E	N
C	H	L	O	R	O	P	H	Y	L	L	F	N
U	G	I	M	X	B	E	A	G	L	A	H	B

Puzzle created at puzzle-maker.com

WORD SEARCH

Complete this botany word search, and then learn the meaning of each word. Be sure to join us for Botany Discovery Weekend on January 19–21 to meet our plant scientists and view real specimens from our collection.

PETAL: usually the most colorful part of a flower. The bright color attracts animal visitors that carry pollen.

POLLEN: tiny grains carried from flower to flower by animals or wind. When a flower receives pollen, it becomes a fruit. Each seed inside the fruit is fathered by one pollen grain.

CHLOROPHYLL: a green, light-absorbing pigment found in plants. Chlorophyll allows the plant to convert light energy to food energy.

FUNGUS: organisms that are rooted in place, like plants, but are really more closely related to animals than to plants. They do not have chlorophyll, stems, roots, or leaves.

BOTANY: the study of plants

SPECIMEN: a sample for study

HERBARIUM: a scientific collection of dried plant specimens; a library of plants

ALGAE: aquatic plants that do not have roots or leaves

MOSS: tiny, leafy plants that grow in moist soil

LICHEN: a plant-like fungus that grows cooperatively with an alga. The alga has chlorophyll and produces food for the fungus.

FOSSILS: remains of ancient plants and animals

FLORA: all the plants found in a certain area

DID YOU KNOW...?

How many different types of animals are there in the world? — *Amaya S.*

Scientists don't know the exact number. Of the known species in the world, around 1.4 million are animals. A little more than 5,000 species are mammals, and humans are just one mammal species!

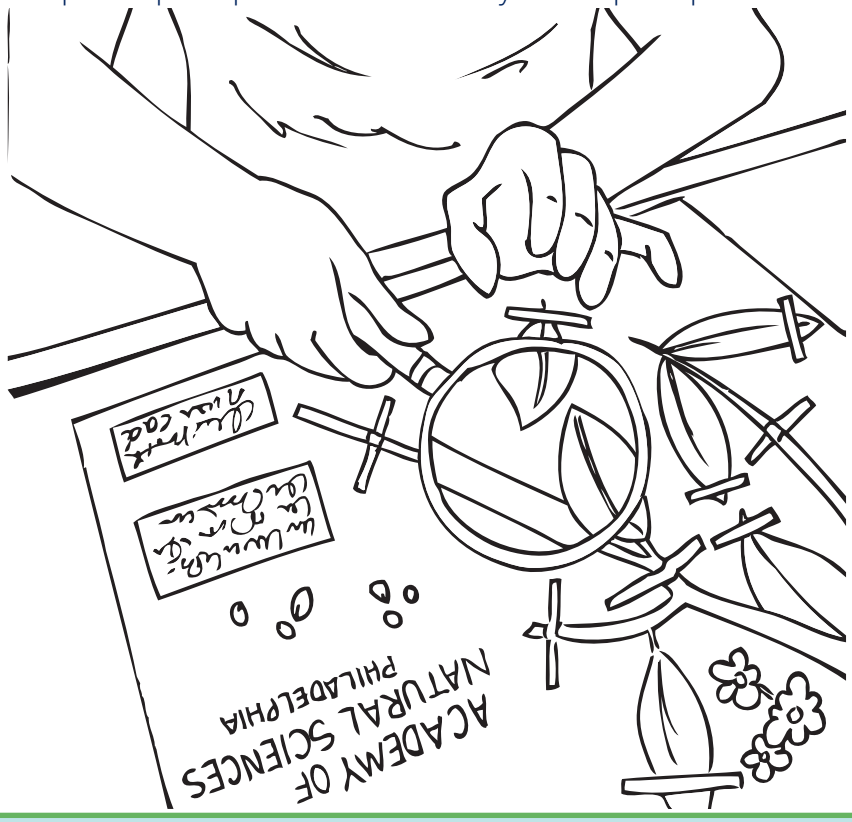
— *Timshel Purdum, Director of Education and Lifelong Learning*

Do you have a question about the natural world?

Email **kidspage@ansp.org**, and if your question is chosen for Just for Kids, you'll win a prize!

COLOR THE SCIENTIST

Collecting and preserving specimens for research is what the scientists at the Academy do every day. Color this scientist studying an herbarium sheet, which is used to preserve pressed plant specimens. Then collect your own plant specimens outside.



Christine Danowsky

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