Academy

FRONTIERS

The member magazine of the
Academy of Natural Sciences

Summer 2010

GREETINGS FROM THE ACADEMY

Bruce Tepper/ANSP

I am very pleased to report that the Academy has tapped George W. Gephart, Jr. as the next President and CEO, starting in August. George has an impressive background in finance, governance, and nonprofit service—experience that is particularly relevant at this point in the Academy's history. What's more, George has deep roots here in Philadelphia. He has built an extensive social and professional network here and we know that he will leave his mark on the Philadelphia cultural scene as a great leader at the Academy.

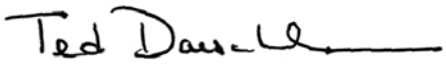
George serves as Chairman of the Board of Main Line Health System, an integrated health care system in suburban Philadelphia and one of the top health systems in southeastern Pennsylvania. He has more than 25 years of experience in the investment business and a long record of nonprofit work in the region. Career history aside, George is also an avid naturalist, birder, and outdoorsman with a keen interest in the environment and natural science.

George's knowledge and experience on nonprofit boards makes him ideally suited to building and working with our board. George is already working to gain a deep understanding of our museum operations, as well as the Academy's fundraising efforts, all key pieces in the Academy's continued success. I think that we are very fortunate to have George join us at the Academy.

It has been an honor and a privilege for me to serve as acting president during the search process. It has been enlightening to see things from the President's perspective—I have a greater appreciation for the interconnection of every part of the operation, the quality of the staff, and the potential that we must live up to. It's also very encouraging to see the outside support flowing in from our members and donors, and to have had the opportunity to get to know the many people and organizations that care about the Academy. However, we need to continue to spread the word and get more people inspired by the work of the Academy.

I am looking forward to getting back to my work in paleontology and to my position as vice president of Systematic Biology and the Library. I hope to squeeze in more field work in Pennsylvania and beyond, and focus a bit more on research projects again.

I'd like to thank each of you for your ongoing support of the Academy, and ask that you continue to support our work and act as ambassadors to encourage others to do the same. I would also like to dedicate this issue of Academy Frontiers to the memory of Robert L. McNeil Jr., a longtime supporter and friend of the Academy. Bob supported many cultural organizations in the community, and was incredibly important to our work. He will be deeply missed.



Ted Daeschler
Acting President and CEO

TABLE OF CONTENTS

3 Calendar of Events

4 On Exhibit

6 Academy Abbreviated

8 Feature Story

13 From the Library

15 Academy Support

18 Snapshots

19 Sustainability Matters

THE ACADEMY OF NATURAL SCIENCES
– Philadelphia –

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Academy membership includes a subscription to *Academy Frontiers*, free admission to the museum, discounts in the Academy Shop and Ecology Café, invitations to special events and exhibit openings, and much more. For information about Academy membership, call 215-299-1022 or visit www.ansp.org/membership.

On the cover: *This colorful image of a dinoflagellate (Protoceratium) is one of 24 photomicrographs in a new exhibit in the Academy's Art of Science Gallery, opening August 7. Microscopic marine life like dinoflagellates and diatoms are single-celled organisms used by scientists to measure water quality and other environmental conditions. Read more on page 4. Image credit: Paul Hargraves/Fay Darling.*

CALENDAR OF EVENTS

July

12–August 27 Academy Explorers Summer Camp
Weekdays, 9 a.m.–4 p.m.
Spend your summer at the Academy! (Ages 5-12)

14–August 25 Tiny Tots Explorers, Wednesdays, 10–11 a.m.
Experience the natural sciences with your child! (Ages 3-4)

August

3 "The Bugs Behind Bug Fest: Exploring the Diversity of Insects" 6–9 p.m.
Explore the diversity of insects and related arthropods and learn about the features that make insects one of the most successful groups of animals on earth. Led by Entomology Curator Dr. Jon Gelhaus, this adult workshop will examine a selection of the 3.5 million specimens housed in the Academy's Entomology Collection.

7 *A Many-Colored Glass: Ethereal Images of Microscopic Marine Life* opens in the Art of Science Gallery. Through October 31.

14–15 Bug Fest, 10 a.m.–5 p.m.
It's back and buggier than ever! Bug Fest returns to the Academy for two full days of insect activity, with a focus this year on bees.

21 "Electrofishing Field Study" adult program, 9:30 a.m.–1 p.m.
Join Academy fisheries scientists on an electrofishing study in a local stream. Participate in the catch and release method used by our scientists to study wild fish populations.

September

6 *Creatures of the Abyss* exhibit closes

7–17 *Butterflies!* exhibit closed for annual maintenance.

11 "Fossil Casting" family workshop, 10:30 am–noon
See how paleontologists excavate, jacket, prepare, and cast fossils, and then try your hand at the process of casting. Each family will experiment with the tools of paleontology and take home a plaster cast of a specimen.

13 Science on Tap, 6 p.m.
National Mechanics, 22 S. Third Street, Philadelphia

20 Town Square, 6–8:30 p.m., featuring environmentalist Bill McKibben
The Academy of Natural Sciences is teaming up with PennFuture and the American Cities Foundation to explore the threat of climate change, and why we need to act now for the sake of our environment and our economy. The evening will cover the who, what, when, where and why of climate change, and the opportunities it provides to grow the economy, create great green jobs for all, and save the planet.

23 Town Square, reception at 6:30; program at 7:15 p.m.
Join us as Department of Natural Resources and Environmental Control (DNREC) Secretary Colin O'Mara talks about how our own region can benefit by connecting the built environment to a sustainable regional economy. This event is part of a Master Speaker series hosted by the Delaware Valley Green Building Council (DVGBC). Cost: $35 DVGBC members, $45 nonmembers, $15 students. To register visit https://dvgbc.org, click on Education and Events and search September 23.

24 Third annual Members' Night, 5–9 p.m.
Join us as we unlock all the "Staff Only" doors and invite our members to see what goes on behind the scenes at the Academy. Rub elbows with Academy scientists and experts and meet fellow Academy members.

29 "Beginning Nature Photography" adult workshop
Harness the power of your digital camera to capture amazing nature photographs! This two-part course is led by Doug Wechsler, director of VIREO, the Academy's collection of bird photography.
Part one: Wednesday, September 29, 6:30–8:30 p.m. at the Academy
Part two: Saturday, October 2, 8:30 a.m.–5 p.m., Field study in the Pine Barrens, N.J. (More details on the field trip will be discussed in class on September 29.)

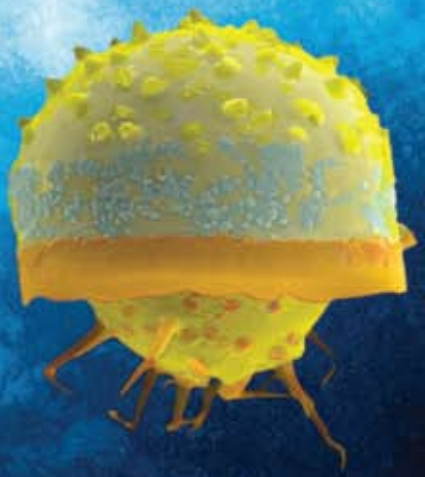
Find more information, including how to sign up, at:

Tiny Tots or Academy Explorers Camp
www.ansp.org/activities/family-programs.php

Adult Programs
www.ansp.org/adult-programs

Exhibits, Festivals, and General Information
www.ansp.org

ON EXHIBIT



Paul Hargraves/Fay Darling

A Many-Colored Glass: Ethereal Images of Microscopic Marine Life

Coming soon to the Art of Science Gallery

August 7 through October 31

Many people have probably never heard of a diatom. Or a dinoflagellate. That's likely because they're invisible to the naked eye. But these microorganisms are extremely important to science. And, they're made up of beautifully intricate shapes and patterns. A new exhibit in the Academy's Art of Science Gallery, *A Many-Colored Glass: Ethereal Images of Microscopic Marine Life*, examines the surprising beauty of these tiny organisms and how they are an important tool for scientists to monitor environmental and water-quality conditions.

The exhibit will feature 24 color-enhanced photomicrographs, which are photos taken through a microscope. These striking images are the products of a collaboration between a scientist and an artist—Florida-based researcher Dr. Paul Hargraves and Rhode Island artist Fay Darling.

Creatures of the Abyss

Now through September 6

Making its U.S. debut at the Academy, *Creatures of the Abyss* descends into the deep ocean, the most inaccessible ecosystem in the world. This vast setting is freezing cold and utterly dark with water pressure so extreme that it would instantly crush you. Yet, this inhospitable place is home to the greatest diversity of life on the planet. Discover the extraordinary, mysterious, and downright strange creatures of the deep.

The exhibit features a life-sized model of a colossal squid—the largest known species of squid. Step inside the Bioluminescence Theatre and find out how the unearthly animals of the deep produce fantastic light shows to see and communicate in complete darkness. Interactive computer programs allow visitors to explore the sea like scientists do and learn how human activity affects this alien environment.

Creatures of the Abyss is a production of Science North, Sudbury, Ontario, Canada.

Ray Troll

Cruisin' the Fossil Freeway with Artist Ray Troll and Paleontologist Kirk Johnson

Coming this fall to the Changing Exhibits Gallery

October 23, 2010–January 2, 2011

Ancient killer pigs, saber-toothed cats, and giant ammonites are once more given life through the whimsical artwork of Alaska artist Ray Troll. Explore questions of evolution, extinction, and early life through Troll's imagined scenes from prehistoric times. Large-scale, action-packed paintings, banners, and murals bursting with color recount Troll's 5,000-mile road trip with Denver paleontologist Kirk Johnson to hunt for fossils in the American West. See rarely seen fossils from the Academy's world-renowned Paleontology Collection. Free with museum admission.

Dr. Katriina Ilves

© Silvia Baptiste

Katriina Ilves' parents still have the video of the first time she caught a fish. She was just two years old when she reeled in a perch from Lake Ontario, picked it up, and kissed it. That was where it all started.

During her undergraduate career at the University of British Columbia, Ilves split her time pursuing two degrees—one in philosophy and the other in marine biology. Toward the end of her college career, Ilves enrolled in a course on diversity and evolution of fishes because, she says, "I thought it was ridiculous that I had a degree in marine biology and knew very little about fish."

It was during that course that "the light bulb really went off," she says.

Now, Ilves works as the Academy's Chaplin postdoctoral scientist in the Department of Ichthyology. Hired in 2009, Ilves has been assessing fish populations in Bahamian reefs to evaluate the effects of half a century of human impacts on the diversity and composition of reef fish communities.

"We are looking at the community structure of reef fishes—what species are there and in what relative proportions, and if that has changed over time," she says.

Her research continues a project started 60 years ago by prominent Academy ichthyologists Dr. James Böhlke and Charles Chaplin (for whom Ilves' position is named). Using the department's collection of Bahamian fishes, she is trying to determine changes in a species' community composition and whether the changes can be linked to any specific variable, such as proximity to human populations.

This fall, Ilves' research will take her to several sites in the Bahamas to further test the hypothesis. She will also look at the effects of the invasive lionfish on the community structure at those sites. The lionfish is a voracious predator and has been known to cause reductions in certain species populations, she says. She will try to determine how that affects the surrounding reef fish community.

"It will be really interesting to see if this predator has had more of an impact than 50 years of urbanization," she says.

Using the Ichthyology Collection, Ilves has already recorded that the reef fish assemblage structure in the areas sampled has not undergone any massive change. That can be attributed in part, she says, to the persistence of coral structure at these sites. Even though it has been documented that the coral habitat has been in decline for decades due to its extreme sensitivity to temperature change, as long as the physical structure remains intact, dead coral can provide shelter from predators, and for juvenile growth.

Ilves' says her research wouldn't be possible without the specimens and historical data collected by Böhlke and Chaplin. "I would like to think this work is continuing their legacy."

ACADEMY ABBREVIATED

Real Science Goes Live!

Academy scientists are hard at work every day, discovering more about the world around us. Most of this work happens out of public view, in back offices, laboratories, or in the field. However, starting this summer, we're bringing Academy science out from behind the scenes right into the galleries for you to see.

On Tuesdays, Wednesdays, and Thursdays from 1–3 p.m., researchers, collection managers, archivists, and others will set up shop in the Science Live Station, located just outside the auditorium. Here you can talk directly with Academy scientists and experts, ask questions about what they are working on, and sometimes even try your hand at helping out.

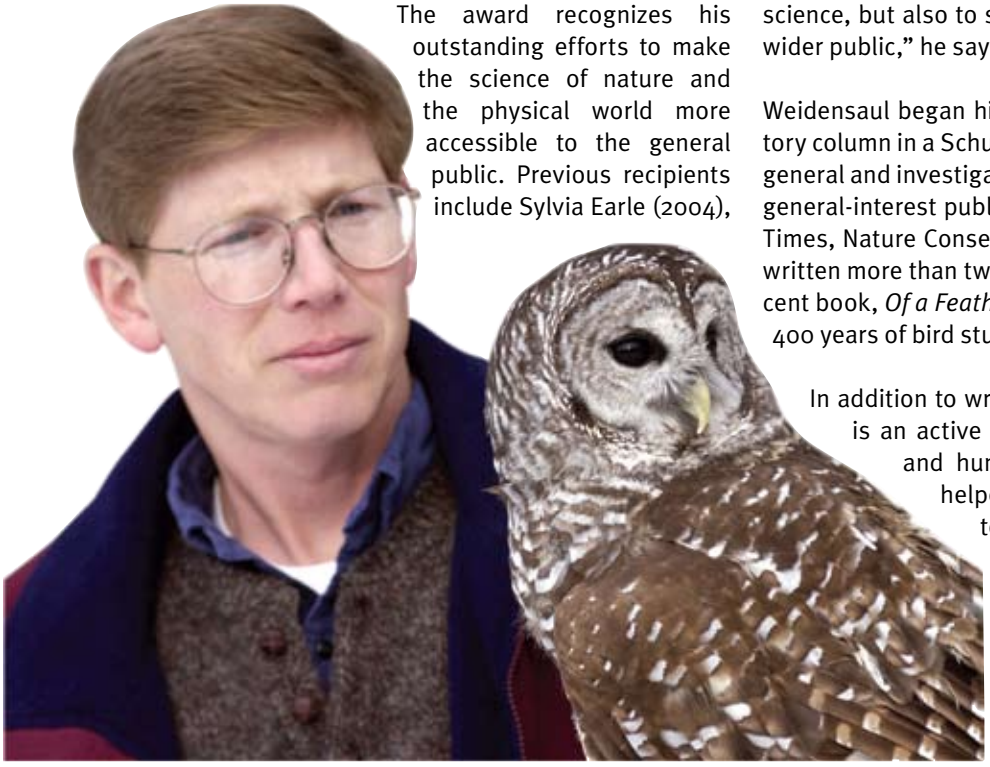
Some of the activities you might see at Science Live include pressing botanical specimens, examining samples from an insect collection trap, analyzing algal samples, and preparing bird study skins, also known as bird-skinning.

Stop by on your next visit to see what's keeping us busy!

Katie O. Clark/ANSP

Naturalist and Author Receives Academy's Day Medal

Scott Weidensaul is finding it's quite nice in the company of heroes. At the Academy's Annual Meeting on May 25, Weidensaul, a Schuylkill County naturalist and prolific author, joined some of his most admired fellow scientists as a recipient of the Academy's Richard Hopper Day Memorial Medal. The award recognizes his outstanding efforts to make the science of nature and the physical world more accessible to the general public. Previous recipients include Sylvia Earle (2004), Thomas Lovejoy (2000), David Attenborough (1983), the Academy's own Ruth Patrick (1969), and Louis Leakey (1964).



Bill Uhrich, Reading Eagle

"I think the medal really cuts to the heart of what has always been the Academy's mission, to not only push the frontiers of natural science, but also to share those discoveries and wonders with the wider public," he says.

Weidensaul began his career in 1978 writing a weekly natural history column in a Schuylkill County newspaper, eventually moving to general and investigative reporting. His work has appeared in many general-interest publications including Smithsonian, The New York Times, Nature Conservancy, and The Philadelphia Inquirer. He has written more than two dozen books on natural history; his most recent book, *Of a Feather: A Brief History of American Birding*, traces 400 years of bird study in America.

In addition to writing and lecturing about wildlife, Weidensaul is an active field researcher, specializing in birds of prey and hummingbirds. Over the last 14 years, he has helped run an all-volunteer research team to monitor migrating owls through the Appalachians, and has participated in banding hawks for research purposes.

The Richard Hopper Day Memorial Medal was established in 1960 in recognition of Day (1847–1924), a life member of the Academy, and his keen interest in natural history.

ACADEMY ABBREVIATED

Give the Gift of Science

Sometimes, it can be a tough decision to choose between glass spider webs, ammonite plates, butterfly jewelry, or a make-your-own-volcano kit when shopping for that special someone. Now that the Academy Shop is offering gift certificates, you don't have to make these difficult decisions!

Gift certificates redeemable for all the weird and wonderful merchandise in the Academy Shop can now be purchased in any amount, starting at $5. Science buffs can browse through a selection of nature books, field guides, and postcards. Kids can search through a wide array of games, puzzles, activity kits, minerals, and fossils. Nature-themed T-shirts are available in sizes for adults and children. And, be sure to check out the largest collection of dinosaur models in the city, found right in the Academy Shop.

Gift certificates are the perfect gift for any occasion and, remember, every purchase helps support the Academy of Natural Sciences. Purchase one today!

These certificates cannot be redeemed for membership or admission.

GET CONNECTED

Anyone can be a naturalist. In each issue of Academy Frontiers, our scientists and staff share their knowledge of the natural world and highlight a seasonal plant or animal that you might find right in your own backyard.

In this issue, David Hewitt, research associate in the Academy's Botany Department, draws your attention to *Scutellinia scutellata*, a species of fungus that is sure to catch your eye.

If you are walking on some wet ground this summer and you look down, you might see what looks to be a reddened eye winking up at you. And, if you kneel down closer, you might see other eyes, growing on rotten, wet wood or in the nearby soil. You may see them growing tightly clustered together, bumping eyelash to eyelash, or perhaps a bit more spread out, giving each other room to grow. They are about a quarter inch across, sometimes less, with brilliant red coloring in the middle and black filaments raying out from their margins.

What you are seeing is the eyelash fungus, or *Scutellinia scutellata*. This fungus commonly grows throughout Europe and North America and is easily recognizable due to its bright red or orange color and the striking "eyelashes" that line its edges. The eyelash fungus is a discomycete, meaning that its spores are produced on an exposed surface, called a hymenium (the red or orange top surface on the fungus). While there are a number of discomycetes growing in the woods, this is the only one with this particular combination of characteristics.

As with most fungi, there is a connection to Lewis David von Schweinitz, one of the founding fathers of North American mycology, or the study of fungi. He was born in the United States in 1780 and, when he was 18, went to Europe to study (he returned to the U.S. some years later to work as a Moravian priest). During his studies in Europe, Schweinitz, who was enamored by the natural world, worked with one of his teachers to produce a monumental work in mycology, called the *Conspectus Fungorum in Lusatiae superioris agro Niskiensi crescentium e methodo Persooniana*—generally just called the *Conspectus Fungorum*, published in 1805. Schweinitz drew and painted some spectacular illustrations associated with this publication, which he bound into volumes, now located in the Academy's Ewell Sale Stewart Library. Most of the illustrations have a distinct charm and are so accurate that they remain some of the best illustrations available today. To see more of Schweinitz's interpretations of fungi, visit www.ansp.org/library/getty_findaid/schweinitz437.xml.

Mike Persico

Exploring New Worlds

By Lois Kuter
Volunteer Coordinator

Volunteers have been at the heart of the Academy since its inception in 1812. The Academy was founded by amateur naturalists who gathered together to pool their resources and share their expertise—in other words, they came together to learn from one another.

Today, residents of all ages from Philadelphia and beyond spend their free time volunteering at the Academy. The Academy benefits from the generous contribution of knowledge, time, and labor on the part of the volunteers. In return, volunteers learn new skills, make new connections, and experience the excitement of sharing their knowledge with visitors.

For volunteer Emily Archer, 19, exploring the back hallways of the Academy is one of the perks that got her hooked. As a volunteer for the Exhibits Department, Archer is captivated by the treasures stored behind the scenes.

"On my first day, I saw squids floating in jars. I thought that was so amazing. It's so cool how much stuff is here and it's great to be able to see the things that the public doesn't normally get to see," she says.

Volunteers ranging in age from 13 to 85 have worked in all corners of the Academy, assisting with curatorial work in the research collections and library, lab work in the Patrick Center for Environmental Research, office work in the administrative departments, animal care in the Live Animal Center, and informal education in Dinosaur Hall, *Outside In*, the *Butterflies!* exhibit, and the Changing Exhibits Gallery. Some volunteers are here for just a season or to help out with special events; others may stay for 10 or 20 years.

For Betty Ruggeri, it's 22 years, to be exact. Betty, 68, and her husband, Nick, volunteer in the Malacology Department helping with various tasks from data entry to rehousing alcohol lots to identifying specimens. Working in malacology is a perfect match for Betty, who has a science background and a passion for seashells. She uses the resources in the department to help with her own shell collection she maintains at home.

Nick, 68, who has an engineering background, started volunteering with Betty eight years ago. At the time, the science of malacology was completely new to him.

"It was like going to Mars and exploring new worlds," he says.

But that's part of the fun, Nick says, since he loves learning new things. "I really get a kick out of learning new things. Every week I learn something new," he says.

The Academy's volunteer program is a unique opportunity for people of all ages. Teens with no work experience can develop incredible job skills and explore future career interests. Adults and retirees have the opportunity to contribute skills gained during a lifetime—or, to explore a field of interest totally unrelated to their prior work. Volunteers are also often drawn to the Academy because of the experiences they had here as a child, and they want to give back and support the work of the Academy.

Although you may not be able to see the dozens of volunteers who work behind the scenes, look for the volunteers wearing bright blue aprons throughout the public exhibit halls and ask them about their work. Don't forget to thank them for the contributions they make.

If you or someone you know wants to explore volunteer opportunities at the Academy, contact Lois Kuter, the Academy's volunteer coordinator, at 215 299-1029 or kuter@ansp.org.

Katie O. Clark/ANSP

Betty and Nick Ruggeri have a combined total of 30 years volunteering in the Academy's Malacology Department.

Opposite photo: Volunteer Melissa Hamblin introduces a resident of the Butterflies! *exhibit to two young visitors.*

Katie O. Clark/ANSP

Katie O. Clark/ANSP

Tales of Fellow Kinsmen

By Katie O. Clark
Editor

Although she works in the Academy's Department of Ornithology, Julie Reich has her sights set on trees. Family trees. For the past four years, Reich, a research associate for the Academy, has been researching the genealogy of the major donors to the Academy's Ornithology Collection. And she's doing it a bit unconventionally.

In many cases, genealogy research starts with an individual alive today and traces back to fill in the ancestral blanks. In Reich's case, she's starting with donors from the 19th and 20th centuries and attempting to track down their descendants. The objective is to bridge generations, connecting people with a unique piece of their family history. More importantly, Reich says, this research is a way to honor these important donors, and get people interested in the Ornithology Department's remarkable collection.

Tied delicately around the foot of every bird study skin in the collection—consisting of some 213,000 specimens—is an ID label. On it is collection information—date, location, the name of the collector, and other biological data. Reich was curious to know more about the names on the labels. And that's how the project began.

"I started going through the entire database of more than 200,000 birds and I embarked on finding out who these people were," she says. Reich decided to focus specifically on identifying the major donors to the collection. A major donor is defined as someone who donated 100 birds or more to the collection, as well as people who donated type specimens, rare or very important birds, and people who financed expeditions that brought back 100 or more birds.

After hundreds of hours of online research, and rifling through old newspaper clippings and microfilm, archival materials, censuses, and treasurer's reports, Reich identified 132 major donors to the collection. She has since found living family members for almost a third of that list. The research process is bittersweet (mostly sweet) for Reich.

"Some of it has been exceedingly tedious, but it's like a mystery story. You have to look for clues, and you have to be a really good detective. It's a great deal of fun," she says.

The next step in the process is to contact the descendants. "I send a casual letter and hope they respond," she says.

Clarence H. Clark, an engineer in York County, PA, received such a letter. In April, he responded, "I received a letter from you…where you note that Clarence Howard Clark was an important donor. I believe this is my great-great-grandfather. I am very interested in the copies of documents written by him to the Academy and in a tour of the specimens donated. This is really pleasant and interesting information to receive."

A. Cope Garrett traveled to the Academy from Massachusetts in June to view specimens donated to the collection by Edward Drinker Cope, his great-granduncle and a big name at the Academy. E.D. Cope was a distinguished 19th-century American scientist and curator at the Academy.

Garrett says he and the family members who traveled with him were "wowed" by the experience. "I was really impressed with the back-room approach that we enjoyed there—not too many people get into the research and collection areas. And, I felt honored to be in the lineage of a person like Edward Drinker Cope. It was wonderful to have that experience," he says.

"I have such nice conversations with the people who come in for tours or who I talk to on the phone. I'm excited that they're excited; it gives me such pleasure to share their ancestor's contribution with them," says Reich.

In addition to continuing the tours—given by Ornithology Collection Manager Dr. Nate Rice—Reich says she expects to create a web page to celebrate each of the major donors.

For now, Reich plans to continue chipping away at her list of 132 names and make more connections between family members and the people responsible for making the Academy's Ornithology Collection one of the finest in the world.

*Ornithology Collection Manager Dr. Nate Rice shows off a collection of Australian ringneck parrots (*Barnardius zonarius*) to Cope Garrett (far left) and his family members. Garrett is the great-grandnephew of Edward Drinker Cope, who was a curator at the Academy in the 19th century.*

Are you or someone you know related to one of the donors to the Academy's Ornithology Collection? Visit www.ansp.org/ornithology-donors to see the list of major donors. We'd love to hear from you! Contact Julie Reich at reich@ansp.org.

Opposite photo: Research Associate Julie Reich has spent the last four years as a genealogical detective. Inset photo: This specimen of a prothonotary warbler, or Protonotaria citrea*, was a gift of Edward Drinker Cope to the Ornithology Collection in 1858.*

Creatures from the Collection

Brandon Zimmerman

This toothy specimen of a fangtooth fish, or Anoplogaster cornuta, *is a crowd pleaser for Academy educators when teaching visitors about deep-sea fishes.*

The Academy's collections hold some of the most beautiful, amazing, and exquisite things ever to have lived on earth. We also specialize in the nightmarish, the alien, and the bizarre.

In honor of our latest exhibit, *Creatures of the Abyss*, the Academy pulled from its collections some of the weirdest and strangest creatures of the deep. While the Academy doesn't have an extensive collection of deep sea animals, we do have some rather bizarre specimens.

Our specimen of the slender snipe eel, or *Nemichthys scolopaceus*, was collected off the Gulf of California in January 1968. The snipe eel is known as the deep-sea duck, because of its unusual bird-like beak. The beak has curved tips covered with tiny hooked teeth used to sweep through the water to catch shrimp and other crustaceans. The snipe eel has more vertebrae in its spine than any other animal—roughly 750. And, the snipe eel's anus moved forward during its evolution—it's located on its throat.

Another interesting—and definitely strange—deep-sea specimen in our collection is this redeye gaper, or *Chaunax stigmaeus*. The redeye gaper is a species of anglerfish native to deep waters in the western North Atlantic. They can be found in waters as deep as 730 meters and living among dense beds of dead coral rubble. The original type specimen was caught in a trawl off Atlantic City on March 1, 1946, and donated to the Academy by Carroll B. Atkinson.

The Academy's collection of deep-sea fishes is merely a sample of various species, says Mark Sabaj Perez, collection manager of the Ichthyology Collection. But, it does hold some interesting oddities, he says, such as the largest known specimen of the genus *Leptostomias*, or a deep-sea dragon fish. We also have several specimens of the fangtooth fish, or *Anoplogaster cornuta*. The fangtooth has the largest teeth of any fish in the ocean proportionate to its body size—they are so big that it is unable to fully close its mouth!

You can learn more about the strange things that inhabit the deep, dark waters in the *Creatures of the Abyss* exhibit, running though September 6. These animals live and thrive in one of the most inaccessible ecosystems on earth—the waters are freezing cold and black, and the water pressure is so extreme, that it would instantly crush a human.

Come explore this alien and amazing world where submarine canyons run deeper than the Grand Canyon and sea mounts dwarf Mount Everest, where fish swallow prey larger than themselves, and where myriad creatures put on dazzling shows of light.

Creatures of the Abyss is free with museum admission, on exhibit through September 6. *Creatures of the Abyss* is a production of Science North, Sudbury, Ontario, Canada.

Brandon Zimmerman

The slender snipe eel, or Nemichthys scolopaceus, *can weigh only a few ounces, yet grow in length up to 5 feet!*

John James Audubon's *Birds of America*

By Katie O. Clark, Editor

A crowd of people gathered around a white-gloved librarian waiting for the slow and careful turn of a page in an old, giant book isn't something you see every day.

At the Academy of Natural Sciences, it happens every week.

Every Friday at 3:15 p.m. in the Academy's Ewell Sale Stewart Library, one page is turned in John James Audubon's historic *Birds of America*, one of the greatest picture books ever produced. Inside are 435 hand-colored prints made from engraved copper plates, detailing the majestic beauty of nearly 500 species of North American birds.

John James Audubon (1785-1851) was an ornithologist, naturalist, hunter and painter. Born in Haiti and raised in France, Audubon became an American citizen in 1812. Just 15 years later, Audubon began to publish the greatest work of his life and a scientific work like no other before it. Audubon's *Birds of America* was published as a subscription, with five plates at a time released over a period of 11 years, from 1827 to 1838. A subscription cost $1,000; today that would equate to about $40,000. The Academy was an original subscriber to the publication, as John James Audubon became a member of the Academy in 1831.

There were about 200 copies published; today, fewer than 100 remain, since most were torn apart for the individual prints. Most of the copper plates were melted for the copper by Audubon's widow, Lucy. Only 76 remain, and the Academy has one of them—plate 366, the gyrfalcon (Audubon called it the Icelandic falcon).

The Academy bound its plates in five volumes, in a format referred to as the "double elephant folio." This format allowed Audubon to show the birds as close to life-size as possible. Turning one page a week, it will take roughly 8 1/2 years to page through the 435 plates.

Keep up with us as we make our way through this magnificent work—one page at a time. Stop by the Library on Fridays at 3:15 p.m. or follow us as we "turn the page" online at www.ansp.org/library/audubon.

Volunteer Dana Cohen

It's partly because she's an ace at the sometimes unpleasant task of bird skinning. And, it's partly because she brings in homemade sweets every Wednesday. The colorful murals she painted throughout the Ornithology Department at the Academy play into it, too. But, it's the fact that she does it all out of kindness, for free, that makes her such an invaluable asset to the Academy.

Dana Cohen started volunteering at the Academy in the 1990s. She had visited the museum as a child but rediscovered the Academy through her son, Alex, who became a volunteer in the Visual Resources for Ornithology (VIREO) Department. Soon after, Dana was asked to help with the young ornithologists program at the Academy, where she taught high-school age students about birds through observation and drawing.

Through this work, Dana took a fancy to the Academy's Ornithology Department. The curator at the time, Leo Joseph, promised Dana some small tasks.

"I was willing to just Xerox things or make coffee," Dana says.

But there was a higher calling for Dana. "My first week the ultra cold freezers malfunctioned and many of the tissue samples were damaged. I helped Leo salvage and organize the mess. It was quite an initiation."

Dana continued to help Leo with dictation and illustrations to accompany scientific papers, a perfect job for Dana, with her background in painting and ceramics.

Katie O. Clark/ANSP

"Then Nate came along, and he had this idea for a mural to depict the work and history of the department," she says of current collection manager for the Ornithology Department, Dr. Nate Rice. Dana spent the next few years painting a mural, which includes portraits of Academy ornithologists past and present. It was a great experience, but Dana had bird skinning on the brain.

"I wanted to skin so badly; it looked so fascinating," she says of study skin preparation, a weekly task performed in the department. It took Dana about a year to get it right and now she loves it. "The birds all have their own little stories," she says, a story told by the contents of the birds' stomachs. "I once skinned a hawk that was frozen with a mouse still in its talons, and a gannet with a fish stuck in its throat."

According to Rice, the Ornithology Department would not function without her.

Dana so admires the work of the department that she and her husband, Neil, have donated funds to support it for more than a decade.

"This department is a microcosm of the Academy, which I feel is sort of like Noah's ark. It's a library and a history of once-living things. It's a facility for education, and a way to connect with non-science people," she says.

For information on how you can support the Academy—or a particular collection or research area—contact the Office of Institutional Advancement at 215-299-1122 or friends@ansp.org.

Leaving a Legacy at the Academy of Natural Sciences

Through your will or living trust, you can remember not only people who are dear to you but also organizations like the Academy of Natural Sciences. A bequest can be a smart way to make a gift and:

- retain full ownership and use of your assets throughout your life. Perhaps you want to make a gift to support the Academy but hesitate to draw upon resources you may need in the years ahead, especially in this economy. A bequest allows you to preserve your financial security.

- possibly reduce taxes payable by your estate. The federal estate tax was temporarily repealed at the end of 2009, but it is scheduled to reappear in 2011 with an exemption of only $1 million and a maximum rate of 55 percent unless legislation is adopted this year. Very likely, Congress will pass legislation this year restoring the tax with an exemption and maximum rate in the range of the 2009 levels ($3.5 million exemption and maximum rate of 45 percent). In any case, it is almost certain that the unlimited estate tax charitable deduction will be continued. This means that any bequest to the Academy would be free of tax.

Several types of bequests are possible:

- General, for a certain dollar amount:
  "I leave the sum of $_____
  to the Academy of Natural Sciences"

- Specific, a particular asset:
  "I leave the 1,000 shares of XYZ stock to the Academy of Natural Sciences"

- Residual, once expenses and other bequests have been distributed:
  "After my specific bequests and all expenses of my estate have been paid, I leave X% of my estate to the Academy of Natural Sciences"

- Contingent, only under certain conditions:
  "In the event my spouse does not survive, I leave my entire estate to the Academy of Natural Sciences"

In addition, your bequest can be used for a variety of purposes:

- Unrestricted
  Allowing the Academy to employ your gift where the need is greatest.

- Designated
  Enabling you to support a particular educational or research program at the Academy.

- Endowed
  Providing ongoing funding for the Academy for the purposes you designate from year to year. Depending on the size and purpose of the endowment, it may be named for you and/or another person, and annual distributions from the fund would be identified with the person(s) for whom it is named.

Here are the next steps to take if the benefits of making a bequest appeal to you:

- Contact Amy Miller Marvin in the Academy's Office of Institutional Advancement (215-299-1013 or marvin@ansp.org) so that we can furnish helpful information. And, if you have already arranged for a bequest to the Academy, please let us know so that we can express our thanks for your forethought and generosity by inviting you to join our legacy society. This society consists of individuals who have arranged some form of future gift in order to assure that the Academy can continue its mission of the encouragement and cultivation of the sciences for generations to come.

- Discuss your situation with your attorney. He or she can advise you about the proper procedure. If you are satisfied with your will and only want to add a provision for the Academy, it is not necessary to execute a new will. Just an amendment, or "codicil," is sufficient.

A bequest is only one of several ways you can leave a legacy to the Academy. We would be delighted to speak with you about the Academy's planned giving program, and share more creative, flexible ways you can leave a meaningful legacy at the Academy of Natural Sciences. Thank you for your support!

Reptile keeper Bar Carter feeds one of the residents of the Academy's Florence R. Foerderer Live Animal Center. The activities of the center are supported in large part by a bequest from Florence Foerderer, a former Philadelphia resident who passed away in 1999 and whose memory lives on through the Academy's educational programs.

ACADEMY SUPPORT

On behalf of the Academy's Board of Trustees, we wish to recognize and thank those supporters who have contributed to the Academy between March 1 and May 31, 2010. Your generosity helps to fund the Academy's many programs of research and education, and we are tremendously grateful for your support.

In Support of the Botany Curator Endowment Fund
Dr. and Mrs. Kenneth W. Ford, In honor of Ernie Schuyler
John C. and Chara C. Haas Charitable Trust

In Support of the Botany Endowment Fund
Ms. Elizabeth Farley

In Support of the Center for Environmental Policy
Sierra Club

In Support of the Center for Systematic Biology and Evolution
Anonymous

In Support of the Chaplin Fellow in Ichthyology
Gordon Chaplin and Sarah Teale

In Support of the Leidy Award
Raynier Institute & Foundation

In Support of the Library Endowment Fund
Dr. Donald H. Cresswell

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Mr. and Mrs. Leonard Evelev
Ms. Elizabeth Farley
Mr. James L. Goldman
Mrs. Josephine S. Klein
Susan and Edward Montgomery
Mr. and Mrs. Richard E. Petit
Mr. William Roberts

Katie O. Clark/ANSP

On June 4, Academy members were invited to a special preview of our current exhibit, Creatures of the Abyss. *The exhibit features this submersible model that simulates how scientists travel to the darkest depths of the ocean.*

Katie O. Clark/ANSP

In May, supporters and friends of the Academy's Ornithology Department were invited to join Collection Manager Dr. Nate Rice to view the impressive collection, featuring more than 210,000 bird study skins collected from all over the world.

Dr. and Mrs. Robert Robertson
Dr. and Mrs. Alfred Schuyler
Joly and James Stewart
Verizon Foundation, In honor of volunteer David Haimbach

In Support of the Townsend Miniature Restoration
Ms. Dana Dunbar King
Mr. Charles T. Spackman

In Support of Malacology
Dr. and Mrs. Robert Robertson

In Support of the Mineralogy Collection
Philadelphia Mineralogical Society

In Support of the "Seeing Eye to Eye" Education Program
Society of Photographic Instrumentation Engineers

In Support of Women in Natural Sciences
Charles E. Ellis Grant and Scholarship Fund
Lincoln Financial Foundation

ACADEMY SUPPORT

Katie O. Clark/ANSP

At the Academy's Annual Meeting in May, naturalist and author Scott Weidensaul spoke to members about the birth of American ornithology in Philadelphia and at the Academy. He was also presented with the Academy's Richard Hopper Day Memorial Medal.

The Academy would like to especially recognize those who have joined or renewed their support through the Academy's Leadership Circles of Giving between March 1 and May 31, 2010.

Jefferson Circle
Mr. and Mrs. R. James Macaleer

Darwin Circle
Mr. and Mrs. Byron T. Clark

Leidy Circle
Mrs. Josephine S. Klein

Lewis & Clark Circle
Mr. Peter Hamilton and Ms. Alta Wister

President's Circle
Marianna and Francis Mirabello

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Dr. and Mrs. Robert Robertson
Dr. and Mrs. Keith S. Thomson
Mr. Peter Weber

Donors to the Malacology Collection
Estate of Edie and Chip Chippeaux

Gift Memberships at the Academy

Need a one-of-a-kind gift for a birthday, anniversary, or just because? Give the gift of science with a membership to the Academy! A gift membership is a unique gift for a child who loves dinosaurs, a teenager with a budding interest in nature, or an adult looking to indulge a passion for science and learning.

It's easy to give a gift membership to the Academy. Simply complete the form found at www.ansp.org/membership, or call our Membership Department at 215-299-1022. Give your friends and family a year's worth of excitement that inspires a lifetime of learning. Remember, your gift supports Philadelphia's premier nature attraction and one of the world's first and foremost scientific research institutions.

In the Field

Mark Sabaj Pérez, collection manager for the Department of Ichthyology, participated in a month-long fishing expedition to Amazonas State, Venezuela in March. Ichthyologists from the U.S., Brazil, Peru, and Venezuela started the expedition in Puerto Ayacucho and traveled up the Río Orinoco, into the Río Ventuari. This scenic river drains the western highlands of the Guiana Shield and has yielded many new species of catfishes during prior expeditions in 2004-05. The March expedition traveled further upstream to the first major waterfalls on the Ventuari, Salto Tencua. There the group collected rare specimens of catfishes and other fishes including a number of new and undescribed species. In the photo, Mark is taking a muscle sample from a thorny catfish, *Oxydoras sifontesi*, collected just below Salto Tencua, Río Ventuari, Amazonas, Venezuela.

Photo courtesy of Mark Sabaj Pérez/ANSP

Katie O. Clark/ ANSP

Behind the Scenes

Academy Senior Fellow Robert Peck is currently researching and writing the history of the institution in honor of the Academy's bicentennial in 2012. Co-authored with Patricia Stroud, the book will be a lively account of the birth and evolution of America's oldest continuously operating natural history institution, featuring many of the colorful personalities and episodes that have made the Academy what it is today. The book will include illustrations from the Academy Archives and original photographs of the collections made on site by the eminent natural history photographer Rosamond Purcell (pictured to the left).

In this photo, Purcell uses natural light on a cool May morning to photograph leg bones from the now extinct moa, a bird from New Zealand, acquired by the Academy in 1848.

Look for more information about the book in future issues of *Academy Frontiers*. Starting early next year, we'll be featuring select excerpts from the book. The 224-page book will be published by the University of Pennsylvania Press in association with the Academy in 2012.

FLASHBACK

Ewell Sale Stewart Library/ANSP

Many of today's scientific terms can be traced back to the man seen in this lithograph. Sir Richard Owen (1804–1892) was a comparative anatomist, paleontologist, zoologist, and a taxonomist who had a long list of "firsts" in his career. He was the first to describe a newly discovered species of primate—the gorilla—in 1847. He is also responsible for the term "homology," which he described as "the same organ in different animals under every variety of form and function." He devised a vertebrate archetype to explain his belief that there was a common structural plan for all vertebrates. For example, if you were to examine a bat wing, a seal flipper, a cat's paw, and a human hand, you would see a similar structure which unified them all. This is a theory that is still studied and debated today.

But it's another of Owen's scientific firsts that would guarantee his celebrity among the great scientists of the last two centuries—he coined the term "dinosaur."

After studying the fossils of giant lizards that were surfacing in the mid 19th century, Owen deduced in 1842 that they were a suborder of extinct reptiles. The common characteristics that these fossils shared with each other also differentiated them from modern lizards. The fossils of *Megalosaurus*, *Iguanodon*, and *Hylaeosaurus* all had column-like legs, as opposed to the sprawling legs of modern reptiles. The fossils also showed five fused vertebrae which would give the dinosaurs great strength. This characteristic is what gave him the idea to name the taxon Dinosauria; from the Greek *deinos*, meaning "fearfully great," and *sauros*, meaning "lizard."

It was Owen's work, *Memoir on the Pearly Nautilus* (1832), which would gain him membership into the Academy in 1834. Among the correspondence from Owen housed in the Academy Archives, there is one letter that chronicles Owen's entry into the Academy. In the letter dated October 23, 1834, Owen writes that he was "much gratified by receiving the diploma constituting me as a correspondent of the Academy of Natural Sciences...it is the first scientific honor I have received." Of course it would not be the last. And, he will always be remembered as the man who "invented" dinosaurs.

This lithograph of Richard Owen appears in Portraits of Honorary Members of the Ipswich Museum*, by George Ransome, 1852, a volume donated to the Academy by T.B. Wilson and found in Collection 286a in the Academy Archives.*

SUSTAINABILITY MATTERS

By Roland Wall, Director of the Center for Environmental Policy

Recent accidents in the coal and oil industries have brought renewed attention to the need for safe, clean, and economical energy sources. One source that has been proposed is the vast quantity of natural gas known to be embedded in the Marcellus Shale, a deep geological formation along the East Coast.

Recent estimates suggest that there is a 14-year domestic supply of gas in the Marcellus Shale. However, questions have been raised about the potential environmental and social impacts of obtaining it.

Situated up to a mile beneath the earth's surface, the Marcellus Shale runs roughly from northeast New York, under most of Pennsylvania, and into West Virginia. Natural gas (methane) lodged in the pores and crevices of the shale was formed from the decomposition of prehistoric life forms. It is thought to have fewer harmful emissions and produce less greenhouse gas than coal.

Previously inaccessible, new technology now makes it profitable to extract the gas. Drillers inject water and other chemicals at high pressure to fracture the shale and release the gas. This process, known as "fracking," has been at the heart of the controversy over the shale gas.

Questions have arisen as to the source of the large volumes of water needed for this process, the disposal of the water and chemicals that are withdrawn from the wells, the impact of drilling on the surrounding countryside, and whether fracking will contaminate groundwater, streams, and the watershed.

Companies planning to drill in the shale are confident that current technologies and regulation are adequate to prevent accidents and minimize environmental disturbance. However, concern over the possible impact of drilling in the shale has led citizens and policy makers to seek actions ranging from an outright ban on drilling, to higher taxes and fees on the companies involved, to stronger regulation.

At this point, the one thing that seems certain is that the Marcellus Shale will require a delicate balance of energy needs, public concerns and business realities. It will also require applying the best science possible to future actions. The Academy of Natural Sciences' environmental researchers and policy programs are working to help develop that scientific approach.

In April, 2010, the CEP presented a panel discussion, "The Marcellus Shale – The Science and the Policy." Video of the program can be seen at www.ansp.org/environmental/category/events/video-events/.

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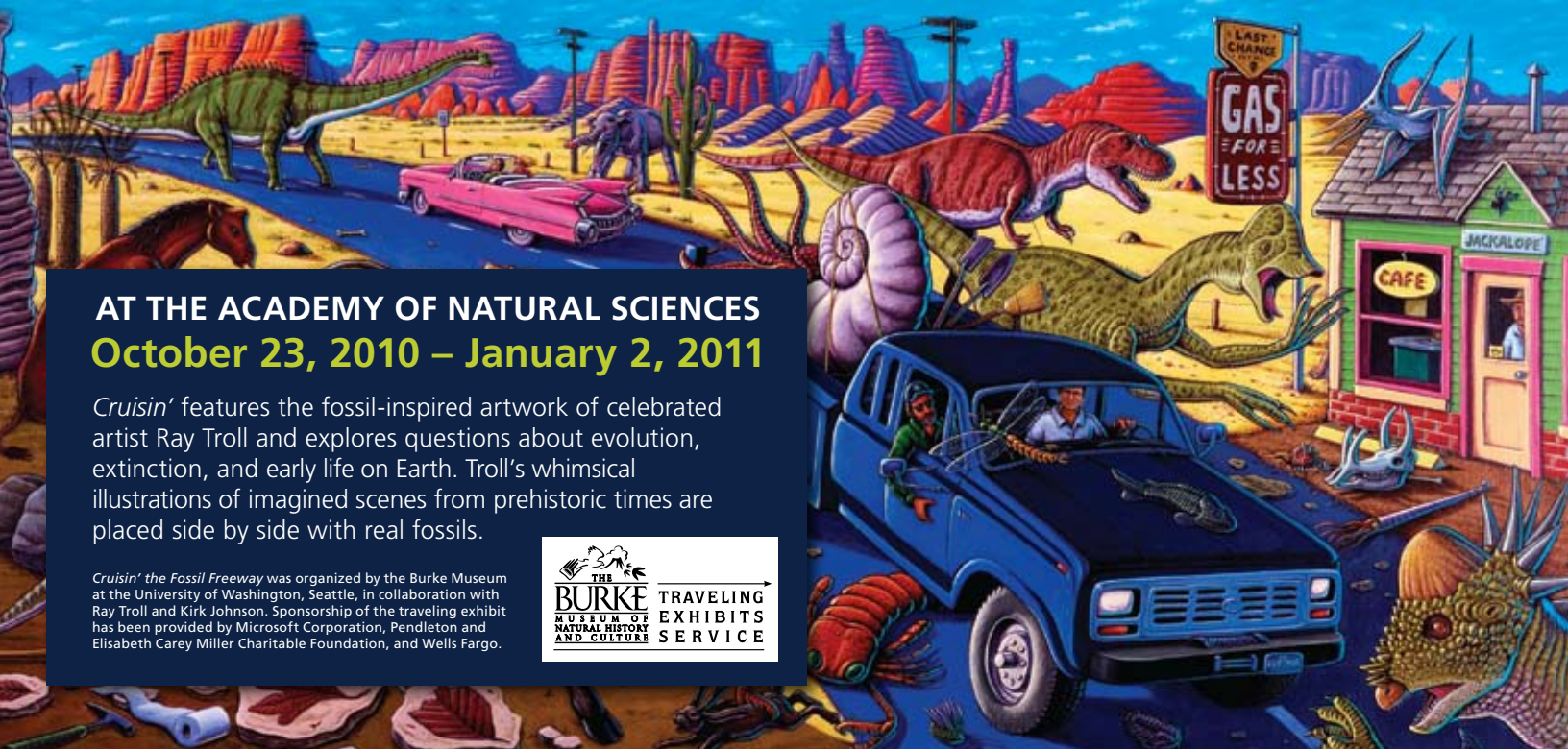
Cruisin' the Fossil Freeway

WITH ARTIST **RAY TROLL** AND PALEONTOLOGIST **KIRK JOHNSON**



AT THE ACADEMY OF NATURAL SCIENCES
October 23, 2010 – January 2, 2011

Cruisin' features the fossil-inspired artwork of celebrated artist Ray Troll and explores questions about evolution, extinction, and early life on Earth. Troll's whimsical illustrations of imagined scenes from prehistoric times are placed side by side with real fossils.

Cruisin' the Fossil Freeway was organized by the Burke Museum at the University of Washington, Seattle, in collaboration with Ray Troll and Kirk Johnson. Sponsorship of the traveling exhibit has been provided by Microsoft Corporation, Pendleton and Elisabeth Carey Miller Charitable Foundation, and Wells Fargo.

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