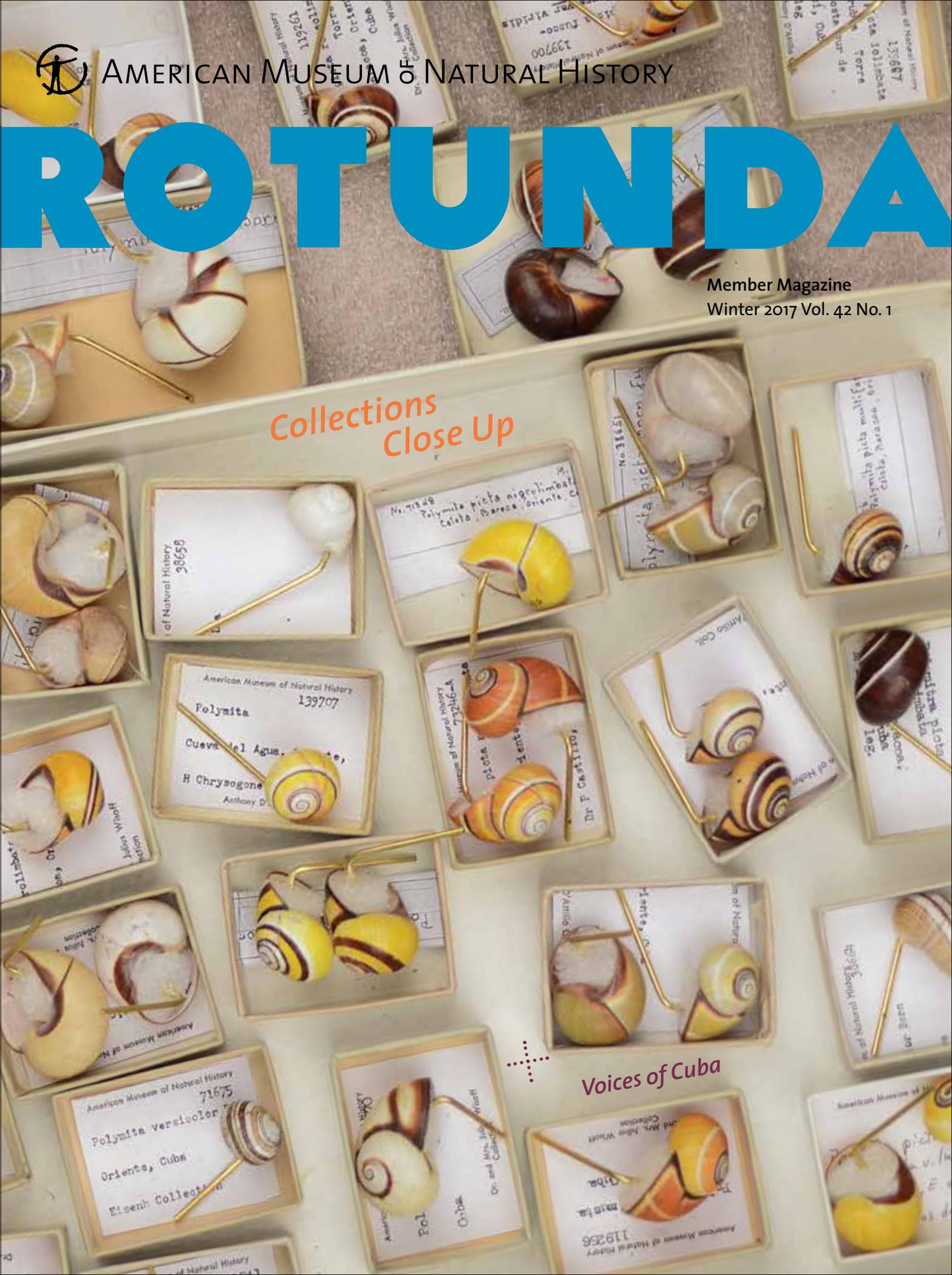


ROTUNDA

Member Magazine
Winter 2017 Vol. 42 No. 1

Collections
Close Up



Voices of Cuba

From the President

Ellen V. Futter



The New Year brings to mind new beginnings, which brings to my mind Commencement day at the Museum.

This past fall's Richard Gilder Graduate School Commencement was the fourth ceremony of our graduate school, and it still feels fresh and exciting to see the Museum more fully exercising its leadership role in post-secondary education.

Of course, for our graduates, Commencement every year is a new beginning writ large. Our Ph.D. recipients have embarked on a range of exciting and important careers in research and education. The back page of this issue offers a glimpse of where some of our Ph.D. recipients are working now. And our Master of Arts in Teaching recipients are working as science teachers in some of the most under-served middle and high schools in New York City and State—in some cases, as the only Earth science teacher in the entire school.

Commencement is also an opportunity to honor the past and celebrate the continuity of our work. This year we conferred honorary degrees on two individuals with deep ties to the Museum.

U.S. Secretary of Education John B. King, Jr., received the Doctor of Humane Letters. In his previous position as New York State's Commissioner of Education, he played a key role in the authorization of our MAT program.

And Cuban zoologist and longstanding colleague of many of our scientists Gilberto Silva Taboada received the Doctor of Science for his authoritative research and advocacy for science and conservation.

As with our Commencement, I hope that the New Year brings to you the opportunity to reflect on the past and to embark on exciting new adventures—including here at the Museum!

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ROTUNDA

American Museum of Natural History
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Design Hinterland, www.hinterlandstudio.com

ISSN 0194-6110
USPS Permit #472-650
Vol. 42, No. 1, Winter 2017
Rotunda is published quarterly 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. © 2017 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.

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Mummies' Mysteries Revealed in New Exhibition This Spring



OPENS
MARCH 17
... for ...
Member
Previews

This painted coffin is among the stunning artifacts on view in Mummies.

Get ready to see how cutting-edge technologies are shedding light on ancient mysteries when the exhibition *Mummies* opens on March 17 for Member Previews.

Mummies are storehouses of information. Each one is like a book: we can understand its story by reading its chapters. In recent years, new tools and technologies like computed tomography (CT) scanning and x-rays have made it possible for scientists to decipher these histories with greater precision, unveiling the startling details of the distant past. In this reverent exhibition, visitors will see each of the 20 rarely seen mummies from ancient Egypt and Peru as individuals with life stories that have only recently been brought to light.

Mummies will be the first—and likely last—chance on the East Coast to see dozens of mummies and related artifacts from The Field Museum's collection. But more than that, this unique exhibition offers visitors an opportunity to encounter these specimens like never before. Through high-resolution scans and forensically reconstructed sculptures, visitors will be able to glimpse the ancient people who were immortalized centuries ago and to find out how scientists have been able to glean stunning details about their ages, their daily lives, even their causes of death.



The exhibition, which makes its only East Coast stop at the Museum, reveals mummies in amazing detail.

MEMBER PREVIEW DAYS
FRIDAY, MARCH 17,
SATURDAY, MARCH 18
AND SUNDAY, MARCH 19
10:30 AM TO 4:30 PM

See the new special exhibition before it opens to the public on March 20. A weekend of exclusive Member Preview Days for Members at the \$115 level and above begins Friday, March 17. Tickets are available starting March 1 by calling 212-769-5200.

Mummies was developed by The Field Museum, Chicago.

The Museum gratefully acknowledges the Richard and Karen LeFrak Exhibition and Education Fund.

Mummies is proudly supported by Chase Private Client.

SUPPORT THE MUSEUM'S MISSION WITH TAX-FREE IRA GIFTS

Did you know that if you're 70.5 years old (or older) it's possible to make tax-favored charitable gifts from traditional and Roth IRA accounts to the Museum's Annual Fund, which supports the overall mission and activities of the Museum? A total of \$100,000 a year can be transferred directly to one or more qualified charities, such as the American Museum of Natural History, free from federal income tax.

There may also be state income tax savings. Amounts given in this way count toward required IRA minimum withdrawal amounts for the year of the gift.

For more information, contact John Matthews, director of planned giving, at 212-769-5119 or plannedgiving@amnh.org. Please consult a tax professional regarding your personal tax situation.

FLOAT ON

It's no surprise that land snails would be so successful on an island. With the ability to secrete a mucus seal around their shell openings, these invertebrates can go dormant for long periods without drying out. This makes them good travelers, hardy enough to survive a trip at sea on vegetation that comes loose from the mainland during a storm or flood.

LIVING LEGACY

A UNESCO World Heritage site since 2001, Cuba's Alexander von Humboldt National Park is named after the Prussian naturalist and explorer who visited the island nation in the early 1800s and was described by Darwin as the "greatest scientific traveler who ever lived." Closer to home, you can see a monument to Humboldt across the street from the Museum, at the 77th Street entrance to Central Park.

FRAGILE BEAUTY

Every species of *Polymita* in Cuba is threatened, primarily from habitat loss. That's not the only hazard they face, though. Live snails are also illegally harvested, and their shells are used as jewelry.

HISTORIC PROVENANCE

Two of the *Polymita picta* specimens in the Museum's collection were collected in the 19th century by the grandson of John Jay, founding father and first Chief Justice of the United States. The grandson, John Clarkson Jay, was a physician and amateur conchologist—a student of snails and their relatives—whose "uncommonly complete" collection of 50,000 specimens was donated to the Museum in 1874.

Bursts of Color

Among the roughly 1,400 species of land snails found in Cuba, those from the genus *Polymita*—that's Latin for "many stripes"—are unique to the island nation. The tiny gastropods are quite aptly known as painted snails because of the variety of vibrant colors found in their shells.

A dazzling array of specimens can be seen in the special exhibition *iCuba!*, including *Polymita picta*, *P. sulphurosa*, *P. versicolor*, *P. venusta*, *P. brochuri*, and *P. muscarum*, all from the Museum's collection.

The beauty of these striped snails is a many-splendored thing. Curiously, differences in color occur not just between species, but also within individuals of a single species. Some scientists suggest that the variations might confuse predators, preventing them from homing in on these snails as a predictable meal, but the question is far from settled.

"Over a century ago, Charles Darwin and Alfred Russel Wallace argued about the purpose of zebras' stripes," says Mark Siddall, curator in the Division of Invertebrate Zoology. "We still don't know the answer, save that it's definitely not about camouflage—that was proven just this year. Obviously we're a lot further away from understanding the stripes on land snails."

Painted snails are found in eastern Cuba, including throughout Alexander von Humboldt National Park, which stretches from the mountains to the sea on the northeastern coast of the island and is considered one of the most biologically diverse ecosystems in the world.

iCuba! is now on view and free for Members. See more *Polymita* specimens among the mollusks in the Hall of Biodiversity.

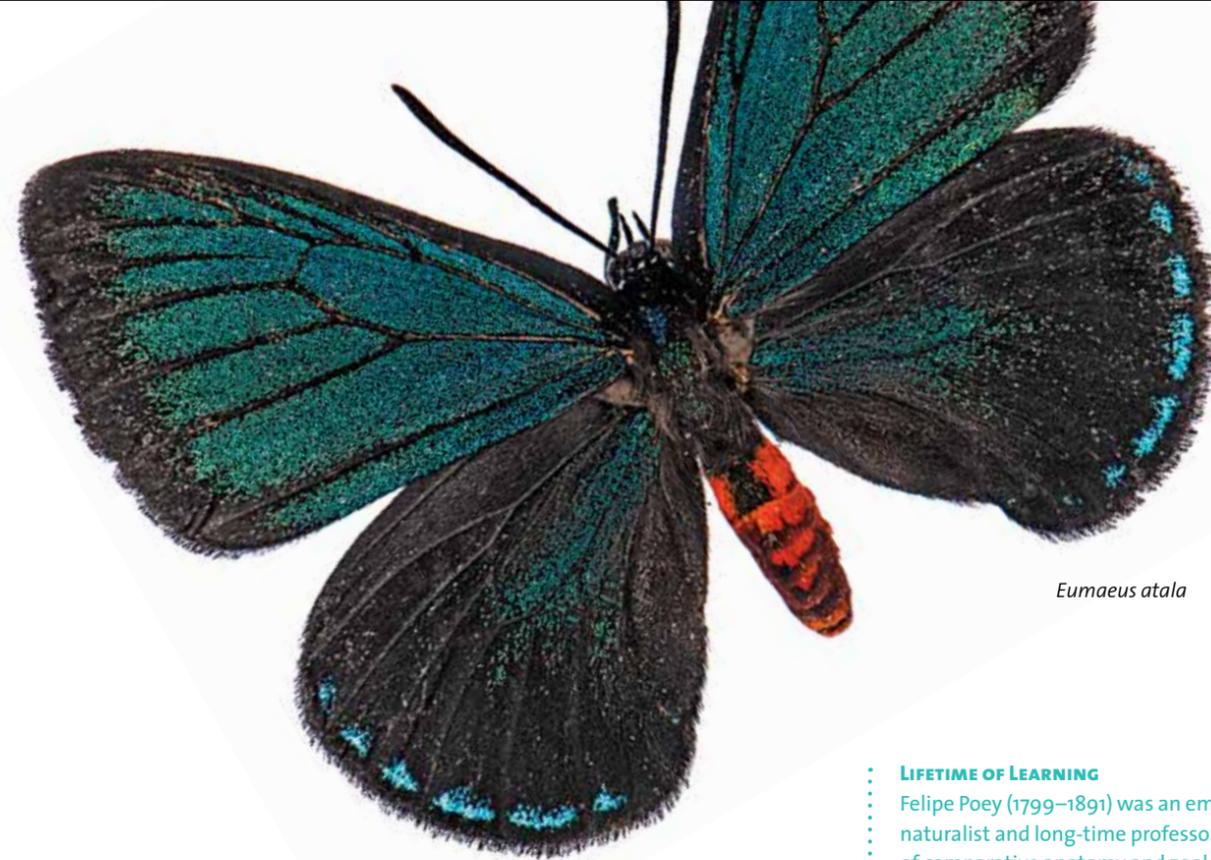


P. versicolor
Catalog no. 71675

P. picta
Catalog no. 38646

P. picta iolimbata
Catalog no. 139687

© AMNH/R. Micklens



Eumaeus atala

Bright and Bitter

This winter, one stunning butterfly is starring in two places at the Museum. The Atala hairstreak (*Eumaeus atala*) is featured in the special exhibition *iCuba!* as an example of the island nation's rich biodiversity, and it can also be seen flying free in *The Butterfly Conservatory: Tropical Butterflies Alive in Winter*.

The diminutive species—the largest examples have wingspans of about 1 inch—is a particularly striking example of aposematism, a flashy coloration that warns would-be predators of the nasty, if not lethal, taste to come.

The caterpillar is bright red with brilliant yellow spots. As a butterfly, its iridescent black and blue body looks dipped in a deep rusty orange—like a firefly on steroids—with drops of the same orange on the underside of the hindwing. In nature, the message sent by red, orange, or yellow is nature's "C" grade from the health department—a sign that says 'eat at your own risk.'

"One probably won't kill anything," says Hazel Davies, director of Living Exhibits at the Museum. "But it would probably make whoever eats it throw up, or not feel so good. And they won't eat it again." Word seems to have gotten out, as the Atala hairstreak has no known natural predators.

The butterfly's bitter taste comes from a toxin ingested by the caterpillar as it feeds on cycad plants. The foul flavor is maintained as it grows into its butterfly body. The role of this plant is so vital that when the availability of a native cycad, the coontie plant, was disrupted by habitat loss and overharvesting, the Atala hairstreak's numbers dropped so much it was thought to be extinct in Florida for much of the 20th century. But the proliferation of a similar alternative plant has led to a comeback.

"Their numbers have rebounded," explains Davies, "because they are feeding on introduced ornamental cycads, such as those planted in gardens."

Besides Florida, the Atala hairstreak can be found in the Bahamas, Turks and Caicos, the Cayman Islands, and, of course, Cuba. In fact, it was Cuban zoologist Felipe Poey who first described the species in 1852.

The Butterfly Conservatory: Tropical Butterflies Alive in Winter is now open. Members enjoy special benefits.

LIFETIME OF LEARNING

Felipe Poey (1799–1891) was an eminent Cuban naturalist and long-time professor and chair of comparative anatomy and zoology at the University of Havana. A profile in *Popular Science Monthly* in 1884 praised Poey for "his entire lack of prejudice" with "no theories which he is not ready to set aside when a better suggestion appears." In other words, the consummate scientist.

GREEK AND FRENCH ORIGINS

The butterfly's name is a euphonious combination of the old and the relatively new. In Greek mythology, Eumaeus was the friend of and swineherd for Odysseus, the hero of Homer's epic poem *The Odyssey*. For the species name, Poey turned to the title of an 1801 novel, *Atala, ou les amours de deux sauvages dans le désert* by François-René de Chateaubriand.

STRENGTH IN NUMBERS

During metamorphosis, Atala hairstreaks have a tendency to stick together—literally. In their first few days of life, the caterpillar larvae line up side by side and remain that way through several molts while eating their way through leaves. As pupae, they often cluster in a large mat, anchored to or near the host plant and to each other by silk—a possible protection from wind or storm.

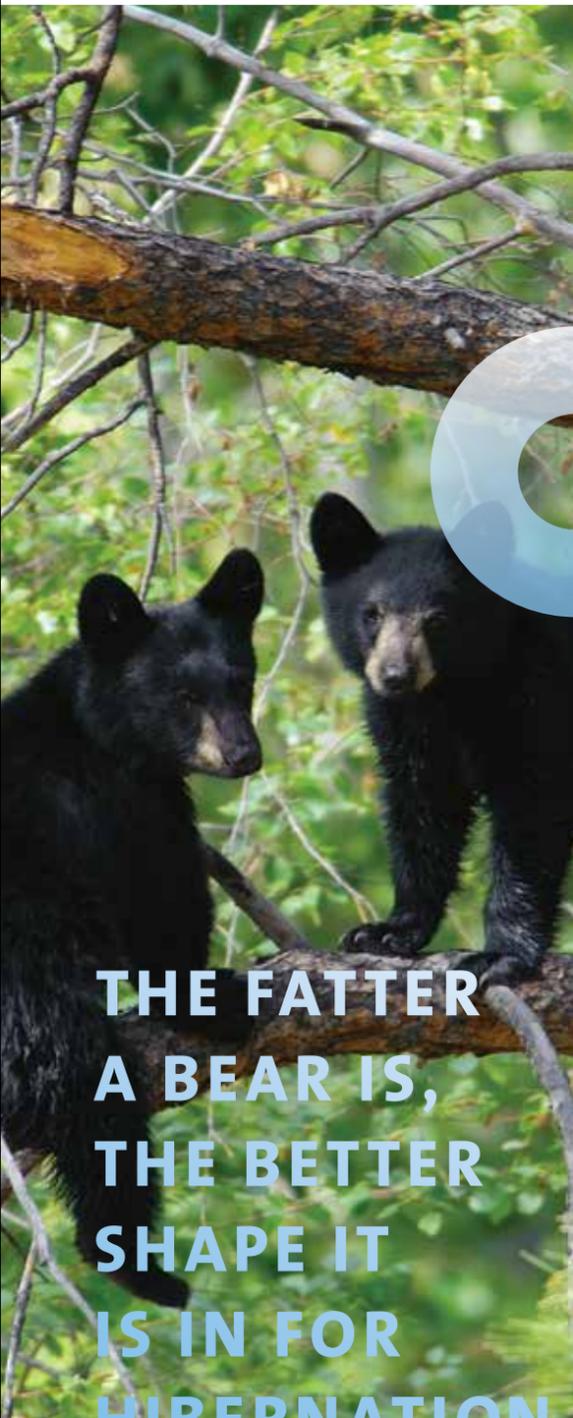
PICK YOUR POISON

An experiment by scientists in Florida found that *Eumaeus atala* larvae live longer and survive better on native coontie plants than the non-native cycads used in gardens. The caterpillars return the compliment: while they derive nutrition—and toxicity—from the plants, their droppings provide fertilizer for the nutrient-poor soil where the native plants grow.

© AMNH/D. Finnin

HEAVY SLEEPERS

MUSEUM SCIENTISTS EXPLAIN HOW HIBERNATION HELPS ANIMALS LIKE BEARS, BATS, AND EVEN FROGS SURVIVE LONG WINTERS.



THE FATTER A BEAR IS, THE BETTER SHAPE IT IS IN FOR HIBERNATION

RAE WYNN-GRANT
DORIS DUKE CONSERVATION FELLOW
CENTER FOR BIODIVERSITY
AND CONSERVATION

On a cold winter morning, there are few greater guilty pleasures than hitting the snooze button and pulling up the blankets to go back to sleep. With the wind howling and the slush puddles getting deeper, it can seem like there's no reason at all to get out of bed. For some species, though, sleeping late—really late—is key to their survival.

Hibernation is actually a much deeper “sleep” than the eight hours *Homo sapiens* are supposed to be getting each night: it provides not just rest, but a means to save energy when environmental conditions are at their harshest.

Every animal that hibernates does so a little differently, but most share a few common traits. Breathing slows to a crawl, as does the heart rate, which can drop to just a beat or two a minute. Body temperature also falls in hibernating animals, many of which are about half as hot at rest as when they're active. Metabolic rate also falls drastically to conserve energy for as long as possible while the animal isn't taking in nutrients.

Beyond these basics, though, different species have many different ways to make hibernation work for them.

BEAR NECESSITIES

Even bears, perhaps the world's most iconic hibernators, don't all hibernate the same way. In eastern North America, food sources like nuts and berries stay available longer, so black bears in places like New York and New Jersey don't start hibernating until November or December. In the southwestern United States, where food sources get scarce earlier, bears can spend as long as six or seven months a year—more than half their lives!—in hibernation.

Before they settle in for a long winter rest, black bears spend the summer and fall in a state known as hyperphagia, chowing down on just about anything they can get their paws on.

“During this period, a bear will eat and eat and eat, all day long,” says Rae Wynn-Grant, Doris Duke Conservation Fellow in the Museum's Center for Biodiversity and Conservation and an educator in the Science Research Mentoring Program. Once they're feeling full enough, bears have to find a place to turn in for the season. Caves or hollowed-out logs are classic bear beds, but just as often, the animals will simply find an overhang under which to spend a few months. One must-have for a hibernation location, says Wynn-Grant, is a nearby water source, to ensure that the animal can have a drink as soon as it wakes up.

Once they're tucked in, bears don't get up for anything. Waste products like urine are recycled back into their bodies to keep them hydrated. And newborn black bear arrive, amazingly, without disturbing their mom's slumber. They find a nipple, settle in, and suckle until spring, when mama bear and cubs emerge from their den together.



Little brown bats hibernate in cold climates, but those that live in warmer regions stay active all year long.

HIBERNATION HAZARDS

Hibernation helps animals survive during lean times. But the extended rest also leaves them vulnerable. For black bears, predators like mountain lions are a threat, but the more common one is humans—not because they will attack a bear, but because they can wake it up.

Whether it's a neighbor's car alarm or the family dog needing an early walk, no one likes being pulled out of bed earlier than planned. For hibernating animals, though, waking up early isn't just an inconvenience—it can be downright lethal. Waking up from hibernation requires a lot of energy, depleting reserves that are key to surviving the winter.

It's not just bears that are in danger of death if they wake up from hibernation at the wrong time. The fungus that causes white-nose syndrome, which has devastated North American bat populations in recent years, kills in much the same way. While the fungus itself isn't deadly to bats, it has the potential to interrupt their hibernation.

“What kills the bat is that the fungus makes them wake up, which is very costly,” says Nancy Simmons, a curator-in-charge in the Department of Mammology whose research specialty is bats. “If they wake up too many times, it burns up all the fat they had stored for the winter.”

REPTILIAN (AND AMPHIBIAN) RESTS

Hibernation isn't unique to mammals. Reptiles and amphibians living in climates with cold winters often hibernate through the season, too. Many do so by burrowing underground, where temperatures may be cold, but they are at least safe from freezing. Some aquatic species like frogs and turtles even spend the winter beneath frozen-over bodies of water.

“The biggest danger for an organism during this time is freezing, so they get to a safe space like the bottom of a pond,” says Chris Raxworthy, curator-in-charge of the Department of Herpetology. “Once they are hibernating, the metabolic rates of these animals slow down, and instead of breathing using lungs, they take in dissolved oxygen from the water through their skin to make it through the season.”

Wood frogs, meanwhile, can make it through a winter frozen solid. While their heart rate and breathing completely stop, sugars stored in their blood keep their cells from freezing. Come the thaw, a wood frog that has been encased in a block of solid ice for months can hop on its way like nothing happened—nature's own Sleeping Beauty, shaken out of slumber by spring. 🦊

For another example of hibernating local species, visit the Hall of New York State Environment, where you can see the hibernation cycle of the Eastern chipmunk.



HIBERNATING BEFORE HATCHING
Extreme inactivity doesn't always take place in a burrow, den, or cave. Sometimes, it can happen inside an egg, before an animal is even hatched.

In a 2008 paper, Curator Chris Raxworthy and colleagues described the singular life cycle of Labord's chameleon (*Furcifer labordii*). This native of Madagascar thrives during the island's rainy season but lives in one of the most arid parts of the island.

Once a *Furcifer labordii* egg is fertilized and laid, it gets buried to wait out the dry season, which can last as long as nine months. For much of that time, the embryo is not developing—instead, it's in a hibernation-like state of suspended development known as diapause. Rather than using valuable resources to grow, the embryonic reptile hits the “hold” button.

Serious development in these embryonic chameleons only starts closer to the onset of the rainy season, when the eggs hatch. Then, the lizards are off to the races, developing from babies to mature adults in just two months. These adults breed, bury their eggs, and then die, en masse, at the post-hatching age of just four or five months. This cycle makes these annual chameleons the shortest-lived terrestrial tetrapods known to science.



Wood frogs (Lithobates sylvaticus) like this one can hibernate all winter long while frozen solid in a block of ice.

SNOWBIRDS

For migrating birds, Cuba can be a welcome pit stop or a winter destination of its own.

Cuba is considered the crossroads of the Caribbean, and the designation is especially true when it comes to migratory birds. Many species use the archipelago's varied habitats—wetlands, forests, mountains, and even human-dominated areas—as a place to stop, eat, and rest on their long annual journeys between North and South Americas.

“Cuba has long loomed large in the consciousness of bird conservationists,” says ornithologist Leo Douglas, president of BirdsCaribbean, a group dedicated to protecting avian wildlife throughout the region. “The whole of the archipelago is important to migratory birds.”

Researchers think that as many as 70 percent of the birds found in Cuba only live there part-time, which means this island nation and its environmental health remain critically important to the welfare of many bird species in the Western Hemisphere. We looked at just a few of the many bird species that call Cuba their home away from home.

WINTER RESIDENT

Black-throated Blue Warbler
Setophaga caerulescens

Males and females of this North American songbird look so different, they were initially thought to be separate species. Both sexes, though, make their homes in Cuba all winter long.



SUMMER MIGRANT

Gray Kingbird
Tyrannus dominicensis

During the spring and summer, when North American migrating birds are absent from Cuba, Gray Kingbirds make their way from Central and South America to the island to breed. “Birds that migrate to Cuba in the winter aren't in their breeding ground, so they don't sing,” says Douglas. “Gray Kingbirds, though, are very vocal and hard to miss!”



Osprey

Pandion haliaetus

Ospreys migrate from North America's east coast to South America. For some, Cuba is a stopover; others stay for the winter. Researchers learned this because more than 100 birds have been fitted with tiny backpacks containing lightweight, solar-powered radio transmitters, which track their movements using satellites and cell phone towers.



WINTER VAGRANT

Wood Thrush
Hylocichla mustelina

Wood Thrushes migrate south from North America to spend their winters in the warmer climes of Central America. During this long trip, many make a last-minute pit stop in Cuba before crossing the Gulf of Mexico to their ultimate destination.



VOICES of CUBA



FRANCISCO "CHICHÍO" GRIÑAN SÁNCHEZ
Director, La Campana Folkloric Company, Holguín, Cuba

In Cuba, I am not afraid of anything, of any change. I don't have to live with the changes because I make the changes, and I myself am the change.

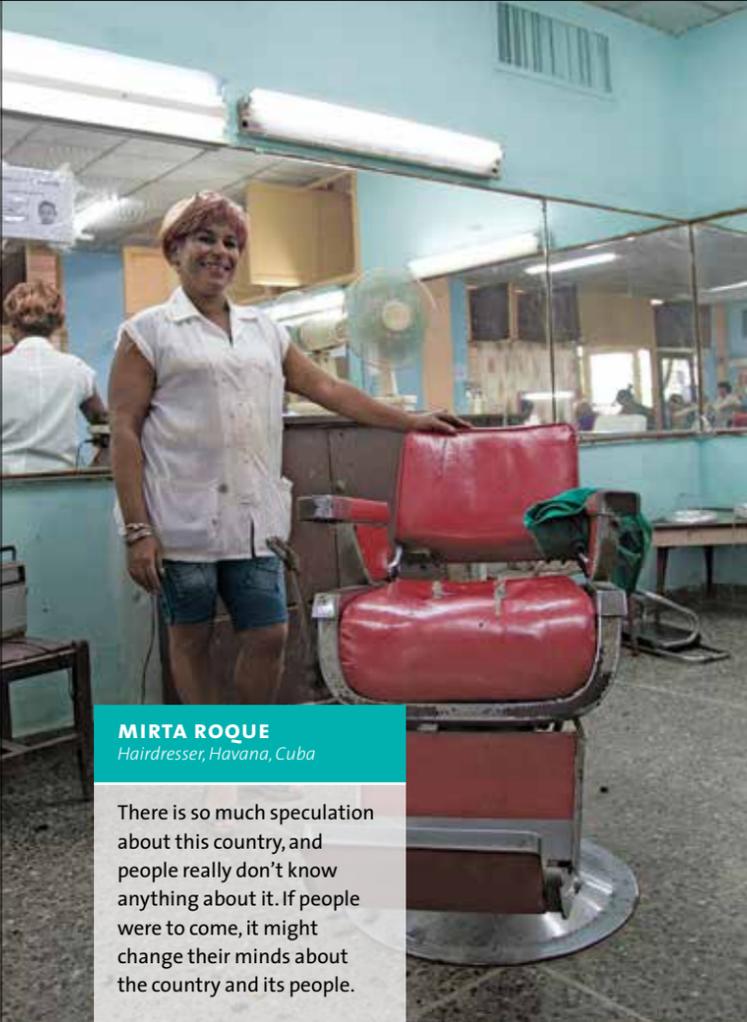
IN THE SPECIAL EXHIBITION *¡CUBA!* you'll learn about life on the island from those who are experiencing—and influencing—this national period of transition. Here are just a few of the Cuban citizens who shared their thoughts and voices with us.

© AMNH/L. Mathieu-Léger

¡CUBA! NOW OPEN

NOMI RAMIREZ
Activist, Cuban National Center for Sex Education, Havana, Cuba

It's strange to think about what defines you. I think that more than anything, the kindness, warmth, the preparedness that we have is what defines us as Cubans.



MIRTA ROQUE
Hairdresser, Havana, Cuba

There is so much speculation about this country, and people really don't know anything about it. If people were to come, it might change their minds about the country and its people.

PABLO "POLLO" RIVERÓN
Musician, Santa Clara, Cuba

Changes are taking place, yes. But at times I don't know if they are good or bad. For instance, I don't want my country to turn into an extremely capitalist country. Cuban society is suffering, it's becoming consumerist, without having anything to consume.



KATHERINE ACEVEDO
Ballet Dancer, Camagüey, Cuba

Here, as we are, we can do anything. You are not hindered or anything. What you have to do is fight and work and go for it. I would want to have my own ballet school or my own company—so that others can keep on dancing, to make their dreams come true.

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 cancelled 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, 2016. Please check amnh.org/calendar for updates.

JANUARY

Walk on the Wild Side

Eight Wednesdays,
January 4–February 22
8 am

Free for Members at the Adventurer-level and above.

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.



SciCafe: Modifying Mosquitos with CRISPR

Wednesday, January 4
7 pm

Free for 21+ with ID

CRISPR gene editing is widely used by biologists as the DNA programming tool of choice to alter the genome of organisms and even populations. Could this lead to the eradication of mosquitos? Should it? Rockefeller University professor **Leslie Vosshall** as she demonstrates what is—and what will be—possible.

The Year in Review

Thursday, January 5

7:30 pm
\$20 Members

Spend an evening with **Neil deGrasse Tyson** as he reviews stories from around the universe drawn from breaking news in 2016.

Hall Tour: Space and Time

Saturday, January 7

10:30 am

Free

Registration required; call 212-769-5200.

Join a Museum tour guide and explore the Cullman Hall of the Universe. Walk the Scales of the Universe and the Heilbrunn Cosmic Pathway to understand the vast spans of time and great distances involved in studying the cosmos. Find out how astronomers identify and observe objects like the Dumbbell Nebula, first discovered in 1764.



Celebrate Pacific Northwest Cultures

First Saturdays,
January–May 2017

Noon–4 pm

Free

Experience the iconic Hall of Northwest Coast Indians through activities guided by Museum volunteers. Enjoy the interactive digital totem and tour the hall with educators from the Haida Gwaii Museum through a telepresence robot.



The Neurobiology of Attachment

Saturday, January 21

10 am–3 pm

\$85

How do babies form attachments to their caregivers? How do these essential emotional connections take shape? In this one-day course, we will delve into recent insights in neurobiology and behavior, providing a greater understanding of what shapes babies' attachment to their caregivers.

Exhibitions

Admission is by timed entry only.

Mummies

Free for Members

Get a rare, up-close look at one of the largest collections of mummies in North America. See how the latest technologies are helping scientists to discover more details about each mummy and the objects buried with it.



OPENS 3/17

¡Cuba!

Free for Members

Explore the extraordinary biodiversity across the island's remote forests, mysterious caves, expansive wetlands, and dazzling reefs, as well as its culture, its people, and its history.



Can We Reach The Stars?

Monday, January 23

7:30 pm

\$12

Professor of physics **Greg Matloff** discusses recent developments that have advanced the possibility of interstellar travel for robots and humans, from the discovery of a small planet candidate in the habitable zone of a nearby star to the announcement of the interstellar-probe Project Starshot.

The Art of Diorama

Six Wednesdays,

January 25–March 1

7-9:30 pm

\$195

Materials included

Discover how dioramas are made and hear behind-the-scenes stories about how they came together as Museum exhibition specialist **Tom Doncourt** leads an after-hours look at our legendary dioramas.



Countdown to Zero

Free for Members

This exhibition, developed in collaboration with The Carter Center, focuses on the scientific innovations that are ridding the world of ancient afflictions, including the 30-year campaign that may soon eradicate Guinea worm disease.

Curator's Lecture: ¡Cuba!

Thursday, January 26

6 pm

Free for Members at the Adventurer-level and above.

Registration required, call 212-769-5606.

Join us for a special Members-only presentation about our latest exhibition, *¡Cuba!* **Dr. Ana Luz Porzecanski**, director of the Center for Biodiversity, will discuss what goes on behind the scenes to create a Museum exhibition. After the talk, Members can stay behind to view the exhibition with a new perspective.

Mercury Rising

Tuesday, January 31

7 pm

Hayden Planetarium Space Theatre,

Enter at 81st Street

\$12

Resembling our Moon, and with similar atmosphere, Mercury hosts enough activity in its interior to generate a small magnetic field. Join guides **Denton Ebel** and **Carter Emmart** for an up-close examination of our solar system's smallest planet.



FEBRUARY

SciCafe: When Insects Get Intimate

Wednesday, February 1

7 pm

Free for 21+ with ID

Just in time for Valentine's Day, behavioral ecologist **Marlene Zuk** examines how six-legged sex lives can be just as interesting as our own.

Behind the Scenes Tour: Anthropology

Conservation Labs

Thursday, February 2

6:30, 7, and 7:30 pm

\$30

Join an exciting hour-long Members-only tour behind the scenes in the Anthropology Department's Conservation Laboratory. Join Director of Conservation **Judith Levinson** and others on this fascinating journey into conservation science, illustrated by artifacts that are currently in the lab for treatment.

Tour is appropriate for ages 10 and up. Children must be accompanied by an adult.

Celebrate Culture!

Spotlight Asia:

Year of the Rooster

Saturday, February 4

Noon–4 pm

Free

The Museum's Lunar New Year festival focuses on the Rooster, a character associated with fidelity, punctuality, and the ability to forecast the future. Celebrate Asian art and culture through calligraphy, traditional storytelling and hands-on activities led by local artisans and Museum scientists.



Gravitons, Exotic Higgs Bosons, or Nothing at All

Monday, February 6

7:30 pm

\$12

In 2015, the Large Hadron Collider (LHC) achieved a milestone, operating at the highest energy ever used by an accelerator experiment. Particle physicist **Dr. James Beacham** discusses what we've learned about gravitons, Higgs bosons, dark matter, and what's next for the LHC.



The Butterfly Conservatory

Housed in a vivarium that approximates their natural habitat with live flowering plants, species in this ever-popular exhibition include iridescent blue morpho butterflies, striking scarlet swallowtails, and large owl butterflies.

Winter Lunchtime Bird Walks in Central Park

Four Tuesdays, February 7–28
Noon-1:30 pm
\$50
Follow ornithologist **Paul Sweet** through three Central Park habitats to observe the bird species that makes their homes in New York City.



Cannibalism: A Perfectly Natural History

Monday, February 13
6:30 pm
Free for Members with RSVP
In his new book, *Cannibalism: A Perfectly Natural History*, Museum Research Associate **Bill Schutt** explains how the practice might be linked to the extinction of Neanderthals, why so many fish eat their young, and when sexual cannibalism can be an evolutionary advantage.

A book signing will follow.



2D AND 3D

Romance Under The Stars

Tuesday, February 14
6 and 9:30 pm
\$125 per person
Celebrate Valentine's Day with a unique night at the Hayden Planetarium, complete with cocktail hour, open bar, hors d'oeuvres, and chocolates accompanied by live music and stellar romance stories from the ancient past.

The Science of Stem Cells

Saturday, February 25
10 am–3 pm
\$85
What are stem cells, and what promise do they hold? In this one-day course, we will explore the basic biology of stem cells, new research techniques, and the ethical concerns that surround them.

Searching for Alien Life in the Universe

Tuesday, February 28
7 pm
\$12
Current scientific evidence is helping us learn whether we're alone in the universe. **Jackie Faherty** and **Emily Rice** tour a nearby solar system and then explore the potential diversity of living conditions on newly discovered extrasolar planets.

MARCH

SciCafe: The Search for Slow Lorises

Wednesday, March 1
7 pm
Free for 21+ with ID
Slow lorises may look like cute countenance has made these primates a target of the illegal wildlife trade. Join primatologist and Center for Biodiversity and Conservation researcher **Mary Blair** as she discusses how research on these endangered animals can contribute to a better understanding of wildlife trafficking.

Hall Tour: The Art of The Diorama

Saturday, March 4
10:30 am, 1:30 pm
Free. Registration required; call 212-769-5200.
The Museum is widely regarded as having the finest, most accurate wildlife dioramas in the world. Discover the role that these windows on nature play in conversation, the big personalities behind their creation, and why these scientific artworks are as important today as they were 50 or more years ago.



2D AND 3D

Behind the Scenes Tour: Herpetology

Wednesday, March 8
6:30, 7 and 7:30 pm
\$30
Join us for an hour-long Members-only tour behind the scenes as we explore the Department of Herpetology's extensive collection of more than 550,000 reptile and amphibian specimens. Discover some of the hidden treasures of the collections alongside Museum scientists.

Tour is appropriate for ages 10 and up. Children must be accompanied by an adult.

Beginner Animal Drawing

Six Wednesdays, March 8–April 12
7–9 pm
\$120
For those who have never taken the Museum's popular Animal Drawing class, this new course begins with basics and offers one-on-one guidance from illustrator and naturalist **Patricia Wynne**.

This course is meant for beginning artists. Enrollment limited to 25 people. Materials not included.

Animal Drawing

Eight Thursdays
March 9–April 27
7–9 pm
\$160
The celebrated dioramas, dinosaur skeletons, and other distinctive features of the Museums are the setting for an intensive after-hours drawing course with illustrator and naturalist **Patricia Wynne**. Learn about the gifted artists who created the world-class dioramas as you sketch subjects in their "natural" environments.

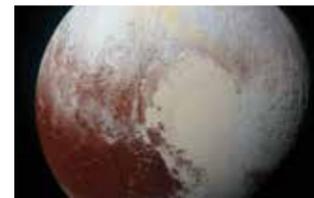
Prior drawing experience recommended. Enrollment limited to 25 people. Materials not included.

Our Earth's Future: Understanding Climate Science and Sea Level Rise

Saturday, March 11
10 am–3 pm
\$85
In this one-day offering, **Dr. Debra Tillinger** will lead an in-depth course about the forces that determine sea levels. Participants will come away with a better understanding of climate change and the ability to discuss the science behind the headlines.



SPACE SHOW



Pluto Revealed!

Monday, March 13
7:30 pm
\$12
Jeff Moore, geology and geophysics imaging team leader for NASA's New Horizons mission, shares findings about Pluto made in the year since mankind's closest brush with the distant dwarf planet. Director of Astrovisualization **Carter Emmart** will present imaging from the mission using the Museum's new OpenSpace software.

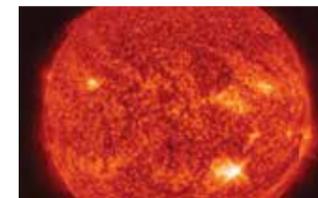
Family Game Night

Tuesday, March 14
6–8 pm
\$35
Join us after hours for an evening of family fun featuring interactive digital and physical games that challenge, entertain, and tease your brain, as well as educational activities, science talks, and more.

This program is recommended for families with children ages 7 and up.

Preview Days: Mummies

Friday, March 17
Saturday, March 18
Sunday, March 19
10:30 am–4:30 pm
Free for Members at the \$115 level and above. Admission by timed entry only. Tickets available starting March 1 by calling 212-769-5200
Join us for *Mummies*, before it opens to the public! See rare artifacts from ancient Egypt and Peru, and learn about how scientists are uncovering new secrets from some of the world's oldest and most opulent tombs.



Sun-Earth Day

Saturday, March 18
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.

Adult Digital Flight School

Seven Wednesdays
March 22–May 3
6–8:30 pm
\$395
Amaze your friends and family by taking the helm of the Hayden Planetarium to lead your own tour through the cosmos. In this seven-week course, **Brian Abbott** and **Mark Popinchalk** train you to lead your own live presentation for invited guests.

History of the Universe

Tuesday, March 28
7pm
\$12
Emily Rice and **Brian Levine** break the laws of physics and travel back in time to the Big Bang to understand how it shaped the universe. Delve into our quasars and galaxy clusters and investigate stranger phenomena like dark energy, dark matter, and the cosmic microwave background.



Credits

Mummies was developed by The Field Museum, Chicago.
The Museum gratefully acknowledges the Richard and Karen LeFrak Exhibition and Education Fund.
Mummies is proudly supported by Chase Private Client.
¡Cuba! was developed in collaboration with the Cuban National Museum of Natural History.

Major funding for ¡Cuba! has been provided by the Lila Wallace-Reader's Digest Endowment Fund.
Significant support for ¡Cuba! has been provided by the Ford Foundation.
Generous support for ¡Cuba! has been provided by the Dalio Ocean Initiative.
¡Cuba! is proudly supported by JetBlue.

COMING SOON

2017 Isaac Asimov Memorial Debate

Frederick P. Rose Director of the Hayden Planetarium Neil deGrasse Tyson hosts the 2017 Isaac Asimov Memorial Debate this spring.

Visit amnh.org for updates, details about this year's debate, and to buy tickets.



Credits:

The SciCafe Series is proudly sponsored by Judy and Josh Weston.

SciCafe: Modifying Mosquitoes with CRISPR and related activities are generously supported by the Science Education Partnership Award (SEPA) program of the National Institutes of Health (NIH).

Special thanks to MicroCulture developers PETLab at Parsons and Jane McDonough.

Support for Spotlight Asia and Celebrate Culture! is provided, in part, by the May and Samuel Rudin Family Foundation, Inc.; the Sidney, Milton and Leoma Simon Foundation; and the family of Frederick H. Leonhardt.

Special thanks to the Ford Foundation.

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.

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

The Science of Stem Cells is supported by the Empire State Stem Cell Fund through New York State Department of Health Contract # DOH01-C30157GG-3450000.

The American Museum of Natural History gratefully acknowledges Lamont-Doherty Earth Observatory PoLAR Partnership and NASA for their participation in Sun-Earth Day.

Special Thanks Buehler Challenger Center, International Ocean Discovery Program, Lamont-Doherty Earth Observatory, NASA Solar System Ambassador Program, New York Cares, Polynesian Voyaging Society, Scrapkins, and Museum Staff and Volunteers.

The PoLAR Partnership is based upon work supported by the National Science Foundation under Grant No. DUE-1239783.

The late Dr. Isaac Asimov, one of the most prolific and influential authors of our time, was a dear friend and supporter of the American Museum of Natural History. In his memory, the Hayden Planetarium is honored to host the annual Isaac Asimov Memorial Debate—generously endowed by relatives, friends, and admirers of Isaac Asimov and his work—bringing the finest minds in the world to the Museum each year to debate pressing questions on the frontier of scientific discovery. Proceeds from ticket sales of the Isaac Asimov Memorial Debates benefit the scientific and educational programs of the Hayden Planetarium.

© AMNH/D. Finmin, R. Mickens, C. Cheseck, and M. Shanley with the exception of Mummies (© 2015 The Field Museum, AH5218d, 003C, photographer John Weinstein), Cuba! (C. Raxworthy), Countdown to Zero (The Carter Center/E. Gubb), Wonders of the Arctic (D. Lickley), Humpback Whales (MacGillivray Freeman Films).

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, and Vestergaard.

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

Generous support for The Butterfly Conservatory has been provided by the Eileen P. Bernard Exhibition Fund.

Wonders of the Arctic is a co-production of Science North and Giant Screen Films; major funding for the film was provided by Raglan Mine (a Glencore Company) and the Northern Ontario Heritage Fund Corporation.

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. 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.

JANUARY

4 WEDNESDAY
Walk on the Wild Side Begins Member Program
Wednesdays through February 22

SciCafe: Modifying Mosquitoes with CRISPR
After-hours program

5 THURSDAY
The Year in Review
Special Event

7 SATURDAY
Hall Tour: Space and Time
Member Program

Celebrate Pacific Northwest Cultures
Celebrate Culture

21 SATURDAY
The Neurobiology of Attachment
Adult Course

23 MONDAY
Can We Reach the Stars?
Hayden Planetarium Program

25 WEDNESDAY
The Art of Diorama
Adult Course

26 THURSDAY
Curator's Lecture: ¡Cuba!
Member Program

31 TUESDAY
Mercury Rising
Hayden Planetarium Program

PLEASE NOTE: The Wallach Orientation Center and The Titanosaur will close for a day in late January while the fossil exhibits are updated.

FEBRUARY

1 WEDNESDAY
SciCafe: When Insects Get Intimate
After-hours Program

2 THURSDAY
Behind the Scenes Tour: Anthropology Conservation Labs
Member Program

4 SATURDAY
Spotlight Asia: Year of The Rooster
Celebrate Culture

Celebrate Pacific Northwest Cultures
Celebrate Culture

6 MONDAY
Gravitons, Exotic Higgs Bosons, or Nothing at All
Hayden Planetarium Program

7 TUESDAY
Winter Lunchtime Bird Walks in Central Park
Nature Walk

13 MONDAY
Cannibalism: A Perfectly Natural History
Museum Lecture

14 TUESDAY
Romance Under the Stars
After-hours Program

25 SATURDAY
The Science of Stem Cells
Adult Course

28 TUESDAY
Searching for Alien Life in the Universe
Hayden Planetarium Program

MARCH

1 WEDNESDAY
SciCafe: The Search for Slow Lorises
After-hours Program

4 SATURDAY
Hall Tour: The Art of the Diorama
Member Program

Celebrate Pacific Northwest Cultures
Celebrate Culture

8 WEDNESDAY
Beginner Animal Drawing Begins
Adult Course

Behind the Scenes Tour: Herpetology
Member Program

9 THURSDAY
Animal Drawing Begins
Adult Course

11 SATURDAY
Our Earth's Future: Understanding Climate Science and Sea Level Rise
Adult Course

13 MONDAY
Pluto Revealed!
Hayden Planetarium Program

14 TUESDAY
Family Game Night
Family Program

17 FRIDAY
Member Preview Days Begin: Mummies
Member Program

18 SATURDAY
Sun-Earth Day
Hayden Planetarium Program

22 WEDNESDAY
Adult Digital Flight School Begins
Hayden Planetarium Program

28 TUESDAY
History of the Universe
Hayden Planetarium Program

A Spotlight on Sauropod Fossils

Foundational specimens from Paleontology Collection go on view.

A pelvis of the sauropod *Diplodocus longus*—part of the very first non-avian dinosaur fossil collected by the Museum—is being given new pride of place in the Wallach Orientation Center on the fourth floor, along with some never-before-displayed specimens from the Museum’s collection.

Previously displayed next to the Hall of Vertebrate Origins, the pelvis will share a home with the Museum’s Titanosaur, a cast of a 122-foot-long adolescent sauropod that was discovered in Patagonia, Argentina, in 2014. Five titanosaur fossils that had been displayed with The Titanosaur when it opened last year are being returned to Argentina’s Museo Paleontológico Egidio Feruglio, and the *Diplodocus* pelvis plus additional sauropod specimens from the Museum’s own collection will go on view beginning in February.

The *Diplodocus* pelvis was unearthed by legendary dinosaur-hunter Barnum Brown along with the rest of an incomplete skeleton in 1897 at Como Bluff in southeast Wyoming, where Brown, then 24 and at the start of his career, was on a Museum expedition in search of ancient mammals. Animals from the genus *Diplodocus*, which translates as “double beam,” had first been discovered 20 years earlier at the same site by Kansas geologist Benjamin Franklin Mudge and Samuel Wendell Williston, who later became Brown’s professor and mentor at the University of Kansas.

Diplodocus was a long-necked, plant-eating dinosaur that lived about 150 million years ago. Its discovery, among a group of Jurassic and Cretaceous giants that included *Stegosaurus* and *Triceratops*, helped fuel the frenzied “bone wars” of the 1870s that saw rival paleontologists racing across the American West in search of finds.

Brown’s 1897 discovery launched the Museum’s dinosaur collection, now one of the largest and most famous in the world. This foundational find also introduced a collection technique that is still used by paleontologists to this day. Before this time, paleontologists had been wrapping fossils in jackets made of cloth or burlap dipped in plaster. To this, Brown added wooden supports, greatly enhancing the stability of the package.

The innovation did not go unnoticed by Henry Fairfield Osborn, the founder of the Museum’s Department of Vertebrate Paleontology and future Museum president. In the biography *Barnum Brown, The Man Who Discovered Tyrannosaurus Rex*, Museum Research Associate Lowell Dingus and Mark A. Norell, chair and Macaulay Curator in the Division of Paleontology, write that Osborn joined the Wyoming team for a time and in his report praised Brown’s technique.

He wrote of the skeletons thus preserved, “They are, perhaps, by far, the most complete and perfect of their kind that have ever been collected and will make magnificent material for purposes of exhibition.”

The *Diplodocus* fossil was one of numerous discoveries Brown would make for the Museum. Over nearly 50 years, he sent back more than 1,200 crates of fossil packages from trips around the world, including from an expedition to Montana that resulted in the 1902 discovery of the specimen used to first describe *Tyrannosaurus rex*.

See the new fossil display in Wallach Orientation Hall beginning in February. Free for Members or with Museum admission.

Generous support for *The Titanosaur* exhibit has been provided by the Susan S. and Kenneth L. Wallach Foundation.

Coming Soon: *Camarasaurus* and Company

The new exhibit space in the Wallach Orientation Center makes it possible for a striking selection of sauropod fossils to come out of storage in the Museum’s Big Bone Room to join the *Diplodocus longus* pelvis. These include:

CAMARASAURUS

Tail and neck vertebrae from Cañon City, Colorado

DIPLODOCUS

Tail vertebrae from the same *D. longus* Brown found in 1897

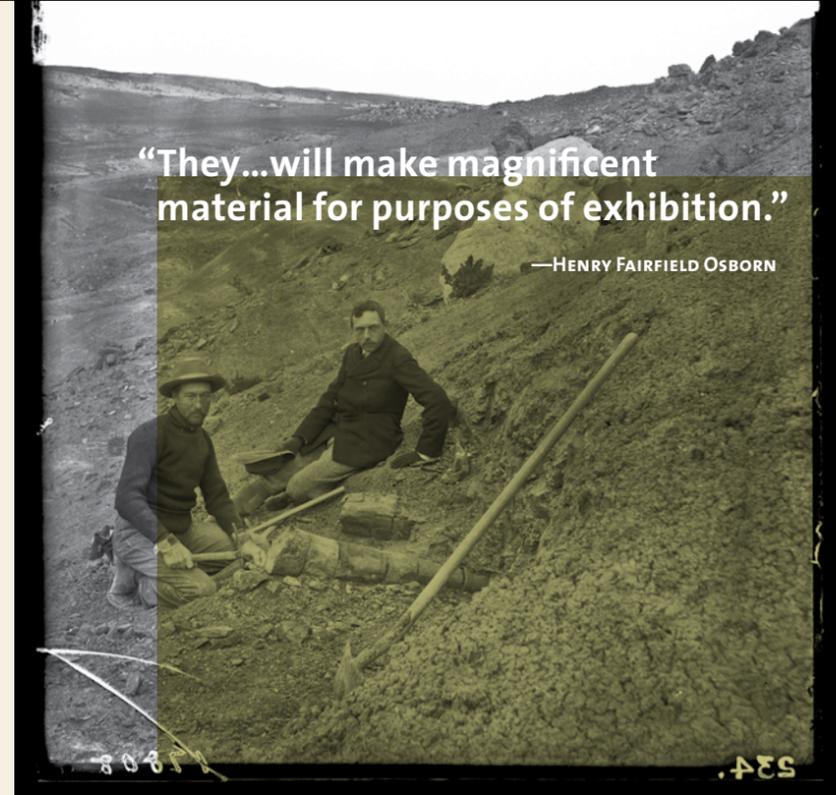
BAROSAURUS

Neck and skull fossils from the juvenile seen in the Theodore Roosevelt Rotunda

Visitors to the new exhibit, just opposite **THE TITANOSAUR**, will also see a new display about the Museum’s history of sauropod collecting.

Please note: The Wallach Orientation Center and The Titanosaur will close for a day in late January while the fossil exhibits are updated.

Top © AMNH Library/17808; bottom © J. Kirschner/AMNH Library/314804



“They...will make magnificent material for purposes of exhibition.”

—HENRY FAIRFIELD OSBORN

(Above) Barnum Brown and Henry Fairfield Osborn sit beside a partially excavated *Diplodocus* bone at Como Bluff, Wyoming, in 1897. (Below) Dinosaur bone prep at the Museum in 1936 shows a growing collection.



Our Ph.D. Graduates – Where Are They Now?

This fall, the Museum marked the graduation of the fifth cohort of doctoral students from the Richard Gilder Graduate School, which oversees the Museum's Comparative Biology Ph.D. and Master of Arts in Teaching degree programs. With instruction from a faculty of curator-professors, access to the Museum's incomparable collections, and outstanding research laboratories, the RGGGS doctoral program continues to develop and redefine the role museums can play in science education.

Ph.D. graduates from the Richard Gilder Graduate School are already making an impact in museums, universities, schools, and government agencies around the world. This map presents just some of the 20 young scientists (and counting!) who have received their doctorate degrees from the school. You can read profiles of every graduate at bit.ly/RGGSAIums.

ISABELLE VEA



Scale Insects

Class: 2013

Advisors: David Grimaldi, Randall T. Schuh

Entomologist Isabelle Vea has been a researcher at Nagoya University in **JAPAN** on a postdoctoral fellowship from the Japan Society for the Promotion of Science. Beginning in 2017, she will join the University of Edinburgh in Scotland as a Marie Curie Postdoctoral Fellow.

ALEJANDRO GRAJALES



Sea Anemone

Class: 2014

Advisors: Estéfania Rodríguez, Ward Wheeler

Alejandro Grajales continues his research on the molecular evolution of marine life such as corals and anemones at Los Andes University in **COLOMBIA**.

JONATHAN FOOX



Myxozoans

Class: 2016

Advisor: Mark Siddall

Jonathan Foox is starting a postdoctoral fellowship at Weill Cornell Medical College's Institute for Computational Biomedicine in **NEW YORK CITY** where he will put his data science expertise to work studying how cancer evolves.

CARLY TRIBULL



Wasps

Class: 2014

Advisors: James Carpenter, David Grimaldi

Carly Tribull is a visiting assistant professor at Sam Houston State University in **TEXAS**, where she also continues to produce her well-received series of science comics.

PEDRO PELOSO



Lizards and Frogs

Class: 2014

Advisor: Darrel Frost

Now a postdoctoral fellow with **BRAZIL**'s National Council for Scientific and Technological Development, Peloso won an award for best thesis from the Brazilian Society of Zoology.

SEBASTIAN KVIST



Worms and Leeches

Class: 2012

Advisor: Mark Siddall

After studying worms and leeches at the Museum, Kvist is now an associate curator of invertebrates at the Royal **ONTARIO** Museum, as well as an assistant professor at the University of Toronto.

ANTONIA FLORIO



Chameleons

Class: 2012

Advisor: Christopher Raxworthy

Queens-native who also took part in the Museum's Research Experience for Undergraduates program while in college, Florio is now an assistant professor of biology at St. Francis College in **BROOKLYN**.

SHAENA MONTANARI



Dinosaurs

Class: 2012

Advisors: Mark Norell, John Flynn

Shaena Montanari is currently on a prestigious Newton International Fellowship at the University of Edinburgh in **SCOTLAND**. You can also find her in *Forbes* magazine, where she is a regular contributor to the online science section.

To learn more about the Richard Gilder Graduate School and its programs, including the Ph.D. in Comparative Biology and Masters of Arts in Teaching, visit amnh.org/our-research/richard-gilder-graduate-school.

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



Cover © AMNH/R. Mickens



Snails from the genus *Polymita* are among the roughly 1,400 species of land snails found in Cuba. Known as painted snails for their vibrantly colored shells, these tiny gastropods are unique to Cuba. See specimens from the Museum's collection and find out more about the island nation's endemic species in *Cuba!*, now open and free for Members.

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, Planetarium Shop, Cosmic Shop, ¡Cuba! 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 at the Museum, email accessibility@amnh.org or call 212-313-7565.