

ACADEMY

INSIDE:
Digging Up Dinosaurs

FRONTLINE



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

FALL 2016

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ON THE COVER: In Montana's Bighorn Basin,
the Academy's Jason Poole and a team of scientists
uncover ribs and vertebrae of Jurassic sauropod
Suuwassea. More on pages 6–11. Photo by Mike
Servedio/ANS



Katie Clark/ANS

Dear Friends,

The Academy is *the* place in Philadelphia to see and learn about fossils, thanks to exciting current exhibits such as *Dinosaurs Unearthed* and our famous Dinosaur Hall. Did you know that paleontology is embedded deeply in our rich history and current scientific research? Among our many famous personalities was Academy scientist and father of American vertebrate paleontology Joseph Leidy, who identified the extinct American lion and named the famous dinosaur *Hadrosaurus foulkii* after its discovery in 1858 in Haddonfield, New Jersey. The Academy created a full cast of the dinosaur and put it on display in 1868, becoming the first place in the world where the public could go to see a dinosaur. In 1868 Academy curator Edward Drinker Cope described the giant marine reptile *Elasmosaurus platyurus*, and its cast sails overhead in our lobby today. Find out how *Elasmosaurus* sparked a heated rivalry between two paleontologists during your next visit!

Nearly 150 years after Leidy and Cope brought *Hadrosaurus* and *Elasmosaurus* into the public eye, our own Ted Daeschler co-discovered the 375-million-year-old fossil fish *Tiktaalik roseae* in the Canadian Arctic. Its 2004 discovery sheds light on a pivotal point in the history of life on Earth: when the very first fish ventured out onto land. Just this summer, a team led by Dinosaur Hall and Fossil Prep Lab Coordinator Jason Poole and scientists from the New Jersey State Museum traveled to Montana to excavate fossils, including a Jurassic sauropod dinosaur named *Suuwassea* (pages 6–11). Their discoveries arrived in our Fossil Prep Lab in early August, and we are eager to learn what these fossils reveal about our past and the future of life on our planet.

As a member, you have countless opportunities to learn more about our extraordinary history and current science. Have you caught a glimpse of Thomas Jefferson's fossils in our Vertebrate Paleontology Collection or talked with Ted or Jason about their research at our annual Members' Night (page 16)? You can ensure that we continue to provide quality care for our special collections, share our scientific breakthroughs, and offer our dynamic exhibits through your contribution to the Academy's Annual Fund this holiday season. As I begin my holiday celebrations, I am thankful for the ways you, our loyal members, have helped the Academy prosper. Together, we will continue to make history every day.

All the best,

George W. Gephart, Jr.
President and CEO

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

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Mike Servedio/ANS

Paleontologist Jason Schein of the New Jersey State Museum digs through rock to excavate a *Triceratops* horn.



Dinosaurs Unearthed

SPECIAL EXHIBITS GALLERY
OPEN THROUGH JANUARY 16, 2017



Back by popular demand—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, full-bodied 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). Visitors will experience brand-new interactives, such as a multi-touch table and a scale that tells you how you measure up to different dinosaurs. A Dino Detective touch-screen quiz, chances to control dinosaur movements, and other activities encourage exciting hands-on exploration.

Sponsored by
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Dinosaurs Unearthed is supported by the Beachell Girls, Buckley & Company, the Delany Family, The PFM Group, Santander Bank, and Veritable, LP.

Frogs: A Chorus of Colors

SPECIAL EXHIBITS GALLERY
FEBRUARY 4–MAY 14, 2017

From radiant blue to fiery red, living frogs around the world offer a glimpse of the vast palette of frog diversity. Frogs are found on nearly every environment on Earth, and they have strange, shocking, and interesting survival strategies. Check out live frogs of many hues, listen to their colorful chorus, and admire the many ways they swim, hop, glide, and soar. Hop into a frog's world as you inspect frog habitats complete with rock ledges, live plants, and waterfalls. See live frogs in action, search for hidden frogs, create a nighttime frog chorus, spin a zoetrope to see how a frog jumps, and conduct a virtual frog dissection.



Backyard Adventures

SPECIAL EXHIBITS GALLERY
JUNE 9–SEPTEMBER 10, 2017

Leap into a garden of wonders, where you can experience the magic of a special backyard world. As you ride the bee bike, collect nectar, check out a food web pond, copy critter calls, and even dress up like living creatures, you'll discover surprising details about how organisms live and interact in their environments. You can even become a mechanic or engineer by learning the feats of construction that go into building a shed, solving the paver puzzle, and playing garden mini-golf. Figure out how to turn your own garden into a mini-exhibit—you'll discover more science in your backyard than you'll ever imagine!



Brittany Malinowski for ANS

MIKE SERVEDIO: TAKING SOCIAL MEDIA TO THE FIELD

IT WAS SUPPOSED TO BE SUNNY, HOT, AND DUSTY, BUT INSTEAD THE CLOUDS OPENED AND RAIN POUNDED FROM THE MONTANA SKY. It was day one of his first-ever fossil dig, and Mike Servedio was bummed out.

But if there is anything the Academy’s web and social media manager learned from his nine years working with scientists and seven years of recreational hiking, it’s that the field is full of surprises, and a little flexibility goes the distance.

When Servedio finally hit the field the next day with camera and notepad in hand, he knew immediately that his patience paid off. The tan desert, dotted with sagebrush and stones, rolled past red and purple rock layers and right into a crater filled with dinosaur bones.

Servedio accompanied researchers from the Academy of Natural Sciences and the New Jersey State Museum for the Bighorn Basin Dinosaur Project, an expedition to find, collect, and document Jurassic, Cretaceous, and Paleogene fossils. His role was to report on the excavation of the Jurassic sauropod dinosaur *Suuwassea*, led by Academy Dinosaur Hall and Fossil Prep Lab Coordinator Jason Poole. Servedio’s experience navigating nature made him the perfect candidate to travel to a remote field site to capture and share fieldwork with Academy followers (pages 8–11).

“It’s great to be able to meet the scientists on their terms,” he says. “The scientists are aware that I know that in the field, you have to be prepared to finish what you started—no matter how tired you are.”

Servedio was determined to detail the amazing work taking place in that Montana desert, from the mapping of the site and the power tools employed to remove large chunks of rock, to the use of tiny paintbrushes and glue to uncover and prep small fossils. He kept the Academy’s audiences up-to-date through photographs and time-lapse videos shared on Facebook, Instagram, and Twitter—the same job he does in the office every day, except with a lot more sun and dirt. He even uncovered a fossil himself.

“It’s crazy—the art it takes to remove, sort, wrap, and preserve the fossils,” he says. “The progress you can make in a day is incredible. You start with a little rib sticking out of the dirt, and by midday you can see the sides of the rib.”

Servedio’s journey to Montana technically began in 2007 when he was hired in the Academy’s Membership Department. Five years later he was promoted to manage the Academy’s website and social media accounts, which are integral parts of the institution’s marketing program. Over the years he has fallen in love with the Academy’s history, quirks, characters, and the ways his job pushes him to learn new things.

“It can be scary to approach experts in their fields with questions, especially when the science gets complicated,” he says.

Servedio hasn’t let down our scientists or his readers. Rather than worrying about the harsh weather in Montana, he was fully focused on telling the exciting story of Academy fieldwork.

“And of course I want to get invited back!” he says.

~Mary Alice Hartsock



Jason Poole/ANS

THE WORLD OF *SUUWASSEA*

By Jason Poole

IT IS HOT, IT'S ALWAYS HOT. The stifling air rises off the hot ground, colliding in rippling waves with the slightly less sweltering air above. The only escape from the relentless sun is a puffy rainless cloud that occasionally makes its way across the vastness. In 145 million years, this expanse will be known as the Morrison Formation of the Bighorn Basin.

In the south and west there are mountains and some volcanoes, the latter causing the airborne ash clouds lying just below the rainless cloud. To the north is a shallow inland seaway extending into Canada. Far to the east, the Appalachian Mountains are tall and sharp as erosion begins to wear down the edges and spires. Farther south past great sand dunes lies another sea where the Gulf of Mexico will one day be.

The sun bakes the ground until cracks form. Thin tendrils of water move across the surface of this forbidding land and evaporate in an instant. Plants cling to lower flows of seasonal and subsurface water. Cycads, conifers, ginkgo trees, horsetails, and ferns are the plants of the Morrison.

Also clinging to the water's edge are frogs and salamanders (*Enneabatrachus* and *Iridotriton*) and turtles (*Dinochelys* and *Uluops*). *Goniopholis*, the ancient crocodilians, wait to explosively ambush whatever might wander too close. Mammals like *Docodon* and *Amphidon* skitter from fern to fern, always on the alert. The pterosaur *Dermodactylus* chases buzzing insects, distracting the predator *Allosaurus*, who swallows the last bit of a lizard. Most animals rest as they wait out the worst of the heat.

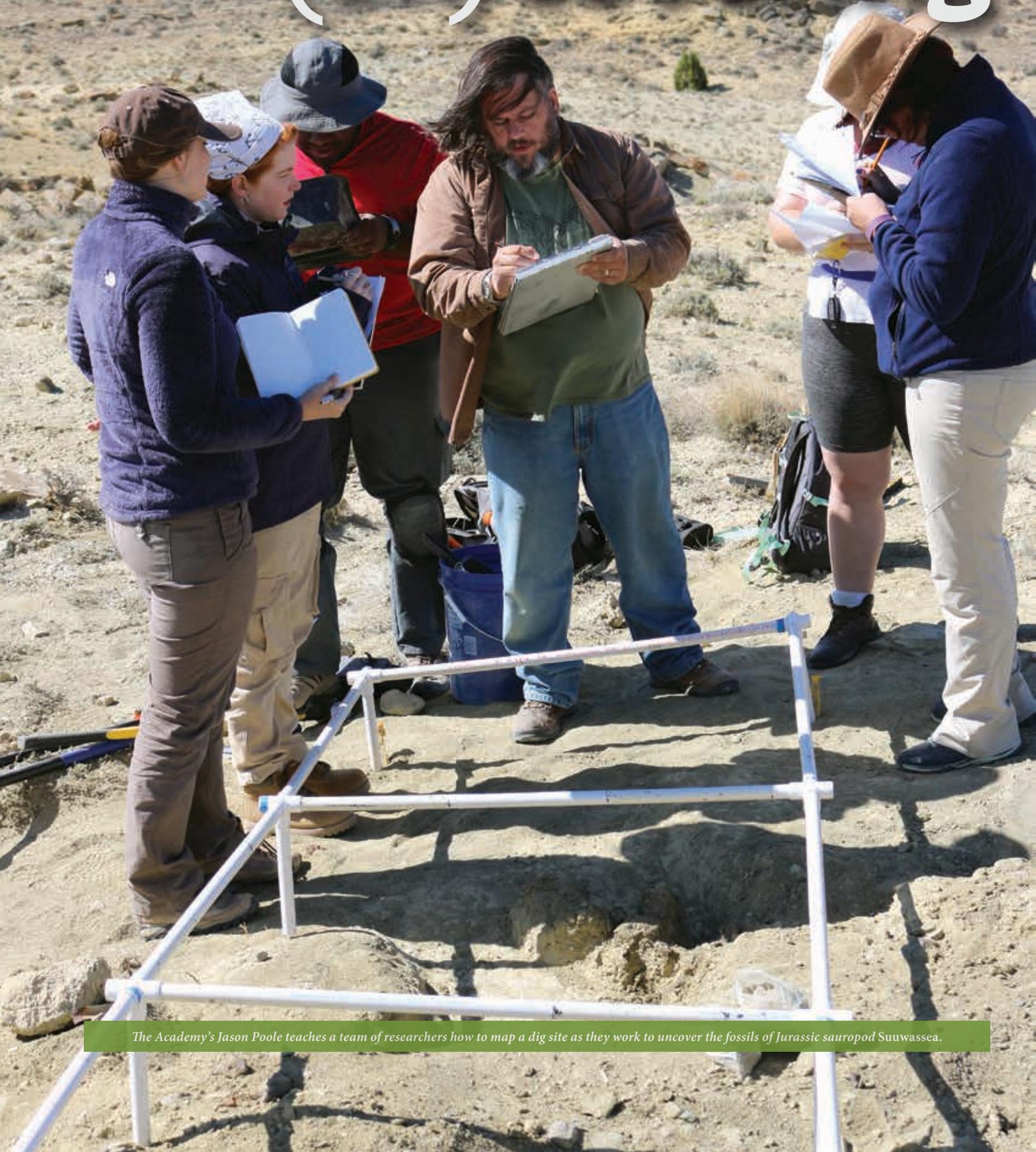
The sounds of crushed ground under heavy feet and the belly rumble of a giant beast roll across the land. The head and long neck of a sauropod called *Suuwassea* break through dust and rippling air, like a ship out of a foggy dream. Slowly the massive body comes into focus. With each footfall comes the wave of a whiplash tail, followed by the next *Suuwassea* in the herd.

The herd is important to *Suuwassea*. At only about 50 feet, *Suuwassea* is not the largest of the Morrison's dinosaurs. *Suuwassea* is easy prey for *Allosaurus* compared with the spiky-tailed *Stegosaurus*, the armored and weaponized *Gargoyleosaurus*, and the giants *Brachiosaurus*, *Apatosaurus*, or *Seismosaurus*. Safety in numbers works well for *Suuwassea* when food is plentiful. During long, dry seasons when food is scarce, desperate *Allosaurus* work together to conquer the herds.

Yet today, *Allosaurus* naps and small mammals drink water from the footprints of *Suuwassea* as the sun sets. The animals feed on the low lying ferns, their heads never stopping as they rake fern frond after fern frond into their mouths and throats. As evening falls, the heat persists, just as it will for the rest of the Jurassic in this place that we will one day call the Bighorn Basin. ☽



(Un)Covering



The Academy's Jason Poole teaches a team of researchers how to map a dig site as they work to uncover the fossils of Jurassic sauropod Suuwassea.

Suuwassea

By Mike Servedio

Late last summer, Academy paleontologist and paleo-illustrator Jason Poole received an unusual call from the Wyoming Bureau of Land Management. They asked him to check on an old field site in the Bighorn Basin, near the border with Montana.

Poole had worked at the site in the late 1990s and early 2000s with University of Pennsylvania paleontologist Peter Dodson. There, they uncovered the type specimen for *Suuwassea*, a sauropod from the Jurassic Era.

Last fall, Poole and a team of associates from the New Jersey State Museum and the Bighorn Basin Dinosaur Project drove the remote dirt roads to the site to investigate. Upon arriving, the team discovered something astonishing: obvious fossil bone protruding above the surface near the old site. A fuzzy phone call from the basin to Dodson back home confirmed that it was possible there was more *Suuwassea* in the ground.

Poole decided to return to the site in summer 2016 for a more thorough investigation. That's where I came in. With the possibility of a successful season, I got the OK to meet Poole in Montana to document the first week of the dig.

SUNDAY

On Sunday, July 10, 2016, I meet up with Poole at the Yellowstone Bighorn Research Association (YBRA) just outside Red Lodge, Montana. The paleo-artist is tucked into a corner of YBRA's main lodge with his sketchbook, putting the finishing touches on a new dinosaur drawing. There's a fire burning in the corner. College students are milling around on the back porch with coffee, admiring the view over town and the mountains in the distance. I'm an avid hiker and outdoor enthusiast. This is my kind of place.

Most of the team has just arrived. There are Poole and co-leader Jason Schein of the New Jersey State Museum and their crew of four experts. Teachers, educators, dinosaur lovers, and a group of friends from the tech industry are joining us via the Bighorn Basin Dinosaur Project. Altogether there are about 20 in our group. We'll be split into two teams for most of the week, half the group heading out with Poole to the *Suuwassea* site and half with Schein to another site where he has unearthed a possible *Triceratops*.

Sunday evening is for instructions. We get updated on the weather and terrain, safety requirements, the wildlife we might encounter, the basic fieldwork techniques, and other odds and ends.



Jason Poole lectures the group on dinosaur anatomy at the Yellowstone Bighorn Research Association's main lodge.

Photos by Mike Servedio/ANS

MONDAY

Mornings start early at YBRA, which organizations and colleges around the country use as a staging ground for environmental education. Breakfast is at 7 a.m. sharp and we're due to hit the road by 7:45 a.m. for the hour-long drive to the field site. We've known since last night that Monday's weather isn't looking ideal. There's rain in the forecast for the basin (which receives less than a few inches of

rain per year). That makes the dusty, rutted roads impassable even for our big trucks.

By the end of breakfast, the crew has determined the rain is going to keep us from the sites today. The disappointment is palpable among everyone, especially Poole and Schein. We spend the day exploring the Wyoming Dinosaur Center, located at the southern margin of the Bighorn Basin in Thermopolis, Wyoming.

TUESDAY

Tuesday is looking much more promising for fieldwork and proves to be so, with clear skies and no precipitation in the forecast. Our two vehicles are on the road before 8 a.m. I'm with Poole and the *Suuwassea* team, and everyone is chomping at the bit to get to the site. We listen to a playlist of songs about paleontology. A cellphone rings, the *Jurassic Park* theme song signaling an incoming call. Dinosaurs are definitely on our minds.

The drive out is long and we traverse increasingly rough roads, with the final miles just through open desert. We park on a bluff overlooking the entire Bighorn Basin, where we can see almost 100 miles in every direction.

Poole is clearly excited as we make our way down the hill to the site. He's been to the site already this season to drop off tools and equipment, but this is the first day of digging. He gathers the team in a circle, and as the tarp is pulled up we are exposed to our first fossils of the trip. An obvious set of ribs protrudes from the dirt. Poole smiles and grabs a brush. It's time to get to work.

The crew arranges tools as Poole gives instructions. The first goal is searching the area for "float"—fossils that are sitting on top of the dirt. We scan the areas around the bones sticking out from the ground and gather any obvious fossils. We clear, bag, and note the float in field books. Two minutes into working, the most common question of the week arises: "Is this a fossil or a rock?"

Our tools are fairly basic and you probably have most in your garage. There are old paintbrushes, brooms, steel shovels, screwdrivers, and awls. Poole has mixed a jar of glue that will be used to attach broken fossils to larger bones.

It's time to try to figure out how much of *Suuwassea* is still below the dirt. The team needs to locate the edges of the obvious exposed ribs and the edges of what appears to be a more robust fossil bed.

It's at this point that I realize that paleontology fieldwork is a lot like people think it is. Or at least how I've always thought it was, even before working for the Academy. Much of the next two days is spent around the fossil bed, patiently pushing away thousands of years of dirt to expose small bits of bone left behind. The dirt itself is first swept away with brooms and then smaller brushes.



Rocks are cracked with screwdrivers and awls and then moved away from the site. Poole and the team look down at the site from a distance and hypothesize how the dinosaur might be buried in the ground.

The minutiae of the work make it seem like it will take forever to unearth enough fossil to jacket and bring back to the Academy. But even as we approach the end of our first day, the crew has made obvious progress. We've cleared piles of dirt from the edges of the site, sifted the dirt (above), and pushed it off to the side. The edges of the rib bones are clear, and more fossil has been exposed. But even more exciting may be the discovery of additional

bones. We've found vertebrae and a possible skull bone just above the ribs. So much of the skull bone is exposed that Poole thinks we might be able to excavate it tomorrow.

WEDNESDAY

We are able to jacket the fossils by the next afternoon (page 11, top right). Putting a jacket (a coat of plaster and other padding) around each fossil and the rock it is embedded in will protect it during the long drive back to Philadelphia. The team makes quick work of jacketing the top of the fossil before Poole digs out the bottom. I'll next see the bowling ball-size jacket back at the Academy in the first week of August.



THURSDAY *Servedio joined the Triceratops excavation team led by New Jersey State Museum paleontologist Jason Schein. On a hillside 15 miles from the Suuwassea dig site, the team used power tools to cut away exceptionally hard layers of rock around a Triceratops horn.*

FRIDAY

Friday is my last day in the field and I'm back at the *Suuwassea* site after spending Thursday at the *Triceratops* field site (page 10, bottom right). I'm surprised to see the progress made in just one day. The rocks around the vertebral area are more exposed. The ribs are completely exposed. There's a fresh lead on a new area where a couple of possible tail bone fossils have been found near the top of the dirt.

The crew continues with the regular brushing, sweeping, and shoveling. Today is also about mapping. A team member brings out a drone to take aerial pictures over the site, which now has a grid placed over it (below, left). The team takes a water break and watches the buzzing machine swoop overhead.

The day ends with prepping the site for next week when a new team from the Bighorn Basin Dinosaur Project will resume the work. Friday night is our last night together and we celebrate in nearby Bearcreek at a local steakhouse and saloon that also has pig races out back.



I leave early on Saturday morning for a quick weekend adventure in Yellowstone and Grand Teton National Parks. Back home in Philadelphia the following week, my long to-do list includes writing this piece and sorting through all the pictures and videos I've captured on the trip. But jumping back into my work at the Academy proves difficult. I sit at my desk on my first day back and check Twitter and Facebook for updates from the field. I watch over the next few weeks as the team makes close to a dozen jackets to bring back home.

Schein arrives at the Academy with a trailer full of fossils the first week of August. I'm surprised by the connection I feel to these ancient bones. Today, as I finish this piece, Poole has invited me down to the Fossil Prep Lab to watch the first jacket being opened. I can't wait to hear more of the story these bones have to tell. 🌿



Mike Servedio is the Academy's web and social media manager. You can check out his posts from the field and connect with the Academy on Facebook, Instagram, and Twitter @AcadNatSci. Turn to page 5 for more information on Servedio and his work at the Academy.

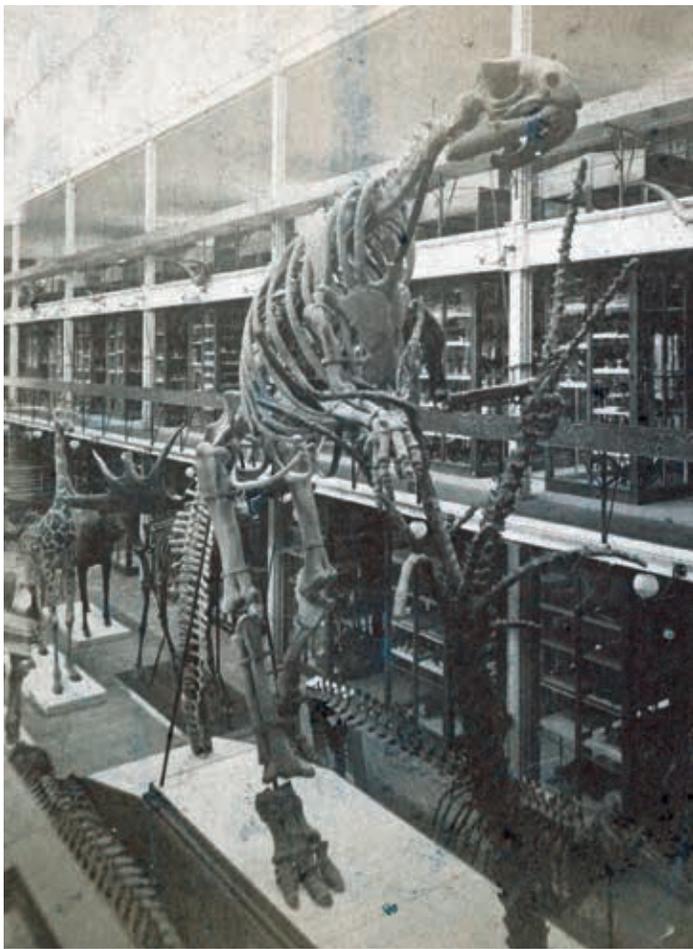
HADROSAURUS FOSSIL FINDS

By Jennifer Vess, Brooke Dolan Archivist

In 1947 in Sewell, New Jersey, the crew of a mining operation for the water-treatment company Hungerford and Terry Corporation noticed something a little strange in the sediments they were excavating. The crew had uncovered dinosaur fossils and, recognizing their importance, contacted Academy paleontologist and geologist Horace G. Richards to come out and take a look.



ANS Archives Coll. 990



The fossils they uncovered would soon be described as the “best materials recovered from this region since the original find of 90 years ago.” The “original find” was the 1858 discovery of a nearly complete skeleton described and named by Joseph Leidy as *Hadrosaurus fouldii* (left).

With the blessing of the Hungerford and Terry Corporation, Richards brought in Edwin H. Colbert, a vertebrate paleontologist from the American Museum of Natural History (AMNH) who also worked part time for the Academy. The excavation team consisted of staff from the Academy and the AMNH, and the fossils were prepared by Richards as well as Jack Graham of the United States Geological Survey. In the end four different institutions were involved in the discovery of the fossils.

The excavation team recovered about 40 bones and a number of bone fragments, all belonging to a single skeleton. With these fossils Colbert was able to identify the animal as *Hadrosaurus minor*, a species first identified by paleontologist O.C. Marsh in 1870. Marsh had named the species from a somewhat small collection of bones, but with this new discovery Colbert felt that the species “rests upon a much firmer foundation than it formerly did.”

Only a few months after the discovery of the fossils, the Academy put them on display, sharing with the public the discovery and science in action. Colbert also wrote a paper about the discovery for the *Proceedings of the Academy of Natural Sciences*. The bones (below) are still held here in the Academy’s Vertebrate Paleontology Collection.

The Archives holds a series of correspondence between the Academy president Charles M.B. Cadwalader, the Hungerford and Terry Corporation, and Colbert documenting the progress of the excavation and the exhibition. The photographs shown on page 12 are snapshots taken at the site, referred to in labels as the Inversand Pit. ☞



PETER A. AUSTEN: CHAIR OF THE BOARD OF TRUSTEES

“ I get excited about what the future holds, when you consider the unheralded role the Academy plays in research about the world we live in. Alongside Drexel University, we are transforming our community. — *Peter A. Austen* ”

IT ALL STARTED ABOUT 20 YEARS AGO DURING A LONG LUNCH BREAK. Peter Austen was new to Philadelphia, having moved to the area to wed Mary Stengel, president and CEO at Tierney. He was taking a midday stroll through Logan Square when he stepped into the Academy of Natural Sciences for a look around.

Four to five hours later, Austen left the museum wanting to know more about the Academy’s roots, visitors, and everything he wasn’t seeing—especially the millions of specimens and stories behind the scenes. Since most of his colleagues and friends hadn’t visited the Academy since childhood, he set out on his own (and over the years with one or more of his five children and their friends in tow) to find out what makes the Academy an enduring Philadelphia institution.

Two decades later, Austen, a senior executive with global insurance broker Willis Towers Watson, thinks he has found his answer. As the child of educators and an active supporter of various causes within the city of Philadelphia, he finds inspiration in offering high-quality educational programs to students, including those who might not otherwise have access to science enrichment. The Academy is able to provide these opportunities, he says, because of its distinctive permanent exhibits and extraordinary efforts to share science and current research with schoolchildren.

He is most motivated to support the Academy’s work when he sees students fall in love with science during field trips, school visits, and programs like Women In Natural Sciences, the Academy’s after-school and summer science enrichment program for young women in our city’s public schools.

A deep believer in the Academy’s community commitment, Austen supports the institution through philanthropy, advocacy, and engagement with our Board of Trustees. This summer, after six years of service on the Academy’s Board, including on the

Governance and Marketing and Public Experience committees, Austen became Chair.

“We don’t always get the opportunity in life to apply our energy and efforts to something we are passionate about and believe in,” Austen says. “Fortunately, I am doing just that.”

Austen says he is eager to lead the Academy’s staff and board into the future, especially considering the extraordinary institutional changes that have taken place within the last five years. During his time on the Board he has seen the formation of a productive partnership with Drexel University, efforts to create a sustainable operating model for the institution, and deep engagement with the philanthropic community in Philadelphia and beyond. He credits President and CEO George Gephart’s visionary leadership for perfectly situating the Academy as a catalyst for educational and environmental action in our community.

With an engaged, passionate, and talented staff and Board of Trustees driving change, the opportunities for our institution are vast, Austen says. His goal is to bring together the strengths and visions of Academy staff and Trustees to drive our science research and education forward.

“I get excited about what the future holds, when you consider the unheralded role the Academy plays in research about the world we live in,” Austen says. “Alongside Drexel University, we are transforming our community.”



YEAR-END CHARITABLE GIVING OPTIONS

AS ANOTHER YEAR COMES TO A CLOSE, YOU MAY HAVE ALREADY STARTED THINKING ABOUT FINANCIAL CONSIDERATIONS. For many people—whether it's for philanthropic reasons, tax planning reasons, or both—one consideration is charitable giving.

There are many financially efficient ways for you to give at the end of the year. Here are a few of the most popular:

GIVING GIFTS OF STOCK

Gifts of appreciated stock are an excellent way to avoid the capital gains tax you'd pay on an appreciated asset if you sold it, and you receive a charitable deduction for the full market value of the stock.

If you have stock that has decreased in value, another strategy is to first sell stock—generating a tax loss you can use to offset any capital gains income—and then gift the sale proceeds, which further results in a charitable deduction.

DONOR-ADVISED FUNDS

The Academy's partnership with Drexel University offers a unique charitable giving opportunity through the Drexel Donor Advised Fund (DAF). Establishing a Drexel DAF is a tremendously effective tool if you're

looking to generate a charitable deduction in 2016 but aren't sure where you want your money to go. You give a gift of cash, appreciated securities, and other assets to your DAF, which in turn gifts the value of the assets to the Academy of Natural Sciences of Drexel University and to other charitable organizations of your choice. Once you've had time to think about where you want the funds to go, you can direct the money each year to the charitable recipients you choose.

A DAF can also be a way to involve your children or other family members in charitable giving, since multiple authorized users are permitted to direct where gifts go. Additionally, a DAF can offer anonymity if you'd like to keep your giving information private.

CHARITABLE TRUSTS

As you begin to plan for 2017, you may want to learn more about creating a charitable trust for future tax years.

Charitable lead trusts allow you to transfer assets that either produce income or are expected to experience strong growth to your heirs while providing a gift to a charity in the form of income during the term of the trust. You get a tax deduction for the value of the income stream going to charity—so

the lower the discount rate, the greater your tax deduction. The assets remaining in the trust can be left to your heirs. The value of your gift to your heirs is the fair market value less the gift to charity, which means the charitable gift completely offsets the gift going to your heirs, making it effectively \$0 for estate and gift tax purposes.

Charitable remainder trusts are the reverse of charitable lead trusts. The income beneficiary can be you or someone else, and whatever remains in the trust at the end of the trust term goes to charity. These trusts aren't as attractive in low interest rate environments, but they may be worth considering for the future depending on your charitable goals and your income needs.

THINKING AHEAD

Please don't hesitate to contact our Office of Institutional Advancement to learn more about how to make the most of your charitable giving and which solutions may work best for you as you consider supporting the Academy. If you have questions about how to support the Academy, please contact Vice President of Institutional Advancement Monica Cawvey Gallagher at 215-299-1013 or cawvey@ansp.org. She would be delighted to assist you. Thank you for your support! ☺

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:

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- **EXCLUSIVE PREVIEWS** of Academy exhibits
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PHILADELPHIA SHELL SHOW

Thousands of shells will be on display and for sale at the annual Philadelphia Shell Show, **October 22–23** at the Academy of Natural Sciences of Drexel University. The largest of its kind in the Northeast, the show features beautiful, competitive displays on mollusks by collectors, amateur scientists, and artists. Visitors will have the chance to shop an international shell market packed with jewelry, shells, books, and more. Members of the Philadelphia Shell Club will be on hand to answer questions and identify shells you've collected during your travels. More at ansp.org

Mike Servidio/ANS



PALEOPALOOZA

Join us on **Saturday and Sunday, March 4–5**, for Paleopalooza, a two-day fossil festival of gigantic proportions. See real fossils from our world-famous collection, meet expert paleontologists, and take guided tours of Dinosaur Hall. Plus enjoy hands-on activities, crafts, and dinosaur-themed fun for the whole family. Don't miss the new exhibit *Frogs: A Chorus of Colors* in the Academy's Special Exhibits Gallery! More details soon at ansp.org.



Paul Janrogo/wires/Drexel University for ANS

WILD WIZARDING WEEKEND

Explore the magical world of the Academy's phenomenal beasts with a weekend of spellbinding, hands-on activities! Meet the Academy's own live beasts and learn about the real animals that inspire your favorite wizarding stories. Take in a Bunny and Broomsticks game, make a magical wand, and take home a dragon's egg during this wild weekend. Wear a costume—wizards are welcome! More at ansp.org.

FROGS MEMBER PREVIEW

Mark your calendars and be the first to see *Frogs: A Chorus of Colors* at our Member Preview on **Friday, February 3**. Bring the whole family to check out live frogs of many hues, listen to their colorful chorus, and admire the many ways they swim, hop, glide, and soar. You can hop into a frog's world as you inspect frog habitats complete with rock ledges, live plants, and waterfalls. Plus see live frogs in action, search for hidden frogs, create a nighttime frog chorus, spin a zoetrope to see how a frog jumps, and conduct a virtual frog dissection. The best part? This special evening is free to Academy members like you! Registration will be available in January on ansp.org.



Mike Servidio/ANS

WINTER BREAK

Spend your winter break with us! Warm up in *Butterflies!*, spend some time with our live animals, catch exciting new stage shows, and visit the roaring, moving dinosaurs in *Dinosaurs Unearthed*. On Bugs and Butterflies Day (**Dec. 27**), experience up-close encounters with beetles, cockroaches, and tarantulas as you discover what makes a bug's life extra special. *Dinosaurs Unearthed* Day (**Dec. 28**) will rock with chances to examine fossils, meet living relatives of ancient beasts, and explore the world of the dinosaurs. Fur, Feathers, and Scales Day (**Dec. 29**) offers a full day of live animal fun. And Weird-Things-in-Jars Day (**Dec. 30**) is exactly what it sounds like—see strange specimens up close and find out how scientists preserve them in jars for future research! Don't forget to mark your calendars—the Academy also will be open on **January 1!** More at ansp.org.



Joe McDonald

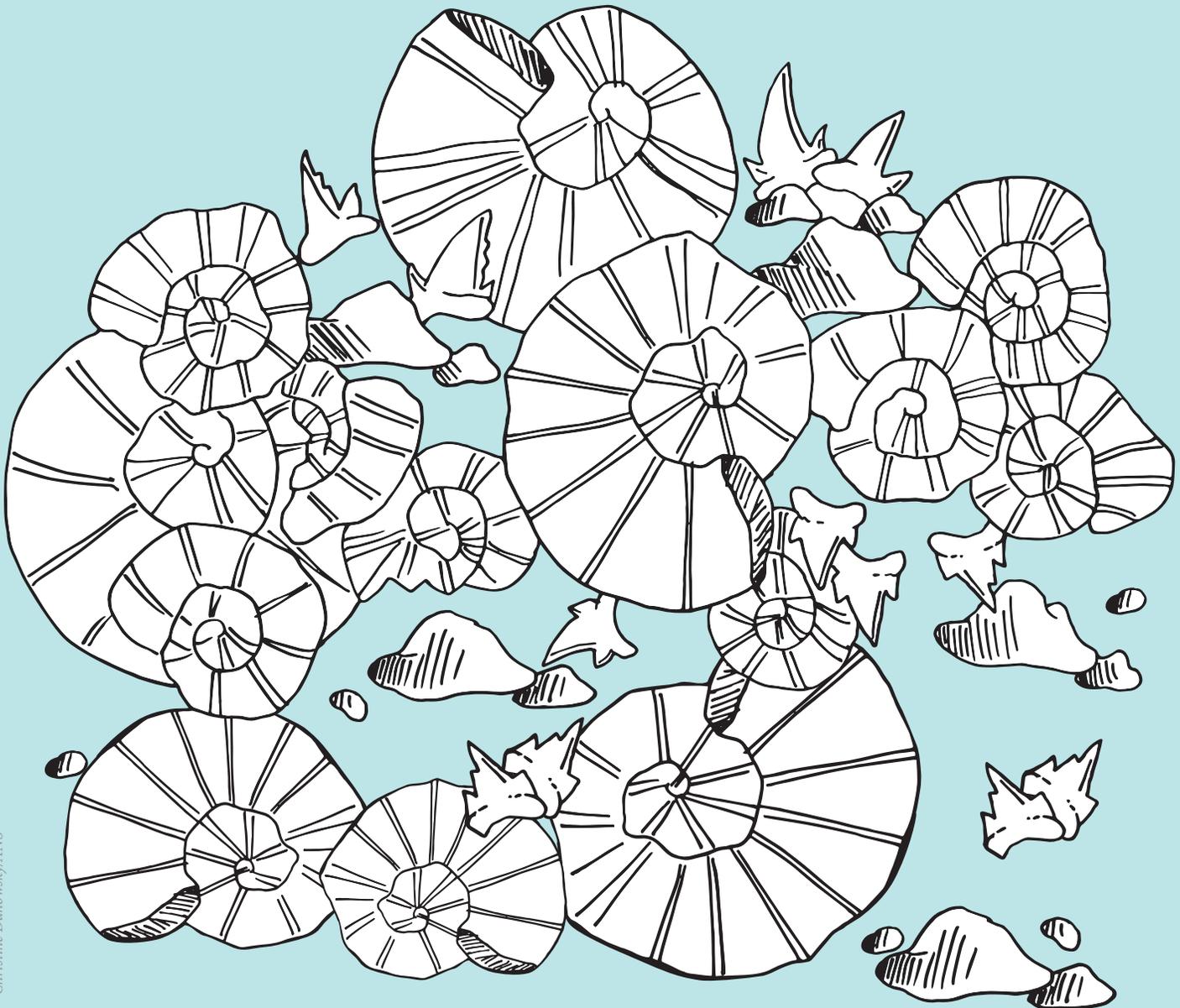


JUST FOR KIDS

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

Shells and Shark Teeth

What colors do you think you can find in the ocean? Pick two of your favorites. Make the shells one color and make the shark teeth another color. Then count how many shells and shark teeth you see. Visit *Outside In* to dig for shark teeth and play on the sandy beach during your next trip to the museum!



Christine Danowski/ANS

ACADEMY PRINTING PARTNER



FPO Green symbols here

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CALENDAR OF EVENTS

OCTOBER

DINOSAURS UNEARTHED IS OPEN!

Now through January 16 *

FEDERAL DUCK STAMP STORY EXHIBIT

Now through November 1

DINO-MITE WEEKENDS

Saturdays and Sundays,
October 1-2, 8-9, 15-16, 22-23, and 29-30

NATIONAL FOSSIL DAY

Wednesday, October 12

SCOUT DAY: DINOSAURS

Saturday, October 15

PHILADELPHIA SHELL SHOW

Saturday and Sunday, October 22-23
10 a.m.-5 p.m.

NOVEMBER

TREASURES FROM THE MINERAL VAULT

Opens Saturday, November 5

WILD WIZARDING WEEKEND

Friday through Sunday, November 25-27

DECEMBER

ALL-STAR DAYS

Tuesday through Friday, December 27-30

JANUARY

OPEN NEW YEAR'S DAY

Sunday, January 1

DINOSAURS UNEARTHED

AFTER DARK FAMILY OVERNIGHT

Saturday, January 7, 6 p.m.-
Sunday, January 8, 9 a.m.

DINOSAURS UNEARTHED

CLOSING WEEKEND

Saturday-Monday, January 14-16 *

FEBRUARY

MEMBER OPENING FOR *FROGS* EXHIBIT

Friday, February 3, 5:30-9 p.m.

FROGS: A CHORUS OF COLORS

OPENING WEEKEND

Friday and Saturday, February 4-5 **

CELEBRATE FROGUARY

Saturdays and Sundays,
February 4-5, 11-12, 18-19, and 25-26 &
Presidents' Day Monday, February 20

SCOUT DAY:

REPTILES AND AMPHIBIANS

Saturday, February 25

MARCH

PALEOPALOOZA

Saturday and Sunday, March 4-5

NIGHT IN THE MUSEUM

Saturday, March 11, 6 p.m.-
Sunday, March 12, 9 a.m.

FOUNDERS' DAY: PAY WHAT YOU WISH

Monday, March 20

APRIL

NIGHT IN THE MUSEUM

Saturday, April 1, 6 p.m.-
Sunday, April 2, 9 a.m.

ANIMAL SUPERHEROES WEEKEND

Saturday and Sunday, April 1-2



Mike Servidio/ANS

Free for members Fee Registration required

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

*\$4 Individual, Family, and Family Plus level member fee for *Dinosaurs Unearthed*; Partners' Club level members and above receive free admission. **\$3 Individual and Family level member fee for *Frogs*; Family Plus level members and above receive free admission. Purchase or renew your membership today at ansp.org/membership.

Visit ansp.org for more information and to register.

