



AMERICAN MUSEUM OF NATURAL HISTORY

ROTUNDA

Member Magazine
Winter 2018 Vo. 43 No. 1

INTO DIVE OCEANS



Climate Change
Snapshots

From the President

Ellen V. Futter



As we continue planning for the Richard Gilder Center for Science, Education, and Innovation, the Museum has launched important and significant enhancements to two existing and historic galleries.

Last September, we announced that we will be restoring and enriching the Museum's very first permanent gallery, the Northwest Coast Hall—one of our most iconic and important halls, a testament to the beauty and depth of the cultures of the Pacific Northwest Coast of North America, and a historically significant space in museology and anthropology. We are honored to be undertaking this project in collaboration with representatives of the communities represented in the gallery, and held a convening in November to begin substantively planning together for the restoration. Beautifully restored with its objects

fully conserved and contextualized, the renovated Hall will explicitly reinforce that these are ongoing, living cultures with contemporary voices.

In October, we announced the complete renovation of the beloved Halls of Gems and Minerals, and unveiled a spectacular 12-foot-tall amethyst geode, a centerpiece of the new halls. Magnificent favorites like the Star of India and the Patricia Emerald will continue to have pride of place in the new Allison and Roberto Mignone Halls of Gems and Minerals and will be joined by unique treasures from the Museum's extensive collections, as well as by new acquisitions such as the amethyst geode.

These renovated halls are both slated to open in conjunction with the Museum's 150th anniversary in 2019–20, followed by the opening of the Gilder Center. We can't wait to share it all with you!

Table of Contents

Close-Up	4
Climate Snapshots	6
The Drifters	10
Made to Measure	12
Next	14
Forest of Totems	20
The Making of a Meadow	22



ROTUNDA

American Museum of Natural History
Chairman Lewis W. Bernard
President Ellen V. Futter
Vice President of Development and Membership Laura Lacchia Rose
Director of Membership Louise Adler

Magazine
Editorial Director Eugenia Levenson
Editor Alanna Martinez
Contributors Joan Kelly Bernard, Ian Chant, Jill Hamilton, Eliza McCarthy, Karen Miller, Elena Sansalone
Design Hinterland, www.hinterlandstudio.com

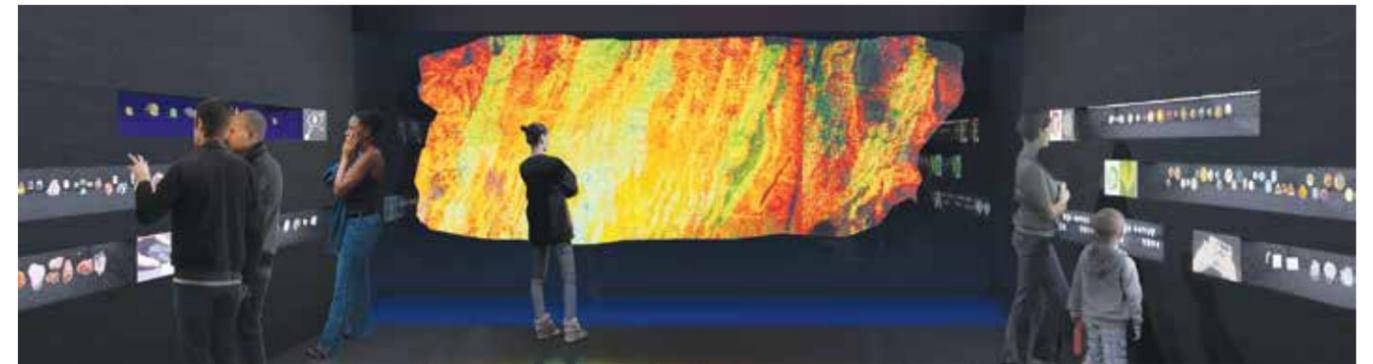
ISSN 0194-6110
USPS Permit #472-650
Vol. 43, No. 1, Winter 2018
Rotunda is published by the Membership Office of the American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024-5192. Phone: 212-769-5606. Website: amnh.org. Museum membership of \$75 per year and higher includes a subscription to Rotunda. © 2018 American Museum of Natural History. Periodical postage paid at New York, NY and at additional mailing offices. Postmaster: please send address changes to Rotunda, Membership Office, AMNH, at the above address.

Please send questions, ideas, and feedback to rotunda@amnh.org.

Portrait: © AMNH/D. Fimmin, Page 4: © AMNH/E. Rezes, Page 12: Ari Friedlaender/Oregon State University, Page 20: © AMNH, Page 22: © AMNH/R. Mickens

Rendering courtesy of Ralph Appelbaum Associates. Photo © AMNH/M. Shanley

2018 and Beyond: All-New Halls of Gems and Minerals, Northwest Coast Hall Restoration Project Underway



A rendering of the planned fluorescence and phosphorescence gallery in the new Allison and Roberto Mignone Halls of Gems and Minerals, planned to open in 2019.

The Museum is starting the New Year with two major projects, both part of a series of physical and programmatic enhancements to historic galleries leading up to the 150th anniversary in 2019–20 and the opening of the Richard Gilder Center for Science, Education, and Innovation.

In September, the Museum launched a multi-year project, working with Pacific Northwest Coast communities, to update and restore the historic Northwest Coast Hall, including the enrichment of exhibit interpretation and conservation of more than 1,000 collections items.

At an event to announce the project on September 25, members of the Haida, Kwakwaka'wakw, Nuuchahnulth, and Tlingit communities spoke about their connections to the gallery and to the Museum's historic collections, and Museum President Ellen V. Futter, Chairman Lewis W. Bernard, and Curator Peter Whiteley offered remarks on the project and the Museum's deepening collaboration with indigenous communities.

The second major project, announced in October, is the complete transformation of the Halls of Gems and Minerals. The new halls will feature recently acquired large-scale specimens, re-designed exhibits, and multiple galleries that tell the story of how approximately 4,500 different minerals arose on our dynamic planet, how scientists classify them, and how humans have fashioned them into gems and used them for personal adornment, tools, and technology throughout history. In recognition of the generosity of Allison and Roberto Mignone, long-standing Museum supporters and volunteers, the new halls will be named

the Allison and Roberto Mignone Halls of Gems and Minerals. Roberto Mignone currently serves as a Museum Trustee, and Allison Mignone is the Vice Chair of the Museum's Campaign.

The halls will also feature a dramatic link, via a stunning Crystalline Pass on the north side, to the new Richard Gilder Center for Science, Education, and Innovation. In addition to the amethyst geode that was unveiled in the Grand Gallery last fall, specimens in the halls will also include a second massive amethyst geode and a massive panel of fluorescent rock, which will be a main feature of a new fluorescence and phosphorescence gallery, one of several curated spaces along with one for gems and one for rotating exhibitions.

The Museum gratefully acknowledges Allison and Roberto Mignone for their leadership support of the redesigned Halls of Gems and Minerals.

Generous support has been provided by the Arthur Ross Foundation.

The Museum gratefully recognizes the Eugene V. and Clare E. Thaw Charitable Trust and Lewis Bernard, whose leadership support has made the restoration of the Northwest Coast Hall possible.

The Andrew W. Mellon Foundation has provided critical planning support, including for consultation with First Nations communities.

The conservation of painted totem poles has been made possible by the Institute of Museum and Library Services under grant number MA-30-17-0260-17.

Additional support has been provided by the Gilbert & Ildiko Butler Family Foundation.

The new Mignone Halls of Gems and Minerals are expected to open in 2019, and the Northwest Coast Hall restoration will be completed in 2020.



A view of the Northwest Coast Hall.



Catalog no. AMNH_IJC 00157712

Critical Corals

Tucked among the 25 million specimens that comprise the Museum's invertebrate zoology collection are historic specimens like this elkhorn coral (*Acropora palmata*).

Collected in the Bahamas in 1942, this specimen offers researchers a window into a time when elkhorn coral was one of the most abundant species in the Caribbean. Along with its close relative, staghorn coral, elkhorn coral is considered to be a key reef builder, and the fast-growing, large branches that inspired its name create crucial habitats for many reef species. But since the 1980s, multiple threats—including coral disease, bleaching from warming waters, overfishing, pollution, and damage from hurricanes—have led to devastating losses, estimated at 95 percent in some locales. Both species were placed on the Critically Endangered Species List in 2008 by the International Union for Conservation of Nature (IUCN).

In addition to several coral diseases—white pox, white band, and black band among them—coral bleaching remains a grave threat. Elkhorn corals obtain their brilliant hues from microscopic algae-like protozoa called zooxanthellae that feed coral polyps with nutrients through photosynthesis. Under the stress of above-average water temperatures, zooxanthellae are expelled, and the loss of food from photosynthesis leaves them weak and more susceptible to disease. “They go into a spiral that is not very good for them,” explains Estefanía Rodríguez, associate curator in the Division of Invertebrate Zoology and an expert on Cnidaria, the phylum that includes corals, jellyfish, and anemones.

So it was with a sense of urgency that the Museum recently embarked on a three-year project, with a grant from the Institute of Museum and Library Services, to conserve, rehouse, and document the 4,000-specimen coral collection, with holdings that date back to the late 1800s, for future research. “All corals are actually threatened,” says Dr. Rodríguez. “And some are not there anymore. So, if we want to know what was there, and what actually made them disappear, this collection is crucial.”

To see elkhorn coral from the Museum's collection on display, visit the Paul and Irma Milstein Family Hall of Ocean Life.

CALL TO ACTION

The chair of the IUCN, David Obura, warned in late September 2017 in the journal *Science* that the Paris Agreement's aim to keep the rise in global temperature well below 2°C is “the only chance for coral reef survival.” He urged “action on an unprecedented scale” to curb greenhouse emissions, pollution, and overfishing, and to accelerate genetic research on heat-resistant corals.

BRIGHT SPOT

A healthy grove of protected elkhorn coral survives in the Gardens of the Queen marine reserve on the southern coast of Cuba, where it provides cover for colorful crabs, scallops, sea urchins, and other marine life. Here, an abundance of large predators at the top of the food chain—sharks, grouper, crocodiles—are also bellwethers of a balanced ecosystem.

IN THE CROSSHAIRS

It's too soon to gauge the long-term effects of the severe hurricanes that hit the Caribbean last fall, but the risks to coral reefs posed by the storms are real. Pounding waves can break reefs apart, and runoff from flooding introduces pollutants and smothering silt. There is, however, a chance that cooler water dredged up from the deep might offer relief from bleaching.

IRREPLACEABLE RECORD

Elkorn and staghorn coral collected in the 1920s can be seen in the Milstein Hall of Ocean Life in the two-story diorama of the Andros Coral Reef in the Bahamas, curated by Roy Waldo Miner. Completed in 1935, with a background painting based on underwater sketches, the display is a unique picture of the reef at its most vibrant.

Sight for Snow

Caribou, also called reindeer, are well prepared for severe, snowy Arctic winters.

Their thick coats, made of hollow hairs that trap heat close to their bodies, offer excellent protection against extreme cold. Their broad, concave hooves are designed to help them traipse through wintry terrain. And a keen sense of smell helps caribou search out nutritious lichens buried beneath thick blankets of snow.

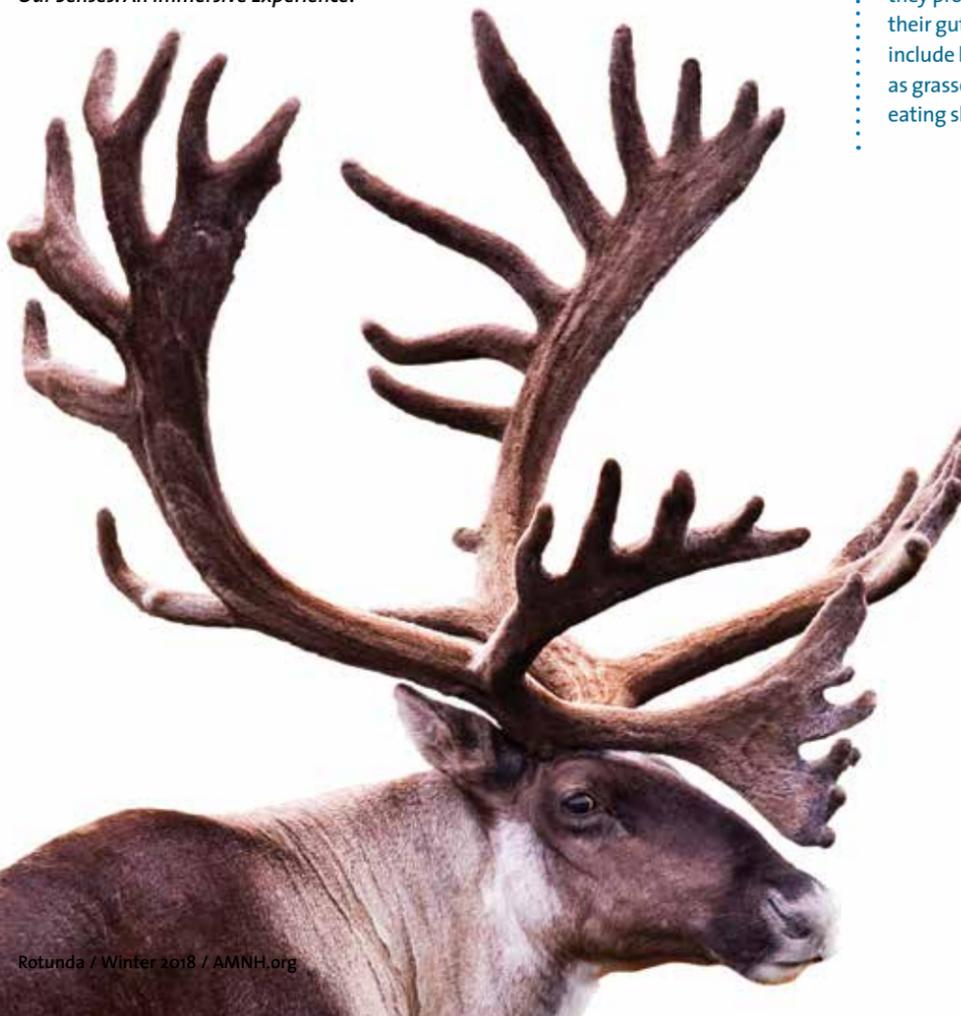
In 2011, researchers at University College London set out to study how well caribou are adapted to another extreme factor in their habitats: Arctic light. These mammals live through long, dark winters followed by long, bright summers. They're also exposed to high levels of ultraviolet (UV) light, both because of the way light is scattered in the Arctic atmosphere and because snow- and ice-covered surfaces are highly reflective, bouncing back up to 80 percent of the UV light that hits them. With this in mind, the researchers wondered: do reindeer sense and process UV light?

As it turned out, the study revealed that reindeer were able to see light wavelengths around 350–520 nanometers (nm), well outside of the so-called visible spectrum. And the ability to see the shorter wavelengths, researchers realized, gives caribou a few important advantages in their harsh environment.

For one, the caribou's major winter food source—lichens—doesn't reflect UV light at all. That means lichens will appear black in a sea of snow, giving these UV light-seers a big lead in the quest for a meal. That's also true of fur, so that caribou should be able to spot even well-camouflaged foes, including the white-furred Arctic wolf.

Seeing what others miss in the snow, it turns out, is an important part of surviving the Arctic.

Discover amazing stories about how other species see the world in *Our Senses: An Immersive Experience*.



Rangifer tarandus

ARCTIC EYES

Humans who are overexposed to UV light can suffer temporary loss of vision from a painful condition commonly known as snow blindness, which is actually a sunburn of the cornea. Not so with Arctic mammals, which have shown no evidence of similar trauma, though the reasons they remain impervious are not known.

ANTLERS FOR ALL

Caribou are the only deer species in which both males and females sport antlers. One hypothesis? Searching for food in the winter, which requires digging through snow, is intensely competitive, so females may benefit from the additional headgear.

BIG MOVES

Among land mammals, caribou herds undertake the longest seasonal migrations, sometimes moving thousands of miles a year in herds that number more than 100,000 individuals. They're fast runners, reaching speeds of 50 miles per hour, and steady swimmers, easily crossing large lakes or rivers during migration.

LICHENS AND THINGS

The caribou diet consists of lichens in winter, which they process with the help of special bacteria in their gut. But the menu expands in springtime to include leaves from willow and birch trees, as well as grasses. Some caribou have even been observed eating shed antlers, likely to get calcium.

CLIMATE SNAPSHOTS FROM AROUND THE WORLD

As paleontologists will tell you, Earth's climate has been changing for most of its history. Today, it's changing at an unprecedented rate. Museum researchers share what they're seeing, and even studying, in the field.

I've worked in the Canadian Arctic, but it's the case that now sea ice just doesn't form to the same depth or in the same areas of distribution that it had only a few years ago. The changeover has been just incredibly dramatic—perhaps 10–15 years.

Are those observations enough to predict the future? No. But you've got data going way back, and you can talk accordingly about individual changes in things like precipitation, for appreciably long periods of time. They are all showing effectively the same thing, which is that things are changing, and they're changing at a very rapid pace.

What we can expect going forward, seemingly, is that the Arctic will be substantially ice-free, with no reversion to what has been the rule for centuries unless something undoes the warming mechanism. You could say, for paleontologists it's great. The permafrost is going away.

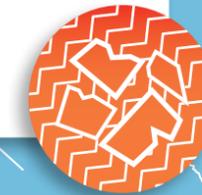
But when the permafrost goes, the tundra turns to mud. This is particularly hideous because it's just sort of this slurry of water and mud, just above freezing. Can't find fossils, can't survey properly—and meanwhile, Arctic villages are disappearing into the muck.

ROSS MACPHEE

Curator, Department of Mammalogy
Research focus: paleobiogeography, recent mammalian extinctions



Canada's Baffin Island



Fairbanks, Alaska

A colleague of mine in Fairbanks, Alaska, mentioned that he'd recently come up with a species of Yellowjacket wasp that he hadn't seen before. So, I started fieldwork three summers ago in Alaska to collect Yellowjackets there. Now, that may not seem like a likely place to collect wasps, but there are 11 species of Yellowjackets recorded from the state.

It's one thing to assert that there are going to be impacts of climate change, and there are plenty of aspects of the climate models that are not very good. But it's another thing entirely to demonstrate. [Yellowjackets are] moving northward.

JAMES CARPENTER

Peter J. Solomon Family Curator,
Division of Invertebrate Zoology
Research focus: social wasps



I work in the lower Congo. There are lots of rapids on that system. And so, it's very critical for me that I time my research visits to when the water level is low. That used to be something that was hugely predictable, even in the 10 or 20 years that I've been going there.

But in the last four or five years, that's completely gone by the board. When you talk to the Congolese about it, they swear up and down that they used to be able to predict almost to the day when the rains were going to start. And that's just no longer true, so it's completely disrupted that predictability in that enormous system.

Now, it's anecdotal in the sense that there haven't been good functioning water gauges in the Congo for many decades now. So, you can't really exactly show it, but boy, they talk about it, and people know that things are really changing.

MELANIE STIASSNY

Axelrod Research Curator, Department of Ichthyology

Research focus: tropical freshwater fishes



Democratic Republic of Congo

I'm a geochemist, and I work primarily with corals. I look at biological carbonate deposits whose chemistry changes based on the environment in which they formed. This work allows us to understand how the environment was changing at the time of formation. It's similar to tree ring analysis.

We can sample the coral to analyze 20 to 30 samples per year for the last 500 years, allowing us to look at monthly changes to temperature, salinity, currents and nutrients. When you're able to understand climate outside the influence of greenhouse gas emissions, we can better understand how the many systems interact.

For the last 10 years I've been in Asia, and our study sites span the Indo-Pacific. The long-term goal with everything we do is to better understand how the natural system interacted before we started adding greenhouse gases. Our intention is that this will inform climate modelers, so that we can improve predictions of how the climate behaves after humans began altering the system.

NATHALIE GOODKIN

Curator, Department of Earth and Planetary Sciences

Research focus: ocean-atmosphere interactions, climate behavior over past 500 years



Porites coral in the waters off American Samoa

I published a paper a few years ago on impacts of climate change in Madagascar, based on two surveys we did of the highest mountain range in Madagascar, over a 10-year period.

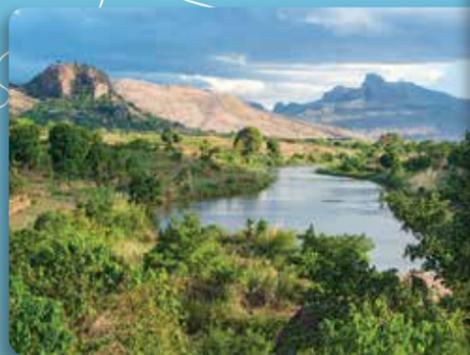
I didn't design the surveys to look for this. But what I started noticing, at the first couple of lower elevation camps, was that certain species were missing. We did ultimately find these species, but now they were at higher elevations. This upslope movement also coincided with a period of climate warming in Madagascar, and is consistent with species moving to higher elevation to stay in the same temperature zone.

The big concern is that as species get pushed up mountains, usually the area that they occupy gets smaller, and they become more vulnerable. And eventually, of course, once you reach the top, you're going to run out of space.

CHRIS RAXWORTHY

Curator-in-Charge, Herpetology

Research focus: reptiles and amphibians in Madagascar



Madagascar



Solomon Islands

We're working with island communities in the Pacific who are facing the real impact of changing climates. They're seeing changes in what they can grow in their gardens. They're seeing changes in the frequency and severity of storms. They're seeing different amounts of rainfall. They're seeing changes in patterns of population dynamics of fish, and changes in fish movements across and around the reefs.

Food is an excellent way into the conversation about climate change. In recent decades, we've seen a rise in extreme weather events like storms, droughts, and heatwaves, with strong evidence connecting this trend to human activities. Future projections based on this evidence and on complex models predict a rise in these events. That's going to be really hard on food production—on a lot of the foods that we really depend on.

ELEANOR STERLING

Jaffe Chief Conservation Scientist,

Center for Biodiversity and Conservation

Research focus: ecological and social resilience



COMING SOON: a re-imagined section about climate change, with interactive data visualizations of global climate trends, will open in the Gottesman Hall of Planet Earth later this year.

Page 7: Arctic Canada ©istock.com/RyersonClark, Fairbanks ©istock.com/lippyjr
 Pages 8–9: Congo River and Madagascar: ©istock.com/guenterguni, Porites coral: NOAA/L. Giuseffi, Solomon Islands: AMNH/AM. Esbach

the DRIFTERS

They're (mostly) tiny. They go with the flow. But plankton make the oceans go.

If you're looking to understand what makes the incredible life in Earth's vast oceans possible, you have to start small—very small. You have to start with plankton.

Plankton isn't a term for animals, nor a genus or family. It's a catch-all for a staggering variety of marine organisms that share one important trait: they're drifters. In other words, if it lives in the world's oceans and can't swim against a current, then it's plankton.

There's phytoplankton, plant-like organisms that can be found near the ocean's surface. And then there's zooplankton, animals that come in a range of sizes from remarkably tiny to easily observed with the naked eye.

Plankton is the ultimate source of nutrition for the world's oceans—the food source that makes everything else possible. And many species don't just depend on plankton for a meal. They actually start out as plankton themselves.

Planktonic Playpen

Some of the world's most recognizable fishes and other marine animals begin life as tiny larvae. These larvae spend some time floating passively before either joining the ranks of active swimmers or drifting down to live out life on the seafloor.

"Many species of fishes start out life as planktonic larvae, suspended in the water column, unable to propel themselves, and at the whim of wind and oceanic currents for their dispersal," says John Sparks, curator of the upcoming *Oceans* exhibition, which opens in March. "These larval fishes are temporary members of the zooplankton that, in turn, feed on smaller plankton."

Among the soon-to-be-swimmers: the blue marlin, *Makaira nigricans*, one of the world's most iconic game fishes, which can grow to weigh more than 1,000 pounds. Blue marlins start their lives as humble, millimeter-long eggs that, when fertilized, develop into slightly less tiny larvae and spend their early days floating among other zooplankton.

If they survive long enough—and avoid being eaten—another subset of part-time plankton settle down—way, way down. These benthic species, as they're known, sink out of the water column and stick to the seafloor. Starfishes and sea urchins, for example, get their start as drifting planktonic larvae before moving to a more sedate maturity.



Permanent Plankton

For some planktonic life forms, though, it's not just a phase—it's who they are. Innumerable microscopic species, including bacteria and viruses as well as algae, tiny water fleas, and copepods, will spend their entire existence riding the currents—and feeding the rest of the ocean's residents.

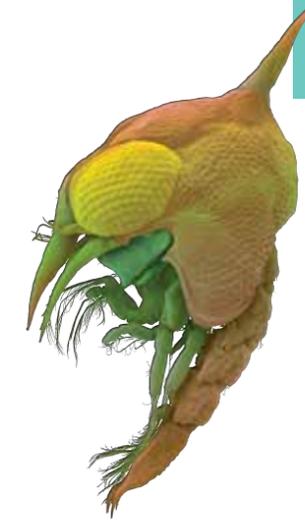
"Although small and inconspicuous, phytoplankton are the foundation of the oceanic food chain," says Sparks. "They are primary producers, converting sunlight via photosynthesis into their own food energy, just as land plants do. Phytoplankton serve as a food source for zooplankton, which in turn feed the largest animals in the ocean, such as whale sharks and blue whales."

Phytoplankton have another crucial role on Earth: they produce about half of the oxygen and soak up excess carbon dioxide from the atmosphere, transferring it to the deep ocean in a crucial carbon cycle.

And just because many planktonic species are small, don't think that they are simple. Consider the diatom, represented by tens of thousands of living species. Despite being single-celled, many species of diatoms craft cell walls called frustules. While they're invisible to the naked eye, these cellular armors are often intricate and beautiful pieces of engineering when viewed through a microscope.

On the other end of the spectrum, there's megaplankton: any species that measures over 2 mm. Here you'll find comb jellies, which use rows of cilia along their bodies to propel themselves through the water, and the Portuguese man o' war, which uses its venom-loaded tentacles to paralyze and kill prey.

So the next time you go for a swim at the beach, look a little closer—whether you see them or not, you're taking a swim with plankton. ☞



MEMBER PREVIEW DAYS FOR OCEANS
FRIDAY, MARCH 9
SATURDAY, MARCH 10
SUNDAY, MARCH 11
10 AM–5 PM

Members can explore our new exhibition *Oceans* first. Discover our blue planet's defining feature—the world ocean—as revealed through 21st-century technology. Robotics, satellite monitoring, miniaturization, and high-definition imaging are now enabling ocean scientists to tackle new questions.

Meet elusive giants of the sea, including whales, sharks, and giant squid; sink beneath the waves in a virtual submersible theater; and marvel at the vivid fluorescence displayed by marine organisms but invisible to us ... until now. Visitors will leave with a deeper awareness that the future of the planet depends on the future of the ocean.

Lead funding for *Oceans* and its educational resources is provided by The Dalio Ocean Initiative.

The American Museum of Natural History gratefully acknowledges the Richard and Karen LeFrak Exhibition and Education Fund.

Oceans is generously supported by Chase Private Client.

MADE TO MEASURE

High-Tech Tags Are Helping Scientists Glean More About Whales

A tagged minke whale in Antarctic waters can offer researchers insight into feeding and social behaviors.

Whale watching is a popular pastime for tourists in coastal regions around the world. But marine biologists take cetacean surveillance to the next level. By attaching video cameras and electronic tags to these marine mammals, scientists are answering longstanding questions about how whales travel, feed, and live in the world's oceans.

These details are critical to finding out how these species behave and to supporting conservation efforts where protective measures are required. But until recently, observing the ocean's largest inhabitants was no easy task. Only in the past two decades have ever-more sophisticated tags and software allowed researchers to gather thorough data about whale behavior. "What drives our research is a curiosity to understand how these enigmatic, gigantic animals live and operate," says Jeremy Goldbogen of Stanford University. "For a lot of these big whales, how do they survive in an increasingly urbanized ocean, where they're dealing with ships and fishing gear? We're trying to understand basic information about their behavior, and that's what these tags provide us with."

Marine animal tagging began in the 1960s, with components that included kitchen timers. Now, a typical monitor includes the same gear as a basic cell phone, with tools like a clock, accelerometer, magnetometer, and audio-video recording

equipment. Once attached, the kit stays on for about 24 hours and records how fast and deep a whale is diving, how it moves through space, and even the sound of water rushing past an animal on the move. "I call it digital natural history," says Goldbogen. "We have a digital record, with video and 3D movement, of what a whale does on a daily basis."

Ari Friedlaender of University of California, Santa Cruz has tagged more than a dozen dolphin and whale species, including humpback whales, blue whales, and minke whales—near Cape Cod, off the coast of California, and in the frigid waters of Antarctica, respectively. He and his colleagues analyze depth data and audio recordings to understand how these massive animals—who subsist on great quantities of relatively tiny prey like krill—get their meals.

I call it digital natural history. We have a digital record, with video and 3D movement, of what a whale does on a daily basis.

JEREMY GOLDBOGEN
ASSISTANT PROFESSOR OF BIOLOGY, STANFORD UNIVERSITY

Audio recording, for example, lets researchers measure the flow noise around each animal as it moves through the water. When whales travel at a brisk pace, there's a lot of flow noise, but



Whale: A. Friedlaender Tagging: U.S. Navy/Photo Courtesy Of National Marine Fisheries Service

Illustration by Alex Boersma, www.alexboersma.com

when they slow down, that sound is dulled—not unlike the sound of wind rushing around your car while you're on the freeway as compared to the relative silence when you're idling at a stop sign. By tracking when the speed of a whale increases, and then suddenly and dramatically decreases, these researchers are able to map the "lunges" that rorqual whales like humpbacks use to gulp down huge mouthfuls of prey at a time.

Tags also let researchers eavesdrop on what whales hear in their ocean environments—which, in places with a lot of ship traffic and human activity, is a lot of racket.

"In the ocean, where sound is a primary mechanism for communication, that can be a really disruptive thing for social animals," says Friedlaender.

And tags that stay on for 24-hour spans let researchers observe more behaviors than ever before. For example, when Friedlaender and colleagues tagged humpback whales in Stellwagen Bank National Marine Sanctuary off the coast of Massachusetts, they discovered the species had several ways of foraging on the seafloor—feeding behaviors that also put whales at risk of entanglements in bottom-set fishing gear.

And in 2014, Friedlaender and team were working in Antarctica and tagged minke whales for the first time—yielding new data that showed the species has carved out a niche by hunting krill under sea ice where larger species like humpbacks can't go.

"Part of it is just sitting and watching, which is quite powerful," says Goldbogen. 📷

Oceans Opens in March



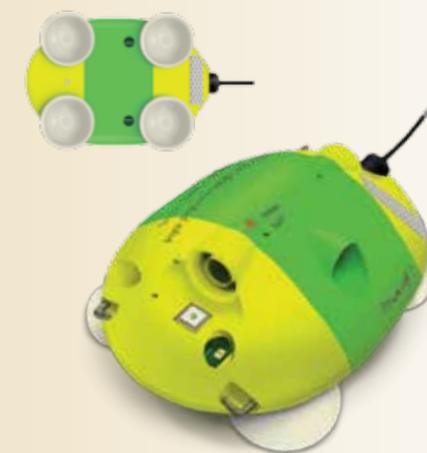
"You can't tag them unless you get close," says Friedlaender.

How to Tag a Whale

First things first: before a tag can do its job, researchers have to get the electronic device applied—and make sure it stays put. It's a demanding task that's made possible by careful seamanship, dedication, and patience. (A long stick doesn't hurt, either.)

Use Suction

Applying a piece of electronics that has staying power underwater and doesn't bother the tracked whale is typically a job for a heavy-duty suction cup. Scientists will place these suction cups, which support a kit that holds a camera and a small suite of sensors and transmitters, on the end of a pole more than 20 feet in length, allowing them to get close enough to tap a whale on the back.



Time It Right

To apply a tag, researchers wait for a whale to surface to breathe. An ideal encounter is with a whale that's either busy with a meal or catching a short nap at the surface.

Retrieve, Repeat

After the tag falls off, it floats to the surface and emits a radio signal that researchers track so they can scoop up the sensor and upload that data to a computer for analysis. Tags can be reused multiple times, on different animals.

Programs and Exhibits

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 canceled by the Museum.

Please check amnh.org for Member ticket prices for live animal exhibits and giant-screen 2D and 3D films.

Information about programs is current as of December 1, 2017. Please check amnh.org/calendar for updates.

JANUARY

SciCafe: The Power of Poop
Wednesday, January 3
7 pm

Free for 21+ with ID
The medical community is just beginning to understand the symbiotic relationship between our bodies and the microbes in our stomach. Gastroenterologist **Ari Grinspan** talks about how to maintain gut health and the exciting future of fecal transplants.

Walk on the Wild Side
Eight Wednesdays,
January 10–February 28
8 am

Free for Adventurer-level Members and above. Tickets available starting December 1. Registration required; 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 to the public.

Being Human in the Age of Artificial Intelligence
Monday, January 8
7:30 pm
\$12

The rise of artificial intelligence will affect crime, war, justice, jobs, society, and our very sense of being human. **Max Tegmark** explores the myriad questions surrounding A.I. and implications for the future.

A book signing follows.

Curator's Lecture: Our Senses: An Immersive Experience
Thursday, January 11
6–8 pm

Free for Adventurer-level members and above. Registration required; call 212-769-5606
Join us for a Members-only evening lecture on the science that informs the Museum's new special exhibition, *Our Senses: An Immersive Experience*. Learn from Curator **Rob DeSalle** how the human brain has evolved extraordinary abilities to gather and process sensory data. The evening will conclude with an opportunity to view the exhibition with new insights fresh in your mind.

Ancient Oceans Hall Tour
Saturday, January 13
10:30 am and 1:30 pm
Free

Registration required; call 212-769-5200
Join a Museum tour guide to explore the Milstein Hall of Ocean Life, the Felix M. Warburg Hall of New York State Environment, and the Hall of Vertebrate Origins. Examine some of the world's oldest living fossils to gain a better understanding of the origins and evolution of life on Earth.

Discovery Squad
Saturday, January 13
Saturday, March 17
9 am

Free
Registration required; call 212-769-5200
Families of 5–14-year-olds with autism spectrum disorders are invited to take a 40-minute tour led by specially trained tour guides, then spend some time exploring the Discovery Room before the Museum opens to the public.

Science Sense Tour: Theodore Roosevelt and the Diversity of Life
Wednesday, January 17
2:30 pm

Free
Registration required; Email accessibility@amnh.org
Through verbal descriptions and touchable objects, visitors who are blind or partially sighted will learn about the history of the Museum, Theodore Roosevelt as a conservationist, and his many contributions to preserving the diversity of life on Earth.

Evening Access: Our Senses
Wednesday, January 24
6–8 pm

Free
Registration required; call 212-769-5606
Explore our newest special exhibition, *Our Senses: An Immersive Experience*, to better understand how we use sight, smell, hearing, touch, and taste to understand the world around us.

The Art of Diorama
Six Thursdays,
January 25–March 1
7–9:30 pm
\$195

Museum exhibition specialist **Tom Doncourt** leads an after-hours look at our legendary dioramas. Discover how dioramas are made from start to finish, hear behind-the-scenes stories about how they came together, and create your own replica to take home.



NASA Missions
Tuesday, January 30
7 pm
\$12

Every beautiful image we see of our solar neighborhood comes from NASA probes, along with data that is rarely seen. Join **Brian Levine** and **Emily Rice** on a journey through the solar system, featuring information and images gathered through recent NASA missions.



The Butterfly Conservatory
Free for Members

This popular exhibition features up to 500 free-flying tropical butterflies from the Americas, Africa, and Asia. Housed in a tropical vivarium with flowering plants, see iridescent blue morphos, striking scarlet swallowtails, and more.



FEBRUARY

Dinos After Dark
Thursday, February 1
7 pm

\$35 (two drinks included) for 21+ with ID
Go back in time for a prehistoric party in the Museum's celebrated dinosaur halls. Toast The Titanosaur and enjoy an exciting evening of expert talks, demonstrations, and after-hours access to the fossil halls.

Dangerous Worlds
Monday, February 5
7:30 pm
\$12

Today, searching for planets—and life—outside the solar system is one of the most rapidly growing fields in astronomy. Join astrophysicist **Elizabeth Tasker** for a discussion of the unique features of exoplanets and their potential for harboring life.

A book signing follows.

Inside You
Free for Members

Our bodies are home to many trillions of microbes, including bacteria, viruses, fungi, and other organisms collectively called the human microbiome. In any human, microbial genes outnumber the genes in human DNA by more than 100 to one.

Lunchtime Bird Walks in Central Park
Six Tuesdays,
February 6–March 13
Noon–1:30 pm
\$50

Glimpse owls, hawks, and woodpeckers in the woods, finches and sparrows in the fields, and ducks and gulls in the lakes as ornithologist **Paul Sweet** guides you through three Central Park habitats to observe the varied bird species that make New York City their home.



SciCafe: Trilobite Takedown
Wednesday, February 7
7 pm

Free for 21+ with ID
The fossil arthropods are among the earliest creatures in the fossil record, and they lived for almost 500 million years before going extinct. Join Assistant Curator **Melanie Hopkins** as to learn how trilobites are key to unlocking the early evolution of animals.



Exhibitions

Admission is by timed entry only.

Oceans

Opens March 9
Free for Members

Meet the elusive giants of the sea, including whales, sharks, and giant squid; sink beneath the waves in a virtual submersible theater; and marvel at the vivid fluorescence displayed by marine creatures but invisible to us... until now.



Our Senses: An Immersive Experience
Free for Members

Explore 11 funhouse-like spaces that dare you to trust your senses—and show you how or why what we perceive is not simply what is occurring around us. See a garden through the eyes of a bee or butterfly, test your skills at tracking sounds, try to unpack a scent, and much more.



Family Astronomy
Saturday, February 10
6:30 pm
\$10

The Hayden Planetarium invites our youngest astronomers (ages 4 and up) for an evening of star-hopping as we look at the winter constellations of the night sky using the Zeiss star projector. The program includes outdoor stargazing through telescopes with the Amateur Astronomers Association (weather permitting).



Hack the Deep
Sunday, February 11
2 pm
Free

Join us for our fourth annual hackathon “demo day.” See what a collaboration among technologists, hackers, and Museum scientists can produce in just 24 hours, and check out new digital applications that explore, transform, and visualize the Museum’s oceanic collections and data.

Romance Under the Stars
Wednesday, February 14
6:30 pm and 9:30 pm
\$125

Join us for a cocktail hour in the Cullman Hall of the Universe, complete with open bar, hors d’oeuvres, and chocolates, accompanied by the music of the **Josh Rutner Quartet**. Then join **Lydia Maria Petrosino** and **Ted Williams** in the Hayden Planetarium for an unforgettable view of the night sky and some stellar romance stories from the ancient past.

Animal Encounter: Bugs with Louis Sorkin
Saturday, February 17
11 am, 1:30 pm, and 3 pm
\$15

Join us for an Animal Encounter with **Louis Sorkin**, senior scientific assistant in the Museum’s Department of Invertebrate Zoology. Get an up-close and personal introduction to some of your favorite insects and bugs from around the world, and learn more about the diversity of life on Earth.

ASL Interpreted Tour: Northwest Coast Hall
Saturday, February 17
1:30 pm
Free

Registration required; Email accessibility@amnh.org
This American Sign Language interpreted spotlight tour of the Northwest Coast Hall explores the Museum’s oldest hall, showcasing the traditions and cultures of the Pacific Northwest Coast.

Passport to the Universe

Tuesday, February 20
6–6:30 pm and 6:45–7:15 pm
\$12.50 adults, \$8 children
Updated with the latest scientific data and narrated by **Tom Hanks!** Traverse billions of light-years across the Milky Way galaxy from our home planet to the edge of the observable universe in this beloved Hayden Planetarium Space Show.

Science Sense Tour: Real Stories Told by the Dioramas
Wednesday, February 21
2:30 pm
Free

Registration required; Email accessibility@amnh.org
Through extensive verbal descriptions and touchable objects, experience the Museum’s dioramas in depth and learn how these iconic “windows on nature” play a role in wildlife conservation and public education. For visitors who are blind or partially sighted.



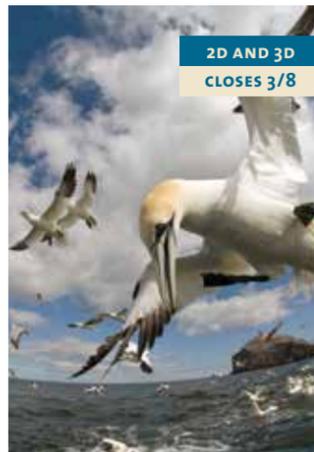
Milstein Science Series: Ocean Technology
Sunday, February 25
11 am–4 pm
Free

Submersibles, robots, and sensors enable scientists to descend to depths beyond human reach, transmit data quickly, and collect samples of unexplored ecosystems. Discover the explorers and equipment that are pushing the frontiers of ocean exploration.

Earthflight

Free for Members
Narrated by Academy Award-winning actress **Cate Blanchett**, *Earthflight* is a totally immersive experience, taking the audience on an incredible flight across the world on the wings of birds.

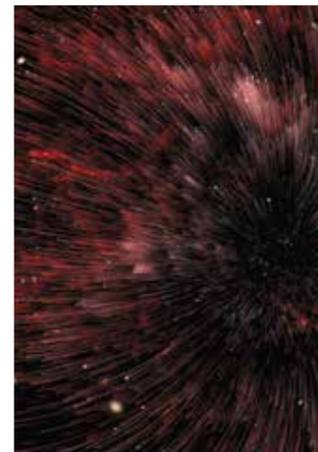
Captioning devices are available.



Dark Universe

Narrated by **Neil deGrasse Tyson**, this 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 find out what scientists are learning about dark matter and dark energy.

Captioning devices are available.



Faster, Higher, Stronger
Tuesday, February 27
7 pm
\$12

Steve Beyer and **Jackie Faherty** take inspiration from the Olympic motto “Citius, Altius, Fortius” for this epic marathon through space, asking: who are the celestial champions of the universe? Follow them in search of the greatest velocities, most distant objects, and most energetic stars.

MARCH

Ocean Luminaries: Making Waves
Friday, March 2
7 pm
\$20

Dive into the latest ocean research, technology, and conservation efforts in an evening of lively talks with the brightest minds in marine exploration, art, and science. Learn more about the role of oceans in the global ecosystem, and find out how we can preserve the seas for future generations.



Exhibition Credits

Lead funding for *Oceans* and its educational resources is provided by **The Dalio Ocean Initiative**.

The American Museum of Natural History gratefully acknowledges the **Richard and Karen LeFrak Exhibition and Education Fund**.

Oceans is generously supported by **Chase Private Client**.

SciCafe: Primate Palate: Orangutans, Obesity, and Human Evolution
Wednesday, March 7
7 pm

Free for 21+ with ID
Dr. Erin Vogel shares her research on wild orangutans from the tropical forests of Sumatra and Borneo, illuminating how the diet, behavior, and metabolism of our primate cousins can provide insights on human conditions.

Beginner Animal Drawing
Six Wednesdays, March 7–April 11
7–9 pm
\$120

For those who have never taken the Museum’s popular Animal Drawing class, this new course begins with the basics and offers one-on-one guidance from master illustrator and naturalist **Patricia Wynne**.

Animal Drawing
Eight Thursdays, March 8–April 26
7–9 pm
\$160

The celebrated dioramas, dinosaur skeletons, and other distinctive features of the Museum serve as the setting for an intensive after-hours drawing course with **Patricia Wynne**. Learn about the gifted artists who created the world-class dioramas as you sketch subjects in their “natural” environments.



We Have No Idea
Monday, March 12
7:30 pm
\$12

Join PHD Comics creator **Jorge Cham** and particle physicist **Daniel Whiteson** as they explore everything we don’t know about the universe with popular infographics, cartoons, and entertaining and lucid explanations of science.



Member Preview Days: Oceans
Friday, March 9
Saturday, March 10
Sunday, March 11
10 am–5 pm

Free for members at the \$115 level and above. Admission by timed entry only, with advance tickets available starting March 1. Join us for this special weekend viewing of our new special exhibition, *Oceans*, before it opens to the public!

Neuroscience Night: Our Sensational Brain
Thursday, March 15
7 pm
\$20

Join us in the Sackler Lab for an evening exploring the biology behind our senses. Participate in activities, challenges, and experiments led by neuroscience researchers and educators. Wine and light refreshments will be served.

Inside You is made possible by the generosity of the Arthur Ross Foundation.

Inside You is proudly supported by the Janssen Pharmaceutical Companies of Johnson & Johnson.

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.

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.

Superlatives Hall Tour
Saturday March 17

1:30 pm
Free
Registration required; call 212-769-5200
Join a Museum tour guide in the Milstein Hall of Ocean Life, and the Arthur Ross Hall of Meteorites on a journey from the depths of the ocean to outer space to examine some of the biggest, smallest, oldest, and rarest objects.



Brain Awareness Weekend: The Senses Lab

Saturday and Sunday, March 17–18
Noon–5 pm
Free
Visitors of all ages can drop into the Sackler Educational Lab to celebrate the wonders of the human brain and learn how this great organ processes the world around us. We will be joined by neuroscientists who will lead informal discussions, experiments, and activities with visitors.

Sun–Earth Day
Saturday, March 24

11 am–4 pm
Free
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. Meet scientists, look through telescopes, and engage in hands-on activities at this family-friendly event.

Mars In Focus
Tuesday, March 27

7 pm
\$12
Join **Carter Emmart** and **Irene Pease** on a tour of the red planet and examine multiple iconic locations in exquisite detail. View the latest high-resolution imagery of rocky terrain assembled from NASA and the European Space Agency, and immerse yourself in the magnificent Martian landscape.



Live Podcast Recording: Randy Cohen's "Person Place Thing"

Thursday, March 29
7 pm
\$12
Comedian and journalist **Randy Cohen** makes a splash in the new *Oceans* exhibition as he records an episode of his popular podcast "Person Place Thing" with two Museum scientists who conduct cutting-edge marine research. Venomous sea snail whisperer **Mandë Holford** and evolutionary biologist **Mercer Brugler** will share tales from their adventures under the sea.

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

The SciCafe Primate Palate is presented in collaboration with The Leakey Foundation.

SciCafe: The Power of Poop, and related activities are generously supported by the Science Education Partnership Award (SEPA) program of the National Institutes of Health (NIH).

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

Hack the Deep is part of BridgeUp: STEM, an initiative educating youth and the public about cutting-edge computing in scientific research and science communication.

BridgeUp: STEM is generously supported by a grant from the Helen Gurley Brown Trust.

The Milstein Science Series is proudly sponsored by the Irma and Paul Milstein Family.

Oceans programs are made possible by The Dalio Ocean Initiative, as part of its generous support of the special exhibition Oceans and its related educational activities and public programs.

The Museum gratefully 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, offering ongoing programs and resources for adults, teachers, and students to illuminate the extraordinary workings of the human brain.

Support for accessibility initiatives at the American Museum of Natural History has been provided by the Filomen M. D'Agostino Foundation.

Page 14: © AMNH/D. Finnin, © AMNH/R. Mickens, Florida Keys National Marine Sanctuary Page 15: © AMNH/D. Finnin, © AMNH/M. Shanley, © AMNH/D. Finnin Page 16: © AMNH/R. Mickens, © AMNH, © John Downer Productions/M.W. Richards, © AMNH/D. Finnin Page 17: © D. Gruber, Nich Hobogood, © AMNH/D. Finnin Page 18: © AMNH/R. Mickens, © AMNH

JANUARY

3 WEDNESDAY
SciCafe: The Power of Poop
After-Hours Program

8 MONDAY
Being Human in the Age of Artificial Intelligence
Hayden Planetarium Program

10 WEDNESDAY
Walk on the Wild Side
Member Program begins

11 THURSDAY
Curator's Lecture: *Our Senses: An Immersive Experience*
Member Program

13 SATURDAY
Ancient Oceans Hall Tour
Member Program

Discovery Squad
Accessible Tour

17 WEDNESDAY
Science Sense Tour: Theodore Roosevelt and the Diversity of Life
Accessible Tour

24 WEDNESDAY
Evening Access: *Our Senses*
Member Program

25 THURSDAY
The Art of Diorama
Adult Course begins

30 TUESDAY
NASA Missions
Hayden Planetarium Program

FEBRUARY

1 THURSDAY
Dinos After Dark
Special Program

5 MONDAY
Dangerous Worlds
Hayden Planetarium Program

6 TUESDAY
Lunchtime Bird Walks in Central Park
Member Program begins

7 WEDNESDAY
SciCafe: Trilobite Takedown
After-Hours Program

10 SATURDAY
Family Astronomy
Family Program

11 SUNDAY
Hack the Deep
Special Program

14 WEDNESDAY
Romance Under the Stars
Special Program

17 SATURDAY
Animal Encounter: Bugs with Louis Sorkin
Member Program

ASL Interpreted Tour: Northwest Coast Hall
Accessible Tour

20 TUESDAY
Passport to the Universe
Member Program

21 WEDNESDAY
Science Sense Tour: Real Stories Told by the Dioramas
Accessible Tours

25 SUNDAY
Milstein Science Series: Ocean Technology
Special Program

27 TUESDAY
Faster, Higher, Stronger
Hayden Planetarium Program

MARCH

2 FRIDAY
Ocean Luminaries: Making Waves
Special Program

7 WEDNESDAY
SciCafe: Primate Palate: Orangutans, Obesity, and Human Evolution
After-Hours Program

Beginner Animal Drawing
Adult Course begins

8 THURSDAY
Animal Drawing
Adult Course begins

9–11 FRIDAY–SUNDAY
Member Preview Days: *Oceans*
Member Program

12 MONDAY
We Have No Idea
Hayden Planetarium Program

15 THURSDAY
Neuroscience Night: Our Sensational Brain
Special Program

17 SATURDAY
Superlatives Hall Tour
Member Program

Discovery Squad
Accessible Tour

17–18 SATURDAY–SUNDAY
Brain Awareness Weekend: The Senses Lab
Special Program

24 SATURDAY
Sun–Earth Day
Family Program

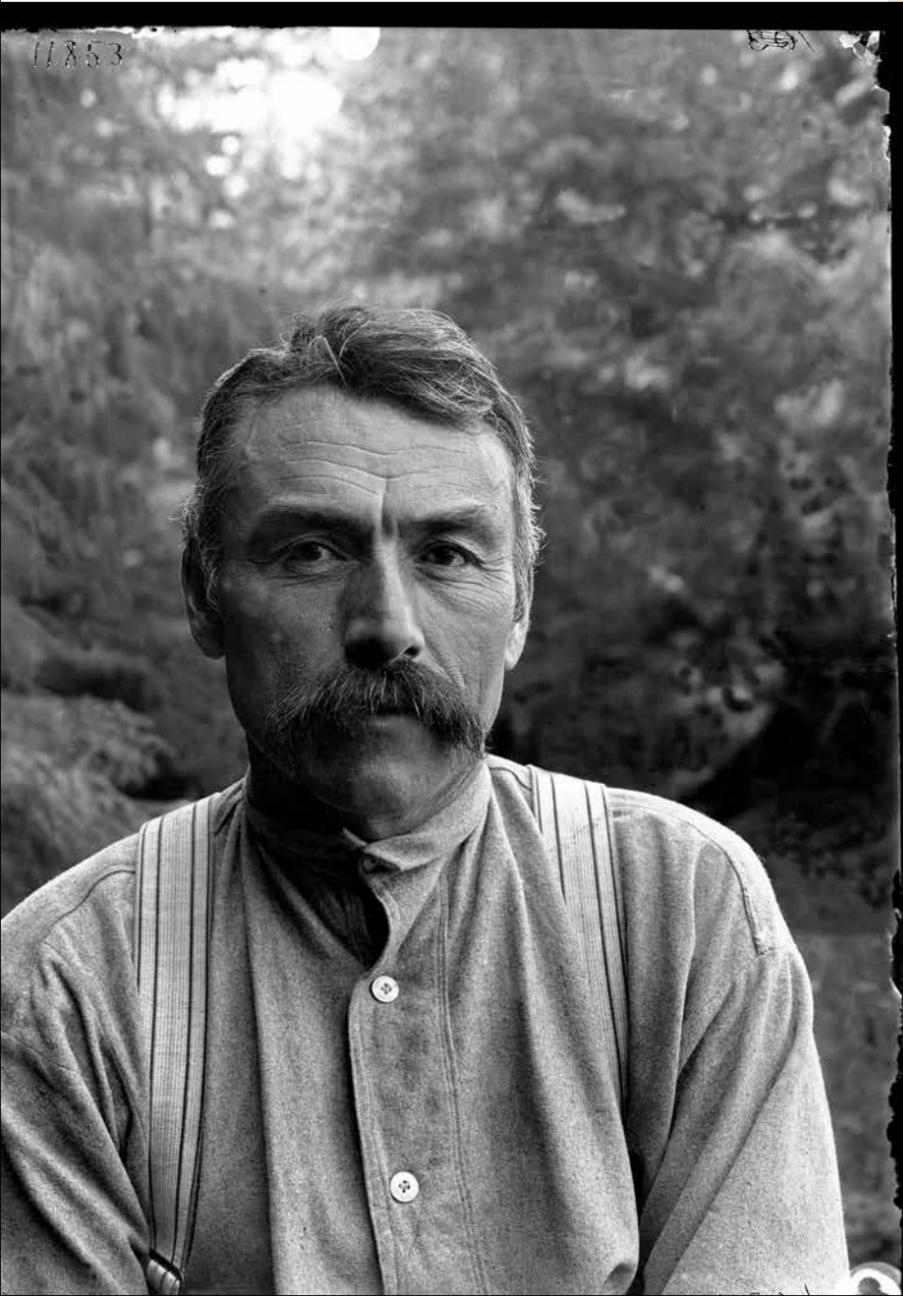
27 TUESDAY
Mars In Focus
Hayden Planetarium Program

29 THURSDAY
Live Podcast Recording: Randy Cohen's "Person Place Thing"
Special Program

A Forest of Totems

Carved in the Pacific Northwest, destined for New York City.

George Hunt, a longterm collaborator of Franz Boas, commissioned four totem poles for the Museum.



In 1922, Pliny Goddard, the Museum's Curator of North American Ethnology and a lifelong student of Native American cultures, was overseeing the renovation of the Hall of Northwest Coast Indians, now called the Northwest Coast Hall. The gallery, conceived by his mentor Franz Boas more than two decades earlier, showcased part of an extraordinary collection led by Boas at the turn of the century, on the Northwest Coast leg of his influential Jesup North Pacific Expedition. It was also revolutionary in its approach—the first public exhibition to present indigenous cultures in their own right instead of on a contrived evolutionary scale of “primitive” and “advanced” cultures. Goddard had big shoes to fill.

As he planned for the gallery's next phase, Goddard envisioned a thicket of totem poles, the iconic wood sculptures carved by peoples across the Pacific Northwest to represent ancestry, spiritual beliefs, and important events.

To make it happen, Goddard wanted to bring in a set of new poles that would welcome visitors to the Museum, much like the ones that Jesup ethnographers had seen at the edges of streams or beaches and in the homes of chiefs and leaders of the Northwest Coast. So he turned to George Hunt.

The son of an English trader and a Tlingit noblewoman, Hunt had lived his whole life in British Columbia. In many ways, it was Hunt who helped realize Boas' ambitious goals for the Pacific Northwest leg of the Jesup Expedition: he was the translator, fixer, and co-author on scholarly works about the languages of the region. For decades, he served as a procurer of artifacts for the Museum's collections.

“Hunt was a full-fledged collaborator with Boas,” says Peter Whiteley, curator of North American Ethnology in the Museum's Division of Anthropology. “A lot of the archival record that goes with the artifacts was meticulously written down by Hunt himself, and he maintained an ongoing relationship with the Museum after Boas left.”

Hunt, in turn, tried to commission the welcome poles from one of the few master carvers who remained active in the region—Arthur Shaughnessy. For decades, Shaughnessy made his livelihood by carving elaborate masks

When Boas's successor Goddard asked Hunt to help source traditional totem poles, Hunt turned to a carver in nearby Alert Bay.

and totem poles that were an important part of Kwakwaka'wakw culture.

Totem poles were commonly raised to mark massive ceremonies of gift-giving, dance, and other traditions, known as potlatches. While potlatches and traditional carving were banned under Canadian law in 1885, just a year after Shaughnessy was born, the practices persisted. In late 1921, however, Shaughnessy had been arrested while attending a potlatch and jailed for two months. So when Goddard and Hunt approached him, he was wary of taking on new commissions. “He was nervous about undertaking any work of this nature, because it was dangerous in those circumstances,” says Whiteley.

Goddard undertook a campaign to persuade officials in British Columbia to grant special dispensation to carve four house poles in 1923, and in April 1924 Shaughnessy began the work. To fit the space, he carved house posts, which traditionally hold up the corners of a tribal leader's home.

All four, each measuring 18 feet high, were finished in just three months, with some assistance from Hunt himself. Each showed a human figure perched atop the head of a grizzly bear, imagery that Whiteley says likely calls back to the roots of a lineage from the area around Fort Rupert, once a Kwakwaka'wakw fishing village called Tsaxis. Correspondence between Hunt and Goddard shows that the poles are largely copied from a set found in the home of a chief in the area who had refused to sell the originals to Hunt, despite some weeks of bargaining.

The finished poles were towed by boat from Fort Rupert to nearby Port Hardy, and from there, passed onto a cargo liner to Vancouver. A 5,000-mile journey by train to New York's Upper West Side followed, and the posts arrived in late November, according to a letter from Goddard dated December 1, 1924.

They were raised by the New Year. Though carved in the Pacific Northwest, from trees that had grown there for decades, the poles never stood in Kwakwaka'wakw country. They'd found a home in the Museum they were built for, thousands of miles from their birthplace, a record of a culture and a reminder of what could be, and of what stood to be lost. 🌲

All images © AMNH



Restoring the Northwest Coast Hall

Last fall, the Museum announced a major project to restore and update the Northwest Coast Hall (see p. 3 for details).

Conservation of more than 1,000 items in the collections, including six monumental totem poles, will be a big part of the effort. The Shaughnessy posts, meanwhile, have already undergone careful restoration in a mobile lab that was temporarily located in the gallery (see above). The Museum's Objects Conservation Lab undertook the effort in 2011–2012, repairing damage from decades of exposure and revealing the vivid, original colors Shaughnessy painted nearly 90 years earlier. That important work provides conservators with invaluable insight for the task that lies ahead as they begin to assess and prepare to begin work on other totem poles from the Hall.

Support for the conservation of the Shaughnessy totem poles was provided by the Stockman Family Foundation Trust.

The Making of a Meadow

What better way to get an insect's-eye view of the world than to walk into a larger-than-life meadow? Here's how the Museum's exhibition team created one of the buggiest galleries in *Our Senses: An Immersive Experience*.



IT'S ELECTRIC

A honeybee's body is covered in nearly 3 million tiny hairs, which help it carry up to 30 percent of its own weight in pollen. To make sure the model bees looked their fuzziest, preparator Jason Brougham used synthetic fibers—and static electricity to stand the strands up straight.

SPECS FROM SPECIMENS

Model makers don't have to go far for inspiration. The Museum's bee collection includes nearly 500,000 specimens representing more than 7,000 identified species. That's a large library to reference for details that photos and other images can't provide.



INVISIBLE PAINT

Bees and butterflies can see ultraviolet light, an adaptation that lets them spot "nectar targets" on nearby flowers or identify potential mates. Humans can't. So how did preparators make models of UV-hued blooms? By shining a UV light while working, as Andrea Raphael is doing in this photo (left).

HIGHLIGHTING WITH LIGHT

Some *Heliconius* look just like another butterfly—except for ultraviolet marks on their wings that only others of their species can see. Human visitors can spot them when a UV light, which cycles on and off on a timer, floods the scene and reveals the secret signal.

ACTION POSES

Jake Adams (pictured below) studied slow motion videos of butterflies in flight to capture how different species maneuver when landing on a flower. *Heliconius* butterflies tuck their legs next to their eyes and under their wings, while monarchs let theirs dangle.

MASSIVE MODELS

At its longest, the wingspan of *Heliconius* butterflies is only about 3 inches. But to reveal details we'd normally miss on these tiny creatures and delicate plants, the models are 750 percent the size of the real thing.

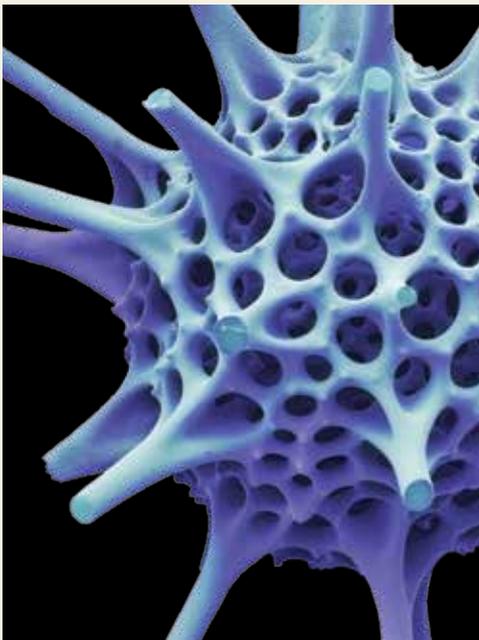


Plan your visit today! *Our Senses: An Immersive Experience* is free for Members.

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



Steve Ochmeissner / Science Source



Radiolarians are a type of zooplankton, one of the many marine organisms explored in the new exhibition *Oceans*, opening this March. Find out more about plankton and the exhibition on p. 10.

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, and Café on 4 offer Members
a 15-percent discount. Hours are
subject to change.

MUSEUM SHOPS

The Museum Shop, Dino Store,
Planetarium Shop, Cosmic Shop,
Senses Shop, and Online Shop
(shop.amnh.org) 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: **B** (weekdays) or **C** to 81st Street;
1 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.

ACCESSIBILITY



For information on accessibility,
email accessibility@amnh.org
or call 212-313-7565.