

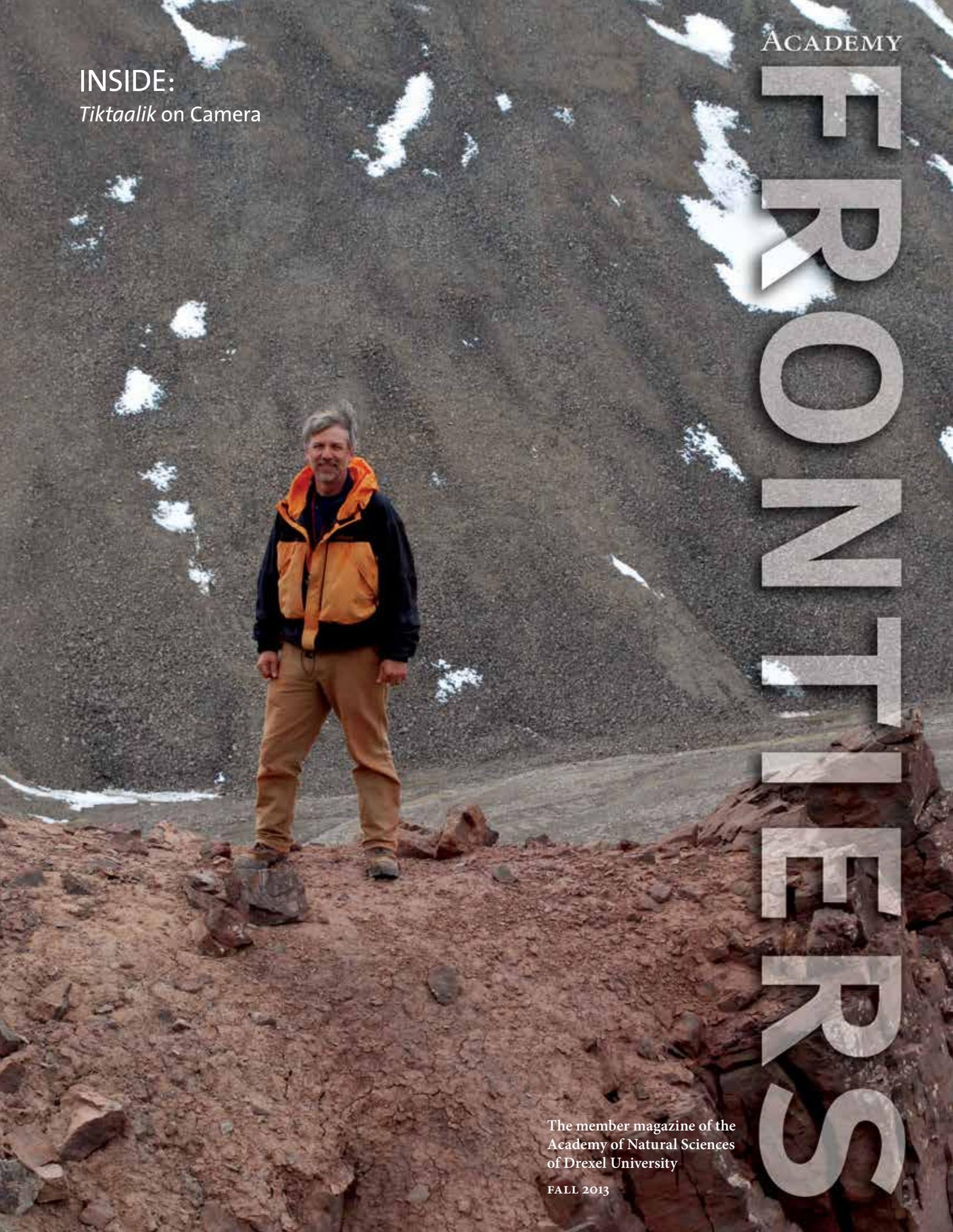
ACADEMY

INSIDE:
Tiktaalik on Camera

FRONTIERS

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

FALL 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.

Please send questions or comments about *Academy Frontiers* to ans_editor@drexel.edu.

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ON THE COVER: *Academy Curator of Vertebrate Paleontology Ted Daeschler explored Devonian-age strata on Ellesmere Island, Nunavut, Canada, in summer 2013. Photo by Josh Miller*

ACADEMY GREETINGS



Dear Friends,

The Academy is many things to our members—a place to learn about the natural world, a friendly space to bring kids for an afternoon of exploration, and a center for groundbreaking scientific research, to name just a few. Regardless of your reason for supporting us, you probably agree that the Academy is the number one place in Philadelphia for everything dinosaur!

For the next six months, the Academy will bring more ferocious beasts to Philadelphia with *Dinosaurs Unearthed*, an awe-inspiring special exhibit featuring life-size, animatronic dinosaurs. This state-of-the-art exhibit will take you back in time, and you will walk among these creatures as you observe their movements. Along with a full-size *T-rex* that will greet you on the Benjamin Franklin Parkway, you will see more than a dozen lifelike dinosaurs, plus fossil casts of skulls, claws and horns, real specimens of mosasaur and *Spinosaurus* teeth, an *Oviraptor* egg, and even a dig site where you can play paleontologist.

As you will notice in this issue of *Academy Frontiers*, we have fossils on the brain this fall. Our Curator of Vertebrate Paleontology, Ted Daeschler, who is also an associate professor in Drexel's Department of Biodiversity, Earth and Environmental Science, recently returned from the Nunavut Territory of Arctic Canada, where he, Neil Shubin, the late Farish Jenkins, and colleagues found *Tiktaalik roseae* in 2004. This summer, the team worked with a film crew to create a documentary on evolution. The scenery is truly stunning—turn to page 8 to see it for yourself. Several of our WINS students also tried their hands at paleontological fieldwork when they traveled to Montana this summer (page 6). Now even Kids Club members can begin to find their inner scientists (pages 7 and 19).

As fall turns to winter and the holidays approach, please consider supporting the Academy. There are many ways you can do so, whether by making a donation to the annual fund, renewing your membership, making a planned gift, buying a gift membership for a friend or relative, volunteering, or talking with our staff about other ways to give back. We couldn't do what we do without your ongoing support.

All the best,

A handwritten signature in black ink, appearing to be 'G. Gephart', written over a light blue horizontal line.

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.

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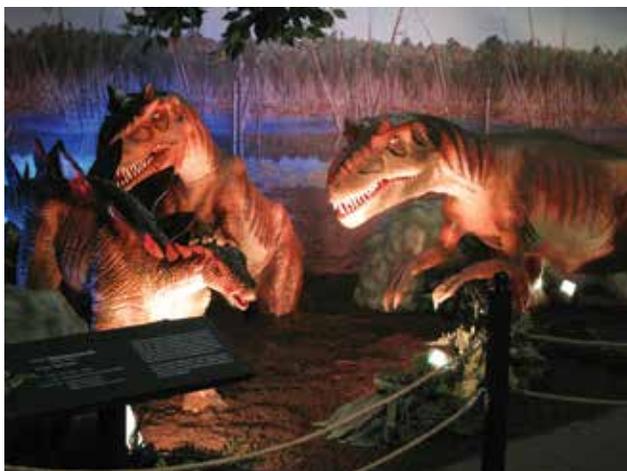
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A return trip to Nunavut in pictures

Rust-hued lichen brings a splash of color to the tundra of Nunavut, Canada.



Dinosaurs Unearthed



Dinosaurs Unearthed

SPECIAL EXHIBITS GALLERY

OCTOBER 12, 2013–MARCH 30, 2014

Roaring, moving, life-size animatronic dinosaurs invade the Academy of Natural Sciences of Drexel University for a multi-sensory experience for the whole family. State of the art and scientifically accurate—down to the feathers on *T. rex*—*Dinosaurs Unearthed* features more than a dozen realistic dinosaurs, as well as skeletons, fossil casts of skulls, claws and horns, real specimens of mosasaur and *Spinosaurus* teeth, an *Oviraptor* egg, and the ever-popular coprolite (dino poop). A dig site for young paleontologists, chances to control dinosaur movement, and other activities encourage exciting hands-on exploration. Fee: \$3 for members and groups; \$5 in addition to museum admission for nonmembers.

International Orchid Show and Sale

SPECIAL EXHIBITS GALLERY

APRIL 11–13, 2014

Mark your calendars for a flower-filled weekend! In April 2014, the International Orchid Show will once again 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. Whether you're a novice or an expert, learn valuable botanical information from expert growers and exhibitors.

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.



Greg Allikas, orchidworks.com

Tim Laman



Birds of Paradise

SPECIAL EXHIBITS GALLERY

MAY 3–SEPTEMBER 1, 2014

Lace up your dancing shoes for a journey to the remote rainforests of New Guinea, land of the exotic birds-of-paradise. An elegant example of extreme evolution, birds-of-paradise show off their feathery flair during elaborate mating rituals. In this special exhibit based on the groundbreaking research of photographer Tim Laman and Cornell ornithologist Edwin Scholes, visitors will behold the birds' cinematic courtship dances, puffed-out plumage, wild calls, and wacky behaviors through video, photography, soundscapes, and displays on research and conservation. Specimens, illustrations, and the chance to learn signature bird moves in a unique dance-off make this attraction fun for the whole family.

Birds of Paradise has been codeveloped by:



NINE YEARS, 10,000 HOURS

By Elisabeth Burnor

ON WEEKDAY MORNINGS AT THE ACADEMY OF NATURAL SCIENCES, volunteer Bill Frezel can be found at his workbench, sipping coffee and preparing to tackle the latest projects on his to-do list (currently a miscellaneous collection of items, including “rebuild the freeze-dryer vacuum pump,” “order repair parts for the mass spectrometer,” and “install a new muffle oven controller”). Later, he’ll take a break to feed his catfish and Asian swamp eel their daily live worms. Sometimes, he invites a colleague to watch him lower a worm enticingly into the tank until it disappears in a flurry of fins and bubbles.

Frezel is the first recipient of the *Al Visco Award for Excellence in Volunteerism in Support of Research*, which recognizes volunteers who contribute to the Academy’s scientific mission and workplace quality in our labs and collections. He has volunteered at the Academy for nine years and has logged 10,000 hours, arriving nearly every day at 7:30 a.m.—long before many Academy staff!

In what Frezel calls his “pre-volunteer life,” he worked as an electrical engineer and managed a dental supply business. When he turned 65 years and four months old, he retired—a transition his wife supported on one condition: “You can retire,” she told him, “but you can’t be home for lunch.”

Frezel’s volunteer life began in June 2004, after a chance meeting with David Hart, the head of the Patrick Center for Environmental Research. Frezel began by assisting a postdoctoral research fellow in the study of black fly larvae, applying his engineering knowledge to the design and repair of data-gathering equipment. Two years and thousands of black fly larvae later, Frezel realized that other Academy research and exhibit departments could benefit from his engineering expertise.

Walking through the Academy’s research labs, Frezel points out just a few of his many contributions. He repaired the heating element of a wax-melting pot, used in the upkeep of *The Big Dig*, the Academy’s hands-on fossil dig. He built a marsh-coring tool, which extracts large samples of sediment for nutrient analyses of marshes, and an odd-looking hammer-like device.

“They use this for pounding the coring tube into sediment,” he explains. “Anyway, it’s heavy, it’s big, and they told me what they needed so I built it.”

After an old mechanical temperature controller broke in a chemistry lab, Frezel designed a new, electronic version. “State of the art!” he says, patting the machine.

Frezel is continually adding to his résumé. “There’s always work to do,” he says, “but no deadlines!” He regularly freeze-dries the Academy’s diatoms, which were previously stored in large plastic bottles. The freeze-dried specimens take up less space and can be stored more efficiently. He also assists with seasonal measurements of the environmental health of the Delaware River. He recently repaired and made operational an old ion chromatograph machine, which measures the concentrations of various chemical ions in solution samples. After years of disuse, it is now running and producing useful data.

Frezel is constantly merging his lifelong interest in natural science with his engineering background—and there is never a dull moment. His engineering skills allow him to bring new ideas and solutions to the Academy, and he considers his interactions with Academy scientists to be the best part of his volunteer experience.

“Not a day goes by that I don’t learn something new,” he says. “I’ve come from the inanimate to the animate,” he laughs, “or, with all these dinosaur fossils, the post-animate!”



WINS TAKES THE FIELD

MARANDA PARKER REMEMBERS HER FIRST TRIP TO A FOSSIL FIELD SITE IN MONTANA LAST YEAR ALL TOO WELL. An intern in the Academy’s Women In Natural Sciences (WINS) program, Parker had the opportunity to attend a weeklong trip to the dig site to build on the knowledge she had gained in the Academy’s Fossil Prep Lab. Searching for Paleocene and Cretaceous fossils was fun, but the dry heat that engulfed her and the crew as they climbed massive hills convinced her that a career involving paleontology fieldwork wasn’t in the cards. Yet after the trip, her results from a survey pointed directly to paleontology as a promising college major.

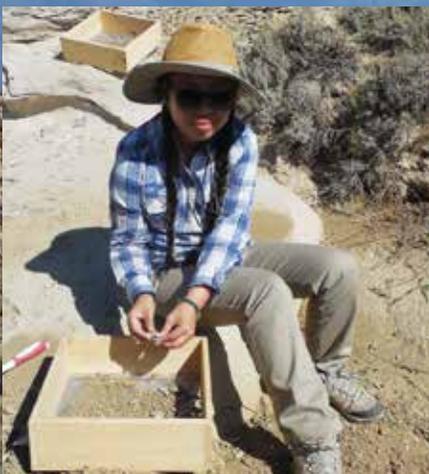
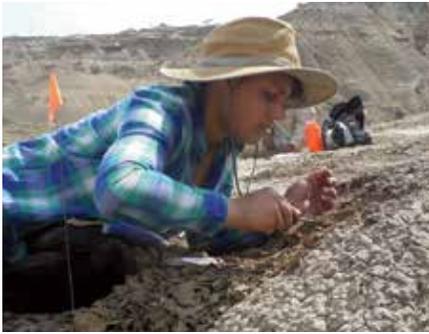
This year when she heard about the opportunity for a return trip with three younger WINS interns, Parker grudgingly gave it another try. She joined Academy Fossil Prep Lab Coordinator Jason Poole and WINS Coordinator Allison Krisch plus a group of paleontologists from outside the Academy on this trip in partnership with the New Jersey State Museum.

As the experienced WINS graduate on the 2013 dig, Parker served as a mentor for her slightly younger colleagues—Fossil Prep Lab workers Kesha Medina, Michelle Huynh, and Jasmene Harvey—and that’s when she changed her mind about fieldwork. She was developing serious paleontological skills to pass along to her colleagues, and suddenly the sun didn’t feel so hot and the hills didn’t seem quite as steep. Now she’s even considering paleontology as a possibility for her future studies.

Parker’s mentorship made a huge difference for her younger colleagues. She comforted Huynh during bouts of homesickness and encouraged Medina and Harvey to tackle the steepest hills. As the team searched for fossil evidence of plant matter, shells, and animals, Harvey helped to unearth a piece of an ankylosaur (a Cretaceous armored dinosaur). Harvey and Huynh both felt that their work in the lab made it easier for them to help identify fossil finds.

Even though Harvey found the 95-degree heat, lack of shade, and constant flat tires inflicted by primitive roads a lot to handle, her collaborations with crew members reminded her how much she enjoys working with people. She wants to use her science background to become a doctor—a career that will require her to interact with people every day—indoors. 🌊

Students from the Academy’s Women In Natural Sciences (WINS) program put their paleontological skills to the test last summer. Trained in the Academy’s Fossil Prep Lab, students (from top) Kesha Medina, Maranda Parker, Jasmene Harvey, and Michelle Huynh searched for Paleocene and Cretaceous fossils under the intense Montana sun.



MODERN TRACES

By Elisabeth Burnor

Anyone can be a naturalist. In each issue of *Academy Frontiers*, our scientists and staff share their knowledge to help you explore the natural world. In this issue, vertebrate paleontologist Jason Downs explains how to develop your paleontology skills while searching for modern traces.



Jason Downs

Theropod footprint

A trace is a record of biological activity in nature. Some examples of traces include footprints, paw prints, or hoof prints; burrows made by rabbits or snakes; holes left in the ground by plant roots; and feeding marks. We can classify traces according to the time that they were formed. There are two main types of traces—trace fossils and modern traces. A trace fossil is evidence of prehistoric biological activity that can teach us about dinosaurs or other ancient creatures. A modern trace is a clue to recent biological activity, and it is produced by animals or plants that are alive today.

Did you know that modern traces are formed in the same way that trace fossils were formed millions of years ago? A trace fossil of a dinosaur's footprint may have once looked similar to a dog's footprint in the mud. Under the right conditions, that dinosaur's footprint was fossilized. Will modern traces in your neighborhood become trace fossils for future scientists to study? It's possible!

If you want to go hunting for modern traces, you'll need to know where to look.

One great place to search for traces is in cement sidewalks. Because cement hardens quickly, plants or animals sometimes leave permanent impressions in dried cement. You can also search near a river, lake, or ocean. Soft sediments, such as mud and sand, are perfect for footprint formation, and you could find anything from squirrel prints to frog prints in the mud. You may also find seagull tracks, dog footprints, or even human footprints in the sand. When you're done searching, you might want to take off your shoes and leave some modern traces of your own!

When you find a modern trace, you can follow the same four-step process that paleontologists use when they find a trace fossil.

IDENTIFICATION: Think about what kind of living thing made this trace. If it looks like a plant impression, is it a leaf or a branch? If it looks like a footprint, was it made by a paw or a hoof? Make some guesses and write them down in a notebook.

EXCAVATION: Excavation means removing material from the ground. You may not be

able to remove your trace, especially if it is a footprint, but there are other ways to create a record of your discovery. Try sketching the trace in a notebook, or, if you have a camera, snap a photograph. If you've found an impression in cement, you can make a tracing of it. Lay a piece of paper over the impression, hold the paper down, and use a crayon to color over the entire piece of paper. A print of your trace will appear on the paper.

COLLECTION: Take home your discovery, and add it to your collection. If this is your first trace specimen, start a brand-new collection!

RESEARCH: Go on the internet or to the library, and try to find out if your identifications were correct. Once you discover what kind of organism created your trace, make a label out of paper and tape. Labeling the items in a collection, and including where and when you collected each item, is very important because it ensures that scientists from all over the world, and even scientists in future generations, will be able to use that collection for their research. 🌊



The Academy's Ted Daeschler and his colleagues set up base camp on Ellesmere Island in Nunavut, Canada, during their summer 2013 expedition.

TIKTAALIK ON CAMERA

By Mary Alice Hartsock, Editor
Photographs by Ted Daeschler

Nunavut Territory, Arctic Canada. Paleontologists.
Tiktaalik roseae fossils.

Jackhammers, shovels, a campsite.

Video cameras.

A prudent sound-recording technician with a
suitcase full of survival gear—just in case his
travel mates weren't prepared for the elements.

A storyboard.

Did we lose you?

continued on page 10

Sea ice glistens at the coastal landing strip on Ellesmere Island.

continued from page 9

IF WE DID, YOU'LL HAVE THE CHANCE TO CATCH UP IN APRIL 2014, when PBS airs a documentary on evolution featuring the discoverers of *Tiktaalik roseae*—that famous 375-million-year-old fossil lobe-finned fish with many features only seen in tetrapods (limbed animals). Academy Curator of Vertebrate Paleontology and Drexel Associate Professor Ted Daeschler, along with Neil Shubin of the University of Chicago, the late Farish Jenkins of Harvard University, and other colleagues, discovered this incredible example of the evolutionary transition between finned and limbed animals in 2004, after two promising expeditions to the Nunavut site. Their discovery has attracted attention not only from the paleontology community, but also from documentary filmmakers, textbook publishers, teachers, and even medical professionals who believe *Tiktaalik* reveals important information about the history of life, including human evolution.

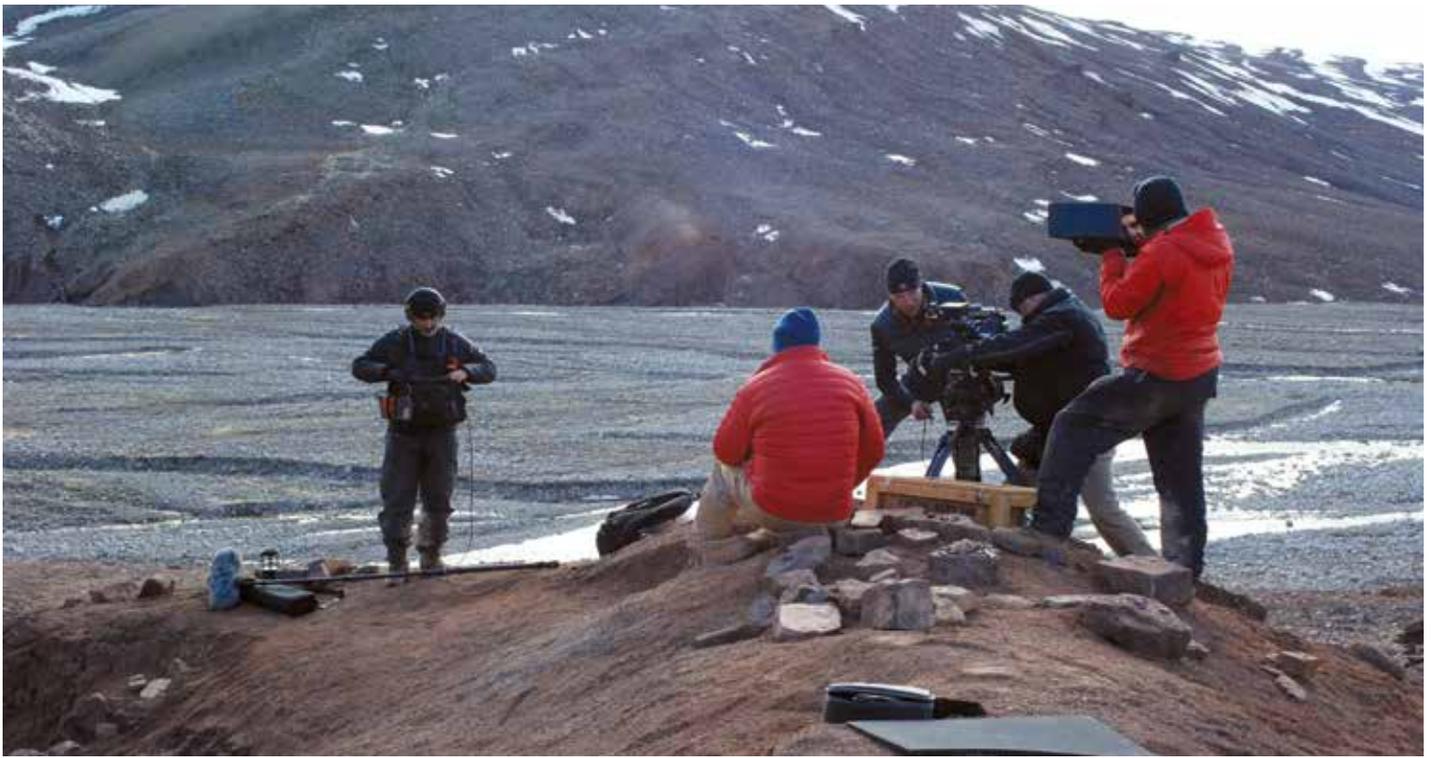
Supported by a Howard Hughes Medical Institute initiative to fund educational programs on evolution, the documentary is based on Shubin's acclaimed book, *Your Inner Fish*. The first of three episodes will feature Shubin, Daeschler, and their colleagues Marcus Davis (Kennesaw State University) and Josh Miller (University of Cincinnati), as well as other evolutionary biologists. The film will be publicized widely before its premiere on PBS and then will find its way into classrooms. Daeschler's participation in this much anticipated documentary is yet another example of Academy scientists' involvement in groundbreaking evolutionary research and their ability to communicate their discoveries to broad audiences.

In July 2013, a crew of four filmmakers joined Daeschler and his colleagues for their trip to the southern Ellesmere Island site where they discovered *Tiktaalik roseae*. Upon arrival, they set up camp, where on the first day they were hit by a minor snowstorm (page 8). Over the next 12 days, the team collected geological and fossil samples from the *Tiktaalik* site and the surrounding area. The film crew documented these activities and conducted interviews. The scientists jackhammered, shoveled rock, excavated fossils, and traversed the rocky landscape—mostly to fill in the blanks on the film crew's storyboard.



(From foreground) Marcus Davis, Brian Whitlock, and Neil Shubin work at the site where the team discovered *Tiktaalik roseae* in 2004.





The crew from Windfall Films conducts an interview with Neil Shubin at the Tiktaalik site.

Daeschler and his colleagues had explored the site thoroughly in the past, but they were eager to travel there again to search for missing pieces. They uncovered a rare piece of a *Tiktaalik* pelvis and some other *Tiktaalik* fragments, in addition to other Devonian fossils that help put the evolutionary events of that time into an ecological context.

After all, as Daeschler explains, paleontologists simply don't turn down a fully funded opportunity to roam across fossil-rich Devonian strata—and trips like this one can easily stretch into the six figures. Daeschler hopes the documentary will inform people about the interconnectedness of all living things and will improve

the scientists' chances for future funding to support additional fieldwork and research. They are already excited to return to Nunavut, and they're considering exploring a new location on Ellesmere Island, way north of this year's field site.

In the northern location, they'll examine rocks that are 400–500 million years old. These rocks could contain the earliest jawed animals, help scientists trace changes in skull structure, and reveal poorly known events in the early history of vertebrate evolution. A significant discovery could once again place the team on the cutting edge of *pre-history*. 🐟

The team prepares to board a Twin Otter aircraft bound for Resolute Bay, Nunavut.



Q

YOU MUST HAVE SOME MYSTERY ITEMS IN THE ARCHIVES.
CAN YOU TELL US ABOUT ONE OF THE HIGHLIGHTS?

A: Imagine living your entire life without a mouth—without the ability to laugh, eat, smile, or speak. The largest moth in North America, the cecropia moth (*Hyalophora cecropia*), emerges from its cocoon without functional mouthparts. Complete with a brilliant red body, feathery antennae, and violet-tipped wings, this mammoth mouthless moth is part of the insect family Saturniidae, also known as the giant silk moths.

This original watercolor of American moths, which prominently features the cecropia in the middle and upper right figures, is from the collection of Carrie Baily Aaron (1860s–1954). It was donated to the Academy’s Library and Archives by Aaron’s nephew, Dr. Harold Bacon Wood, in 1955.

While the cecropia moth has found celebrity throughout many of the works of world-famous artist-naturalists, including Titian Ramsay Peale and John James Audubon, the identity of the artist responsible for this particular watercolor remains shrouded in mystery—her name listed simply as “a lady.”

Who could this “lady” be? Perhaps she is Carrie Baily Aaron, the original owner of the watercolor. Writer, entomologist, colorist, and purveyor of American butterflies, C.B. Aaron devoted much of her career to the study of disease-spreading insects. In 1889 she entered a competitive entomological essay contest, “regarding methods of destroying the mosquito and the house fly.” Her report, “The Dipterous Enemies of Man,” won first prize, earning Aaron a coveted monetary award by the eccentric art and antiques collector Dr. R.H. Lamborn.

As a colorist, Aaron completed illustrations for the first edition of Rev. Henry C. McCook’s pioneering work on American spiders. Of the more than 500 hand-colored arachnids painted by Aaron, one of the most noteworthy was *Drexelia directa*, a spider whose genus was named in recognition of the founder of Drexel University, Anthony J. Drexel.

Given her demonstrated artistic talent and lifelong love for North American insects, could C.B. Aaron indeed be the illustrator of this original work? Perhaps, but we may never know for certain. The answer to that mysterious question lies solely with “a lady.” But, like the cecropia moth before her, she isn’t telling. ~Brandon Zimmerman, Harrison Expedition Researcher & Photograph Technician



Academy Archives Coll. No. 911

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.



© Kirsty Hall

COMPOSTING: A GUIDE

Reviewed by Lee Armillei of GreenWeaver Landscapes and Lee Meinicke of Philly Compost

YOU RINSE YOUR PLASTICS AND TOSS THEM INTO RECYCLING BINS. You sort your magazines so they may later be repurposed as recycled paper. You even purchased a reusable water bottle. But is that enough?

The good news is that you've taken important steps to make a difference for the environment. The even better news is that you can do more, and it won't take much extra time or effort.

Composting enables you to turn your organic waste—items such as fruit peels, food scraps, coffee grounds, leaves, and more—into a resource that can help nourish your soil and spruce up your yard. When thrown into an oxygen-deprived landfill, the very same items break down slowly and produce methane, contributing directly to global warming.

Composting requires aeration, which supplies oxygen for the decomposition process. As it decomposes, your waste heats up, breaks down, and develops beneficial bacteria and fungi, excellent byproducts for growing healthy plants. Compost is great for your garden because it helps improve the structure of the soil so that it can better retain water. It also contains nutrients, so it supports plant health when mixed with garden soil, added to potted flowers, or incorporated into raised beds.

“Why waste something the earth already spent time and energy growing?” says Lee Meinicke, co-founder of Philly Compost, which provides composting-related services

for businesses in the Philadelphia area. She believes that composting is the easiest thing you can do to make a difference.

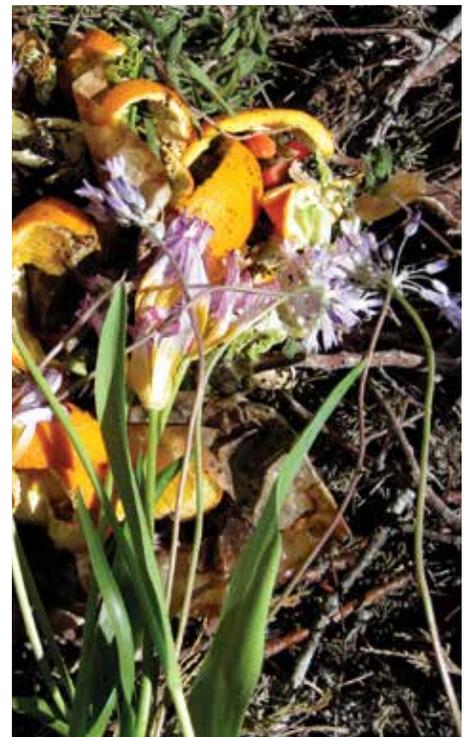
Start this fall by gathering your dried leaves—these, along with newspapers, wood scraps, paper waste, dead flowers, and other organic matter, are considered “browns.” On about 9 square feet of land, surround a heap of organic, compostable materials with inexpensive fencing to keep out uninvited animal guests, or place your items into a garbage can that is drilled with holes. Then alternate layers of browns with layers of “greens,” which include your vegetable debris, grass clippings, weeds, egg shells, coffee grounds, and tea bags. Always keep a layer of browns on top of the pile.

Periodically add oxygen by using a shovel or pitchfork to turn and aerate the pile, rotating items from the center to the outside of the pile. This will help the waste break down. Keeping pieces small will speed up the process. Avoid adding meat and dairy products to home compost piles, as these can decompose slowly and attract animals, Meinicke says.

If you don't have outdoor space, your township or county may have a drop-off location that accepts compostable items you've collected inside your home. For shared spaces such as offices or apartment complexes, consider working with management to gather information on composting, pricing, and logistics. Or search for a community garden that accepts donations to its compost pile. ~M.A.H.

LANDSCAPING WITH COMPOST

- ▶ Compost should never smell, says Lee Armillei, designer and project supervisor at GreenWeaver Landscapes. When it's deprived of oxygen, it develops bacteria and gases that cause a foul odor—just like in a landfill. Aerate a stinky compost pile right away, and dispose of compost that has smelled for a while.
- ▶ Freshly cut grass clippings provide an excellent nitrogen source. Leaving grass clippings on your lawn is better than adding fertilizer, Armillei says, and safer for the environment too. Weeds, leaves, small sticks, and clumps of grass can be added to your compost.
- ▶ Any extra shredded leaves serve as a beautiful mulch. Apply a thick layer after you've incorporated finished compost into your garden soil. Shredded leaves are a lightweight and inexpensive alternative to purchased hardwood mulch. Since many insects overwinter in leaf litter, you are also helping to preserve their habitats.
- ▶ Don't forget: Compost areas can be beautiful! You can surround your compost pile with a lattice fence, ornamental plants, or painted concrete blocks. Weave sticks into an inexpensive fence or grow a vine on it. 🌿



© Alan Levine

ROBERT AND HARRIET ROBERTSON

**ROBERT ROBERTSON WAS A LUCKY KID.**

With parents who traveled the world, he visited Jamaica, the Bahamas, France, and Tahiti, where he climbed mountains and swam in lagoons searching for specimens to add to his shell collection.

Robertson was having the time of his life—and then his father firmly told him that it was time to go to college.

“He picked up one of my shells and said, ‘What is *this* going to lead to?’”

Robertson went on to earn a Harvard Ph.D., and his decision to study malacology turned out to be a wise one. He was an Academy Jessup Scholar in 1956 and then became assistant curator in the Malacology Department. He was later promoted to chair and curator. Having access to the facilities at the Academy—“to do whatever work [he] wanted, however long it took”—was something he could not have had anywhere else, he says. His work ranged from shells to living animals and their anatomy—including even the radular teeth! He has published about 95 malacological papers.

Robertson added shells from all over the world to the Academy’s Malacology Collection. While collecting on the Indian Ocean, he survived a mutiny onboard a ship, and while exploring the waters of British

Honduras (now Belize), he traded his spot on an overcrowded boat for the sole seat in its tiny towed dinghy, which provided quiet and space to sort his shell collection.

Robertson connected with his future wife, Harriet (Happy) Davis, when she was employed at the Academy during the late 1970s. She was responsible for artwork, histology, photography, and research for the Malacology Department. Bonding over shared interests in parenting and natural science, the pair married in 1980.

Happy went on to a successful career as a research lab technician studying human genetics at the University of Pennsylvania. She volunteered at the Academy, assisting with expeditions and collection management over the years. She is currently helping to update the protective packing of specimens in the Malacology Collection.

Robert especially has enjoyed studying the work of Mark Catesby, who published the first major work on the flora and fauna of North America, *The Natural History of Carolina, Florida, and the Bahama Islands*, between 1729 and 1747. The Academy’s Library has permitted him to study its first-edition copy—one of 80 that survive today. Viewing Catesby’s Bahamian images brings him back to his childhood on the islands.

Years ago, the Robertsons began looking for additional ways to give back to the institution that has been so important to them over the past 50 years. Robert donated his personal collections to the Academy, where they will be preserved and cared for in perpetuity. The couple also began making donations to the Library and Malacology Department, as well as the Academy’s annual fund. Recently they began to receive extra income from Robert’s IRA, and that’s when they recognized that their contributions to the Academy could stretch even further.

“Reading through the literature, we realized that if we donated the money directly from the IRA to the Academy, it wouldn’t be taxed,” Happy says.

The couple made the Academy the recipient of an IRA charitable rollover, allowing them to make a meaningful, immediate gift and meet the “required minimum distribution” of the IRS without recognizing taxable income.

“The Academy does the most good for education and research and fostering the environment,” Happy says. “We want to keep that going—to enable the Academy to keep its books and collections for the future.” ~Mary Alice Hartsock

COST-EFFECTIVE WAYS TO MAKE A DIFFERENCE

YOU CAN HELP SUPPORT THE ACADEMY of Natural Sciences of Drexel University's research and education programs and the upkeep of our world-renowned collections! Charitable beneficiary designations of retirement funds or life insurance policies can benefit you and your family and also make a real difference at the Academy.

RETIREMENT PLANS

You can name the Academy as a beneficiary for all or part of your IRA, 401(k), 403(b), or other qualified retirement plans. When these retirement assets are distributed to the Academy, they are entirely free from U.S. federal estate and income tax. Any money distributed to the Academy will also qualify for an estate tax charitable deduction.

It is important to review all of your estate assets carefully and make provisions for your family's needs first. If your family has already been provided for and you choose to make a gift to the Academy, your loved

ones will be able to avoid heavy income and estate taxes upon your passing. When the Academy is named as a beneficiary, you will be able to continue to make lifetime withdrawals. You also have the flexibility to change your designation at any time during your life, should the needs of you or your family change.

LIFE INSURANCE POLICIES

If you have a life insurance policy that you no longer need for its original purpose, you can turn it into a charitable gift. There are many ways to structure a life insurance gift. You can transfer ownership of a paid-up policy to the Academy, and we will either hold or cash it in. In either case, you would receive an income tax charitable deduction for the policy's cash value.

You also may choose to make the Academy the beneficiary of an existing life insurance policy. The proceeds will be

included in your gross estate, and the amount the Academy receives will be eligible as a charitable deduction.

Other options include making the Academy the owner of a policy on which you are still paying premiums or purchasing a new policy and naming the Academy as owner and beneficiary. With either option, you can deduct the approximate cash value of the policy and all future premium payments as charitable contributions.

Using retirement plans and life insurance policies as charitable donations allows you to make a significant gift to the Academy. These gifts also are extremely cost-effective, providing substantial tax savings for you and your family. If you would like more information about these and other methods of making charitable donations, please contact Amy Marvin, vice president of Institutional Advancement, at 215-299-1013 or at marvin@ansp.org. 



SAVE BIG ON A YEAR OF DISCOVERY!

Introduce someone on your holiday shopping list to the wonders of the natural world. Purchase an Academy gift membership for a friend or relative, and they will receive:

- Unlimited, **FREE GENERAL ADMISSION** all year long
- **FREE** or **DISCOUNTED TICKETS** to special exhibits, including *Dinosaurs Unearthed*
- **EXCLUSIVE PREVIEWS** of Academy exhibits
- **PARKING DISCOUNTS**

And much more!

Present this coupon at our admissions desk to receive 10% off an Academy gift membership, or purchase a gift membership online using promo code THANKS.

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 **June 1 and August 31, 2013**. Your generosity helps to fund our many programs of research and education, and we are tremendously grateful for your support.

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Drs. Barbara and Len Frank
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Edible insects were a big hit at this year's Bug Fest.

Mike Servedio/ANS

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Margaret and Tom Ralph
The Redpaths and Russells,
in honor of Dr. Edward Daeschler
Dr. Janine Remillard and Mr. David Tristano
Dr. and Mrs. Gary Rosenberg
Andrea Rowe and Benjamin Stahl



Michael Long

Visitors examine live bugs during Bug Fest in August 2013.

Mr. and Mrs. David A. Rusenko
Mr. and Mrs. Alan Sacks
Mary and Peter Scout, *in honor of Allen Model,*
board member of WOMEN'S WAY
Mr. and Mrs. Peter H. Sellers
Edward Shakespeare
Joseph Shapiro
Carol and Art Silverman,
in memory of Cheryl Beth Silverman
Mrs. Henrietta Slap
Mr. and Mrs. Jeffrey Sturgis
Marilyn Torres and Leopold Jusino
Mrs. Charlotte G. White
Mrs. Margaret H. Wolcott
Caryl Wolf
Mr. and Mrs. C. Thomas Wood

ESTATE GIFTS

James W. Needham

GIFTS TO THE COLLECTIONS AND LIBRARY

Mr. Nicholas Brady
Paul Callomon and Sayuri Yoshii
Lyle Campbell
The Field Museum
Ms. Gail J. Sklar
Mrs. Carol M. Spawn

IN-KIND GIFTS

Subaru of America Foundation

MATCHING GIFTS

Bristol-Myers Squibb Company
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The Academy would especially like to recognize those who have joined or renewed their support in the Academy's Leadership Circles of Giving between **June 1 and August 31, 2013.**

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DINOSAUR DAYS AND ALL-STAR WEEK

Save the dates for two weekends featuring your favorite Academy ambassadors! Dinosaur Days, November 29–December 1, will feature live animal shows starring our own living dinosaurs, fossil presentations in Dinosaur Hall, and a chance to see our special exhibit *Dinosaurs Unearthed*. Experience the Academy’s most popular attractions—dinosaurs, live animals, birds, bugs, and weird things in jars—during All-Star Week, December 27–30.



Mike Servvedio/ANS



Mike Servvedio/ANS

PHILADELPHIA SHELL SHOW

Come to the annual Philadelphia Shell Show and Festival on October 19 and 20 for two memorable days of mollusks. See beautiful shell displays, watch a live animal show, dissect a mollusk, and shop for shells, jewelry, and books at the International Shell Market. Learn more about shells in a behind-the-scenes tour of the Academy’s Malacology Collection, and talk with Academy malacologists and Philadelphia Shell Club experts.



Jason Poole/ANS

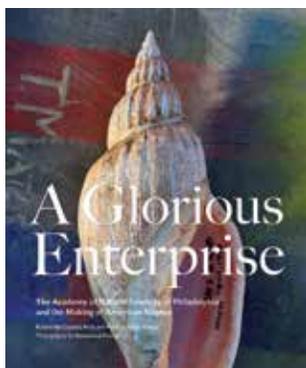
CUISINE FROM THE COLLECTIONS

Join us on November 2 for a museum-themed cocktail party! Eat delicious and unusual treats inspired by the Academy’s 18 million scientific specimens. Try food made from unexpected ingredients such as sea creatures and exotic plants. Notable local chefs will offer extreme tasting options, and 12th Street Catering will provide appetizing food for less adventurous diners. Purchase tickets at ansp.org/cuisine.



NEW DEVONIAN FOSSIL FISH

Dr. Ted Daeschler, Academy curator of vertebrate paleontology and associate professor at Drexel, has recently discovered and described a new species of fossil fish. The new species, *Phyllolepis thomsoni*, is a placoderm—an armored fish that lived during the late part of the Devonian Period (385–365 million years ago). It is distinguished by its bony outer body armor and the distinct ridges that cover the armor. Daeschler named the fish in honor of former Academy President and CEO Keith S. Thomson, who has been a mentor and colleague to Daeschler and was once a Devonian fossil researcher himself.



REVIEW OF A GLORIOUS ENTERPRISE

The Academy’s bicentennial book, *A Glorious Enterprise*, by Academy Senior Fellow Robert M. Peck and historical biographer Patricia Tyson Stroud, has received another positive review—this time in the peer-reviewed journal *Archives of Natural History*. The reviewer, Paul D. Brinkman, compliments the book’s scope and variety, commenting that “there is something here for everybody.” He also offers high praise for the book’s images, including both its historical photographs and Rosamond Purcell’s color photographs of Academy specimens and artifacts. Brinkman states that *A Glorious Enterprise* is proof that it is possible to write a successful in-house institutional history. “The bar for such projects,” he says, “has now been gloriously raised.”

Purchase *A Glorious Enterprise* in the Academy Shop (\$75, members receive 10 percent discount).



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!

QUIZ: WHAT KIND OF ACADEMY SCIENTIST ARE YOU?

What is your favorite scientific activity to do in your free time?

- a. Go outside and bird watch
- b. Collect water samples from a local river to look at under a microscope
- c. Read books about prehistoric creatures
- d. Visit the ocean and search for shells

When you play outside, you wish you could be:

- a. In an open field with a perfect view of the sky
- b. Near a local river
- c. On a rocky hillside
- d. At the beach

What tools do you like to use when you investigate?

- a. A pair of binoculars
- b. A microscope
- c. A chisel and brush
- d. A bucket and sifter

Check out the key below to find out what type of science interests you most!

DID YOU KNOW...?

How do bugs walk upside down?
– Ella Jane, age 3 1/2

Insects and spiders have different ways of walking on surfaces that seem smooth to us and impossible to walk on! Even glass has miniature bumps that we cannot see but that the animals can grip onto and walk up, sideways, and even upside down. The feet of these animals may have tiny hairs, hooks, or Velcro-like surfaces that help them grip the bumps.

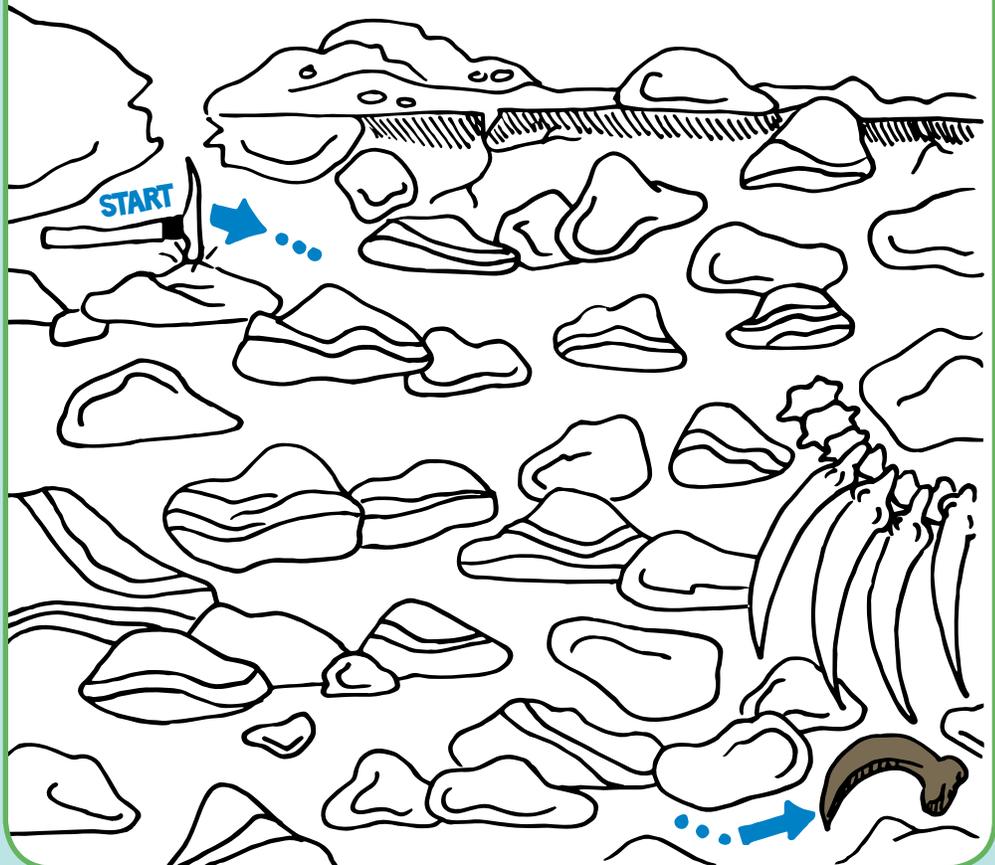
Do you have a question about the natural world?

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

KEY
A: You would make a great ornithologist, a scientist who studies birds.
B: You should explore the career of a paleontologist, a scientist who studies fossils.
C: You could become a paleontologist, a scientist who studies fossils.
D: You are a young malacologist, a scientist who studies mollusks.

SEDIMENTARY ROCK MAZE

Can you make it to the raptor claw fossil?



Christine Danowsky/ANS

CALENDAR OF EVENTS

OCTOBER

TINY TOT EXPLORERS

Wednesdays through November 13
11 a.m.–12 p.m.  

DINOSAURS UNEARTHED

EXCLUSIVE MEMBER PREVIEW
Friday, October 11, 5:30–9 p.m.  

DINOSAURS UNEARTHED

OPENING WEEKEND
Saturday and Sunday, October 12–13
10 a.m.–5 p.m. 

SCIENCE ON TAP

Presented by the Mutter Museum
Monday, October 14, 6 p.m.
22 S. 3rd Street, Philadelphia

PHILADELPHIA SHELL SHOW AND FESTIVAL

Saturday and Sunday, October 19–20
10 a.m.–5 p.m. 

BROWNIE AND JUNIOR GIRL SCOUTS SHELL PATCH ACTIVITY

Saturday and Sunday, October 19–20
10 a.m.–5 p.m. 

MEGA-BAD MOVIE NIGHT: THEM!

Thursday, October 24, 6:30 p.m.  

DINOSAURS UNEARTHED

EXCLUSIVE MEMBER PREVIEW
Friday, October 25, 5:30–9 p.m.  



NOVEMBER

CUISINE FROM THE COLLECTIONS

Saturday, November 2, 7–10 p.m. 

SCIENCE ON TAP

Presented by the Chemical Heritage Foundation
Monday, November 11, 6 p.m.
22 S. 3rd Street, Philadelphia

DINOSAUR DAYS

Friday and Saturday, November 29–30
10 a.m.–5 p.m. 



DECEMBER

DINOSAUR DAYS

Sunday, December 1, 10 a.m.–5 p.m. 

SCIENCE ON TAP

Presented by the American Philosophical Society
Monday, December 9, 6 p.m.

ALL-STAR WEEK

Friday through Sunday, December 27–30
10 a.m.–5 p.m. 

JANUARY

ANIMALS IN MOTION WEEKEND

Saturday through Monday, January 18–20
10 a.m.–5 p.m. 



 Free for members  Fee  Registration required

Unless otherwise noted, all events held at the Academy are free with museum admission.*
*\$3 member fee for *Dinosaurs Unearthed*, or purchase a Dino Pass for unlimited free admission.

Visit ansp.org for more information and to register.