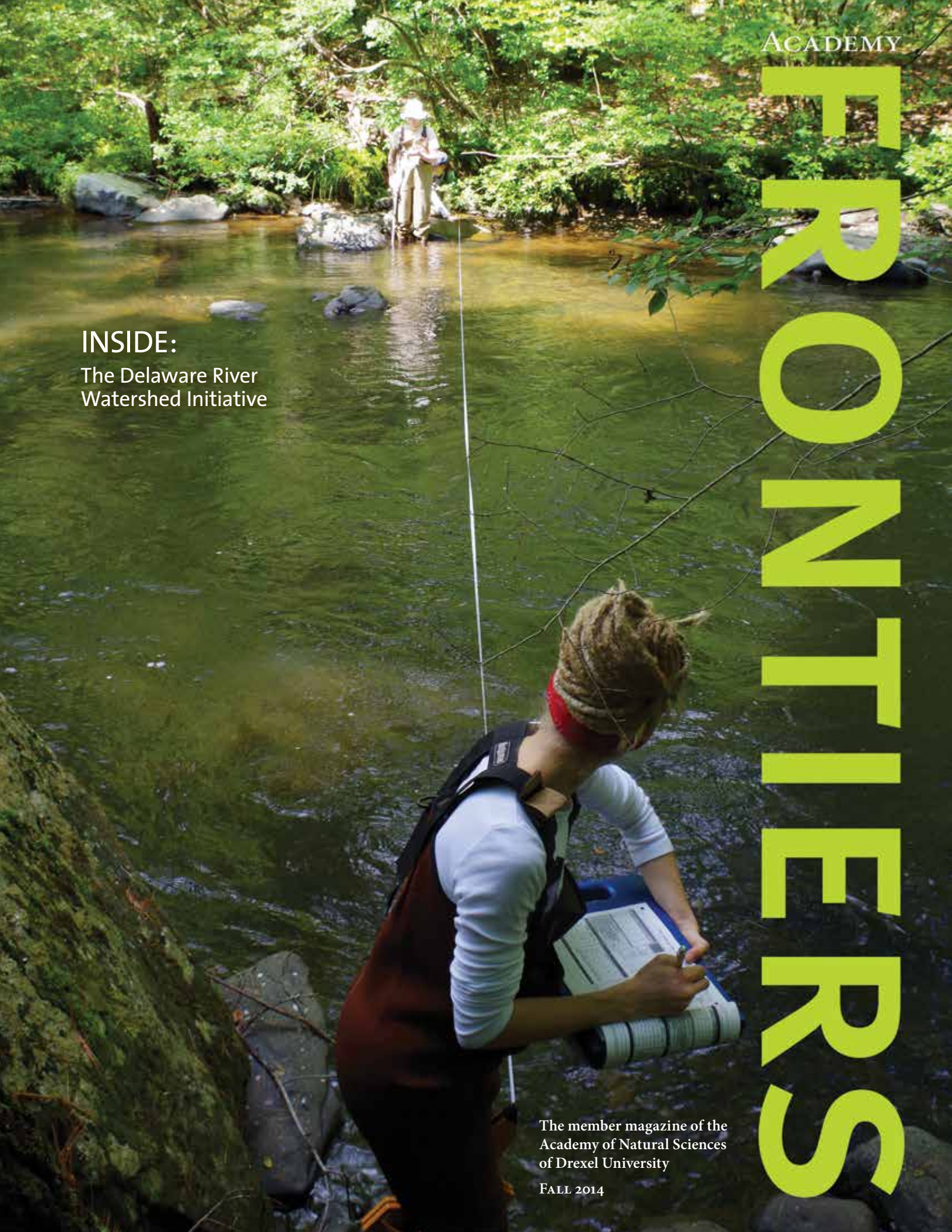

ACADEMY

FRONTIERS

INSIDE:

The Delaware River Watershed Initiative

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

Fall 2014

President and CEO: George W. Gephart, Jr.
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Please send questions or comments about *Academy Frontiers* to ans_editor@drexel.edu.

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

On the cover: *To support the Delaware River Watershed Initiative, Academy scientists sample algae and measure width of the Tenmile River near Tusten, New York. More on pages 8–11. Photo by Arielle Webster/ANS*

Academy Greetings

Katie Clark/ANS

Dear Friends,

The Academy of Natural Sciences has excelled in environmental research for decades thanks to the pioneering work of Dr. Ruth Patrick. Dr. Patrick demonstrated that biological diversity is the key to understanding ecosystem health. Her legacy continues today through Academy scientists' work on the Delaware River Watershed Initiative (DRWI), a large-scale, collaborative program that is taking action to maintain and improve the quality of aquatic ecosystems within the Delaware River Basin.

The Academy has been granted three years' funding from the William Penn Foundation to provide scientific oversight for the DRWI, with more than 40 grantees working to restore degraded areas, protect undamaged areas, and monitor watershed health. This work is critical in protecting and restoring sources of drinking water for 15 million people in the Delaware River Basin. It is relevant not only to all of us who live and work in the Delaware Watershed, but also to the wildlife living in and around our streams. Turn to pages 5 and 8 to meet some of the scientists who are working on this project and to learn more about their research.

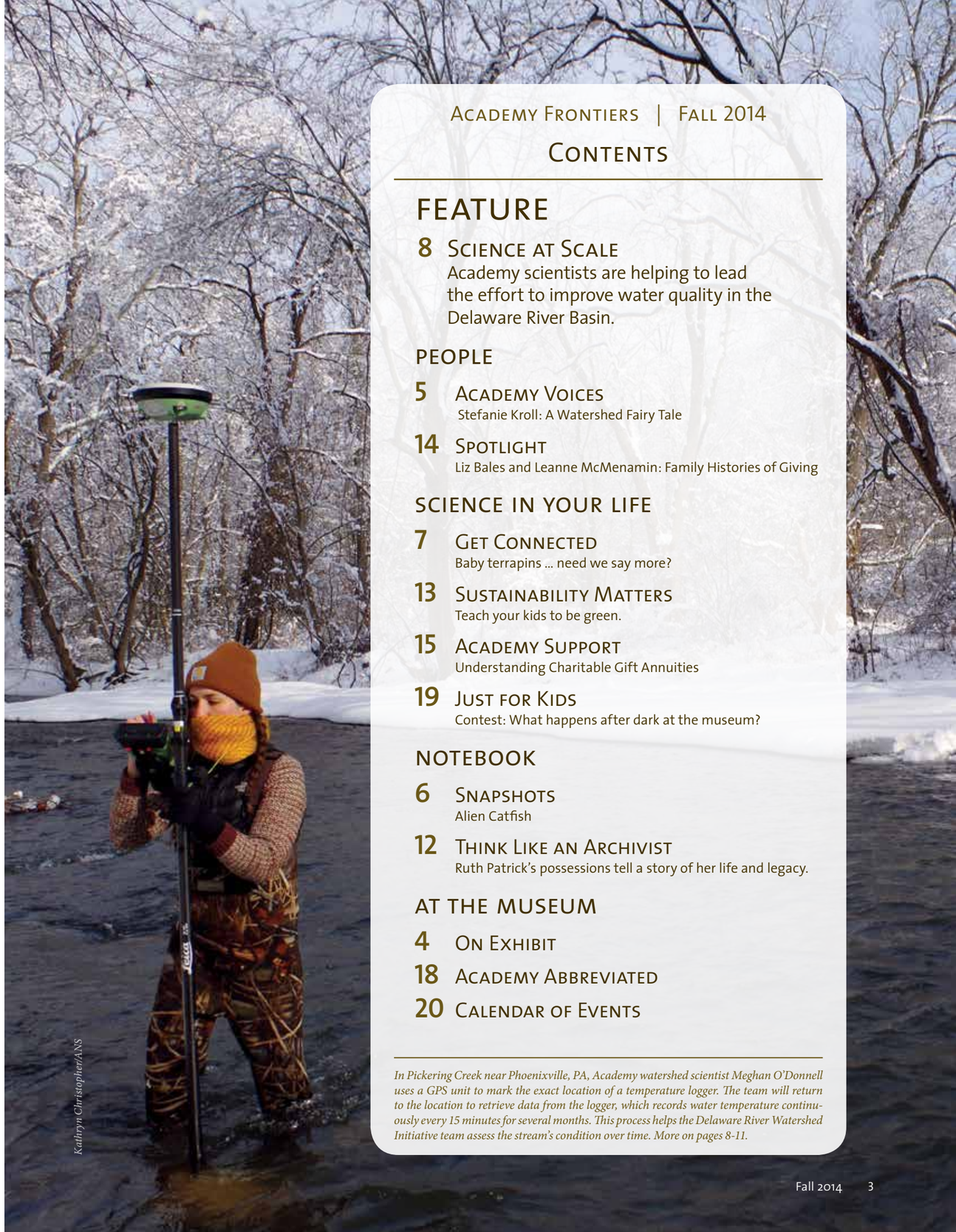
As we approach the holiday season, many positive changes are taking place at the Academy. This fall we open *Chocolate: The Exhibition*, a fun exhibit for the whole family. We also welcome Jason Weckstein, PhD, formerly of Chicago's Field Museum, to the Academy's Ornithology Department. November begins with *Cuisine from the Collections: Chocolate Edition*, a celebration inspired by the edible items in the Academy's collection. We will round out the season with special dinosaur activities (November 28–30) and appearances by the Academy's all-stars, including our live animals (December 27–30)—perfect ways to introduce your holiday guests to the Academy.

As you and your family gather for the holidays this year, please consider integrating the Academy into your celebrations. Do you know a family member who would enjoy a gift membership to the Academy? Would a friend appreciate your gift to the Academy made in their honor? Is planned giving an option for you? You can also make a difference through your gift to the Academy's Annual Fund, which provides vital support for research, collections care, education, and exhibits. You are crucial to our ongoing work, and we are thankful for your support.

All the best,

George W. Gephart, Jr.
President and CEO

FOUNDED IN 1812, the Academy of Natural Sciences of Drexel University is a leading natural history museum dedicated to advancing research, education, and public engagement in biodiversity and environmental science.



Kathryn Christopher/ANS

Contents

In Pickering Creek near Phoenixville, PA, Academy watershed scientist Meghan O'Donnell uses a GPS unit to mark the exact location of a temperature logger. The team will return to the location to retrieve data from the logger, which records water temperature continuously every 15 minutes for several months. This process helps the Delaware River Watershed Initiative team assess the stream's condition over time. More on pages 8-11.

Pinned: Insect Art, Insect Science

Art of Science Gallery
August 9, 2014–January 11, 2015

Pinned: Insect Art, Insect Science celebrates the elegance and beauty of insects. Artist Christopher Marley uses colorful insect specimens to create intricate mosaic pieces. He photographs diverse groupings of beetles, butterflies, and other bugs, sharing with us an irresistible palette of colors and textures that reflect the amazing diversity of the insect world. His symmetrical arrangements of the mini-beasts of nature reflect the masterfully balanced design of nature itself. Alongside Marley's works, dozens of specimens from the Academy's Entomology Collection illustrate why and how scientists pin insects for research. Free with regular museum admission.

Christopher Marley

© 2002 Photodisc

Chocolate: The Exhibition

Presented by Mars Chocolate

Special Exhibits Gallery
October 11, 2014–January 24, 2015

Indulge yourself in the sumptuous world of chocolate! *Chocolate: The Exhibition* traces the intriguing story of this "food of the gods" from its origin as a unique rain forest tree to the sensuous sweet millions of people crave today. Explore chocolate's impact on tropical ecosystems, human cultures, and the global economy through a range of fun, hands-on activities for all ages. Stand under a life-size cacao tree, touch pods and seeds, and learn about the steps in chocolate production. Whether you are a novice or a connoisseur, *Chocolate* will engage your senses and share an enticing tale of the world's favorite treat. *$3 Individual and Family level members; Family Plus level members and above receive free admission.*

In Spanish and English. *Chocolate* and its national tour were developed by The Field Museum, Chicago. This project was supported, in part, by the National Science Foundation.

Titanoboa: Monster Snake

Special Exhibits Gallery
February 14–April 19, 2015

Deep underground in a Colombian coal mine, scientists have uncovered remains of the largest snake in the world, *Titanoboa cerrejonensis*. Stand eye-to-eye with a full-scale model of this massive predator, which at 48 feet long and 2,500 pounds could crush and devour a crocodile. *Titanoboa* haunted the rain forest during the Paleocene, the lost world that followed the demise of the dinosaurs 65 million years ago. This fearfully fun exhibition delves into *Titanoboa's* discovery and reconstruction, as well as what scientists have learned from this enormous reptile.

Smithsonian

STEFANIE KROLL: TALES OF A WATERSHED SCIENTIST

By Mary Alice Hartsock, Editor

Stefanie Kroll calls fieldwork her "Cinderella Clause." Like the fabled princess, the Academy scientist spends most of her time indoors and behind the scenes, striving to make sure that the work that takes place outdoors runs smoothly.

Yet when Kroll steals a moment to step into the field, she's no ordinary Cinderella figure. She trades glass slippers for chest waders, for when she hops into a stream and the dirt settles underneath her fingernails, she's living her own version of a fairy tale.

Ever since Kroll was a youngster, she has enjoyed spending her days outside picking up salamanders and bugs. In college, she assisted a PhD student with fish sampling in the Salmon River in New York, and that's when she first became fascinated with the complexity of aquatic ecosystems. She loved interacting with the fish, and she was stunned by the beauty and adaptations of aquatic insects.

At heart an explorer, Kroll veered away from science for eight years while working as an interpreter and an English teacher in Spain. During her time there, she completed a master's in stream ecosystem research. Her field sites, located in the sparsely populated Castilla-La Mancha, became the subject of her PhD research: assessing human impacts on stream ecosystems as measured by aquatic insect communities. The work also sparked her interest in climate's influence on aquatic ecosystems.

"After living in Spain's arid climate, I have a greater appreciation for how much water we have available to us [here in the United States]," Kroll says. "By understanding how much human actions are affecting our ecosystems and how to perform everyday activities in a less harmful way, we can reduce the impact and be better stewards of the earth."

And that's increasingly urgent, she says. Recent studies on the Colorado River and the Kirkwood-Cohansey Aquifer in New Jersey indicate that contaminants are prevalent in the groundwater. The results signal that the amount of water available and the quality of the local water supply are at risk.

"Freshwater is a finite resource, and the more we take care of it now, the better condition it will be in in the future," she says.

She's referring specifically to the water in the Delaware River Basin, an area over which she, along with a slew of Academy scientists, has been granted oversight. In addition to its undisturbed regions, the basin contains areas where drainage from abandoned mines is polluting streams, as well as stretches where storm water runoff from large cities and agricultural fields is introducing contaminants into the water.

Calíz Navarro-Llacer, University of Castilla-La Mancha

"The Delaware River Watershed is a great area for analysis because it contains waterways with many of the conditions we find throughout the country, with different stressors on the water, and it's a good incubator for projects aimed at preserving water and habitat quality," she says.

Kroll began working at the Academy after scientists from the Academy's Patrick Center had begun work on the Delaware Watershed Conservation Program, funded by the William Penn Foundation. This spring, Kroll and her colleagues were awarded a multi-year grant to continue working within this initiative to protect and restore critical sources of drinking water for 15 million people in and around the Delaware River Basin. Kroll is now project science director, working with the William Penn Foundation, the National Fish and Wildlife Foundation, the Open Space Institute, and the Institute for Conservation Leadership to collaborate with more than 40 grantee organizations that are working to restore degraded areas, protect undamaged areas, and monitor watershed health.

Kroll is a nexus for researchers studying water quality issues in the region. She works with senior Academy scientists to identify field sites for testing, coordinates the on-the-ground science and monitoring, conducts data analysis to evaluate the effectiveness of the grantees' land conservation efforts and restoration projects, and connects with water researchers throughout the Basin and beyond.

Kroll is thrilled to be performing research that has a practical outlet, and she says it's a privilege to take a leading role in a comprehensive monitoring program with potentially huge implications. Yet there's still a part of her that revels in the basic sampling—the dirty work—that is so necessary to forming reliable results. For Kroll, being in nature is the epitome of a happily ever after.

3D scans, Kyle Luckenbill/ANS
Center image, Mark L. Riccio, Cornell University BRC CT Imaging Facility

THE "ALIEN" CATFISH

By Mike Servedio

The catfish is only about 4 inches long. It lives in one specific region of the world, the Western Ghats Mountains of India. Even there, humans rarely see this subterranean creature, which occasionally emerges in springs and flooded rice paddies. It has a jaw like a bulldog and teeth like the creature from the movie *Alien*. These are some of the things we know about *Kryptoglanis shajii*. But what scientists are still working to understand may be the most interesting part of the story.

Upon first glance, *Kryptoglanis* does appear to look particularly unusual for a catfish. Examining the bone structures of the catfish's face, Academy Curator Emeritus of Ichthyology and resident catfish expert Dr. John Lundberg notes of the fish, "The more we looked at the skeleton, the stranger it got. The characteristics of this animal are just so different that we have a hard time fitting it into the family tree of catfishes."

Many subterranean fish lack bones that others of their species possess, but the fact that the bones in *Kryptoglanis*' face are so uniquely shaped was the biggest surprise to researchers. With numerous modified bones found in the fish, Lundberg speculates that there may be a functional purpose behind the unique features. In dogs, he says, selective breeding led to unique bone features.

"In *Kryptoglanis*, we don't know yet what in their natural evolution would have led to this modified shape," Lundberg says.

Using digital radiography as well as high-resolution CT scans provided by the Cornell University Biotechnology Resource Center CT Imaging Facility, Academy Interim Collection Manager of Ichthyology Kyle Luckenbill was able to carefully create three dimensional images of the unique bone structures, as well as the whole fish. The use of the CT scans allowed the researchers to examine cross sections of the bone structures of the fish, revealing just how unique the structures are while keeping the specimen completely intact.

Lundberg and Luckenbill weren't the only ones looking into the strange new catfish. A team of researchers at the Natural History Museum of London, led by Ralf Britz, did a separate study of *Kryptoglanis*. Britz's team utilized a technique of clearing and staining, in which the skeleton of the fish is rendered red in contrast to making the cartilage blue and the flesh invisible.

"There was an amazing congruence between the results," Lundberg said. "Neither of us was way out."

But some questions remained after both studies. What is *Kryptoglanis*' closest relative? Where exactly does the species fit into the family of catfishes? Is there a purpose to the unique bone structures? Researchers, including Lundberg and his team, will continue to investigate these questions.

The study of Kryptoglanis shajii *was published in the 2014 issue of the* Proceedings of the Academy of Natural Sciences of Philadelphia *by John Lundberg, Kyle Luckenbill, K.K. Subhash Babu, and Heok Hee Ng.*

Paul Kaczmarczik

TANTALIZING TERRAPINS: EXPLORATIONS OF AN ACADEMY EDUCATOR

By Mike Kaczmarczik

Summer in Philly means it's time to head down the shore for sun, sand, and surf. What I look forward to the most during any foray to the beach isn't basking under the sun, but swapping my beach towel for a flashlight once the sun goes down.

A nighttime walk on the beach is like entering an entirely different world. Ghost crabs of all sizes emerge from their burrows and scurry across the sand searching for food. Juvenile dogfish, a small species of shark, cruise the edge of the surf, their eyes glowing when they catch the light. Wind and waves create a thick layer of background noise, and all you can see is the round patch of sand illuminated by your flashlight.

This year the light emanating from my flashlight fell onto something surprising. In the compact sand left by a receding tide was a set of tracks I had never encountered on the beach. I followed the tracks until they disappeared into the soft sand. A few yards down the shoreline I came across another set of the tracks, this time much fresher, as their creator was still making her way to the dunes.

The maker of this trackway was *Malaclemys terrapin terrapin*, the northern diamondback terrapin. Diamondbacks are unique among all turtle species for living exclusively in brackish (salty) water in bays and estuaries along coastal regions. No other turtle in the world has adapted to this environment as diamondback terrapins have. True turtles, those with flippers, live in the open ocean. Tortoises are strictly terrestrial. Other turtles (referred to in general as terrapins) live in bodies of freshwater or almost entirely on land.

You don't often see diamondback terrapins in the ocean except for a brief period in late spring or early summer when females prepare to lay eggs—and that's why this sighting was so exciting. After 30 years of visiting the Jersey shore, I was witnessing, for the first time, female diamondbacks on their way up the beach to dig nests and lay clutches of eggs in the soft sand by the dunes.

DID YOU KNOW?
While many species of terrapins have some variation in their shell and scale patterning, every diamondback has a unique color and pattern on the shell, limbs, and head.

The following night I set out for the beach around midnight. Within minutes I spotted a terrapin floating in a small tidal pool. Every 40 or 50 yards along the beach was another large female looking to do her part in propagating the species.

Terrapin mothers receive a bad rap as being "absentee" parents. It is true that after laying a clutch of eggs, the mother will have completed her duties. But laying that clutch of eggs is no easy task.

The beach is full of dangers for the soon-to-be mother. A family of foxes regularly patrolled the area, and nightly I saw fox tracks on the beach and a few sets of glowing eyes in the dunes. Bits of dried white eggshell served as evidence of nests the foxes had already raided.

Digging a hole in loose sand using only your back feet is a challenge in itself. I watched one determined female scoop and flick away sand for well over an hour. The result? A slight depression in the sand. The mother, unable to make a suitable nest, wandered up into the dunes in search of a better site.

In mid-August each year, hundreds of baby terrapins emerge from the sand. As the nearly quarter-sized babies make their way toward safety, they will evade foxes, birds, raccoons, and cars. So be alert the next time you are down the shore!

While you'll probably have to wait until next year to spot terrapins at the beach, you can see some beautiful northern diamondback terrapins in *Outside In*, the Academy's children's discovery center. Meet our two adult females, Cheerio and Squirtle, and our male, Clem. Be sure to check out Clem and Squirtle's brand-new babies, hatched early in the summer. They will be on display in *Outside In* until they are old enough to be released into the wild.

SCIENCE AT SCALE

By Robin Abell

Arielle Webster

In the Poconos-Kittatinny Ridge Cluster, Academy scientists Kathryn Christopher and Babs Rinkel, and field technician Shawn Rybacki, measure wetted width of the Tenmile River near Tusten, New York. Rinkel, center, collects algae and measures the depth, flow, and substrate at various points along the measuring tape. Taking precise measurements is important so that the scientists can accurately categorize the habitat both in-stream and on the bank and ensure the correct characterization of the algal community that is sampled.

When Academy fish biologist Richard Horwitz, PhD, talks about streams in the Delaware River Watershed, people listen. Horwitz, who has worked in the region for nearly 40 years, isn't your typical fish expert—he's also an avid student of environmental history and a keen observer of all living things.

When he walks a stream, he is not only studying what's in the water, but he is also looking all around, ahead, and behind. With this perspective, he understands how the land and the streams it drains into, together forming a watershed, are connected. He and his colleagues in the Academy's Patrick Center for Environmental Research know that everything we do on land has implications for the health of streams, the species that live in them, and the people who depend on them.

Since 1947, the Patrick Center has been devoted to understanding, protecting, and restoring the health of watersheds through its embodiment of this holistic view. The center is named for its founder, Ruth Patrick, who developed the fundamental "Patrick Principle" on which much environmental science and management is based: that biological diversity holds the key to understanding the environmental problems affecting an ecosystem.

Patrick helped to write the Clean Water Act, and over the past half-century Academy scientists have continued to influence river science, policy, and management. When the William Penn Foundation looked for an institution to help guide a massive new effort aimed at improving water quality in the Delaware Watershed, the Academy was an obvious choice.

Biological diversity holds the key to understanding the environmental problems affecting an ecosystem.

The Foundation had honed its vision for clean water in the Delaware through early conversations with experts like Horwitz; Roland Wall, the Academy's senior director for environmental initiatives; and Carol Collier, the former executive director of the Delaware River Basin Commission who later joined the Academy. The William Penn team concluded from these discussions that only a sizeable investment could make a measureable difference for the Delaware's water quality. On April 1, 2014, the Foundation announced a commitment of $35 million to protect many of the watershed's healthiest streams and restore other impaired ones to good condition.

The recently christened Delaware River Watershed Initiative (DRWI) will focus on priority groupings of smaller watersheds, or "clusters." To select these clusters, the Academy and the Open Space Institute pulled together and analyzed information from Pennsylvania, New York, New Jersey, and Delaware, and then mapped out where investing in conservation activities has potential to do the most good.

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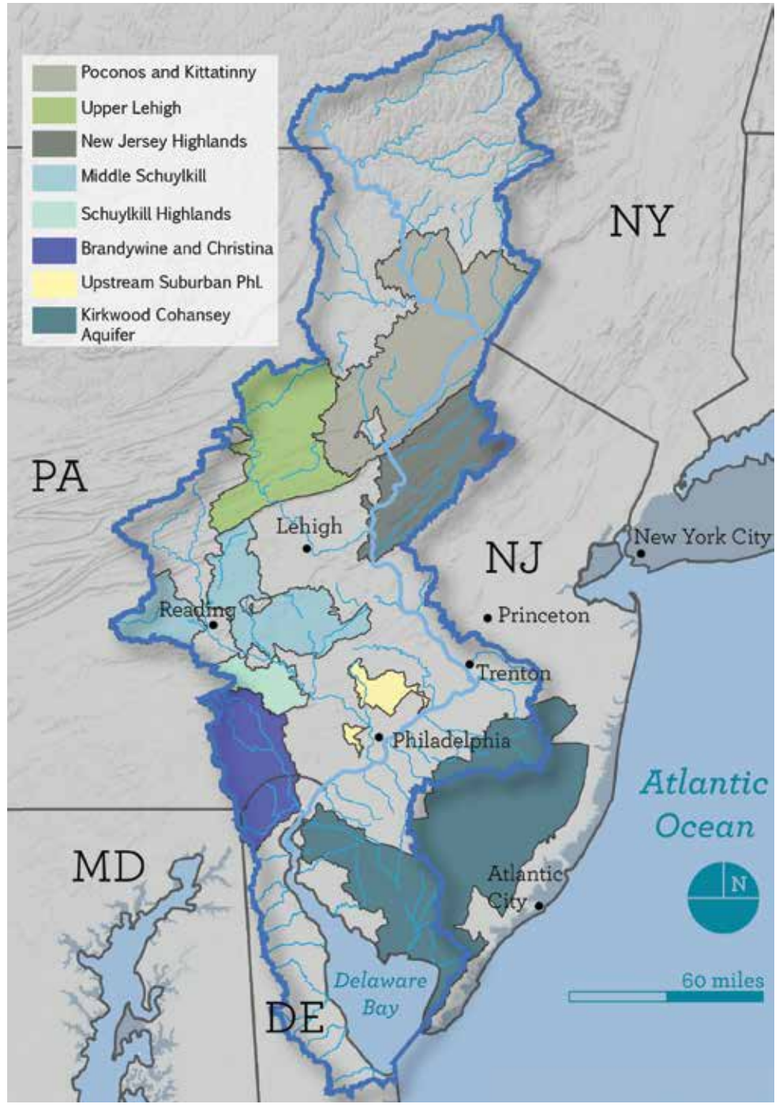


Lin Perez/ANS

DRWI activities and associated monitoring sites are located in the eight clusters above. Clusters, comprised of groups of small watersheds, are targeted for agricultural restoration, suburban restoration, protection of intact forests, or a combination of these activities. Learn more at ansp.org/drwi.

A MODEL WATERSHED

There's a direct line from the Delaware Watershed to the health and well-being of more than 15 million people who rely on it for drinking water. Almost half of those people live outside the basin in the greater New York City area, underscoring the importance of the Delaware for the larger region.

The health of streams in the watershed varies from place to place and is tied to surrounding land use, with water quality being more impaired in downstream agricultural, suburban, and urban areas. Excess nutrients and sediment loads from increased development, agriculture, and other sources impair some streams. Toxic pollutants—including some "legacy" contaminants like DDT and PCBs from historic activities—affect others. Nonetheless, most people in the region have access to all the clean water they need. So why invest in protecting and restoring the watershed?

Stefanie Kroll, PhD, the Academy's science director for the DRWI, explains, "It's true that clean, abundant water is available in the Delaware River Watershed now, but we shouldn't plan on that always being the case. Recent news headlines highlight the fragility of our water supply, with hundreds of thousands losing access to clean water as a result of pollution and poor management. Paying attention to the Delaware today is essential for having the same resource quality in the future."

BIG, BOLD, AND NECESSARY

It's nearly impossible to describe the Delaware River Watershed Initiative without illustrating the scale of effort. The eight clusters where the project will focus together cover around 6,575 square miles, or an area larger than the size of Connecticut and Rhode Island combined.

To compare data across sites and obtain reliable results, scientists and partners must execute activities and collect data similarly from site to site. Coordination and standardization, which are baked into the initiative's design, are rare in a project involving so many actors.

And the cast is literally in the hundreds. The coordinating group members—the William Penn Foundation, the Academy, the Open Space Institute, the National Fish and Wildlife Foundation, and the Institute for Conservation Leadership—each have their own expert teams. Then there are dozens of local organizations working within individual clusters to put protection and restoration strategies into practice.

"You won't find other watershed projects that engage so many organizations," observes Collier, now the Academy's senior advisor for watershed management and policy. "The DRWI is a wonderful example of how to build support from the ground up. After all, it takes all the citizens of a watershed to make a clean, healthy river system."

MONITORING FOR IMPACT

Good water quality is essential not only to people, but also to the species that rely on the Delaware's aquatic systems. From the tiniest algae to the majestic bald eagle, degraded water affects the flora and fauna living in and around it.

"If you put a garbage dump next to your house, everyone who lives in the neighborhood is going to move," says Kroll. "Animals and plants are the same way. They don't want to live in horrible conditions, so their presence or absence tells us if something has happened in the past year."

The disappearance from degraded sites of species that need high-quality habitat, and the proliferation of more tolerant species, is at the core of biological monitoring, she says.

At dozens of sites, Academy scientists sample algae, macroinvertebrates, crayfish, fish, salamanders, and water chemistry. Together these indicators, along with measures of water flow, temperature, and streamside conditions, illustrate ecosystem health. For instance, salamanders often disappear or show abnormalities when exposed to pollutants, but the types of pollutants may be unknown. Different kinds of algae can help fill in the picture by indicating whether heavy metals or excess nutrients have been in the water.

Local organizations are adopting Academy protocols and undertaking their own monitoring programs at individual sites, often for the first time. Academy scientists are providing guidance, to ensure consistency of methods so that all the data can ultimately be used together.

The data from more than 300 sampling sites will help scientists understand whether the initiative's stream restoration and protection activities are improving water quality. If they are, then there is a good argument to replicate them elsewhere in the Delaware and beyond. If they aren't, then it's important to figure out why and consider changing course.

Evaluating what works may seem like common sense. Yet a landmark 2005 study of thousands of stream restoration projects in the U.S. found that the vast majority lacked rigorous scientific evaluation of whether the projects were successful.

The DRWI built in evaluation from the start. "The William Penn Foundation emphasized the importance of scientific credibility from our earliest discussions with them," says Wall, the Academy's team leader on the DRWI. "They made sure that monitoring and assessing ecological quality were going to play a central role in the project."

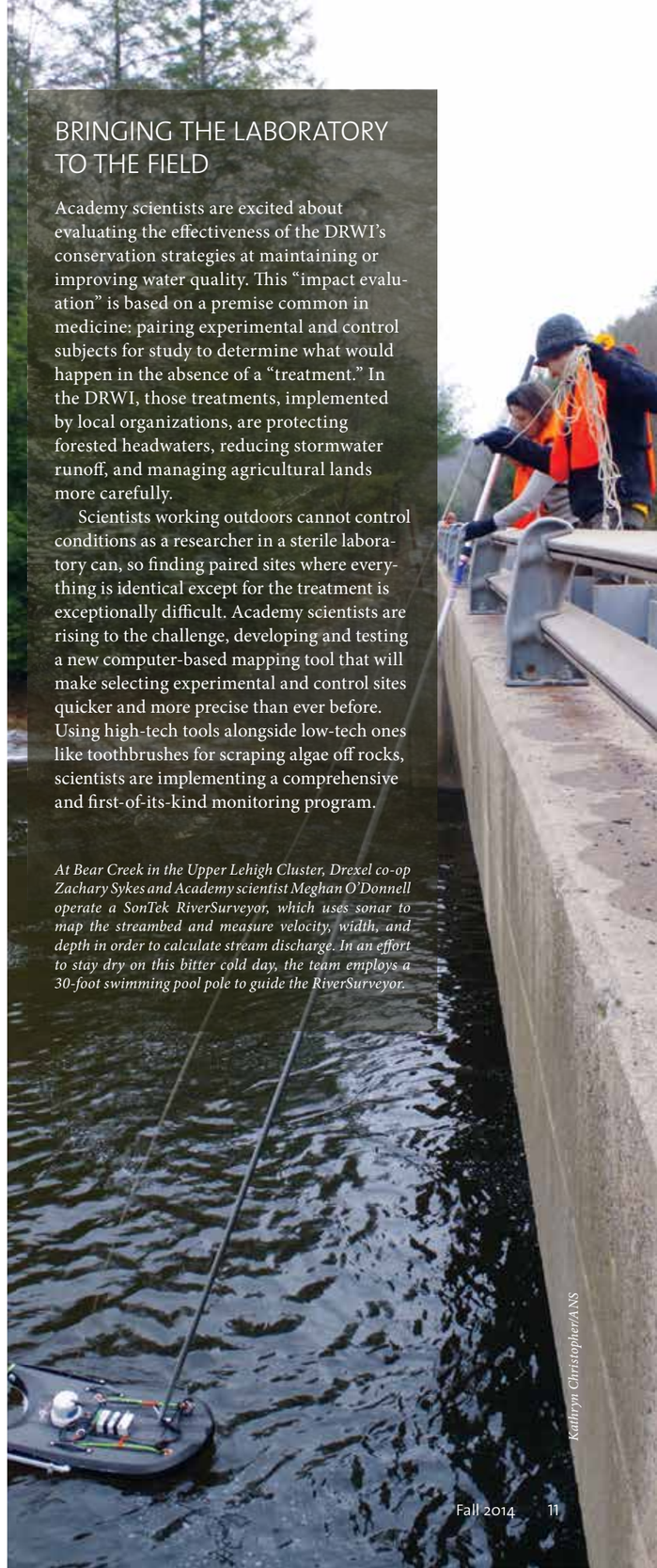
As the monitoring program gets fully underway this year, it will begin generating scores of data sets for integration into a single database accessible to all project partners. This standardized dataset, which Kroll happily refers to as a "luxury," will be an accomplishment in and of itself. But the real achievement will be using it to understand what it takes to move the needle on water quality at a scale that will make a difference to the millions of people who live, work, and play in the Delaware River Watershed.

Visit ansp.org/drwi to learn more about the Academy's work on the Delaware River Watershed Initiative, the people involved, and the tools they're using to preserve and protect our water supply.

BRINGING THE LABORATORY TO THE FIELD

Academy scientists are excited about evaluating the effectiveness of the DRWI's conservation strategies at maintaining or improving water quality. This "impact evaluation" is based on a premise common in medicine: pairing experimental and control subjects for study to determine what would happen in the absence of a "treatment." In the DRWI, those treatments, implemented by local organizations, are protecting forested headwaters, reducing stormwater runoff, and managing agricultural lands more carefully.

Scientists working outdoors cannot control conditions as a researcher in a sterile laboratory can, so finding paired sites where everything is identical except for the treatment is exceptionally difficult. Academy scientists are rising to the challenge, developing and testing a new computer-based mapping tool that will make selecting experimental and control sites quicker and more precise than ever before. Using high-tech tools alongside low-tech ones like toothbrushes for scraping algae off rocks, scientists are implementing a comprehensive and first-of-its-kind monitoring program.



At Bear Creek in the Upper Lehigh Cluster, Drexel co-op Zachary Sykes and Academy scientist Meghan O'Donnell operate a SonTek RiverSurveyor, which uses sonar to map the streambed and measure velocity, width, and depth in order to calculate stream discharge. In an effort to stay dry on this bitter cold day, the team employs a 30-foot swimming pool pole to guide the RiverSurveyor.

Kathryn Christopher/ANS

Jennifer Vess/ANS

Q: WHAT IS IN THE LARGEST COLLECTION IN THE ACADEMY ARCHIVES?

A. The smallest collection in our archives consists of a single piece of paper; the largest collection fills 168 boxes and is still growing. This largest collection is the Ruth Patrick Papers (Coll. 974).

Dr. Patrick's association with the Academy began in the late 1930s and continued until shortly before her death in 2013. With that many decades of work, it isn't surprising that she produced so many documents.

Dr. Patrick herself transferred the first portions of the collection to the Academy in 1994, 1997, and 1998, but there's more. Dr. Patrick's office (which consisted of multiple rooms and workspaces) is still brimming with potential archives. Shelves packed with books and reports wrap around two walls, and one large closet is lined on two sides with tall filing cabinets so full that more files and reports line the tops.

The walls around her desk are a grid of awards and plaques. Waist-high stacks of boxes and trunks that her family transferred to the Academy cover the office floor. Dr. Patrick's work, like the work of many scientists over the years, spilled beyond the walls of the Academy and into her home.

When caring for a collection this size, archivists have two main goals: preservation and access for researchers. Over the next few months, possibly even years, we will be working with the Ruth Patrick Collection, incorporating all of the documents from her office and home into those files already here in the archives. This new transfer also includes photographs and objects, which are crucial to a researcher's ability to fully understand Dr. Patrick's life and work and for the Academy to connect visitors with our rich history.

These objects range from the personal knickknacks that Dr. Patrick kept on her desk to the equipment she used in her work. She invented the Diatometer (above), a device used to monitor water quality, and we have three early versions in our collections. Though these objects can stand on their own as examples of technology and change and the history of environmental science, we can gain a broader understanding of these items with the help of the archives.

In the files we have yet to explore, we may have Dr. Patrick's own words on how the Diatometer came into being and how she and other colleagues used it, changed it, and improved it. I hope we do, though it's going to take some time and digging to make those discoveries. *~Jennifer Vess, Brooke Dolan Archivist*

What have you always wondered about the Academy's history?
Please send your questions to ans_editor@drexel.edu, and we in the Academy Library and Archives will comb through our collections and respond to an intriguing question in the next issue.

TEACHING KIDS TO BE GREEN

"Sustainability" is a big word. It's complex enough that experts write books about it, and important enough to compel companies to integrate it into their strategic plans. Whether you are an adult naturalist or a tiny explorer, getting your mind wrapped around the many meanings of "sustainability" can be challenging. That's why the first thing experienced Academy educator Allie Krisch does is break it down.

As the Academy's manager of science and community programs and former coordinator of the Women In Natural Sciences program for young women from Philadelphia high schools, Krisch has taught science to just about every age group and maturity level. She believes that there are many ways to help your child learn about the environment. Here, she provides some general guidelines for talking with kids about being green.

PRE-K–KINDERGARTEN

Kids should be exposed to recycling in school and in their communities, and the best way to reinforce these messages is by being a role model, Krisch says. For example, when you're cleaning up after a meal, you might explain why you use glasses and dishes instead of disposable items. Or you might explain why you throw a milk jug into the recycling and not the trash.

For this age group, hands-on learning works great. Have kids sort through clean food packaging and recyclables (check first to remove any sharp edges!), or have kids look around a room and point out things that can be recycled.

GRADES 1–5

As you are preparing meals, engage your kids. Krisch recommends that you ask them to think about the packaging that butter, eggs, vegetables, and other ingredients come in and what can be recycled. Do you buy foods in bulk? Explain why your family does so—whether it's to save money for the long-term, to save packaging, or both.

Take slightly older or more mature kids grocery shopping and encourage them to check out food packaging in the store. Take along reusable bags, and point out how to properly dispose of plastic bags outside grocery and hardware stores. This is also a good time to start using keywords like "sustainability" that kids may be hearing in school.

MIDDLE SCHOOL

The best approach for teaching middle school kids about sustainability is to relate the subject to their lives, Krisch says. Ask them lots of questions, and frame the conversation around their interests to encourage their participation. For example, if they like sports, ask whether environmental conditions affect their practice space or playing field. If they are focused on technology, ask about the environmental implications of their phones or tablets.

© Jasmin Merdan

HIGH SCHOOL

Often high schoolers already know and practice many sustainable behaviors. But Krisch says they may not realize how much of an impact they alone can have on the environment. Pick a relevant concept—for example, the water supply in the City of Philadelphia—and ask them to think about how they can help it to become sustainable. Don't be afraid to use the term "sustainability"—but approach with caution. At some point, ask what your child thinks it means to be sustainable. If they're not sure, ask them what the word sounds like it might mean.

The Academy is a great place to get kids and adults alike thinking more about our environment and what we can do to preserve it. As an Academy member, you can be a great role model for friends, family, and others who cross your path. Your membership offers you the tools you need to help those around you visualize a sustainable world.

LIZ BALES AND LEANNE MCMENAMIN: ACADEMY DAUGHTERS, *CUISINE* CO-CHAIRS

Liz Bales with her father, John F. Bales III

Leanne and Rob McMenamin

Joan Bang

Liz Bales and Leanne McMenamin live on opposite sides of Philadelphia, but they have a lot in common. For starters, both have become supporters of the Academy by following in the footsteps of their parents.

Bales' father, John F. Bales III, is an Academy Trustee, and her mother, Jane Bales, is a former member of the Women's Committee. The two have been major backers of the Academy's Library, Women In Natural Sciences program, and education initiatives for many years.

When Liz Bales was a teenager and college student, her father invited her to Academy special events, where the then veterinarian-in-training had the opportunity to interact with scientists one-on-one. Watching her parents collaborate with the institution for more than two decades, she says, made her feel at home in the world of science—a sentiment she has shared with her own daughters through visits to the museum.

"The Academy puts the words of science in their heads and the tools in their hands, so that it becomes part of an everyday experience for them," she says. "My girls [ages five and 10] think they are scientists, and being at the Academy has provided them with that notion."

Similarly, Leanne McMenamin's support of the Academy began through her father, Fred Merz, another prominent Academy Trustee. Through their family foundation, Fred Merz (and now his daughter) have made generous contributions to the Annual Fund.

McMenamin remembers her father being in awe of the Academy's sizable collection. He made clear to his young daughter that supporting the Academy was an opportunity to support Philadelphia, and he shared his interest with his grandchildren.

It makes sense for McMenamin to continue the family tradition. Like her father, she values environmental conservation and preservation, and she wants to teach her son, Bo, about the earth and how to take care of it. Luckily, Bo loves learning about nature, animals, and natural history. He has even overcome his fear of the *T. rex*, a creature he couldn't bear to approach during his first few visits to the Academy.

"He has gotten braver and braver, and eventually he started chatting it up with the *T. rex*," McMenamin says. "And he loves bringing his friends to experience the Academy with him."

That, too, runs in the family—the belief that the Academy is a great place to connect with friends. McMenamin and her husband, Rob McMenamin, accepted the job as co-chairs of the Academy's *Cuisine from the Collections* (with Bales and husband Michael Dell'Angelo) because it gave them a way to communicate their excitement and motivate friends to get involved. *Cuisine* is a fun Academy cocktail party that features food and drink inspired by the 18 million scientific specimens in the Academy's collections.

With Academy staff, McMenamin, of Wayne, and Bales, of Chestnut Hill, have merged an entertaining evening with the Academy's science and history, choosing foods, selecting scientists for special appearances, and networking with friends from all over the Greater Philadelphia region.

"Our two sides of Philadelphia don't overlap much because of geography," Bales says. "Seeing everyone come together at an event like *Cuisine* is energizing."

This year's event is focusing on chocolate to complement *Chocolate: The Exhibition*. Guests can expect creative variations of chocolate, as well as a glimpse of how chocolate is used in all types of cuisines—not just desserts.

"It's all about delicious food and interesting pairings," McMenamin says. "*Cuisine* is a wonderful night out in the city, and the evening is enhanced by the knowledge that everyone's participation impacts the Academy in a positive way. Last year's party was so much fun, I felt like we could have stayed all night!"
~Mary Alice Hartsock

To receive an invitation or for more information on *Cuisine from the Collections*, visit ansp.org/cuisine or email cuisine@ansp.org.

CHARITABLE GIFT ANNUITIES

You can help support the Academy of Natural Sciences of Drexel University and have a steady stream of cash you can count on—even during challenging economic times—through a charitable gift annuity.

The economy and the financial markets don't always perform as we need or want them to perform. This is especially challenging if you are retired and living on a fixed income. Even if you planned well, market performance can upset the best laid plans. If you are concerned about the performance of some of your appreciated assets or need to increase your cash flow, you may want to learn more about a charitable gift annuity.

HERE'S HOW IT WORKS

You transfer cash or appreciated, marketable securities to the Academy of Natural Sciences, and in exchange, we make fixed, annual payments to you for the rest of your life. The payout percentage is based on age, so the older you are, the higher the rate.

The charitable gift annuity provides other benefits, too. A portion of your annual payment is tax free because it is considered return on principal. You will also be entitled to a charitable income tax deduction in the year you create the gift. Then you will have up to five additional years—if you need them—to use it.

In addition to personal benefits, you will also be providing a future gift to the Academy. At your death, whatever assets remain in your annuity will be available for the Academy to use in support of our mission.

The following table provides the current CGA rates for sample ages.

Single Life				
Age	70	75	80	85
Annuity Rate %	5.1	5.8	6.8	7.8
Two Life				
Age	70-70	75-75	80-80	85-85
Annuity Rate %	4.6	5.0	5.7	6.0

We'd be delighted to prepare a personal gift annuity illustration for you at no obligation. If you think a charitable gift annuity would work for you, we will do our part to make the process go smoothly. Just let us know how we can help. Please don't hesitate to contact Amy Marvin, vice president for Institutional Advancement, at 215-299-1013 or marvin@ansp.org. She would be delighted to assist you. Thank you for your support!

On behalf of the Academy's Board of Trustees, we wish to recognize and thank those who have contributed to the Academy between **June 1 and August 31, 2014**. Your generosity helps to fund our many programs of research and education, and we are tremendously grateful for your support.

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At Bug Fest 2014, notable chefs prepared foods using insects. Always a hit—the famous chocolate chirp cookies!

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Children lined up for face painting and insect tattoos at the Bug Ball during Bug Fest 2014.

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Mike Servedio/ANS

Academy Entomologist Isa Betancourt talks with Bug Fest 2014 attendees about her efforts to survey Philadelphia's insects.

Mike Servedio/ANS

OCEAN FEST

Join us on Saturday and Sunday, October 18–19, for Ocean Fest Featuring the Philadelphia Shell Show. As always, thousands of shells will be on display and for sale. Enter an ocean immersion room and experience the sights and sounds of the deep. Dissect a shark, see shark specimens, and watch live shows featuring live animals from the ocean. Search the shell beach for shells to take home, and listen to ocean-themed stories in *Outside In*. You can even cheer some speedy snails to victory in the clockwork snail races as you meet their slightly slower live snail counterparts. More at ansp.org.

Michael Long for ANS

DINOSAUR DAYS AND ALL-STAR DAYS

Save the dates for two weekends focused on your favorite Academy stars! Dinosaur Days, November 28–30, will include live animal shows featuring our own living dinosaurs, crafts that you can make and take home, and fossil presentations in Dinosaur Hall. Experience the Academy's most popular attractions—dinosaurs, live animals, birds, bugs, and weird-things-in-jars, during All-Star Days, December 27–30. See live stage shows, touch real specimens, and put your science investigation skills to the test. Bring the whole family! More at ansp.org.

Michael Long for ANS

PHOTOGRAPHY CONTEST

Have you been taking photographs inside the Academy? Do you have pictures of your family or friends to share? Do you think you have a winning image of Dinosaur Hall? Your best shot could win you a free renewal of your household's membership! Please submit photographs or albums to the Academy of Natural Sciences' flickr with the hashtag #Academyphotographycontest or to ans_editor@drexel.edu by November 17, 2014. *Contest is for adults 18 and up. By submitting your photographs, you agree that the Academy has any and all rights to use your photographs in its promotional materials. The Academy will provide proper credit whenever possible.*

AAM AWARD

The Academy is pleased to announce our receipt of an award in the American Alliance of Museums' Publications Design Competition!

The Academy and our graphic designers at Eastern Standard received second place in the annual report category for institutions with a budget greater than $750,000 with our 2012–2013 annual report, *Telling our Story*. For more than 25 years, the Alliance has recognized and encouraged excellence in the graphic design of museum publications. Winners are chosen for their overall design excellence, creativity, and ability to express an institution's personality, mission, or special features. To receive a copy, please call 215-299-1182 or download the report at ansp.org/about/governance.

CUISINE FROM THE COLLECTIONS

cuisine *from the* collections

On November 8, the third annual *Cuisine from the Collections* will feature food and drink inspired by the 18 million specimens in the Academy's scientific collections. A variety of food stations will include ingredients not usually found in the kitchen, from bugs and snakes, to snails and more! And this year's *Cuisine* event coincides with *Chocolate: The Exhibition*, so you can count on some decadent menu items to coordinate. It's not too late to buy tickets. To receive an invitation or for more information, visit ansp.org/cuisine/tickets or email cuisine@ansp.org.

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!

CONTEST: NIGHT AT THE MUSEUM

Attention explorers 3–12! What do you think happens at the Academy after dark?

Write a short story about it (250 words or fewer) or draw a picture (or both) in the space below for your chance to win a prize! One lucky winner will receive a free family four pack to a 2015 Safari Overnight. Upcoming overnights are Friday, February 21, and Saturday, April 18. Please include your name, age, and contact information on the back of your story or drawing and mail to Academy Membership Office, 1900 Benjamin Franklin Parkway, Philadelphia, PA 19103, or drop off your submission at either of our admissions desks during your next visit. Entries must be received by December 5, 2014.

Christine Danowsky/ANS

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CALENDAR OF EVENTS

OCTOBER

Chocolate: The Exhibition opening Weekend
Saturday and Sunday,
October 11–12, 10 a.m.–5 p.m. $*

Ocean Fest Featuring the Philadelphia Shell Show
Saturday and Sunday,
October 18–19, 10 a.m.–5 p.m. M

Mega-bad Movie Night:
The Lost World (1960)
Thursday, October 23, 5:30 p.m. $ 📞

Stef Kroll/ANS

Meghan O'Donnell/ANS

NOVEMBER

Sustainable Chocolate Day
Sunday, November 2, noon–2 p.m. $

Museum Closes Early
Saturday, November 8, 3 p.m.

Cuisine from the Collections
Saturday, November 8, 7 p.m. $ 📞

Scout Workshops:
Webelos and Boy Scouts
Saturday and Sunday,
November 15 and 16,
10:15 a.m., 1:30 p.m. $ 📞

Dinosaur Days
Friday through Sunday,
November 28–30, 10 a.m.–5 p.m. M

DECEMBER

Scout Workshops: Webelos
Saturday and Sunday,
December 6–7, 10:15 a.m., 1:30 p.m. $ 📞

Nerd Nite
Wednesday, December 3, 7:30 p.m.
Frankford Hall,
1210 Frankford Ave., Philadelphia $

All-Star Days
Saturday through Tuesday,
December 27–30, 10 a.m.–5 p.m. M

ANS

Don't miss our special Hot Chocolate bars in the Academy Café from noon–2 p.m. during Dinosaur Days and All-Star Days! $

M Free for members $ Fee 📞 Registration required

Unless otherwise noted, all events held at the Academy are free with museum admission.
*$3 Individual and Family level member fee for *Chocolate: The Exhibition*. Family Plus level members and above receive free admission. Purchase or renew your membership today at ansp.org/membership.

Visit ansp.org for more information and to register.

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