



AMERICAN MUSEUM OF NATURAL HISTORY

ROTUNDA

Member Magazine
Winter 2015 Vol. 40 No. 1

Countdown to Zero
Opens January 13

DEFEATING GUINEA WORM



**EXPLORE21
EXPEDITION**

From the President

Ellen V. Futter



International health topics are increasingly on the front burner. The recent Ebola crisis is among those that underscore the critical role disease plays in our global welfare, and highlights the interconnectedness of people worldwide—all of which makes the Museum’s upcoming exhibition *Countdown to Zero*, presented in conjunction with The Carter Center, particularly timely.

Countdown to Zero focuses on global efforts to contain, eliminate, or eradicate disease, chiefly The Carter Center’s 30-year campaign against Guinea worm disease, which is today on the verge of eradication. Health workers are closing in on other scourges, including polio and malaria, and better controlling diseases like tuberculosis and Ebola. The exhibition is curated by Museum parasitologist Mark Siddall, who has studied Guinea worm in Africa.

The Museum has a long history of presenting

issues in human health to the public, from the *International Tuberculosis Exhibition* in 1908 through more recent exhibitions, including *Epidemic! The World of Infectious Disease*, *The Genomic Revolution*, and *The Power of Poison*, also curated by Dr. Siddall.

Human disease does not happen in a vacuum, and is often the result of complex, even ancient, interactions among species within ecosystems. The Museum’s research includes many areas related to human health, including study of the evolution and ecology of the human papilloma virus, the tuberculosis bacterium, and other disease-causing agents. Of course, human behavior is a big factor in disease spread and control, and the Museum has a long history of helping people understand the role of humans within natural ecosystems.

And so we are very pleased to collaborate with The Carter Center to present the important and inspiring stories told in *Countdown to Zero*.

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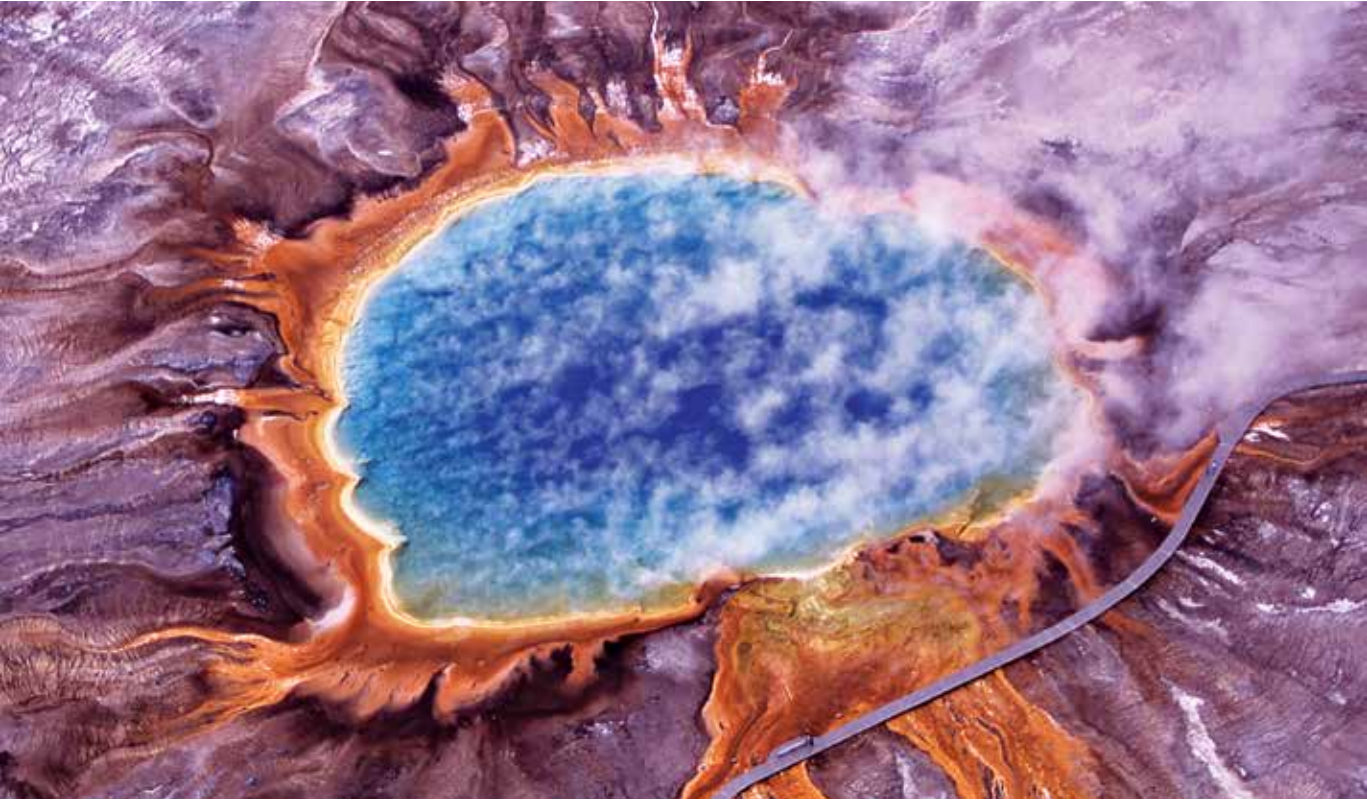
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Up Next: *Life at the Limits: Stories of Amazing Species*



The astounding colors of Yellowstone National Park’s Grand Prismatic Spring are produced by several species of bacteria that thrive in the hot spring’s waters.

Imagine holding your breath for an hour and a half. Or enduring temperatures above 500° Fahrenheit and below -328° F. These are just a few of the extreme approaches to life on Earth showcased in the new exhibition *Life at the Limits: Stories of Amazing Species*—an exploration of the diverse and sometimes jaw-dropping strategies animals and plants employ to find food, fend off predators, reproduce, and thrive in habitats we would find inhospitable, even lethal.

Consider the examples mentioned above. The elephant seal, featured as a life-sized model in the exhibition, can hold its breath for 100 minutes to dive 2,000 feet in search of food. The tiny tardigrade, a microscopic animal shown in three oversized models, can withstand extremes of temperature, hibernate for decades when deprived of water, and survive radiation in outer space.

The exhibition, overseen by Curator Mark Siddall, a parasitologist, and Curator John Sparks, an ichthyologist, will take visitors deep into a cave where animals that live without light lack eyes and pigmentation. A fluorescent coral reef will reveal the phenomenon of synchronous spawning in which different coral species are triggered by moonlight to release billions of eggs and sperm in unison. Live animals on display will include stick insects, masters of camouflage, and the surprisingly powerful mantis shrimp. In a nod to its strength, the Hercules beetle will be featured as a climbable model.

A cacophonous soundscape will showcase the inventiveness of mating serenades, from the hammerhead bat’s honk to the shy pig frog’s group-sing. And a life-sized model of the titan arum plant will nod to another form of seduction: this unusual plant releases the scent of rotting flesh to attract flies that dine on carrion.

Life at the Limits opens April 4 and is free for Members.

Generous support for *Life at the Limits* has been provided by the Eileen P. Bernard Exhibition Fund.

Member Preview
Thursday, April 2, 4–8 pm

Discover the amazing organisms that have evolved to face the unusual challenges of living on Earth in *Life at the Limits: Stories of Amazing Species*. Explore incredible specializations for surviving harsh surroundings, escaping predators, attracting mates, living very long lives, and more.

Members are invited to see *Life at the Limits: Stories of Amazing Species* at a special preview on April 2, beginning at 4 pm. View the exhibition and stay for a wine reception from 5 to 8 pm in the Akeley Hall of African Mammals. Please RSVP by calling the Membership Office at 212-769-5606.

Coming Up on AMNH.org

On February 4, amnh.org will be introducing a number of new features for a much more personalized online experience—one that you can tailor to your interest and needs. All you have to do is create a new user account on or after that date, and you’ll be able to track your ticketing benefits, collect web content, and more! Please visit amnh.org/register for more information.

SEISMIC TOOLS

Though they are sometimes used interchangeably, the terms seismometer and seismograph describe different instruments: a seismometer measures seismic waves, the vibrations traveling through the Earth caused by an earthquake, while a seismograph records them, producing the spikey graphs known as seismograms.

PERSISTENT SCALE

Seismologist Charles Richter developed the well-known scale in 1935 to compare magnitudes of quakes in southern California. More accurate techniques to measure energy release, using the moment magnitude scale, have replaced Richter’s original formulation, but his name remains interchangeable with earthquake size.

EARLY WARNING

The 6.0-magnitude earthquake that struck the San Francisco area in August 2014 provided a test of California’s Early Earthquake Warning (EEW) system, which uses sensors to detect an earthquake’s fast-moving P-waves and issues alerts before the slower but more damaging S-waves hit. Where earthquakes are concerned, advance warning is usually only a matter of seconds or minutes—just enough time to take cover.

QUAKE STATE

Situated on top of the San Andreas Fault, the boundary of two moving tectonic plates, California is well known for its earthquakes, from small disturbances to the disastrous earthquakes that struck the Bay Area in 1906 and 1989. But in terms of the total number of earthquakes, California is second to sparsely populated Alaska, which accounts for more than 50 percent of all U.S. earthquakes.

QUAKE ZONE

Earthquakes occur in the middle of tectonic plates, too. The central U.S. is home to the New Madrid Seismic Zone, which reaches into parts of Illinois, Kentucky, Tennessee, Arkansas, and Missouri and has been the source of nearly 40 earthquakes in the last 30 years. The zone takes its name from three large earthquakes that destroyed the town of New Madrid, Missouri, in the winter of 1811–1812.

A Sleek Seismometer

In the course of a year, the National Earthquake Information Center, the arm of the United States Geological Survey (USGS) responsible for tracking and sharing information about earthquakes worldwide, reports approximately 30,000 events. That’s an average of 80 earthquakes a day, a number made even more impressive by the fact that it represents only the most significant of the Earth’s constant movements: quakes with magnitudes of 3.0 or higher, a tiny fraction of the many millions of earthquakes that the USGS estimates occur annually.

Feeding this massive data collection effort are national and global seismic networks, which rely on hundreds of instruments like the compact, stainless-steel seismometer pictured here. This 14-inch-tall model currently takes measurements of Earth’s vibrations at stations from Albuquerque, New Mexico, to Santo Domingo, Venezuela, then transmits the information digitally, making rapid earthquake alerts—and prompt mobilization of aid by government and humanitarian agencies—possible.

The ability to detect and locate earthquakes has been more than 1,800 years in the making. The earliest known seismic instrument dates back to AD 132, an invention of the Chinese polymath Zhang Heng. It was designed as an urn decorated with eight dragon heads, each holding a ball. Eight open-mouthed toads circled the base, and though the exact mechanism is unknown, seismologists think a pendulum inside the vessel was used to sense ground movement, which would trigger one of the balls to drop from dragon to toad to reveal the direction of an earthquake’s waves. The instrument was said to have accurately detected an earthquake hundreds of miles away from the imperial court.

See a digital seismometer and a seismograph drum in *Nature’s Fury: The Science of Natural Disasters*, which is free for Members.



Guralp CMG 3T compact seismometer

© Courtesy Guralp



Hercules beetle (Dynastes hercules)

An Extreme Beetle

It’s no accident, of course, that this beetle is named for a mythological hero who was most famous for his strength. Primarily because they have an external skeleton, Hercules beetles, like many in its genus, can lift many hundreds of times their weight.

In the male, such a show of strength is useful during competition for mates. In 1947, noted naturalist William Beebe, who was a research associate at the Museum from 1925 until his death in 1962, described the ritual, in which two Hercules males rush at each other until one securely grasps the other and then rears up to a nearly vertical stance, with all the drama of a professional wrestling match. “At the zenith of this pose [the dominant beetle] rests upon the tip of the abdomen and the tarsi of the hind legs, the remaining four legs outstretched in midair, and the opponent held sideways, kicking impotently,” Beebe wrote. “This posture is sustained for from two to as many as eight seconds, when the victim is either slammed down, or is carried away in some indefinite direction to some indeterminate distance, at the end of which the banging to earth will take place.”

Along with their strength, Hercules beetles are also notable for their size: they are among the largest of the rhinoceros beetles (Dynastinae), a subfamily of the scarab beetle family (Scarabaeidae). Hercules males can grow as long as 7 inches, including the horns, and females, 3 inches. They are sexually dimorphic, most notably with the female lacking the horns that distinguish the male. The setae along the male’s horn aid in gripping; setae elsewhere protect the beetles from bacteria, dirt, and moisture.

They are found in Central and South America and a few of the islands of the Lesser Antilles. The tropical climate plays a role in the curious tendency of their elytra, or hardened wings, to change rapidly from yellowish olive to black as humidity rises.

See the climbable Hercules beetle model in *Life at the Limits: Stories of Amazing Species*, which opens April 4 and is free for Members.

© AMNH/R. Mickens

A NATURAL OBSESSION

No 19th-century naturalist’s collection, the proverbial cabinet of curiosities, would be complete without beetles. Alfred Russel Wallace (1823–1913) collected more than 80,000 specimens in the Malay Archipelago alone. Such passion is not surprising, since beetles (Coleoptera) are the largest order of insects, with about 350,000 known species.

BEHIND THE SCENES

The Museum’s collection of beetles and weevils numbers nearly 2 million—at last count, 1,977,800 specimens—or 8.5 percent of the Museum’s invertebrate zoology collection. The invertebrate zoology collection in turn, with more than 23 million specimens, accounts for nearly 70 percent of the Museum’s total scientific collection of 33,430,000 specimens.

OTHER SCARABS

Museum collections tend to reflect the special interests of its researchers. So, while the invertebrate zoology collection has only a modest number of Hercules beetles, it has an impressive representation of other Scarabaeidae, primarily the genus *Diplotaxis*, collected by the late Patricia Vaurie during her 38-year career at the Museum.

CLEANING UP

Hercules beetle larvae, which live in and feed upon rotting or decayed wood, are natural recyclers with an important place in the cycle of life. Fossils suggest that scarab beetles alive 150 million years ago fed on dinosaur dung. Egyptian dung beetles (*Scarabaeus sacer*) were considered a sacred symbol of death and rebirth, and ancient amulets in their image inspired the familiar gemstone jewelry called scarabs.



Guinea worm patients Sadia Mesuna (right) and Fatawu Yakubu read an educational comic book at a case containment center in Ghana.



Picture books are used to teach children and adults how to avoid contracting and spreading Guinea worm disease in South Sudan. Right: Health workers in Ethiopia conduct house-to-house searches for malaria and trachoma.

COUNTING DOWN TO AN EXTINCTION

BY MARK SIDDALL

WHY WOULD A **BIOLOGIST** CELEBRATE THE **ERADICATION** OF AN **ORGANISM**?

THE LIFE CYCLE of a Guinea worm, *Dracunculus medinensis*, is deviously simple. Cool water teems with life, much of it microscopic crustaceans; this is normal, and typically without consequences. But sometimes, resident water fleas host larvae of a rapacious, fiery serpent. When ingested, the water flea hosts dissolve in stomach acid, allowing the larval worms to move through the human body, where they mature and mate. As the females of the next generation grow, they pack their own bodies with live young. During this period, the victim suffers no immediate symptoms. A year later, the 3-foot-long mother awakens deep in her host's leg. She rises to the surface and induces a blister on her victim's skin that is so fierce, and of such searing agony, that the afflicted seek relief in the coolness of water. Here, the mother dumps her offspring, completing the life cycle for another generation. The Guinea worm has repeated this process for hundreds of thousands of years.

The Guinea worm can only reproduce at the expense of those it infects. Adult worms only infect humans, while the larvae only invade water fleas. It is also the only human parasite that must

cause pain in order to successfully reproduce. In addition to deeply wounding and torturing its victims for weeks on end, dracunculiasis is a disease of starvation. It leaves families in affected areas incapacitated and unable to reap the crops they have sown.

There is no vaccine for Guinea worm, and there are no drugs that can cure those who are infected. The pest once afflicted hundreds of millions of people from Gambia to India. But the

worm is now gone from Guinea, and from almost everywhere else. At last count (2015), there were only 148 people infected, down from an estimated 3.5 million in 1986. Of the remaining cases, 113 are in South Sudan.

We know these numbers with precision because of a campaign that former President Jimmy Carter began leading in 1986 to destroy the worm. That community-driven process, coordinated by The Carter Center and executed by the South Sudan Ministry of Health, village

volunteers, and trained technical advisors, is driving the parasite out of its last remaining human hosts. Each person known to be infected with the worm, along with every village in which outbreaks have occurred or are occurring, is tracked. Intervention



Countdown to Zero: Defeating Disease
Tuesday, January 13–Sunday, July 12

Countdown to Zero, a new exhibition about scientific and social innovations that are ridding the world of ancient afflictions, was developed in collaboration with The Carter Center and focuses on several global efforts that have been able to contain, eliminate, or eradicate disease. The exhibition will highlight the 30-year campaign by The Carter Center to eradicate Guinea worm disease, programs to eradicate polio and for more localized elimination of river blindness, lymphatic filariasis, and malaria, and efforts to control diseases like Ebola.

Countdown to Zero is presented by the American Museum of Natural History in collaboration with The Carter Center.

Countdown to Zero is proudly supported by Conrad N. Hilton Foundation, Lions Clubs International Foundation, Mectizan Donation Program, Mr. John J. Moores, Sr., and Vestergaard.

This exhibition is made possible by the generosity of the Arthur Ross Foundation.

Countdown to Zero: Defeating Disease
in the 21st Century
Monday, January 12, 7:45pm
\$20

What does it take to eradicate a disease? Former President Jimmy Carter, whose Carter Center has worked for the past 30 years to break the life cycle of the Guinea worm, will be joined by Curator Mark Siddall, a parasitologist, and Dr. Donald Hopkins, vice president for health programs at The Carter Center, for a dynamic conversation about the science and politics of disease eradication.

is multi-pronged: the infected are voluntarily quarantined, since patients with emergent worms must be kept away from water sources; containment-care facilities welcome not just the victims but their dependents, too; local education programs focus on water filtration.

Many years ago, when I was beginning a career in parasitology, I was told about the “parasitologists’ dilemma,” a spin on the Malthusian catastrophe. The premise was that, should parasitologists actually manage to eradicate infectious diseases caused by parasites, we’d be morally responsible for thrusting millions of people into the inevitable conflict and poverty that would result from population growth and increased pressures on a limited food supply. But in every place where the Guinea worm has been eliminated, the very opposite is true. Just a couple of decades ago, Ghana and Mauritania had thousands of cases. Now, both countries are free not only of Guinea worm but, increasingly, of the shackles of extreme poverty: per capita G.D.P. has tripled, the number of people living on less than a dollar a day has been halved, and the birth rate has plummeted. This, obviously, is the result of many factors besides Guinea worms. But I can say this: so much for Malthus.

Most conservation efforts, like those for spotted owls and pandas, are proxies for threatened ecosystems, or seek to preserve “keystone species,” like sharks. Few focus on the despised and downtrodden species that crawl beneath our feet. As a leech expert, “save the maggots” has always been my rallying cry, but let no one mourn this extinction.

Mark Siddall is a curator in the Division of Invertebrate Zoology and curator of the exhibition *Countdown to Zero*, now on view in the Akeley Gallery.

This piece was originally published in *The New Yorker’s* Elements blog as “An Extinction to Celebrate.”



In 2007, former U.S. President Jimmy Carter and First Lady Rosalynn Carter visited Tingoli village in Ghana, where The Carter Center worked to eradicate Guinea worm disease in partnership with Ghana’s Ministry of Health.

© The Carter Center/L. Cobb

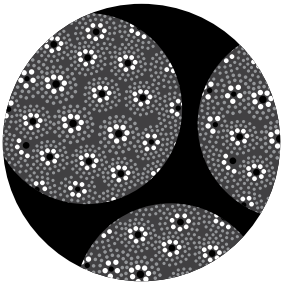
COUNTING
DOWN
FOR SIX
DISEASES

WHAT DOES IT TAKE TO WIPE OUT
A DISEASE? WHETHER THE PRIMARY
METHOD IS TO VACCINATE, EDUCATE,
OR INTERRUPT TRANSMISSION BY OTHER
MEANS, WIDESPREAD COOPERATION
ACROSS NATIONAL BORDERS IS KEY.



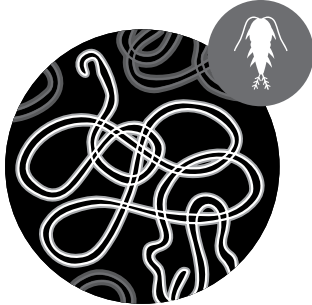
SMALLPOX

The agent: The variola virus
The threat: First-ever disease to be eradicated; the smallpox virus exists only in secure labs.
How infection spreads: From person-to-person contact, through the air, and from contact with infected bodily fluids and objects such as bedding or clothing.
Defeating the disease: The smallpox vaccine, discovered by Edward Jenner in 1796, was the world’s first vaccine. A global immunization effort began in the mid-20th century, led by the World Health Organization (WHO).
Eradication potential: Declared eradicated in 1980.



POLIO

The agent: The poliovirus
The threat: Polio infections fell by more than 99 percent from 1988 to 2013.
How infection spreads: From person-to-person contact or through contaminated food or water.
Defeating the disease: Two vaccines—the Oral Polio Vaccine and Inactivated Polio Vaccine—have been in use for over 50 years, helping bring the number of cases worldwide to all-time low in 2012.
Eradication potential: Eradication is possible, but only if vaccination programs are not compromised by regional instability or opposition to vaccines.



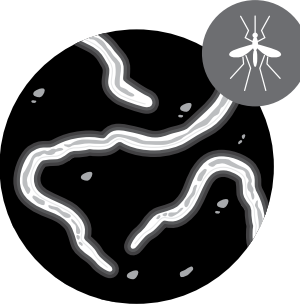
GUINEA WORM DISEASE

The agent: The parasitic worm *Dracunculus medinensis*
The threat: The number of cases has decreased by more than 99 percent since the 1980s, to 148 cases in 2013.
How infection spreads: Through drinking water, which contains microscopic crustacean hosts that carry worm larvae.
Defeating the disease: A concerted effort spearheaded by The Carter Center—educating and engaging communities in solutions to avoid contracting and spreading the disease, plus making available water-filtering tools—has brought the disease within sight of eradication.
Eradication potential: Poised for eradication.



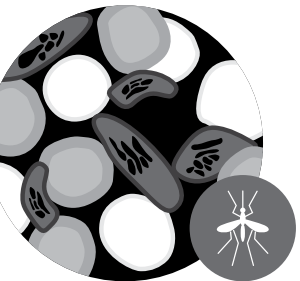
RIVER BLINDNESS

The agent: *Onchocerca volvulus* worms
The threat: Occurs mainly in tropical areas; more than 99 percent of infected people live in sub-Saharan Africa.
How infection spreads: Through the bites of black flies. Worms reproduce under the skin, producing thousands of offspring that inflame the skin and cause blindness.
Defeating the disease: Drug treatment is critical; killing fly larvae in their breeding places also helps interrupt transmission.
Eradication potential: Successful elimination efforts in Latin America offer models for tackling the disease in sub-Saharan Africa.



LYMPHATIC FILARIASIS

The agent: Three species of nematode worm: *Wuchereria bancrofti*, *Brugia malayi*, and *Brugia timori*
The threat: About 120 million people are currently infected, with nearly 1.4 billion people in 73 countries under threat.
How infection spreads: Through mosquito bites, which transmit these worms’ larvae. The worms damage the lymphatic system, causing painful, disfiguring, and disabling swelling.
Defeating the disease: Drug treatment and bed nets can prevent transmission.
Eradication potential: Identified by the WHO as a candidate for eradication.



MALARIA

The agent: *Plasmodium* parasites
The threat: Though preventable and curable, malaria continues to infect hundreds of millions annually across about 100 countries in Africa, Asia, and Latin America.
How infection spreads: Through the bites of female *Anopheles* mosquitoes; there are numerous species of *Anopheles* around the world.
Defeating the disease: Widespread use of insecticidal bed nets has been successful in stopping transmission, and vaccines are in development. Genetically engineering mosquitoes is another approach that is being considered.
Eradication potential: Malaria has been eliminated in certain regions, while for others, control may be the most effective short-term approach.



Netherlands New Guinea, Balim River: The crossing of the Wamena.
826941

Far-flung

Field



Netherlands New Guinea, Lake Habbema: Guba on wharf.



Sites

Much like in the 1930s, crossing streams and unconventional landings are par for the course when conducting fieldwork on the island of New Guinea.

The hiking boot soles lasted only a few hours into the 11-hour trek, the first of two required to reach camp on the north slope of the central highlands of Papua New Guinea. Heavy rains pelted the expedition team as they tackled a series of deep, muddy ravines and river crossings over suspension bridges made of vines. “I had expected that getting here would be hard,” wrote Museum ornithologist Paul Sweet in a dispatch from the field on October 3, “But I had no idea how hard.”

Famous for the richness of its native fauna—the majority of the birds of paradise are found here, as are two of the five living egg-laying species of mammals—New Guinea’s mountainous terrain exacts a steep toll from biologists who seek out its enigmatic animals. (Papua New Guinea makes up the eastern half of New Guinea, the world’s second largest island, while the west is part of Indonesia.) Sweet, together with ornithologist Brett Benz, herpetologist Christopher Raxworthy, and mammalogist Neil Duncan, who traveled to the highlands of Papua New Guinea as part of the Explore21 Expedition last fall (see page 12), joined a long line of Museum vertebrate specialists to survey the region’s native species in increasingly remote parts of the island.

Beginning in 1927, when evolutionary biologist Ernst Mayr first traveled there to collect birds before joining the Museum’s historic Whitney South Sea Expedition, Museum researchers have led more than 18 expeditions to the region. But a series of three field trips, led by mammalogist and philanthropist Richard Archbold in the 1930s, is perhaps most notable for its attempts to solve the practical problem of reaching the island’s interior.

The first expedition, in 1933–1934, left Archbold convinced that transport was the greatest challenge to uncovering New Guinea’s “most zoologically interesting areas.” He decided that effective fieldwork on the island required airplanes for scouting locations, transporting personnel, and delivering supplies, especially food, to far-flung, long-term camps. For their second trip, in 1936–1937, the Archbold Expedition team used a Fairchild amphibian airplane to establish camp in the mountains, aiming to collect specimens at high elevations. But after the plane was destroyed while buoyed in the harbor at Port Moresby, the capital, the expedition was forced to abandon the original plan, ferry its team back using rafts, and settle for conducting fieldwork in the lowlands.

For the third expedition, in 1938–1939, Archbold acquired a “flying boat” that could land on, and take off from, water. The so-called Guba, a long-range patrol bomber that was used by the United States Navy, was customized for the expedition and flown from San Diego to New Guinea via Honolulu and Wake Island over the course of a week in June 1938. The plane proved invaluable in establishing and supporting several camps for the duration of the expedition, which lasted until May 1939, explored more than 2,000 square miles across various elevations, and contributed thousands of specimens to the Museum’s collections.

While the flight to Papua New Guinea no longer takes a week—the Explore21 Expedition team members arrived in Port Moresby just 29 hours after departing New York—reaching remote field sites on the island is not too different than it was in the 1930s. Small chartered planes ferried Sweet, Benz, Raxworthy, and Duncan to their base camp in the village of Malaumanda, landing on a muddy grass airstrip, lined with local residents who came to welcome the guests. From there, much like explorers who had come to the island before them, the team had to trek to high camp by foot, scaling several thousand feet through tropical rain forest—rain, mud, and all.

For the Explore21 Expedition to Papua New Guinea, team members traveled to one of the most remote areas on Earth.

Inside the Explore21 Expedition to Papua New Guinea

The South Pacific island of New Guinea accounts for only about 0.5 percent of the world's land mass—but it's home to more than 7 percent of its biodiversity, much of it highly unusual. And unlike those in other parts of the world, its tropical rain forest ecosystems remain mostly intact, undisturbed by large-scale human development and, in some remote areas, mostly unstudied. Scientists estimate, for example, that less than half of the island's amphibians have been described so far.

All of these made Papua New Guinea (the eastern half of the island; the western half is governed by Indonesia) a rich destination for the second expedition under the banner of Explore21, a new scientific initiative launched by the Museum in 2013 to support fieldwork focused on discovering new species developing new collection methods, preserving biodiversity, and uncovering new knowledge about the natural world.

Last September, four vertebrate specialists from the Museum headed out on a seven-week expedition to the island's rugged interior together with three Papua New Guinea field biologists. Their goal: to conduct intensive surveys of the island's birds, mammals, reptiles, and amphibians—as well as their viruses and parasites—and to learn more about the evolutionary processes and environmental factors behind this island's unique fauna. The results of this work will be used in many ways: to add important specimens and tissues to the Museum's collections, to inform conservation planning for the region, and, through findings about the distribution of viruses, to influence public health policies.

The Museum's Explore21 Initiative is supported by the leadership contributions of Katheryn P. and Thomas L. Kempner, Jr., and Linda R. and William E. Macaulay.



READ

.....
Paul Sweet's and
Chris Raxworthy's
posts from the field
at amnh.org/blog

CHRISTOPHER RAXWORTHY
*Associate Curator,
Department of Herpetology*

Herpetologist Chris Raxworthy worked closely with Bulisa Iova, collection manager from the Papua New Guinea National Museum and Art Gallery, during surveys for snakes, lizards, and frogs. The team was working in a previously unsurveyed region, and because the island's amphibians and reptiles are not well known, Dr. Raxworthy anticipates that the expedition could yield several new species. One exhilarating surprise: at top camp, at an elevation of about 2,460 meters, Raxworthy discovered "frog heaven... one of the most beautiful bright green tree frogs I have yet found in PNG, and other species that did not seem to fit the species descriptions I had at camp."

PAUL SWEET
*Collection Manager,
Department of Ornithology*

Before leaving for Papua New Guinea, ornithologist Paul Sweet was looking forward to observing several species of bowerbird and their exquisitely decorated bowers, some of the most elaborate animal-made structures. He was not disappointed: at Wagilia Camp, Sweet wrote in a dispatch for the Museum blog, "We wake up to the bizarre calls of the Black Sicklebill, a bird of paradise, and on the ridge above camp we have found the maypole bowers of MacGregor's Bowerbird."

BRETT BENZ, EXPEDITION LEADER
*Curatorial Associate,
Department of Ornithology*

Ornithologist Brett Benz, who has conducted fieldwork in Papua New Guinea for more than a decade, studies several bird groups including birds of paradise and bowerbirds. Fluent in Melanesian Pidgin, Dr. Benz traveled to Papua New Guinea several months before the expedition to establish agreements with local landowners, choose camp locations, and secure research permits.

NEIL DUNCAN
*Collection Manager,
Department of Mammalogy*

Among mammalogist Neil Duncan's many tasks on the expedition was to collect tissue samples from New Guinea's rodents, marsupials, and fruit bats, which may carry zoonotic viruses (viruses that can be passed between species), for analysis at the Museum. Data about the distribution and diversity of pathogenic viruses can yield important information about the risk of transmission to livestock and humans. At low camp near the Ayuwagu River, Papua New Guinea biologist Enock Kale recorded many mammal species that didn't occur at higher elevations, including four species of tube-nosed bats.

Papua New Guinea is located north of Australia on the eastern half of the South Pacific island New Guinea, the world's second-largest island.



Programs and Events

For more programs and to purchase tickets, visit amnh.org/calendar.

For updates and reminders, sign up for monthly Calendar Highlights for Members by sending your membership number and request to subscribe to members@amnh.org. The Museum does not trade, rent, or sell this information.

Tickets

Tickets are available by phone at 212-769-5200, Monday–Friday, 9 am–5 pm, or by visiting amnh.org. Please have your membership number ready.

Availability may be limited. Please purchase tickets in advance.

Please be aware that ticket sales are final for all Member programs. All programs go ahead rain or shine. There are no refunds unless the program is cancelled by the Museum.

JANUARY

From Quasars to Quarks Tour
Sunday, January 4
10:30 am–Noon
Free; registration required
212-769-5200

How far away is a quasar? How small is a quark? Explore these fascinating phenomena on a special tour in the Rose Center for Earth and Space.

SciCafe: The Science Behind Football
Wednesday, January 7
7 pm
Free for 21+

Scientist and author **Ainissa Ramirez** explores the science behind one of America’s favorite games, addressing topics from concussions to decision-making.

Walk on the Wild Side
Eight Wednesdays, January 7–February 25
8–9:30 am
Free for Adventurer-level Members and above; call 212-769-5606
Heed the call of the wild and join an intrepid band of walkers for a fitness experience like no other: power walking the halls of the Museum before it opens.

Live Wolf Encounter
Saturday, January 10
11 am (for children 5 and under)
1 pm
\$10

Meet Atka, an Arctic gray wolf from the Wolf Conservation Center in South Salem, New York, on a visit to the Museum.



Countdown to Zero: Defeating Disease in the 21st Century
Monday, January 12
7:45 pm
\$20

Join former President **Jimmy Carter**, Dr. **Donald Hopkins**, vice president of health programs at The Carter Center, and Curator **Mark Siddall**, a parasitologist, for a dynamic conversation about the science and politics of disease eradication.

Inside Out Tour with Sidney Horenstein
Thursday, January 15
6–7:30 pm
\$25
Explore the history and architecture of the Museum with historian **Sidney Horenstein**. This tour will take place inside and outside of the Museum.

Culture Salon: Coffee
Wednesday, January 21
6:30 pm or 7:30 pm
\$40
Led by Stumptown Coffee’s **Nick Kirby**, this after-hours culinary tour through the Museum includes insights about many coffees of the world.



Curator Lecture: Edmond A. Mathez
Wednesday, January 21
6–8 pm
Free for Adventurer-level Members and above; registration required 212-769-5606
Join us for a special presentation about our latest exhibition, *Nature’s Fury*, with Curator **Edmond A. Mathez**. Dr. Mathez will discuss disaster risk reduction and the Museum’s research about these topics.



The Year in Review with Neil deGrasse Tyson
Thursday, January 22
7:30 pm
\$20
Spend an evening with Rose Director of the Hayden Planetarium **Neil deGrasse Tyson** as he reviews stories about the universe drawn from breaking news in 2014.

Astronomy 101
Tuesday, January 27
6:30 pm
\$12
Interested in becoming an amateur astronomer but unsure where to begin? In this program, **Ted Williams** will get you on the road to becoming a professional amateur astronomer. The city skies may just offer the beginner the best place to start sky watching.

Behind the Scenes: Research Library
Tuesday, January 27
6:30 pm, 7 pm, 7:30 pm
\$35
The Library hosts extensive photographic collections and the Darwin Manuscripts Project—a joint effort with Cambridge University Library to digitize and annotate the primary written evidence of Darwin’s thought. Join Library Director **Tom Baione** and Director of Darwin Manuscripts Project **David Kohn** to view items from these collections and learn about ongoing projects to make these resources freely available online.



The Art of Diorama
Six Thursdays, January 29–March 12
7–9:30 pm
\$170 Members
Back by popular demand! Join Museum exhibition specialist **Tom Doncourt** for a hands-on look at the creation of our legendary dioramas. Learn behind-the-scenes stories and discover how dioramas are made, from start to finish.

FEBRUARY

Catching a Comet with the Rosetta Spacecraft
Monday, February 2
7:30 pm
\$12
Rosetta, launched in 2004, is the first spacecraft to orbit a comet, which it reached in 2014. Now Rosetta will study the comet for more than a year. Mission scientist **Joel Parker** will provide an overview of the mission so far—and share the excitement of why we study comets.

Winter Lunchtime Bird Walks in Central Park
Four Tuesdays
February 3–February 24
Noon–1:30 pm
\$50
Catch a glimpse of owls, songbirds, and woodpeckers, seed-eating birds in the fields, and multiple species of ducks and gulls in the lakes as ornithologist **Paul Sweet** guides you through Central Park to observe the varied bird species of New York City.

SciCafe: NYC Subways: Mapping the Urban Microbiome, Genome, and Metagenome
Wednesday, February 4
7 pm
Free for 21+

Geneticist **Chris Mason**, assistant professor in the Department of Physics and Biophysics at Weill Cornell Medical College, is one of a group of researchers combing the New York City subway system to swab surfaces, collect specimens, and create a map of the urban microbiome and DNA around us—information that could signal a microbial threat due to bioterrorism or emergent disease.



Exhibitions

Admission is by timed entry only.

Nature’s Fury: The Science of Natural Disasters
Free for Members

From earthquakes and volcanoes to tornadoes and hurricanes, nature’s forces shape our dynamic planet and endanger people around the world. Discover the causes of these natural yet hazardous events and explore the risks associated with each.



Countdown to Zero: Defeating Disease
Opens Tuesday, January 13
Free for Members
This new exhibition developed in collaboration with The Carter Center highlights scientific and social innovations that are ridding the world of ancient afflictions—including the 30-year campaign that may soon eradicate Guinea worm disease.



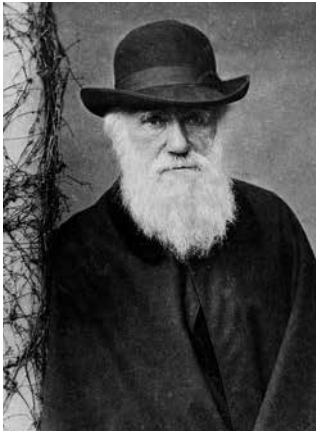
Natural Histories: 400 Years of Scientific Illustration from the Museum’s Library
Free for Members
Featuring scientific illustrations spanning five centuries, this visually striking exhibition explores the integral role illustration has played in scientific discovery.

The Butterfly Conservatory: Tropical Butterflies Alive in Winter
Please check amnh.org for Member prices
Housed in a vivarium that approximates their natural habitat with live flowering plants, butterfly species in this ever-popular exhibition include iridescent blue morpho butterflies, striking scarlet swallowtails, and large owl butterflies.

**Winter:
The Coldest Season Tour**
Saturday, February 7
10:30 am–noon
Free registration required
212-769-5200
Join a guide to learn about winter in North America. Explore the Cullman Hall of the Universe, Gottesman Hall of Planet Earth, Bernard Family Hall of North American Mammals, and the Hall of North American Forests to learn about the forces that create “winter” and how animals and plants adapt to the cold.



Darwin Goes Digital
Tuesday, February 10
6:30 pm
Free; registration required
212-769-5200
Charles Darwin’s Evolutionary Manuscripts include numerous original documents that trace the long maturation of Darwin’s theory of evolution by natural selection. Mark the Museum’s historic project to publish the entire 30,000-item corpus online with **Randal Keynes**, a conservationist and Darwin’s great-great-grandson; field biologist and historian of evolution **James Costa**, and **David Kohn**, director of the Museum’s Darwin Manuscripts Project.



Romance Under the Stars
Saturday, February 14
6 pm or 9:30 pm
\$125 per person (includes open bar and appetizers)
Celebrate Valentine’s Day with a unique NYC experience only at the Hayden Planetarium! Join us for a cocktail hour complete with open bar, Champagne, chocolates, and passed hors d’oeuvres; then join Hayden Planetarium presenters **Lydia Maria Petrosino** and **Ted Williams** in the Planetarium for a view of the night sky.

**Behind the Scenes:
Invertebrate Zoology**
Thursday, February 19
6:30 pm, 7 pm, 7:30 pm
\$35
Visit the Division of Invertebrate Zoology to see some of the Museum’s world-class, 25-million-plus insect and marine invertebrate collections, hosted by Curatorial Associate **Christine Johnson** and Senior Scientific Assistant **Louis Sorkin**.

**Sackler Brain Bench:
One-Day Course**
The Early Childhood Brain
Saturday, February 21
9 am–6 pm
\$85
What lies behind the wonder in a baby’s eyes? Are my toddler’s tantrums or facility with language determined by genes or upbringing? In this one-day course, a group of experts will lead you through recent insights into early-childhood brain development.



NASA Missions
Tuesday, February 24
6:30 pm
\$12
After an eight-year journey, NASA’s New Horizons mission will soon be arriving at Pluto. Join **Brian Levine** and **Carter Emmart** for a ride around the solar system, to visit this and other missions and check on the truly amazing research they are doing.



Please check amnh.org for Member ticket prices for IMAX, 3D films, and the Space Show.

**LeFrak Theater
Tiny Giants**
Opens Monday, January 5
In an adventure of epic proportions, *Tiny Giants* reveals the astonishing lives of some very small animals.

Hayden Planetarium Space Show: Dark Universe
Narrated by Neil deGrasse Tyson, the Space Show celebrates pivotal discoveries and the cosmic mysteries that remain. Gaze up at the Milky Way from Mt. Wilson Observatory in California, plunge into Jupiter’s atmosphere with a NASA probe, and more.



**HERE WE STAND:
Honor Black History**
Saturday, February 28
3–5 pm
Free for Members
Experience globally minded, groundbreaking artists creating history at the Museum. Legendary hip-hop artist **Darryl “DMC” McDaniels** and **NEA Jazz Master Delfeayo Marsalis** return to this exciting event. Renowned director **Jamal Joseph** with the Oscar-nominated Harlem-based **IMPACT Repertory Theatre** and New Orleans’ **Uptown Music Theatre** premiere a new work, “From the African Village to the Urban Village.”

MARCH

**SciCafe: Explore21
Papua New Guinea**
Wednesday, March 4
7 pm
Free for 21+
Join Museum scientists as they tell tales of their recent rugged expedition into the highlands of Papua New Guinea. The team will share findings from their survey of birds, mammals, amphibians, and reptiles, as well as parasites, from one of Earth’s most biodiverse spots.



Baby Animals Tour
Sunday, March 8
2–3:30 pm
Free; registration required **212-769-5200**
Baby animals come in all shapes and sizes, and different animal species care for their young in many different ways. See how baby animals including gorillas, dinosaurs, and others learn to survive and thrive with help from their families during this special tour of Museum halls.

Our Earth’s Future
Four Tuesdays, March 10–31
6–8 pm
Free; apply on amnh.org
Our Earth’s Future is about the science of climate change—and how to talk about it. By the end of the course, participants will be able to confront misconceptions and contribute confidently to conversations about climate change.



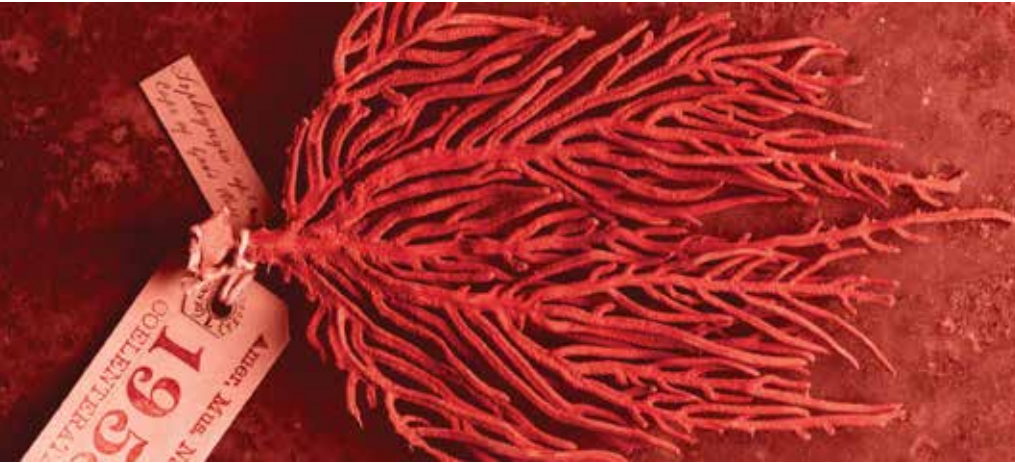
Opulent Oceans
Wednesday, March 11
6:30 pm
Free; reservations required
212-769-5200
Join author **Melanie L. J. Stiassny**, Axelrod Research Curator of Fishes, on an epic, oceanic journey as she discusses the early histories that shaped the study of the oceans.

Animal Drawing
**Eight Wednesdays,
March 18–May 6**
7–9 pm
\$160 (Materials not included)
The celebrated diorama and fossil halls serve as the setting for an intensive after-hours drawing course with illustrator and naturalist **Patricia Wynne**. All experience levels welcome.

Culture Salon: African Games and Gastronomy
Thursday, March 19
6:30 pm or 7:30 pm
\$40
Play mancala and dice games while snacking on Tanzanian street food and sipping on Nigerian palm wine in the Hall of African Peoples. Uncover the meaning behind game-playing with experts.

Shelf Life: A Collection for Curious Minds
Dive deep inside the Museum’s collection to discover the past, present, and future of its approximately 33 million artifacts and specimens in this new series with original monthly videos.

amnh.org/shelflife





Sun/Earth Day
Saturday, March 21
Noon–5 pm
Free for Members
Join us as we explore the special relationship between Earth and the Sun and learn about the delicate balance that makes our planet the perfect place to call home. Talk with scientists, look through telescopes, and engage in hands-on activities at this family-friendly event.

Behind the Scenes: Ichthyology
Tuesday, March 24
6:30 pm, 7 pm, 7:30 pm
\$35
Ranging from deep-sea fish to prehistoric sharks, the Department of Ichthyology’s collection comprises more than 2 million specimens from around the world. **Radford Arrindell** and **Jairo Arroyave** share a rare look at collection storage spaces representing thousands of species and discuss techniques for preserving and studying these specimens.

On the Nature of Things by Karole Armitage
Wednesday, March 25; Thursday, March 26; Friday, March 27
8 pm
\$25
Dance meets science in *On The Nature Of Things*, a meditative performance about climate change by choreographer **Karole Armitage**, in collaboration with author and MacArthur fellow **Paul R. Ehrlich**, who wrote original text for the production and will provide live narration.

Nature’s Fury: The Science of Natural Disasters was originally created by *The Field Museum, Chicago*, with additional content developed by the *American Museum of Natural History*.

Nature’s Fury is proudly sponsored by **Travelers**.

The presentation of Natural Histories at the American Museum of Natural History is made possible through the generosity of the Arthur Ross Foundation.

Countdown to Zero is presented by the *American Museum of Natural History* in collaboration with **The Carter Center**.

Countdown to Zero is proudly supported by *Conrad N. Hilton Foundation, Lions Clubs International Foundation, Mectizan Donation Program, Mr. John J. Moores, Sr., and Vestergaard*.

This exhibition is made possible by the generosity of the *Arthur Ross Foundation*.

Our Cosmic Address
Tuesday, March 31
6:30 pm
\$12
No *Cosmos*-esque Ship of the Imagination in your apartment? Come for a cosmic ride in the Hayden Planetarium instead! **Christina Pease** and **Brian Abbott** spell out our cosmic address, from Earth’s position in the solar system and the solar system’s position in the Milky Way galaxy to where galaxy fits in the observable universe.

Spring 2015 Museum Dance
Dance the night away at the annual Museum Dance, the social event of the spring season. Call 212-496-3495 for more information.

Credits:
The SciCafe series is proudly sponsored by Judy and Josh Weston.

The February 4 SciCafe is supported by the Science Education Partnership Award (SEPA) program of the National Institutes of Health (NIH).

Dark Universe was created by the *American Museum of Natural History*, the *Frederick Phineas and Sandra Priest Rose Center for Earth and Space*, and the *Hayden Planetarium*.

Made possible through the generous sponsorship of **Accenture**.

And proudly supported by **Con Edison**.

Support for Hayden Planetarium Programs is provided by the Schaffner Family and by the Horace W. Goldsmith Endowment Fund.

Our Earth’s Future was made possible in part by the Institute of Museum and Library Services under grant number MA-10-13-0200-13.

The Museum greatly acknowledges The Mortimer D. Sackler Foundation, Inc. for its support to establish The Sackler Brain Bench, part of the Museum’s Sackler Educational Laboratory for Comparative Genomics and Human Origins, in The Spitzer Hall of Human Origins.

“From the African Village to the Urban Village” is supported in part by an award from the National Endowment for the Arts. Art Works.

Support for multicultural programs is provided, in part, by the May and Samuel Rudin Family Foundation, Inc., the Sidney, Milton and Leoma Simon Foundation, the family of Frederick H. Leonhardt, and The Max and Victoria Dreyfus Foundation.

The Museum also gratefully acknowledges major funding from the Charles Hayden Foundation.

Presented with special thanks to NASA and the National Science Foundation.

Dark Universe was developed by the *American Museum of Natural History, New York (www.amnh.org)* in collaboration with the *California Academy of Sciences, San Francisco*, and *GOTO INC, Tokyo, Japan*.

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JANUARY

4 SUNDAY
From Quasars to Quarks Tour

7 WEDNESDAY
Walk on the Wild Side
Member Program
Wednesdays through February 25

SciCafe: The Science Behind Football
After-Hours Program

9 FRIDAY
One Step Beyond
For details, visit amnh.org/OSB

10 SATURDAY
Live Wolf Encounter
Family Program

12 MONDAY
Countdown to Zero: Defeating Disease in the 21st Century with former President Jimmy Carter
Museum Lecture

15 THURSDAY
Inside Out Tour with Sidney Horenstein
Member Program

21 WEDNESDAY
Curator Lecture: Edmond A. Mathez
Member Program

Culture Salon: Coffee
Celebrate Culture!

22 THURSDAY
The Year in Review with Neil deGrasse Tyson
Hayden Planetarium Program

27 TUESDAY
Behind the Scenes: Research Library
Member Program

Astronomy 101
Hayden Planetarium Program

29 THURSDAY
The Art of Diorama
Adult Course
Thursdays through March 12

FEBRUARY

2 MONDAY
Catching a Comet with the Rosetta Spacecraft
Hayden Planetarium Program

3 TUESDAY
Winter Lunchtime Bird Walks in Central Park
Tuesdays through February 24

4 WEDNESDAY
SciCafe: NYC Subways: Mapping the Urban Microbiome, Genome, and Metagenome
After-Hours Program

6 FRIDAY
One Step Beyond
For details, visit amnh.org/OSB

7 SATURDAY
Winter: The Coldest Season Tour
Member Program

10 TUESDAY
Darwin Goes Digital
Museum Lecture

14 SATURDAY
Romance Under the Stars
Hayden Planetarium Program

19 THURSDAY
Behind the Scenes: Invertebrate Zoology
Member Program

21 SATURDAY
Sackler Brain Bench One-Day Course: The Early Childhood Brain
Adult Course

24 TUESDAY
NASA Missions
Hayden Planetarium Program

28 SATURDAY
Here We Stand: Honor Black History
Celebrate Culture!

MARCH

4 WEDNESDAY
SciCafe: Explore21 Papua New Guinea
After-Hours Program

6 FRIDAY
One Step Beyond
For details, visit amnh.org/OSB

8 SUNDAY
Baby Animals Tour
Member Program

10 TUESDAY
Our Earth’s Future
Adult Course
Tuesdays through March 31

11 WEDNESDAY
Opulent Oceans
Museum Lecture

18 WEDNESDAY
Animal Drawing
Adult Course
Wednesdays through May 6

19 THURSDAY
Culture Salon: African Games and Gastronomy
Celebrate Culture!

21 SATURDAY
Sun/Earth Day
Hayden Planetarium Program

24 TUESDAY
Behind the Scenes: Ichthyology
Member Program

25 WEDNESDAY
On the Nature of Things by Karole Armitage
Celebrate Culture!
Through March 27

31 TUESDAY
Our Cosmic Address
Hayden Planetarium Program

Three Curators Join Museum

On the Trail of Human Ancestors



Brian Richmond
DIVISION OF ANTHROPOLOGY

(L) Brian Richmond finds in footprints new evidence of our early ancestors' behavior. (R, top) In her work with trilobites, Melanie Hopkins benefits from the proximity of fossil sites in New York State. (R, bottom) Brian Smith explores relatively recent events to resolve the "tips of the avian tree of life."

VISITORS TO THE MUSEUM'S SPITZER HALL OF HUMAN ORIGINS are invited to "walk" in the footsteps of hominins who lived some 3.6 million years ago. For biological anthropologist Brian Richmond, deciphering what such footprints can tell us about the behavior of our early ancestors is the stuff of his life's work.

"Bones and teeth tell us what species existed at a given time and place, what they looked like, and how they were related," explains Dr. Richmond, the new curator of human origins in the Museum's Division of Anthropology. "But footprints preserve a snapshot of their behavior. They tell us how our extinct ancestors walked, how many individuals were walking, whether they were adults or kids, and what other animals shared the same habitat. Footprints give us an amazing window into human behavior in deep time."

Before arriving at the Museum in August, Richmond taught at The George Washington University and had a long association with the Smithsonian Institution. In 2007, he and his colleagues discovered the first 1.5-million-year-old hominin footprints at Lake Turkana in Kenya's Great Rift Valley, opening a fascinating new line of inquiry.

In the field, Richmond and his team have uncovered layer upon layer of impressions of early hominin and animal prints first made in mud, then rapidly buried in soft sand. Such sites can now be recorded digitally, undisturbed, and re-created back in the lab using a 3D printer, then analyzed using the biomechanics of modern humans and skeletons of humans and apes, including the incomparable specimens available in the Museum's collection.

As important as the lab work is, Richmond revels in the thrill of fresh discoveries made in the field. "The first time, I had to pinch myself," he says. "Here we were sweeping sand off these beautifully preserved footprints. The last time someone walked in this spot was 1.5 million years ago, and we're now seeing it for the first time. Toes, an arched foot, an essentially modern shape. These provide the oldest evidence of a modern foot—and a moment captured in time."

© AMNH/D. Finnin

Tracking Evolution's Rate through Trilobites



Melanie Hopkins
DIVISION OF PALEONTOLOGY

MELANIE HOPKINS IS WORKING TO UNLOCK THE HISTORY OF THE EVOLUTION of animals over vast stretches of geologic time and, for her, the key is trilobites—extinct arthropods that lived for almost 300 million years until 250 million years ago when Earth experienced the largest mass extinction in its history.

"My main work is studying variation within species and how that drives long-term evolution within lineages," says Dr. Hopkins, who came to the Museum in January 2014 as an assistant curator in the Division of Paleontology after stints of postdoctoral work at The Field Museum of Natural History in Chicago, the Museum für Naturkunde Berlin, and the University of Erlangen-Nuremberg. "One thing that I'm really interested in is when and why rates of evolution are faster in some environments than others."

Trilobites were incredibly diverse, with more than 20,000 described species. Because their shells were made of the mineral calcite, like those of crabs or clams, trilobites are well represented in the fossil record, preserved in sites all over the world from the United States to China. Moreover, like insects, they molted throughout their lifetimes leaving clues to how they changed during development.

Hopkins' fieldwork has taken her from Sweden to the deserts of Nevada and Utah. This summer, Hopkins explored several historic fossil beds near Utica. "Trilobite paleontology goes back a long way in New York State," she says.

There is also untold value in mining the Museum's own trilobite collection of an estimated 400,000 specimens, many from localities no longer accessible.

"Discoveries can actually happen opening up old drawers and finding specimens collected years ago probably for a completely different purpose," says Hopkins. "Collections can be very useful in answering questions that we hadn't even thought about when the material was first collected."

Studying Tropical Bird Diversity

BRIAN SMITH, ASSISTANT CURATOR IN THE DEPARTMENT OF ORNITHOLOGY since last January, credits his career path to a curiosity about nature ignited by childhood wanderings in the woods of northern New Jersey—and his mother's passion for birds.

"I was really young, going through the woods and exploring, trying to find animals, flipping up logs, looking for salamanders, and became really interested in wildlife," says Dr. Smith. "I wasn't into birds at first but my mother was and she introduced me to them. I slowly became more and more interested in them too."

Today, Smith scours the bird habitats of Central and South America and Mexico to discover how the extraordinary bird diversity on Earth came to be and how it has evolved across time and space.

"The levels of diversity in the tropics are greatly underestimated," says Smith who, before coming to the Museum, worked as a postdoctoral fellow at the Museum of Natural Science at Louisiana State University. "A lot of the work I will be doing in the coming years is trying to get a better handle on what is the diversity of tropical birds."

Smith is aided in this work by modern genomics, which allows for a much clearer picture of the evolutionary history of individuals through DNA sequencing. Besides working with source material from the field, Smith has the added advantage of turning to stored specimens for what he calls "ancient DNA."

"We have one of the largest bird collections in the world," he says of the Museum's nearly one million ornithological specimens covering nearly 99 percent of all species. "We have specimens of species that are really rare or specimens that come from areas that are never going to be collected again. It provides a very unique resource."

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Brian Smith
DEPARTMENT OF ORNITHOLOGY

Donors to Naming Campaign Enjoy Permanent Recognition in Beloved Halls



To support science while honoring loved ones, Rachael and Marshall Levine named three iconic displays, including these *Triceratops* relatives, in the Museum's fossil halls.

The formative years of fossil hunting at the American Museum of Natural History are recorded in one-of-a-kind specimens in the Museum's famed fossil halls on the fourth floor—from Barnum Brown's *Tyrannosaurus rex* to a majestic mammoth some 11,000 years old.

For the first time, as part of a campaign called Name a Dinosaur! And Other Iconic Fossil Displays, the Museum has invited donors to support its general operations and ongoing scientific research by naming select fossil mounts.

For Rachael and Marshall Levine of Manhattan, the initiative was a perfect fit—a chance to support the Museum as well as to honor loved ones in a gallery with special meaning to the family.

"We jumped at it," says Rachael, explaining that their four-year-old son calls the Museum "the dinosaur museum." "The fossil halls are the biggest attraction for us and the children."

With plaques honoring their son and two-year-old daughter, Marshall Levine's parents, and the memory of his aunt, the Levines have named three striking displays: a 2-million-year-old land turtle, *Geochelone atlas*, and an 85-million-year-old *Pteranodon longiceps* in the Hall of Vertebrate Origins and, in the Hall of Ornithischian Dinosaurs, three skulls of 75-million-year old relatives of the dinosaur *Triceratops*.

Both Levines, who are members of the Museum's Advisory Council, studied science before pursuing careers in finance and,

in Rachael's case, non-profit fundraising. Rachael graduated from Princeton with a B.S. degree in geology and a concentration in molecular biology and paleontology (and fondly recalls working with a Museum paleontologist on her senior thesis). Marshall, also a Princeton graduate, majored in computer science and has since studied molecular biology and, more recently, astrophysics, with a passion.

"Institutions like this Museum are a beacon of hope."

— MARSHALL LEVINE

"Rachael and I are convinced that science is the key to solving the many challenges facing us today," says Marshall. "Carl Sagan said it beautifully: science is 'a candle in the dark.' Institutions like this Museum are a beacon of hope."

To establish a Museum legacy on the fourth floor, please contact the Development Office at 212-769-5151. Consider that a gift to name one of these exquisite displays might be the ultimate way to recognize and celebrate milestones or a rare opportunity to honor and memorialize loved ones.

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2014 By the Numbers

HAPPY NEW YEAR! Here's a quick look at some of the numbers that made last year so memorable at the Museum.

15,000
pounds of marine fossils

540,000 SPECIMENS

added to the Museum's collections, pushing the total past

33 MILLION SPECIMENS AND ARTIFACTS

3 33-FOOT

NEW CURATORS

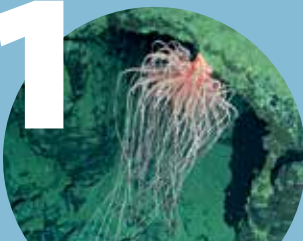


wingspan of the *Quetzalcoatlus northropi* model in Pterosaurs

1,158 VOLUNTEERS CONTRIBUTED TO DEPARTMENTS ACROSS THE MUSEUM

16 species of live spiders featured in *Spiders Alive!*

1 NEW ORDER OF MARINE ANIMAL DISCOVERED



500,000 school children visited the galleries

44 FILMS FROM MORE THAN 50 COUNTRIES SHOWCASED AT THE 2014 MARGARET MEAD FILM FESTIVAL

10th anniversary celebrated by the Urban Advantage Middle School Science Initiative

530-LB aluminum alloy Exosuit, exhibited at the Museum in March



Central Park West at 79th Street
New York, New York 10024-5192
amnh.org



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While tending his herd at a cattle camp in South Sudan, a young man wears ash on his face for decoration and to keep away flies. Around his neck, he wears a pipe filter. The filter, which strains out the small water fleas that transmit the Guinea worm parasite to humans, is one of the tools that is helping to eradicate the debilitating Guinea worm disease. Find out more in *Countdown to Zero*, a new exhibition that opens January 13.

General Information

HOURS

Museum: Open daily, 10 am–5:45 pm;
closed on Thanksgiving and Christmas.

ENTRANCES

During Museum hours, Members may
enter at Central Park West at 79th Street
(second floor), the Rose Center/81st Street,
and through the subway (lower level).

RESTAURANTS

Museum Food Court, Café on One,
Starlight Café, and Café on 4 offer
Members a 15-percent discount.
Hours are subject to change.




MUSEUM SHOPS

The Museum Shop, Dino Store,
Shop for Earth and Space,
Cosmic Shop, Nature's Fury Shop,
and Online Shop (amnhshop.com)
offer Members a 10-percent discount.

PHONE NUMBERS

Central Reservations 212-769-5200
Membership Office 212-769-5606
Museum Information 212-769-5100
Development 212-769-5151

TRANSPORTATION AND PARKING

Subway:  (weekdays) or  to 81st Street;
 to 79th Street, walk east to Museum
Bus: M7, M10, M11, or M104 to 79th Street;
M79 to Central Park West
Parking Garage: Open daily, 8 am–11 pm;
enter from West 81st Street. Members can park
for a flat fee of \$10 if entering after 4 pm.
To receive this rate, show your membership card
or event ticket when exiting the garage.