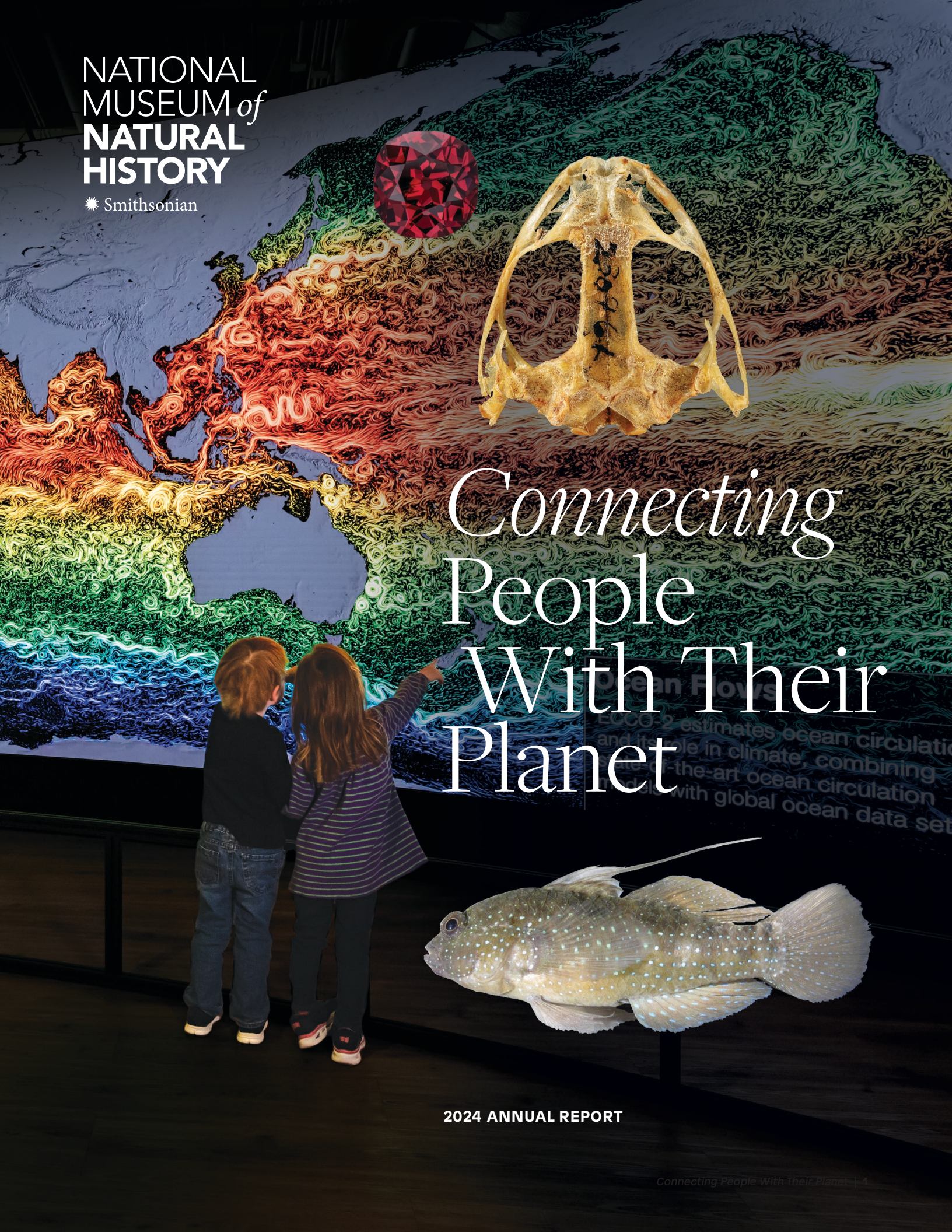
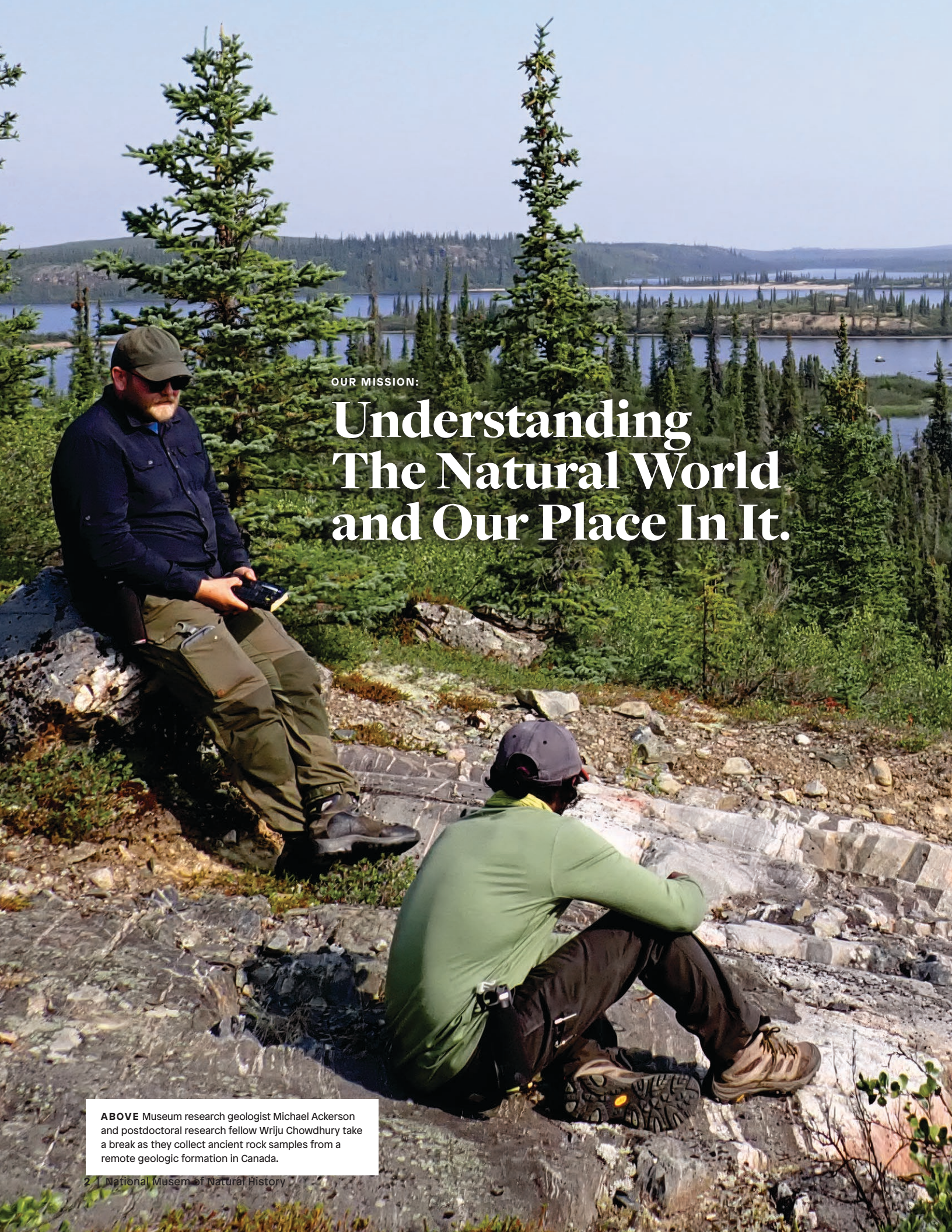


NATIONAL MUSEUM *of* NATURAL HISTORY

Smithsonian

Connecting People With Their Planet

2024 ANNUAL REPORT



OUR MISSION:

Understanding The Natural World and Our Place In It.

ABOVE Museum research geologist Michael Ackerson and postdoctoral research fellow Wriju Chowdhury take a break as they collect ancient rock samples from a remote geologic formation in Canada.

DEAR FRIENDS,

Our planet is unique—a hospitable haven bursting with life and covered in water and continents.

The only constant on our planet is change. Over the eons, continents have drifted, climates have fluctuated, and innumerable life forms have originated, diversified and disappeared.

Our planet remains in flux, and the upcoming decades and centuries will continue this cycle, bringing even more changes, including many that can be traced back to us.

As the home of the world's largest natural history collection, the National Museum of Natural History safeguards a detailed history of our planet's future. This sprawling record contains clues into how life has responded and adapted to tumultuous times in the past.

The museum's world-class researchers analyze Earth's natural history every day, uncovering insights that may help forecast our planet's future.

In 2024, this work was at the forefront of our efforts.

The museum's paleobiology team completed a years-long effort to chart Earth's global surface temperatures over the last 485 million years. Their results offer the most detailed look yet at temperature change over a vast swath of the planet's history and add a deep time context to current climate trends.

Global change is a major theme of the museum's latest exhibition, "NASA's Earth Information Center @ NMNH." Utilizing data collected by NASA satellites and research by Smithsonian scientists, the immersive exhibit displays awe-inspiring visualizations of a constantly changing Earth on a giant state-of-the-art video wall.

Few researchers went further back in time than members of the museum's mineral science team who ventured into the Canadian Arctic in search of the oldest rocks on Earth. The samples they brought back contain minerals that originated billions of years ago.

Understanding our planet's changing past can give us the tools to predict its future. This work, critical to building a sustainable path forward, could not have been made possible without a network of supporters and partners like you.

We thank you for your continued contributions to the museum.

Sincerely,

W. Matthew Kelly,
Board Chair

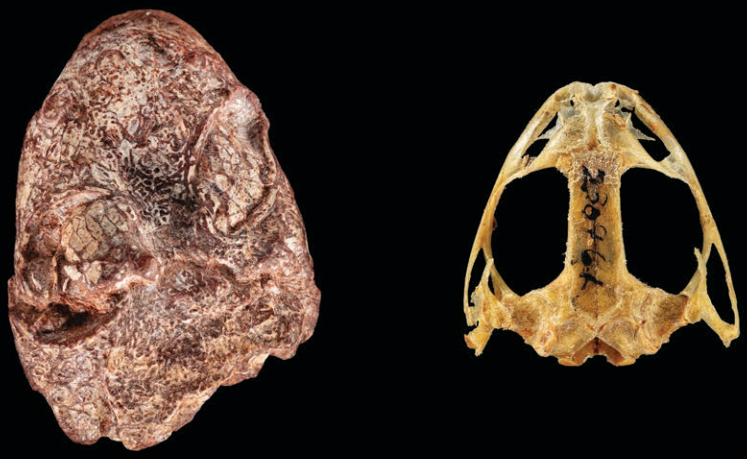
Kirk Johnson,
Sant Director

RESEARCH SPOTLIGHT

Prehistoric Amphibian Ancestor Discovered in Museum's Collection Named After Kermit the Frog

Discovery Sheds Light on the Origin of Living Frogs and Other Amphibians and Pays Homage to the Iconic Muppet

RIGHT The fossil skull of *Kermitops* (left) alongside a modern frog skull (right).



270 million years ago, an ancestral amphibian that resembled a stout salamander lived in a primeval swamp in what is now Texas. The creature's fossilized skull was unearthed by the late Smithsonian paleontologist Nicholas Hotton III in 1984. However, decades would pass before researchers were able to give the fossil a closer look.

In March, researchers formally described the skull as a new species of proto-amphibian named *Kermitops* gratus in the *Zoological Journal of the Linnean Society*. The team was led by Calvin So, a doctoral student at the George Washington University, and Arjan Mann, a postdoctoral paleontologist at the museum and a former Peter Buck Fellow, who named the ancient critter after the iconic Muppet, Kermit the Frog.

Kermitops's skull, which measures just over an inch long and possesses large, oval-shaped eye sockets, displays traits seen in both older tetrapod groups and younger amphibians. The fossil's mishmash of traits and age help flesh out an intriguing period in the evolution of amphibians and their kin.

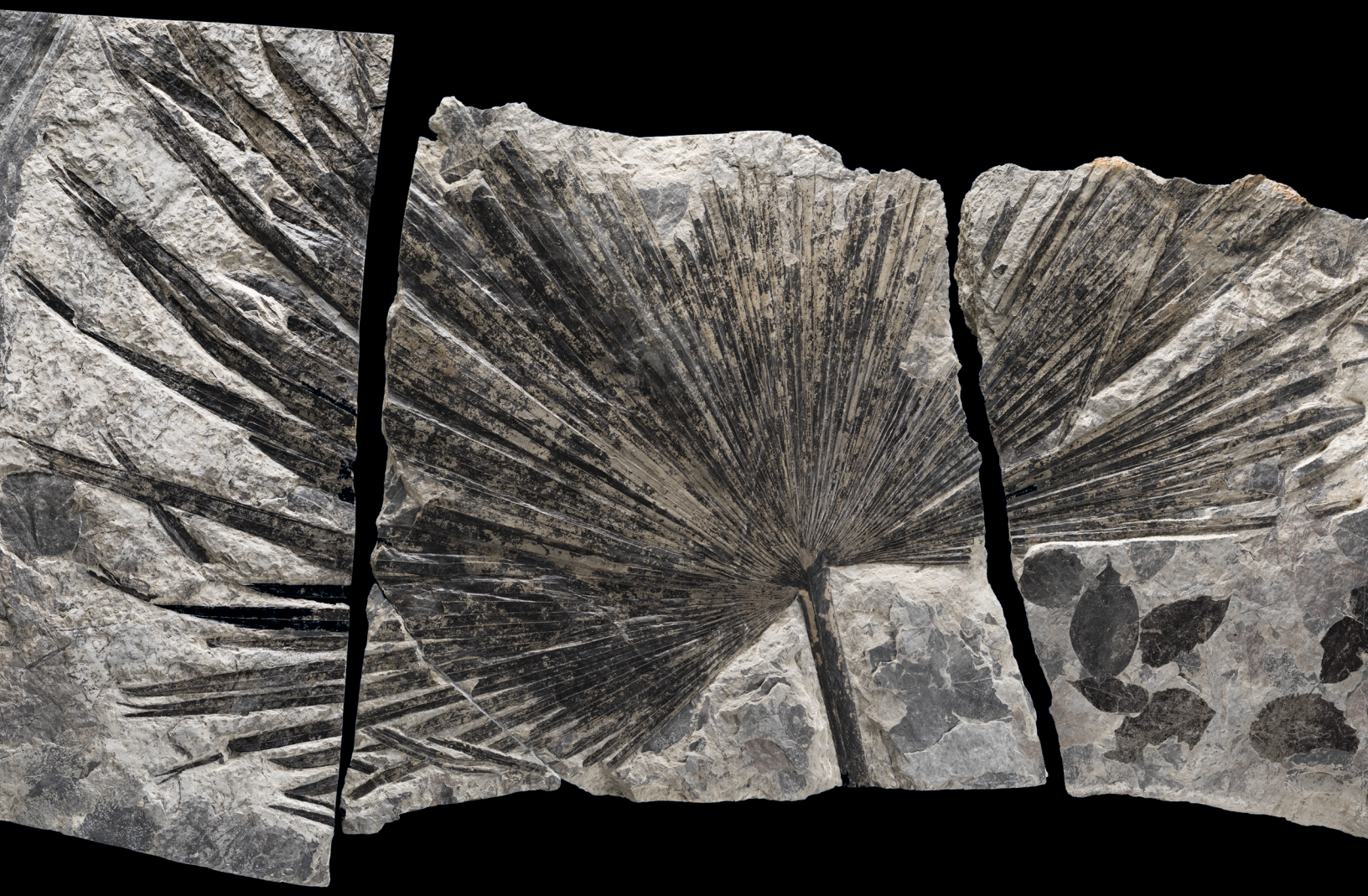
The researchers hope that naming the new creature after the beloved frog character is an opportunity to get people excited about the discoveries scientists make using museum collections.

"Using the name Kermit has significant implications for how we can bridge the science that is done by paleontologists in museums to the general public," So said. "Because this animal is a distant relative of today's amphibians, and Kermit is a modern-day amphibian icon, it was the perfect name for it."

ABOVE Arjan Mann, a Smithsonian postdoctoral paleontologist and former Peter Buck Fellow, examines *Kermitops* in the museum's fossil collection.

Earth's Global Temperature Has Drastically Changed Over the Past 485 Million Years

Smithsonian-Sparked Study Underscores Perils Presented by Unprecedented Rate of Human-Made Warming



In September, museum scientists helped create the most detailed glimpse yet of how Earth's surface temperature has changed over a vast swath of the Phanerozoic Eon, a period when life diversified, populated land and endured multiple mass extinctions. Their findings, published in the journal *Science*, reveal that global mean surface temperatures (GMST) have varied more than previously thought over the past 485 million years and are strongly correlated to the amount of carbon dioxide in the atmosphere.

The new paper is part of an ongoing research effort that began in 2018, when paleobiologists Scott Wing, Brian Huber and other Smithsonian researchers were helping develop the museum's "David H. Koch Hall of Fossils — Deep Time." The new hall aimed to put the museum's fossils in context by highlighting how Earth's climate has changed over the past half-a-billion years. For example, several specimens — including fossilized palm fronds found in Alaska (left) — attest to a period in Earth's past when global temperatures were much warmer than today.

The team wanted to provide museum visitors with a curve that charted Earth's GMST across the Phanerozoic, which began around 540 million years ago and continues into the present day. But Wing and Huber were surprised to find that a reliable temperature curve for this period did not yet exist.

The team, which was co-led by researchers at the University of Arizona, created the new temperature curve utilizing an approach called data assimilation. This allowed the researchers to combine data from the geologic record and climate models to create a more cohesive understanding of ancient climates.

"This method was originally developed for weather forecasting," said Emily Judd, the lead author of the new paper and a former postdoctoral researcher at the museum and the University of Arizona. "Instead of using it to forecast future weather, we're using it to hindcast ancient climates."

Refining how Earth's temperature has fluctuated over deep time provides crucial context for understanding modern climate change. "If you're studying the past couple of million years, you won't find anything that looks like what we expect in 2100 or 2500," said Wing, the museum's curator of paleobotany whose research focuses on the Paleocene–Eocene Thermal Maximum, a period of rapid global warming 55 million years ago. "You need to go back even further to periods when the Earth was really warm, because that's the only way we're going to get a better understanding of how the climate might change in the future."

The climate curve revealed that Earth's current global temperature is cooler than during much of the Phanerozoic. But greenhouse gas emissions are currently warming Earth's temperature much faster than any other time during the Phanerozoic. This rapid rate of warming puts species and ecosystems around the world at risk.

ABOVE Museum paleobiologist Scott Wing stands in the snow-covered badlands of Wyoming, where alligators once lived 56 million years ago.

ABOVE The Acasta Gneiss rocks contain a multitude of layers that are sandwiched together, each with a different geologic age than the layers above and below.

Venturing into the Canadian Wilderness in Search of Earth's Oldest Rocks

A Remote Region of the Northwest Territories is Home to Ancient Minerals that Could Provide Insights into How Earth's Continents and Oceans Originated

Earth formed over 4.5 billion years ago. However, little is known about the conditions of primordial Earth due to a lack of rocks from the planet's earliest period.

"The earliest rocks on our planet tell a story of the nascent stages of Earth before modern-style plate tectonics and long before life," said Michael Ackerson, a research geologist at the museum. "Analyzing these rocks is the only direct way for us to observe the Earth 4 billion years ago, but it is almost impossible to find them."

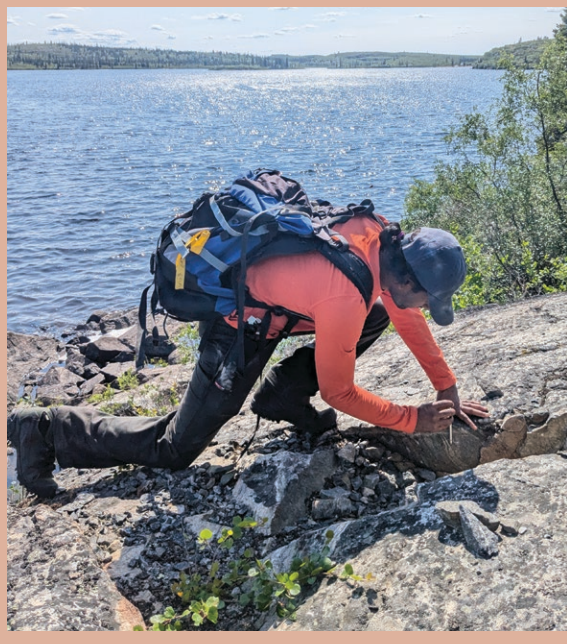
To help fill in this knowledge gap, Ackerson and Wriju Chowdhury, a postdoctoral research fellow at the museum, led an expedition to a rock formation known as the Acasta Gneiss in Canada's Northwest Territories. The rocks in this region contain ancient minerals that may date back billions of years.

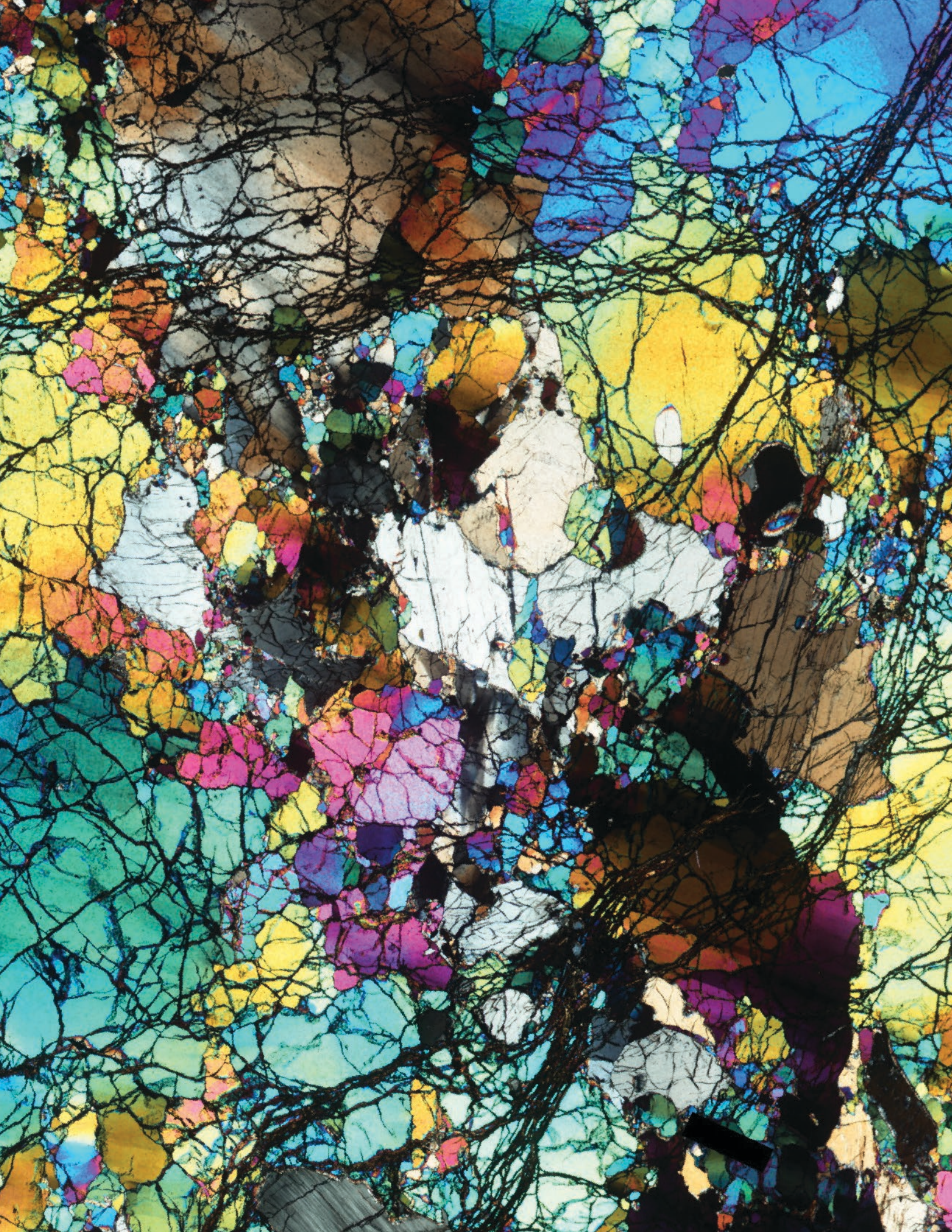
This trip was far from a vacation. The remote field locations were far from civilization and could only be accessed via float plane. Despite being close to the Arctic Circle, the temperatures were blistering, and the sun stayed up around the clock. Much of the researchers' days were spent bush-wacking through marshy tundra, swatting at mosquitoes and wielding rock hammers to collect samples.

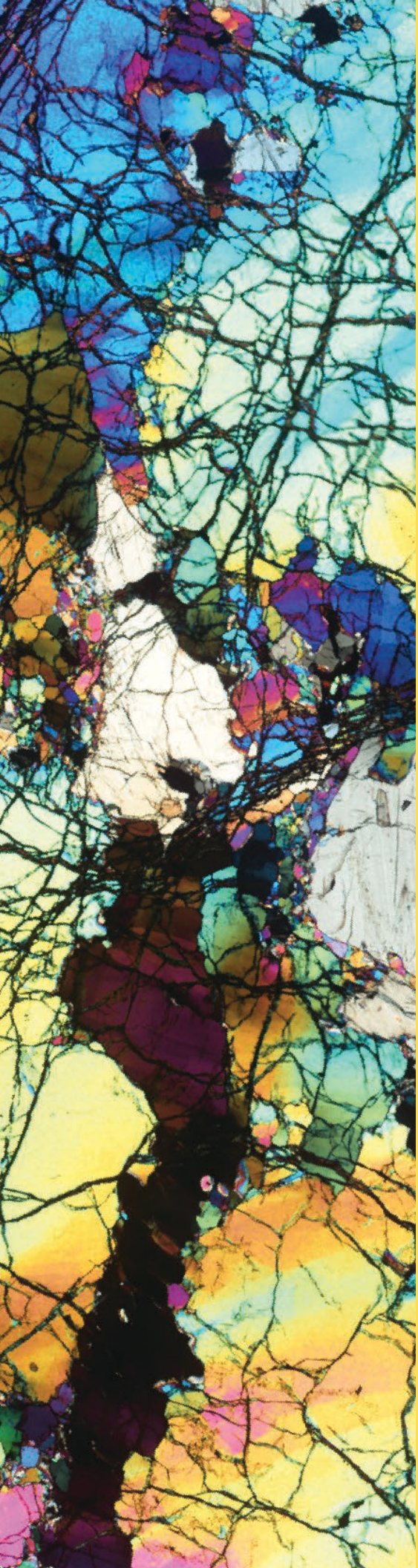
However, the researchers were beyond grateful for the opportunity. "During the entire expedition, we kept pausing to appreciate the absolute privilege that it was to be out there," Chowdhury said. "We had the opportunity to stand on the oldest rocks on the planet, and that was only possible because dozens of people at the Smithsonian helped us make it happen."

The team collected more than 1,000 pounds of rock from the Acasta Gneiss. Ackerson and Chowdhury are working to process the samples into the museum's National Rock and Ore Collection, where they will be available for generations of future scientists to study. "These rocks are so rare, very few people have ever had access to them," Ackerson said. "But now, the entire scientific community can work together to answer some of the biggest questions about our planet."

Ackerson and Chowdhury will also conduct their own analyses of the materials, looking for chemical signatures in the rocks that could contain information about the environments in which they were created. This work is part of the museum's Our Unique Planet initiative, which seeks to further our understanding of the origins of the continents, the oceans and life on Earth.







Conducting New Analyses on Ancient 'Time Capsule' Rocks, at Least 2.5 Billion Years Old

New Study Supports Stable Mantle Chemistry Dating Back to Earth's Early Geologic History Museum researchers recently analyzed a group of rocks from the seafloor thought to be at least 2.5 billion years old.

Museum researchers recently analyzed a group of rocks from the seafloor thought to be at least 2.5 billion years old. These rocks, which formed along two oceanic ridges where tectonic plates are spreading apart, contain clues that help clarify the chemical history of the Earth's mantle — the geologic layer beneath the planet's crust.

Elizabeth Cottrell, chair of the museum's department of mineral sciences and curator of the National Rock Collection, worked with a team of researchers including Suzanne Birner, who completed a pre-doctoral fellowship at the museum, to study the samples. Their findings, published in the journal *Nature* in July, reveal that the oxidation state of the vast majority of Earth's mantle has remained stable through geologic time and has not undergone major transitions, which challenges what other geologists have previously theorized.

"This study tells us more about how this special place in which we live came to be the way it is, with its unique surface and interior that have allowed life and liquid water to exist," Cottrell said. "It's part of our story as humans because our origins all trace back to how Earth formed and how it has evolved."

LEFT A thin slice of the ancient rocks collected from Gakkel Ridge near the North Pole, photographed under a microscope and seen under cross-polarized light.

BELOW Bamboo octocorals display bioluminescence in the Bahamas.

OCEAN SCIENCE CENTER

Catalyzing Change and Action by Advancing and Sharing Knowledge of the Ocean

Smithsonian Scientists Discover that Ancient Corals Evolved Bioluminescence 540 Million Years Ago

A variety of creatures, including glow worms, squids and anglerfish, utilize chemical reactions in their bodies to produce light. Known as bioluminescence, this behavior has evolved nearly 100 times, making it difficult to discern when exactly animals first began to glow.

A team of researchers, including Andrea Quattrini, the museum's curator of corals, and Danielle DeLeo, a museum research associate and former postdoc, recently examined the evolution of octocorals. This ancient group of animals includes soft corals and sea fans, many of which produce bioluminescence when disturbed.

The team compared octocoral fossils and genetics to create an evolutionary tree for the group. Their analysis, published in the *Proceedings of the Royal Society B* in April, revealed that octocorals began producing bioluminescence at least 540 million years ago. This is nearly 300 million years older than the previous estimate for the dawn of bioluminescence.

Pioneering eDNA Research

Even if you can't always see them, traces of life on Earth are all around you. A small scoop of sea water may look unremarkable, but it is teeming with the genetic "fingerprints" of local marine life including fish and mollusks.

Scientists have begun to analyze these genetic signatures, which are known as environmental DNA (eDNA). Just as detectives use clues to solve a case, researchers sift through water and soil samples for eDNA — which includes things like skin, blood and hair cells — to piece together a comprehensive picture of a local ecosystem.

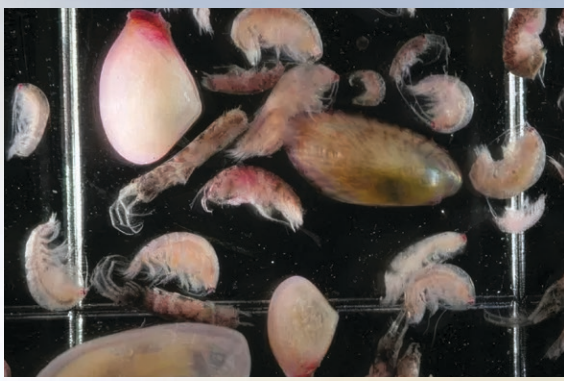
Since launching its Ocean DNA Program last year, the museum has leveraged its ongoing eDNA research at marine sample sites around the world. This revolutionary technology allows researchers to efficiently catalogue biodiversity without destroying natural habitats.

To fine tune these datasets, the Ocean DNA team utilizes the museum's vast collection of physical specimens. By sequencing genetics from preserved sea creatures, researchers can match eDNA fragments with specific species.

Scientists at the museum are currently using this approach to create a genetic database of the 4,000 species of marine fish swimming through United States waters. The team has already sequenced DNA from over a third of those species in the museum's U.S. fish collection.

Smithsonian researchers are also collecting eDNA samples as part of the long-term monitoring programs at the Smithsonian Marine Station in Fort Pierce, Florida. As they continue to collect environmental samples, the team will run their results through the growing reference database and fill in any gaps they do not already have catalogued.

The Ocean DNA team has taken a significant role in promoting eDNA research with other institutions and government agencies. In June, the museum hosted the National Workshop on Marine eDNA with Johns Hopkins University, bringing researchers, practitioners and policymakers together to discuss the strategy and their plans for the future of eDNA.



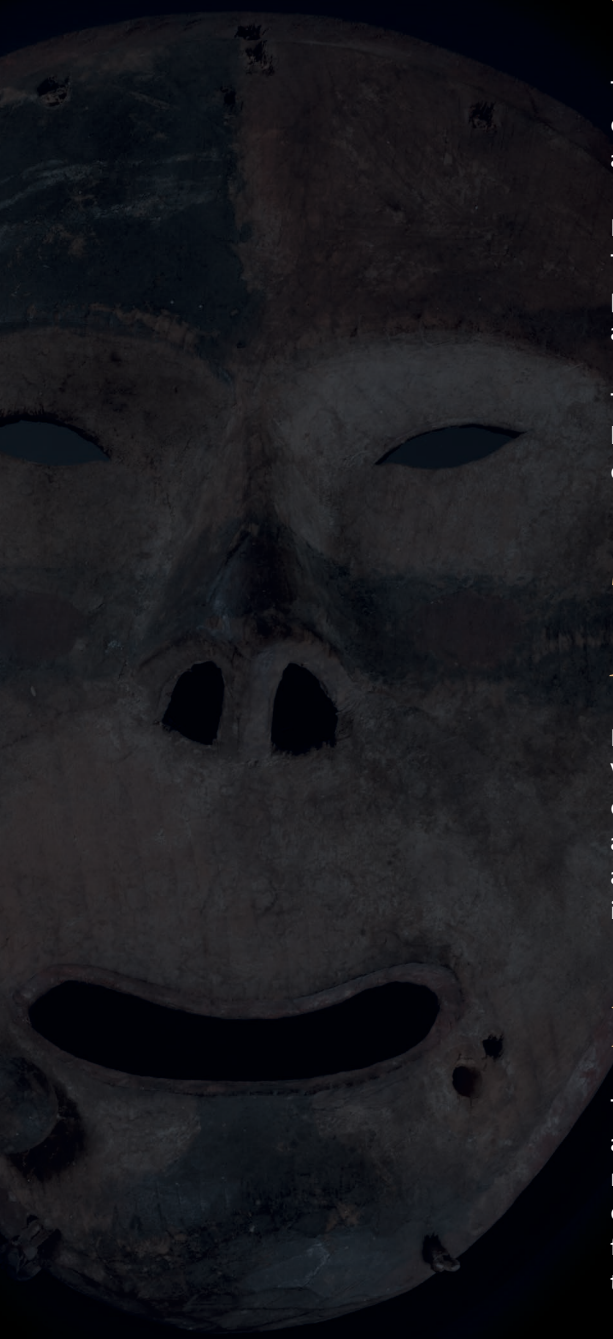
The workshop highlighted how this simple, scalable, non-destructive and non-invasive eDNA sampling can meet the challenges of a changing world.

"We have this unique role as the national museum to unlock our collections and help our partnering agencies understand their eDNA samples to the fullest potential," said invertebrate zoologist Chris Meyer, the head of the museum's Ocean DNA program. "We have the technology, we have the natural history collections and we have the need."

ABOVE Museum invertebrate zoologist Chris Meyer samples a basket star to generate reference libraries that will be used in eDNA research.

ABOVE The Indian River Lagoon, one of the most diverse waterways in the country, is the National Museum of Natural History's primary eDNA monitoring and testing site.

ABOVE A 3D replica of a traditional dance mask from Igiugig Village in Alaska.



Collaborating with Tribal Communities

The Repatriation Office partnered with Igiugig Village in Alaska to replicate six cultural objects from the region. Five 3D replicas, including a dance mask, were milled from wood, and bone and antler from caribou and moose shipped to the museum from Igiugig.

Igiugig plans to paint and attach feathers to the mask to finish it and put it into use. This project was initiated at the request of President AlexAnna Salmon, aiming to provide physical items for students and community members as educational tools and models for their own carving during culture camps.

The replication of the wooden dance mask, the only one known from the community, holds special significance as it offers a medium through which traditional cultural ceremony of dance mask use may be revived.

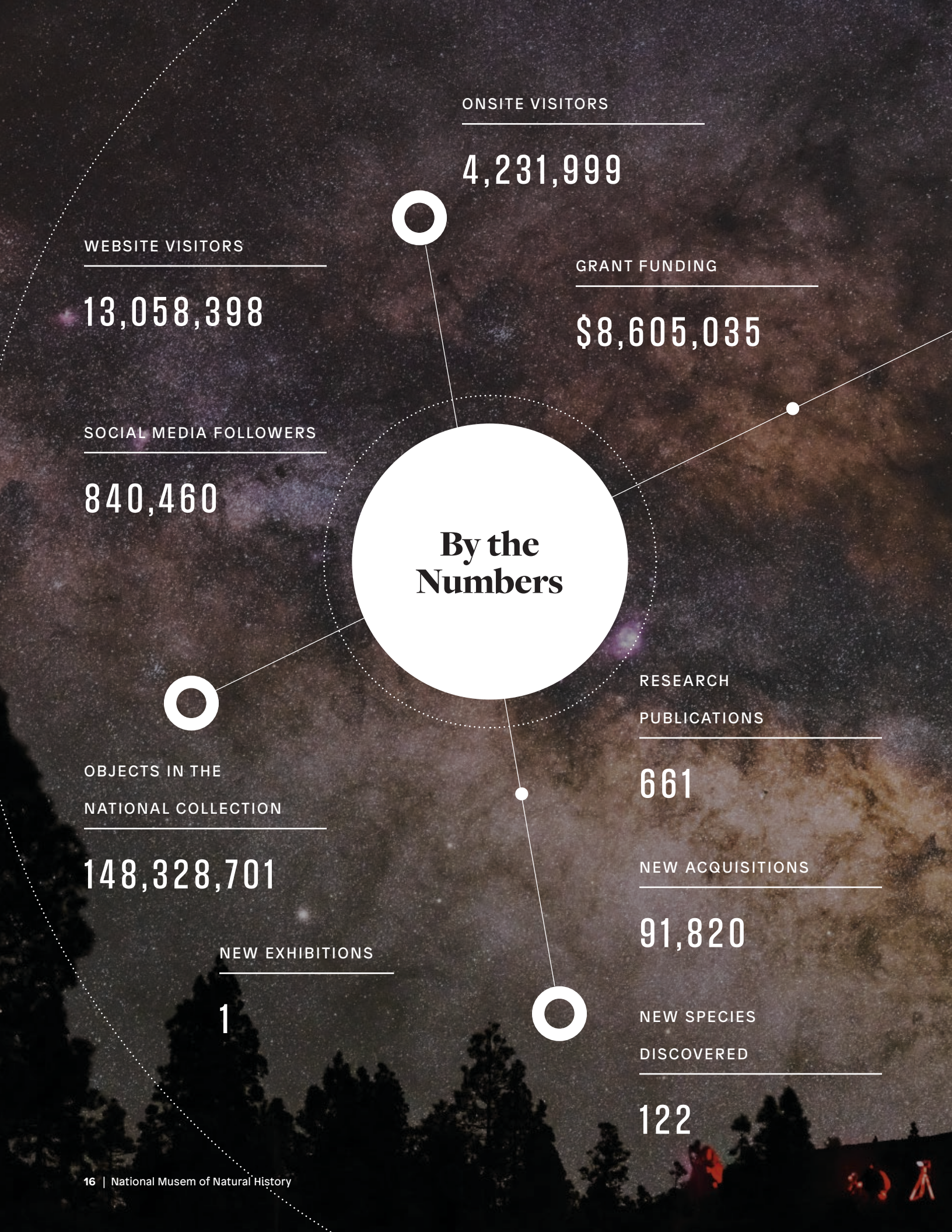
The Journey Home to Anaktuvuk Pass

In December, President Charles Hugo and other representatives from the Native Village of Anaktuvuk Pass, Alaska, visited the museum to formally receive repatriation of remains of two individuals and nine funerary objects from the Anaktuvuk Pass area. The remains and objects had been collected in the early 1960s. The museum and the tribe look forward to continuing a renewed relationship exploring collaborative interests in community and public education about the Anaktuvuk Pass region.

Building a New Program

The museum has received a $10 million grant from the Mellon Foundation to build a program akin to our Repatriation Office to enable the return the remains of non-Native Americans held in our collections to their families or descendant communities or nations. This initiative will be guided by a new Smithsonian policy, formally adopted in December, that will govern the return or memorialization of these remains.

In November, we completed the first international return under the new program repatriating the remains of several ancestors to French Polynesia. Representatives of French Polynesia's Division of Cultural Patrimony travelled to the museum to help prepare the ancestors for their journey home. Over the course of the year, the museum has engaged with governments and communities from eight more nations to collaborate on additional future returns.


ONSITE VISITORS
4,231,999
WEBSITE VISITORS
13,058,398
GRANT FUNDING
$8,605,035
SOCIAL MEDIA FOLLOWERS
840,460
By the Numbers
RESEARCH PUBLICATIONS
661
OBJECTS IN THE NATIONAL COLLECTION
148,328,701
NEW ACQUISITIONS
91,820
NEW EXHIBITIONS
1
NEW SPECIES DISCOVERED
122

Financials

VOLUNTEERS

501

RESEARCH ASSOCIATES

516

STAFF

369

FELLOWS

164

INTERNS

86

FY 24 REVENUE
$167,092 MILLION

GIFTS AND PRIVATE GRANTS - 49%
FEDERAL APPROPRIATIONS - 35%
ENDOWMENT PAYOUT - 8%
FEDERAL GRANTS AND CONTRACTS - 5%
EARNED REVENUE - 3%

FY 24 EXPENSES
$70.687 MILLION

SCIENCE - 72%
OPERATIONS - 17%
AUDIENCE - 11%

Museum and NASA Partner to Open Exhibition Exploring Ever-Changing Earth from Space and on the Ground

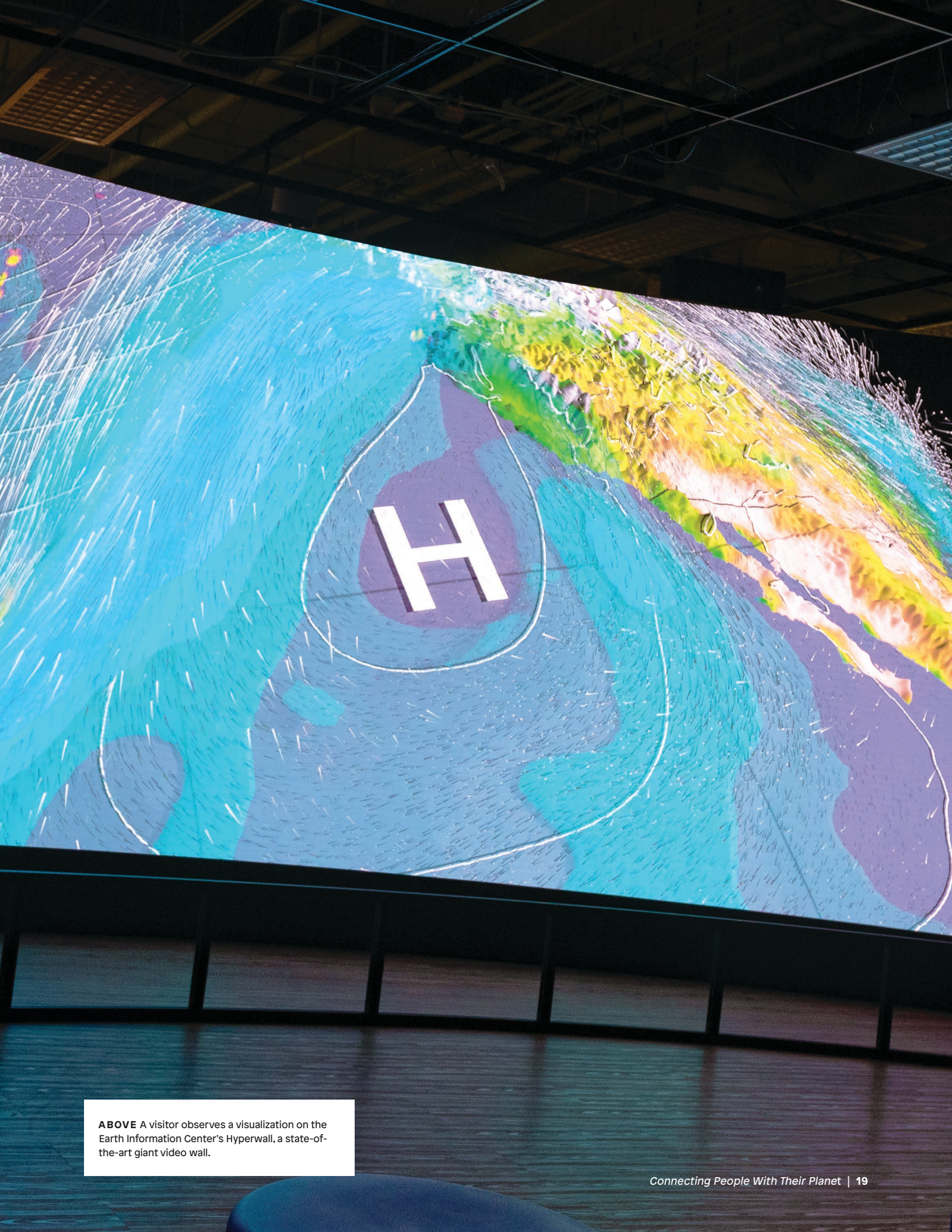
The Centerpiece is a Larger-than-Life Screen Pairing Real-Time Graphics with Short Feature Videos to Visualize Interconnected Changes on the Planet

In October, the museum opened "NASA's Earth Information Center at the National Museum of Natural History" — a 2,000-square-foot exhibition showcasing the dynamic forces and processes that are constantly shaping the planet. The centerpiece of the immersive exhibition is NASA's Hyperwall, a state-of-the-art 32-foot-long, 12-foot-high curved video wall presenting awe-inspiring visualizations of Earth. On the mammoth screen, the forces and processes that are constantly shaping the planet come to life: ocean currents pulsate, ice sheets retreat and greenhouse gases swirl.

These dramatic displays are part of NASA's Earth Information Center (EIC) and utilize data captured by satellites and sensors monitoring Earth. The EIC provides a live look at Earth's conditions by tracking factors like global temperature, precipitation, sea level rise and the atmospheric levels of carbon dioxide and other greenhouse gases. This information helps policymakers, researchers and communities understand and respond to the impacts of climate change, biodiversity loss and natural disasters.

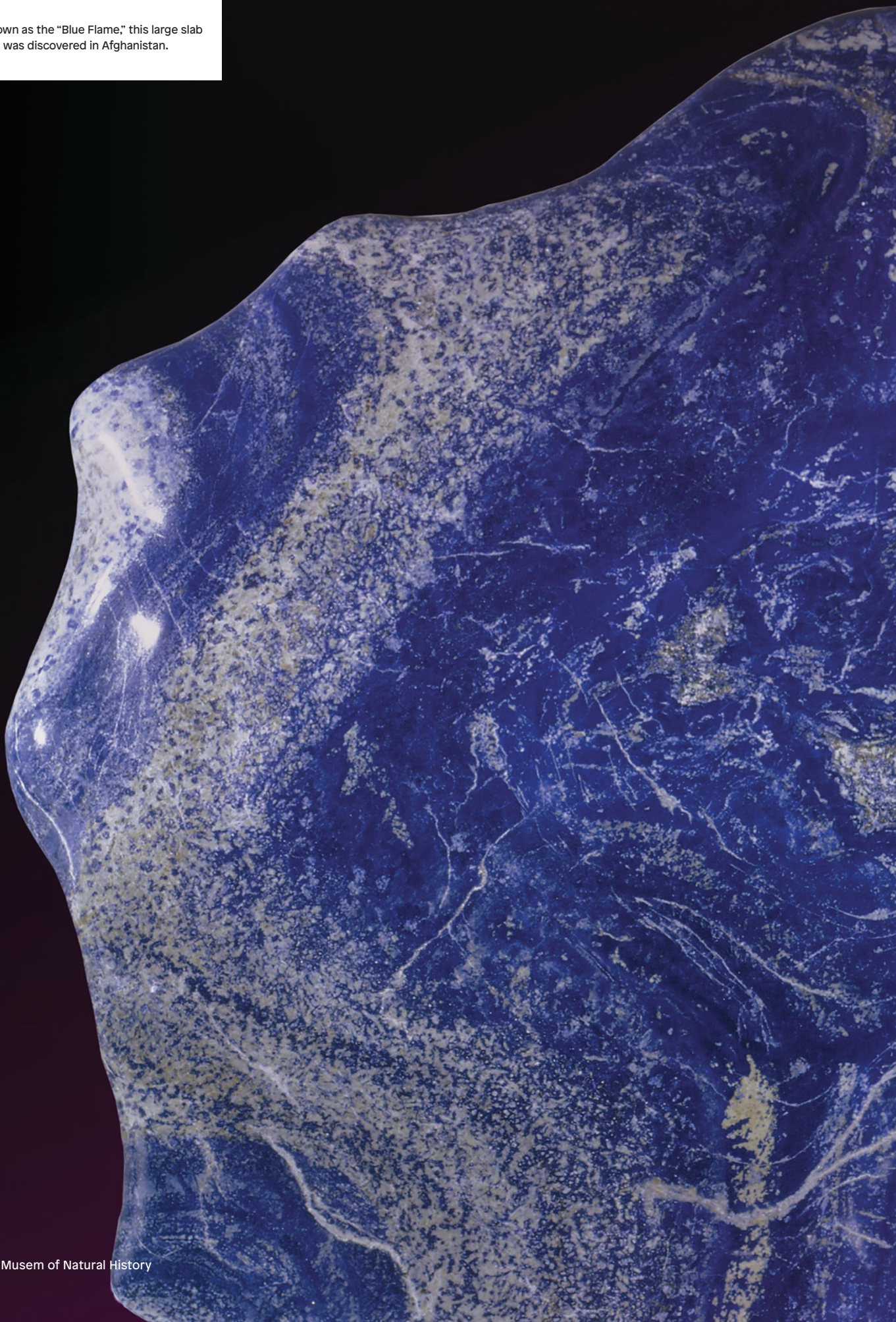
In addition to data visualizations, the Hyperwall also plays rotating short-form videos that highlight how researchers and stakeholders around the planet are using this data to tackle environmental issues. One such video explores how the Smithsonian's National Zoo and Conservation Biology Institute scientists utilize GPS collars and satellite data to monitor the reintroduction of the scimitar-horned oryx, a desert-dwelling antelope that went extinct across its native range in northern Africa. Another video focuses on long-term efforts by the Smithsonian Tropical Research Institute's Forest Global Earth Observatory (ForestGEO) network to track forest cover.

In addition to the Hyperwall, museumgoers can explore exhibit information panels and interact with touchscreen displays. One interactive display allows visitors to track the route of NASA satellites as they collect data on Earth. A model of one such satellite, NASA's Surface Water and Ocean Topography satellite, hangs above the exhibition. The exhibition will remain on view through 2028.



ABOVE A visitor observes a visualization on the Earth Information Center's Hyperwall, a state-of-the-art giant video wall.

BELOW Known as the "Blue Flame," this large slab of lapis lazuli was discovered in Afghanistan.



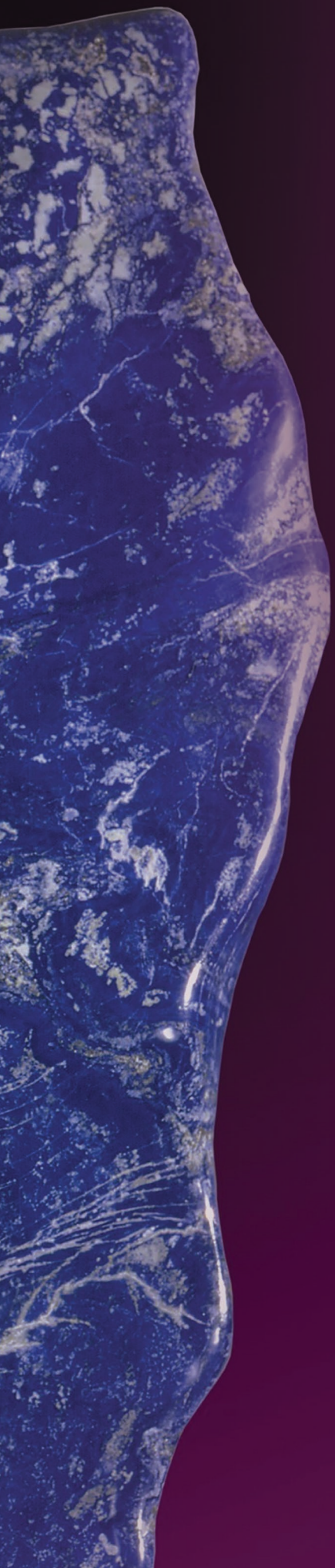
Objects of Wonder Closes

The National Museum of Natural History has more than 148 million specimens and objects in its collection — more than any other natural history museum in the world. Due to its staggering size, most of the museum's collection is kept behind the scenes for researchers to study.

In 2017, some of the museum's most intriguing specimens were brought out of storage and displayed to visitors as part of the "Objects of Wonder" exhibition.

For seven years, this gallery displayed some of the museum's greatest hits — including Martha, the last passenger pigeon (below), a suit of Samurai armor given to Theodore Roosevelt for his role negotiating peace in the Russo-Japanese war and an emerald carved for Moghul rulers. But the exhibition also displayed deeper cuts, like a cleared and stained snapping turtle, an ancient harpoon tip embedded in whale bone and a fossilized squirrel gnawing on petrified walnuts.

When "Objects of Wonder" closed in September, this trove of treasured specimens returned to the collection, where scientists can easily access them. This also created space for an array of new and fascinating objects from the museum's collection to go on display to the public in 2026.



Education, Outreach & Visitor Experience

Activating Exhibition Halls

Many of the museum's four million visitors engaged with our visitor experience associates and educators through a variety of programs in NMNH's exhibition halls.

This included the "Ocean Around Us Tour" in the Sant Ocean Hall, an interactive walking tour connecting visitors to the ocean. Volunteers were also trained to facilitate the interactive "Science on a Sphere" program that helps visitors visualize global change.

More than 2,600 visitors participated in interactive activities during World Ocean Day programs on June 7. In October, 1,600 visitors stopped by the museum to celebrate National Fossil Day. Dozens of scientists, artists, communicators, volunteers and educators helped make these programs possible.

We also launched national outreach programs connected to the museum's "Cellphone: Unseen Connections" exhibition. The museum partnered with twelve Smithsonian affiliates who are integrating cellphone programming at their institutions.

The Power of Play

Programs such as "Play Dates" and "World & Me" that use objects, storybooks, and crafts to encourage families to explore natural history and discover connections to science served more than 15,000 participants in Q?rius, the Coralyn W. Whitney Science Education Center. These immersive activities were especially designed for families with young children.

New K-12 School Programs Debut

In 2024, the museum delivered 600 school programs for more than 15,500 students, both in Q?rius and virtually. We piloted two new programs this year: "Exploded Cellphone" for students in grades 6-12 and "Marine Ecosystems" for students in grades 3-5.

The first program celebrates the museum's "Cellphone" exhibition and blends cultural anthropology, mineral science and chemistry. It quickly became the museum's most popular offering for students in middle and high school. "Marine Ecosystems" built on NMNH's relationship with NOAA, combines game play and collections-based learning.

An Evening *With* and More

We hosted ten evening programs for adults in 2024, which attracted 2,300 participants. One such event featured Sant Director Kirk Johnson interviewing boardgame designer Elizabeth Hargrave and Harvard ornithologist and NMNH Board Member Scott Edwards about how birds have the power to help people appreciate nature, feel connected to science and understand the importance of biodiversity. After the discussion, Labyrinth Games facilitated game play tables (pictured in photo) with Hargrave's renowned board game, "Wingspan." In October, Hargrave returned for a similar event honoring the release of her latest game, "Undergrove."

Our Volunteers

335 In 2024, 335 museum volunteers supported the museum's educational mission

37,515 Volunteers donated 37,515 hours, which is equal to

18 18 full-time positions.

They served a variety of roles throughout the museum, working with the public, K-12 students and research and collections staff.

Digital Learning with the Museum

1M+ Views of Teaching Resources

The museum's education webpages logged more than one million views in 2024, with users visiting from all 50 states and D.C. Most gravitated toward our 400 digital teaching resources, including Periodical Cicadas which provided a deeper look at the historic double emergence of two cicada broods in the spring. Our short explainer videos on topics like "What Is an Insect?" and "What Is a Mineral?" also proved to be a hit on YouTube.

An App for Q?rius

The new Q?rius App went live and is being tested with school groups enrolled in the museum's "Collections Challenge" school program. When Q?rius reopens, visitors will be able to visit qrius.si.edu to look up or scan the objects in the Q?rius collection and to unlock catalog records, images and related narratives.

Museum's Dinosaur Skeleton Becomes the Scientific Standard for Prehistoric Predator

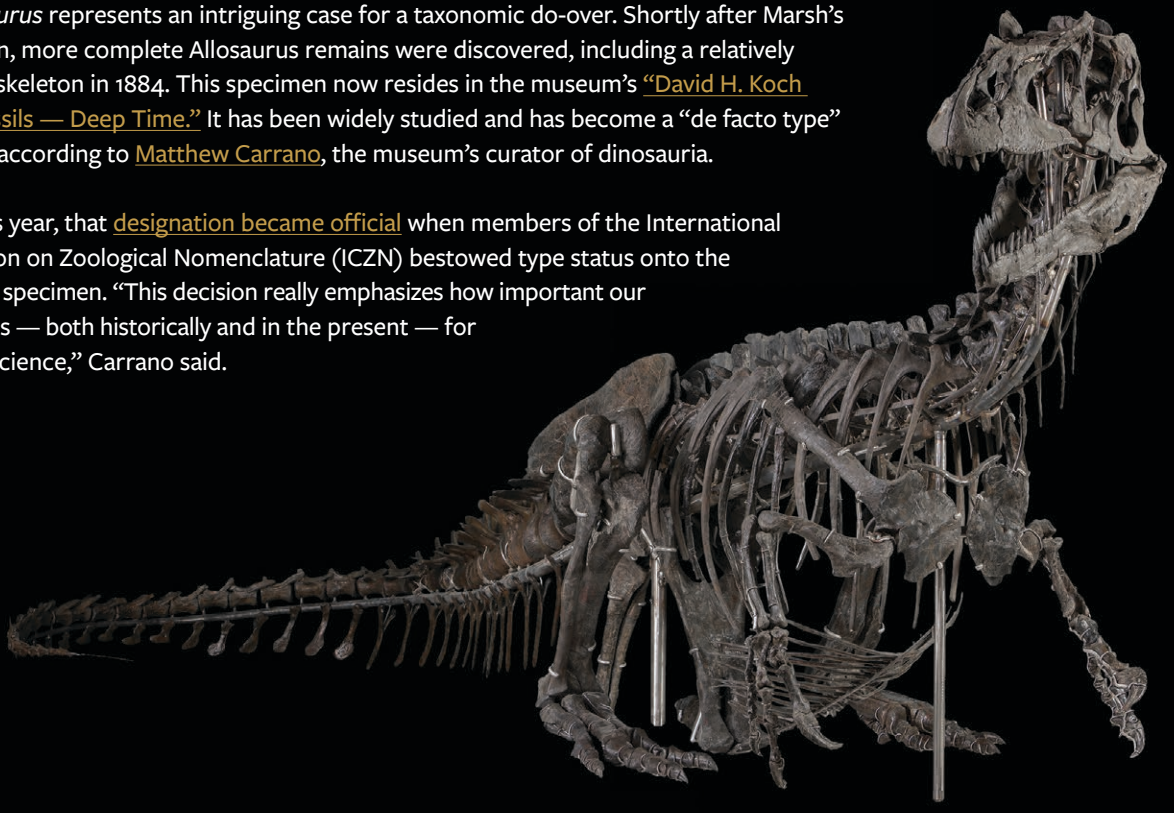
Allosaurus Fossil Is Now the Name-Bearing Specimen for the Entire Species

Few prehistoric predators were more fearsome than *Allosaurus*. These carnivores stretched over 20 feet and sported a mouthful of dagger-like teeth, which they used to terrorize other dinosaurs during the Late Jurassic Period some 150 million years ago. Allosaurus lived in western North America alongside other well-known species like the armored *Stegosaurus* and a number of supersized sauropod dinosaurs like *Diplodocus*.

The name *Allosaurus* has been in the scientific lexicon for nearly 150 years. But it did not always belong to a well-known dinosaur. In 1877, Yale paleontologist Othniel Charles Marsh formally described a fragmented fossil as *Allosaurus fragilis*. Because it was described first, this meager sample became the species' official type, or name-bearing, specimen.

But *Allosaurus* represents an intriguing case for a taxonomic do-over. Shortly after Marsh's description, more complete Allosaurus remains were discovered, including a relatively complete skeleton in 1884. This specimen now resides in the museum's "David H. Koch Hall of Fossils — Deep Time." It has been widely studied and has become a "de facto type" specimen according to Matthew Carrano, the museum's curator of dinosauria.

Earlier this year, that designation became official when members of the International Commission on Zoological Nomenclature (ICZN) bestowed type status onto the museum's specimen. "This decision really emphasizes how important our specimen is — both historically and in the present — for dinosaur science," Carrano said.



BELOW The museum's fossil specimen of *Allosaurus fragilis* is perched like a nesting bird guarding a clutch of fossilized eggs.

COLLECTIONS SPOTLIGHT

Museum Specimens Help Clear Up a Case of Mistaken Squirrel Identity

The squirrel family contains nearly 300 known species ranging from ground-bound prairie dogs to purple squirrels as big as cats. But there are many more squirrel species yet to be described, including several that have been previously misidentified.

In October, research zoologist Arlo Hinckley, a Margarita Salas postdoctoral fellow, and Melissa Hawkins, the museum's curator of mammals, re-evaluated squirrel species from Asia. They discovered that two subspecies of squirrels were actually distinct enough to be unique species. The resulting *Vertebrate Zoology* paper describes these newly recognized species: the Southeast Asian striped squirrel (*Tamiops barbei*) and the southern gray-bellied squirrel (*Callosciurus concolor*).

COLLECTIONS SPOTLIGHT

Scientists Create an App to Save Imperiled Freshwater Mussels

Freshwater mussels are ecologically important, deceptively colorful and wonderfully weird. They are also among the most threatened groups of animals, especially in the United States. In the past century alone, more than 25 U.S. freshwater mussel species have gone extinct.

John Pfeiffer, the museum's curator of bivalves, recently led an effort to track how freshwater mussel populations were changing across time and space. The project yielded MusselMapR, an easy-to-use, web-based application containing more than 400,000 individual records of mussel specimens stored in museum collections across the country. This application will help conservationists pinpoint which mussel populations need the most help. "This tool is designed to better understand these creatures and translate that into practical conservation," Pfeiffer said.

An Octopus Collected by John Steinbeck is Finally Identified

In 1940, the famed novelist John Steinbeck embarked on a collecting expedition to the Gulf of California with friend and marine biologist Ed Ricketts. Many of the specimens they amassed ended up at the Smithsonian. However, one of their octopus specimens proved to be quite a curious cephalopod.

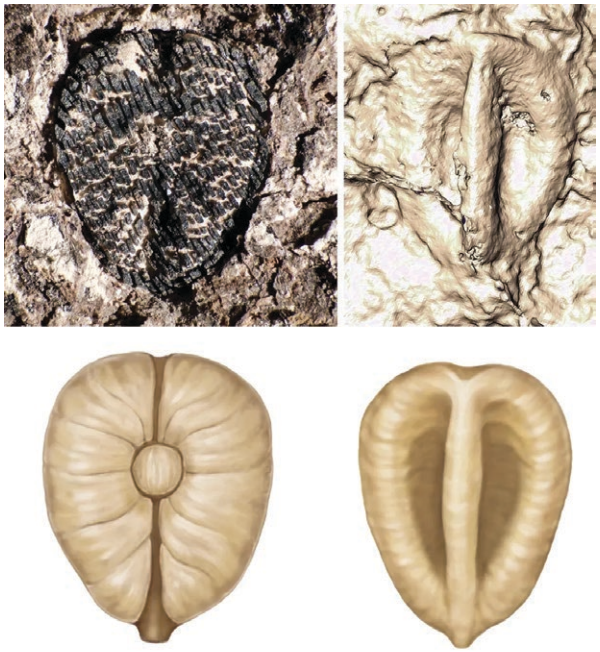
This octopus, which is known by the nickname Berry, defied taxonomic description for decades. In October, Mike Vecchione, the museum's cephalopod curator, and museum specialist Katie Ahlfeld went through the archival material associated with the specimen and determined that it belonged to the species *Octopus hubbsorum*. 84 years after it was plucked out of the surf, Steinbeck's octopus was identified.

Ant Agriculture Began in the Aftermath of an Asteroid Impact

When humans began cultivating crops thousands of years ago, they were millions of years behind fungus-farming ants.

Entomologist Ted Schultz, the museum's curator of ants, has spent 35 years studying how ants' knack for growing fungi evolved. In a paper published in the journal *Science* in October, Schultz and his colleagues analyzed genetic data from hundreds of species of fungi and ants to craft detailed evolutionary trees.

They discovered that ants and fungi have been intertwined for 66 million years. This coincides with the cataclysmic asteroid impact at the end of the Cretaceous period. While the event was catastrophic for dinosaurs, it was a boon for fungi, which proliferated as they consumed dead plant material in the aftermath of the asteroid strike. This brought them into close contact with ants. It took the insects another 40 million years to master the advanced agricultural practices seen in leafcutter ants today.



Fossil Grape Seeds Reveal Fruit Thrived After Mass Extinction

When an asteroid collided with Earth 66 million years ago, it sparked a mass extinction event that wiped out nearly half of all plant species alive at the time. But it was not all doom and gloom for flora. The extinction event opened space for a multitude of new flowering plants to bloom, including vine-producing plants like grapes.

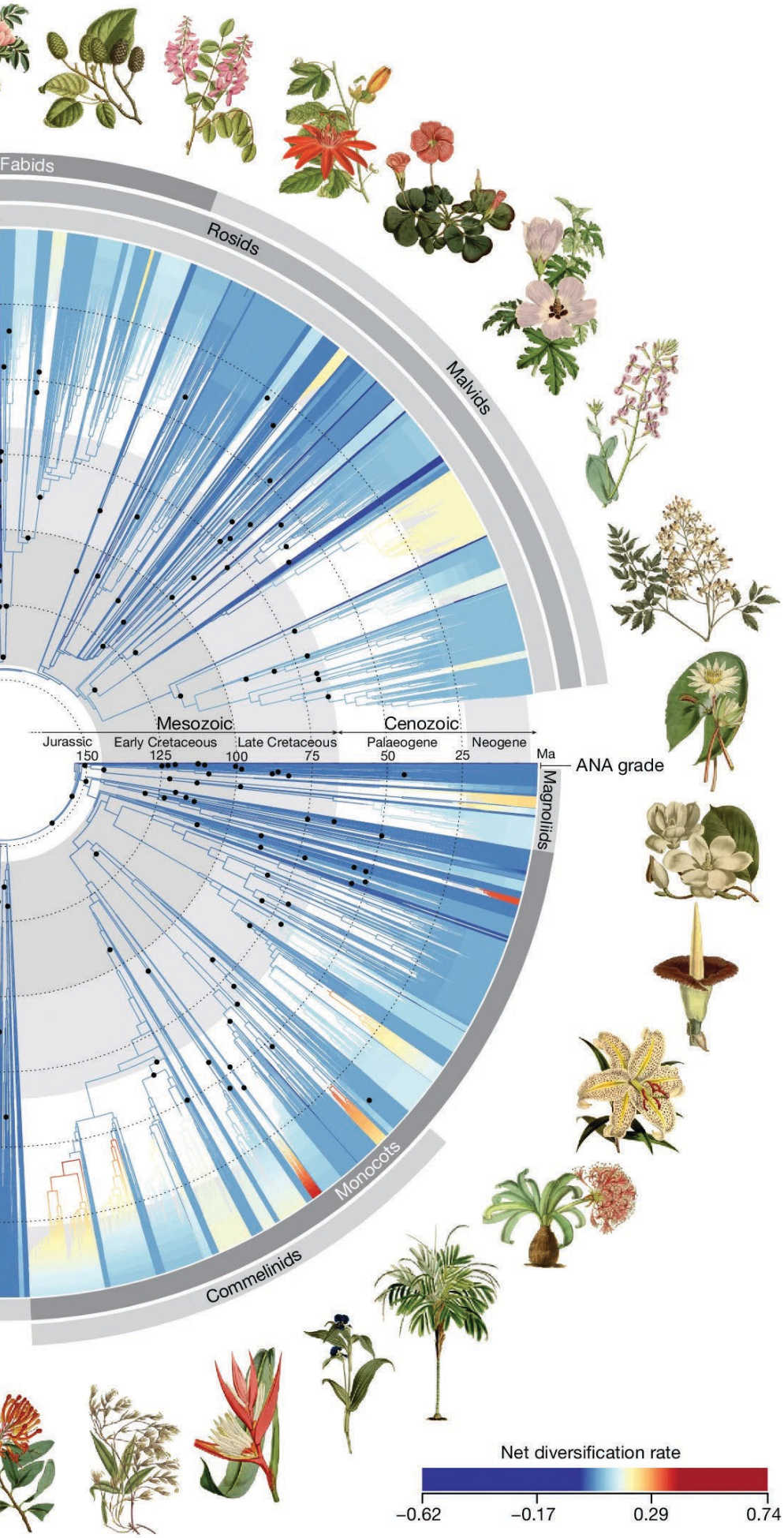
A team of scientists including USDA botanist Gregory Stull recently analyzed a cache of fossilized grape seeds, some of which date back to just after the asteroid impact. In a paper published in the journal *Nature Plants* in July, the researchers described nine species of ancient grapes, four of which are new to science, that were uncovered in sites in Colombia, Panama and Peru. One of the new species, *Ampelocissus wenae*, was named after museum botanist Jun Wen.

A Family Tree of Flowering Plants Blooms

Flowering plants, or angiosperms, account for roughly 90% of plants on Earth. Organizing this diverse group of flora is daunting, but researchers are finding helpful genetic clues preserved in the plants' DNA.

In recent years, an international team of nearly 300 researchers, including museum research associate Robert Soreng, worked together to analyze DNA from over 9,500 species of flowering plants. This sprawling dataset included several species that have gone extinct and only persist in museum herbariums.

The team's findings, published in the journal *Nature* in April, yield a detailed tree of life for flowering plants. This record is the most comprehensive look yet at angiosperm evolution and provides new insights into how various botanical groups are related.



Genetic Clues Reveal When Bird Evolution Took Flight

Birds are exceptionally diverse with thousands of species found all over the planet. As a result, organizing this sprawling group of feathered creatures into a family tree is no easy feat. New insights into avian genetics are a boon to bird research. Research zoologist Gary Graves, the museum's curator of birds, recently worked with an international team of scientists to compare the genomes of 363 bird species. Their work, published in the journal *Nature* in April, yielded one of the most comprehensive looks at avian evolution to date. The new work revealed several evolutionary milestones, including the rapid diversification of birds following the extinction of other dinosaurs at the end of the Cretaceous.

Fossilized Footprints Reveal That Early Human Relatives Crossed Paths

1.5 million years ago, on the outskirts of an ancient lake in what is now northern Kenya, human relatives called hominids left their footprints. These tracks were not one size fits all — one set of prints was left by a flat foot with a wide, big toe, while other sets were left by a foot with a higher arch.

These fossilized footprints were recently analyzed by an international team of researchers that included Kay Behrensmeyer, the museum's curator of vertebrate paleontology. Due to the differing anatomy of the footprints, the researchers concluded that the prints belonged to two distinct species of ancient human relatives. The flat-footed prints were left by *Paranthropus boisei*, a member of a now extinct group of hominids, while the high-arched prints were made by *Homo erectus*, a close relative to modern humans.

The team's findings, published in November in the journal *Science*, provide the first direct evidence of two different human relatives simultaneously occupying the same immediate landscape.

ABOVE A team of excavators at the footprint site revealed several stratigraphic layers that may contain fossil clues from the site's ancient inhabitants.

To Protect Biodiversity, Researchers Look to the Moon

As Earth's biodiversity dwindles, it has become paramount to create a stockpile of biological samples for safe keeping. To keep such this trove safe, a group of scientists is looking to store it at an otherworldly location: the moon.

It may sound like science fiction, but a group of Smithsonian scientists and their collaborators recently explored the efficacy of creating a lunar biorepository to safeguard Earth's species in a paper published in the journal *BioScience* in July. The project is inspired by the Svalbard Global Seed Vault in Norway, an international genebank of food crops, which is currently threatened by climate change.

The moon may eventually provide an alternative. The moon's craters are cold enough for cryogenic preservation without the need for electricity or liquid nitrogen. However, the logistics of sending samples to the moon remain hazy. The team, which included Lynne Parenti, the museum's curator of Indo-Pacific freshwater and coastal fishes, are currently testing transportation methods on cells from starry gobies (*Asterropteryx semipunctata*), a common species of reef fish.

Researchers Analyze Historic Samples From the Asteroid Bennu

As it soared past Earth in September 2023, NASA's OSIRIS-REx dropped off a capsule containing rock and dust specimens from Bennu, a carbon-rich, near-Earth asteroid. The material collectively weighs a little more than four ounces — or slightly heavier than a deck of cards. But they boast an outsized scientific importance and may contain insights into the origins of water and life on Earth.

Before researchers could analyze the cosmic clues preserved inside Bennu, they first had to take stock of the samples themselves. In June, an international team of researchers published an initial description of the various Bennu samples in the journal *Meteoritics & Planetary Science*. The team, which included Tim McCoy, the museum's curator of meteorites, provided insights into the mineralogical and chemical properties of the samples, laying the groundwork for more comprehensive analyses of Bennu in the future.

Awards and Honors


Rebecca Johnson

Rebecca Johnson (Chief Scientist) was presented with the inaugural Embassy of Australia Award.

Nina Ramos (Invertebrate Zoology) won the National Science Foundation Graduate Research Fellowship Award.

Alfred Gardner (Vertebrate Zoology) was recognized in the Louisiana State University College of Science Hall of Distinction.

Kevin de Queiroz (Vertebrate Zoology) was recognized as a Distinguished Herpetologist by the Herpetologists' League.

James Tiller, Cailin Meyer and **Rebecca Snyder** (Media/Collections/ Informatics and Data Science) won the Smithsonian Excellence in Digital Innovation Award for leading an effort to enhance digital image accessibility.

Matthew Carrano (Paleobiology) won the Fulbright U.S. Scholar award and spent four months studying terrestrial polar Cretaceous ecosystems at the Melbourne Museum in Australia.

Debbie Thompson, Anthony Brooks, and **Rick Blasi** were each awarded the Smithsonian Office of Facilities Maintenance and Reliability's (OFMR) ELITE Award. OFMR's ELITE Awards recognize employees for excellence in their performance.

Carole Baldwin (Vertebrate Zoology) received a Lowell Thomas Award from the Explorers Club for her contributions to our understanding of the ocean and its fish and her longstanding commitment to mentoring the next generation of scientists.

The **Cellphone Team** was formally awarded the Smithsonian Excellence in Exhibitions Special Achievement in Audience Engagement award for "Cellphone: Unseen Connections."


Gabriela Farfan

Gabriela Farfan (Mineral Science) received the 2024 Doris M. Curtis Outstanding Woman in Science Award from the Geological Society of America.

Briana Pobiner (Anthropology) received the Evolution Education Award from the National Association of Biology Teachers.

Nick Pyenson and **Holly Little** (Paleobiology), along with Jon Blundell (Office of the Chief Information Officer), were named recipients of the 2023 Smithsonian Secretary's Research Prize for the article "Grouping behavior in a Triassic marine apex predator."

Conrad Labandeira (Paleobiology) was named a 2024 Fellow by the American Association for the Advancement of Science (AAAS) for his significant contributions to the study of fossil insects and their interactions with ancient plants.


Conrad Labandeira

Dr. Coralyn W. Whitney

Ever since she was a young girl collecting seashells along the beach near her home in Florida, Dr. Coralyn W. Whitney has understood that touch is a crucial sense to unlock the natural world. "Just being able to pick up an object, there's an immediate connection," she said. "These hands-on experiences are the best way to understand our planet."

Whitney's tactile approach crystallized when she began taking gemology classes. The opportunity to observe the vivid colors of gemstones up close captured her fascination and she soon crossed paths with Jeffrey Post, who was the curator-in-charge of gems and minerals at the National Museum of Natural History at the time. In 2005, Post invited Whitney for a tour of the National Gem and Mineral collection and she's been enamored with the museum ever since.

Over the past two decades, Whitney has become one of the museum's most generous donors. Her support helped the museum acquire several showstopping specimens, including the Whitney Flame, a blazing red topaz from Brazil that weighs nearly 50 carats.

But Whitney's top priority has always been to create a space at the museum where young students could find the same inspiration that she did as a child studying objects from the natural world. She found an opportunity to do that by funding Q?rius, the Coralyn W. Whitney Science Education Center, an interactive area where novice naturalists can partake in educational activities, meet scientists and interact with some 6,000 specimens from the museum's collection.

Coralyn's commitment to the museum's mission didn't end there. In 2024, Whitney made a transformational gift to the museum to fund a variety of projects, including the renovation of the museum's historic Baird Auditorium, which will be renamed in her honor upon its completion in 2027. The gift also endowed a fund for strategic priorities across the museum as well as the new Coralyn W. Whitney Chief Scientist position.

"Renovating and creating a world-class auditorium will provide an environment where people will be excited to come learn about science," Whitney said. "This will help bolster the museum's mission and encourage people to learn more about the natural world around them."

Kirk Johnson, the museum's Sant Director, said that this transformational gift ensures that Whitney's legacy will endure at the museum for many decades to come. "Coralyn's exceptional generosity helps make the museum's unrivaled collection and groundbreaking science accessible to curious minds of all ages," he said. "Her gift will have a massive impact on the museum and its audience."

Whitney Flame

Museum Displays the Winston Red and a Cache of Fancy Color Diamonds

The National Museum of Natural History is excited to welcome the Winston Red, a 2.33-carat diamond with a "Fancy red" color grading. Red diamonds are some of the rarest gems on the planet, and the Winston Red is among the finest and largest red diamonds ever discovered. It was gifted to the museum by Ronald Winston in December of 2023 and will be exhibited near the Hope Diamond in the Winston Gallery.

The Winston Red will be displayed alongside an additional 40 color diamonds from Winston's collection. These glittering gems embody a rainbow of hues ranging from pale pink to bright blue. The "Winston Fancy Color Diamonds" will go on display on April 1.

Artists Reflect on Climate Change in New Exhibition

This April, the museum will open "artxclimate," a new exhibition featuring artworks by artists from across the U.S. and its territories. The exhibition, which will be located in the Sant Ocean Hall's gallery space, contains a selection of artworks that helped illustrate the United States' Fifth National Climate Assessment in 2023. These works, which were done by artists of all ages, will allow visitors to see climate change from many different perspectives and imagine positive ways of overcoming climate challenges.

Ocean DNA Program

Launched last year, the museum's Ocean DNA Program will continue its work in three key areas: reference libraries, informatics, and demonstration sites.

In 2025, the program's trusted, voucher-based reference library will contain more than half of all United States fish species. The program will build on an existing prototype for managing environmental DNA data to analyze and publish its results in partnership with the Global Biodiversity Information Facility (GBIF). Finally, they will hold a BioBlitz at the Smithsonian Marine Station in Fort Pierce, Florida, to target missing species and better calibrate their molecular efforts with the ongoing benthic biodiversity monitoring program.

Museum Collaborates with National Gallery of Art to Explore Little Beasts

This spring, a menagerie of critters from the museum's collection is heading to the National Gallery of Art. These specimens, which include everything from a marmot and peacock to beetles and butterflies, will be featured in the new exhibition "Little Beasts: Art, Wonder, and the Natural World."

This show is the first collaboration between NMNH and its neighboring museum. The scientific specimens will be displayed alongside a variety of historic paintings, prints and drawings, allowing visitors to explore the rich exchange between artists and naturalists at the dawn of European natural history. The exhibition opens May 18 and runs through November 2, 2025.

Congressional Night at the Museum

In July, the National Museum of Natural History welcomed more than 2,000 guests as part of Congressional Night 2024. Members of Congress, their staff, and family members were invited to explore the museum's exhibition halls after hours to see iconic Smithsonian specimens like the Nation's *T. rex* and the Hope Diamond.

More than 40 museum researchers also participated in the evening event. Stationed throughout the museum, these s cientists displayed specimens and answered questions on everything from anthropology to zoology.

The event, which rotates Smithsonian museum venues each year, was made possible through the annual support of Nissan North America, Inc.

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The Smithsonian National Museum of Natural History gratefully acknowledges our steadfast and generous supports.

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The Smithsonian extends its gratitude to the individuals, companies and foundations that made possible numerous activities of the National Museum of Natural History through gifts of $1,000 or more in 2024.

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KNOWLEDGE FOR THE WORLD

Dr. Winnie Hill and Dr. Carter Mann

Dr. Winnie Hill and Dr. Carter Mann's journey to philanthropy was deeply shaped by their own journeys together — in education, public service and in medicine. Their gift of $100,000 to the National Museum of Natural History will help support science education, particularly through online programs and platforms. It reflects their lifelong dedication to ensuring access to knowledge and bridging educational gaps.

After college and medical school, the couple embarked on a yearlong journey around the world — funded through charitable contributions — to serve in mission hospitals in places like Papua New Guinea, Nepal and Kenya. They often fell victim to the infectious diseases they were tasked with treating, including dengue, giardia, malaria, amoebic dysentery and tuberculosis. In these mission hospitals, they witnessed firsthand the power of education and medical knowledge. "A little bit of money could help a lot," Hill said of the role of investing in preventative care.

Upon returning to the U.S., they built careers in emergency, family and travel medicine, and raised a family. Their professional lives remained intertwined with their global health mission: Mann worked as a medical director for cruise lines, while Hill's internal medicine practice eventually evolved to allow her to provide healthcare for patients in twenty different states through telehealth platforms.

During a program on the exhibit "Outbreak: Epidemics in a Connected World" with NMNH anthropologist Sabrina Sholts, Hill and Mann found a keen resonance with natural history's ability to reach diverse and international audiences — not only in the physical museum building, but also online. Inspired by the potential to reach international audiences, the pair saw an opportunity to support the efforts of a mission deeply aligned with their values.

"Education is such a central thing in our lives," Hill said. "We want to make a difference, especially in sharing knowledge about science, health, and climate change."

"We feel so strongly about the future of education," Mann added. "We believe it does and will continue to make such a critical difference for the public and the world."

Through their generous support, Hill and Mann's gift supports efforts that exemplify the museum's mission: preserving scientific knowledge, leveraging collections for research and ensuring that knowledge and research are accessible to all.

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We gratefully acknowledge our Leadership Circle members whose annual donations support museum needs.

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These generous donors have included the museum in their estate plans.

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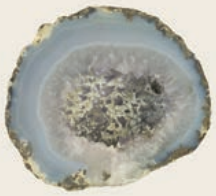

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The museum recognizes the generous support towards the acquisition of major gemstones and mineral specimens as well as associated research and programs for the Department of Mineral Sciences.

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LIFELONG LEARNING

Dr. Robert Hevey, Jr. and Dr. Constance Filling

A passion for learning is a way of life for Dr. Robert Hevey and Dr. Constance Filling.

Hevey returned to college at the age of 61 to pursue a Ph.D. in botany; Filling, who also holds a doctorate, has dedicated her career to medical education and training. Their gifts, totaling $1,095,000, will enable a new generation of young scientists to pursue advanced scholarship by endowing fellowships in Mineral Sciences, Invertebrate Zoology and Anthropology.

For ten weeks during the summer, fellows will tap into the museum's unparalleled collections and expertise. "We can talk about the science of their work—but we can also talk about working in science," said Martha Nizinski, the curator of crustaceans in the museum's Invertebrate Zoology department.

"They are truly able to experience all the museum has to offer," added Cari Corrigan, the museum's curator of meteorites.

The fellows pursue a wide range of natural history topics and disciplines.

For example, Brooke Grubb, a Ph.D. candidate at Tennessee Tech University, studied crayfish during her 2024 Invertebrate Zoology fellowship. After measuring and photographing over 200 specimens, collecting tissue samples for genetic sequencing and even identifying several unnamed specimens in the collection, Grubb shared preliminary findings at meetings in Croatia and in Arkansas.

Moe Mijjum, a Ph.D. candidate at Purdue University, joined the Mineral Sciences department in 2023 for research into noble gases in meteorites. A resulting paper, presented at the 2024 Meteoritical Society meeting in Belgium, garnered an award.

Paulina Ascencio Fuentes, a 2021 fellow in Anthropology, researched Indigenous perspectives on the 1943 eruption of the Paricutín volcano in Mexico — and was inspired to pursue a Ph.D. at New York University.

The fellowships offer benefits for staff, as well. "The fellows remind me that research is fun, that we do cool work and that we have a lot to offer," Corrigan said.

"The fellows have helped us see aspects of our collections anew," said Joshua Bell, Anthropology department chair and the museum's curator of globalization. "Through their research, each fellow has helped reactivate these belongings and made them more accessible to the wider world."

Nizinski points to the reward of mentorship as a bright note. "We all have very different paths. For people who have not had the straightest of paths — including me — it inspires confidence that there are opportunities for them as well," she said.

RIGHT Ph.D. candidate Moe Mijjum, who studies noble gases in meteorites, holds a specimen in the museum's meteorite collection.

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CREATIVE Fuszion

ABOVE A spectacular fossil of *Primobucco mcgrewi*, an early bird from Wyoming's famed Green River Formation.

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