California Academy of Sciences

FY16 Annual Report

July 1, 2015–June 30, 2016

October 21, 2016

Dear Friend of the Academy,

We are very proud to send you our Fiscal Year 2016 Annual Report reflecting on a truly outstanding year and an important inflection point for the California Academy of Sciences. Please click on any of the hyperlinks to learn more about a particular subject.

Every day your generosity and partnership enable the Academy to make its mission to **explore, explain, and sustain life on Earth** a reality. As we celebrate the close of FY16, and fully turn our attention to FY17, we want to thank you and our entire community of supporters for your belief in the Academy and our shared vision of path-breaking science in service to a thriving, healthy, natural world!

Since becoming the Academy's leaders two years ago, we have pursued five goals.

First, **scientific excellence** has always been at the heart of the Academy's mission and this year was no exception. Just one example is our work to explore the world's coral reefs, particularly the mysterious mesophotic depths (100-500 feet below the ocean's surface). Down there, undiscovered species thrive and they may hold important clues to reversing the alarming degradation of the gorgeous shallow water reefs that are familiar to all of us. This work was funded by the National Science Foundation, plus leading philanthropists and foundations, and we shared it with the public in a fascinating new exhibit, *Twilight Zone: Deep Reefs Revealed*, in our aquarium.

Our Trustees were active partners in helping us develop a powerful **strategic focus** and the selection of six "Big Ideas" to concentrate on over the next five years. The Big Ideas include three critical geographic areas – Coral Reefs, Tropical Rainforests, and California Ecosystems. Two more share the Academy with a global public - through *bioGraphic* and our Environmental Literacy initiative. And the last one—Academy for All—brings us back home to the community that has supported us for nearly 170 years.

Scaling our work to the nation and the world was not foremost in our minds just a decade ago, before our iconic new museum in Golden Gate Park opened. Since then, we have hosted more than 11 million visitors and have learned that the public is hungry for more authentic science and sustainability solutions. Thanks to the generosity of our supporters, teachers and students in all 50 states are using our Environmental Literacy materials! And, through media partners around the world, more than 300 million viewers have discovered our new online magazine, *bioGraphic*!

We have also committed the Academy to discovering real **sustainability impacts** that will help address the Earth's urgent environmental crises. Some of these will be accomplished with NGO partners like a massive project to restore coral reefs across the world. Others will be led by our own scientists and by the legions of "citizen-scientists" who have eagerly joined iNaturalist and recorded observations of more than three million species - uploaded and verified in a global database.

Last, but not least, we have **strengthened the Academy as an organization** by ensuring that our professional staff is top-notch and that we manage our financial resources wisely. Over the last two fiscal years we reviewed operating expenses and found significant savings while reinvesting our resources in the core Academy. This resulted in a modest surplus and an annual draw from endowment fund of approximately 5%. Our Trustees ensure that ongoing financial discipline is a key priority for today's Academy and for its sustainable future. Finally, this spring we hired a new Chief Financial Officer who has overseen the Financial Statements that accompany this report (a full audit will be available upon request by December).

This pivotal year for the Academy would not have been possible without your generous contributions and partnership. Thank you again for supporting our commitment to open our doors wide to everyone in the Bay Area, to bring science literacy to scale for a global audience, to transform our understanding of the natural world, and to discover critical factors for sustaining its beauty and health.

Sincerely,

Jonathan Foley
Executive Director
William R. and Gretchen B. Kimball Chair

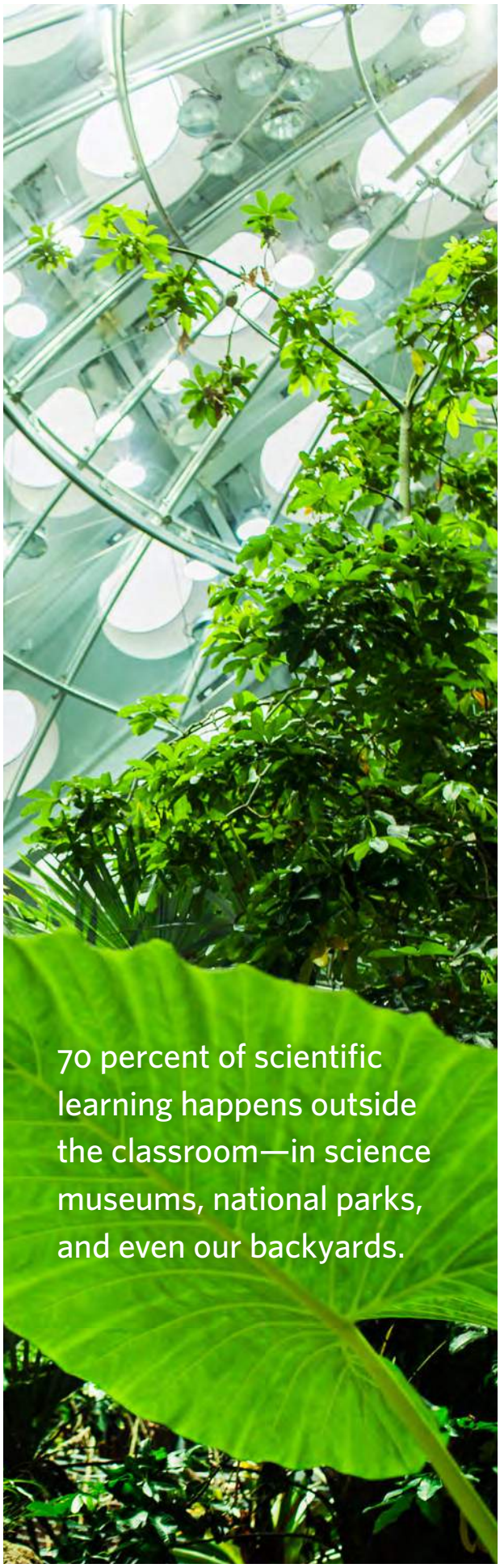
Jerome C. Vascellero
Chair, Board of Trustees

Where does a sustainable future begin?

A sustainable future begins *with you*, at the California Academy of Sciences.

How can we ensure that life on Earth will not only exist, but thrive in coming generations? It starts with curiosity. The kind you may feel when gazing at the magnificence of a coral reef, teeming with color and unknown diversity. Or when a butterfly pauses to perch on your head in a rainforest, and the fresh, humid air envelops your skin.

At the California Academy of Sciences, we strive to share the wonder and importance of nature with everyone. We craft messages to educate, inspire, and empower our audiences, so we can sustain a healthy world for generations to come.



It Starts Here

Our society faces enormous challenges, including threats from environmental degradation and climate change, educational and economic inequity, and a divided public discourse. We need credible information sources, non-partisan interpretations, and a motivated public to find solutions.

America's museums are a vital force for public education and civic engagement. Each year they host more visitors than all sports stadiums and theme parks combined. Museums are also consistently ranked among the most trusted institutions in the country. And when it comes to sharing science and knowledge about the natural world, museums are crucial educational venues; studies show that more than 70 percent of scientific learning happens outside the classroom—in science museums, national parks, and even our backyards.

As treasured repositories of our history and cultures, guardians of scientific knowledge and stewards of our planet, museums have never been more important to society. We need them to create a brighter future.

Now, more than ever, the California Academy of Sciences (the Academy) plays a leading role in engaging a global public with authentic science, sharing research on Earth's biodiversity, and most importantly, helping shape a vision for a sustainable future.

We are pursuing the Academy's bold mission to explore, explain, and sustain life on Earth. Thank you for partnering with us in FY16.

Explore:

Doing Good Science

Whether documenting biodiversity in our home region of the San Francisco Bay Area or discovering new species in Mozambique, scientific research and exploration are at the heart of everything we do at the Academy. More than 100 world-class scientists conduct fieldwork, lab studies, and genomic analyses to understand how life is changing within interconnected ecosystems—and how we can work together to protect this life.

Our experts survey animal and plant life from around the world to add to our scientific vaults of over 46 million specimens—one of the largest natural history museum collections in the world. They also care for nearly 40,000 live animals within the Academy's walls—from birds and butterflies, to fish and frogs, to reindeer and rattlesnakes.

In 2015, Academy researchers discovered 102 new species: 2 frogs, 23 ants, 3 beetles, 8 wasps, 11 spiders, 26 fishes, 9 sea slugs, 2 corals, 9 plants, 1 water bear, and 8 viruses.

All of our scientists are passionate science communicators, and they share their discoveries with the world in leading research publications, popular media, and Academy exhibits. Their work advances cutting-edge biological research, influences environmental policy and practice, and significantly advances our understanding of global sustainability issues. The Academy believes in *doing good science* and that *science can do good*.

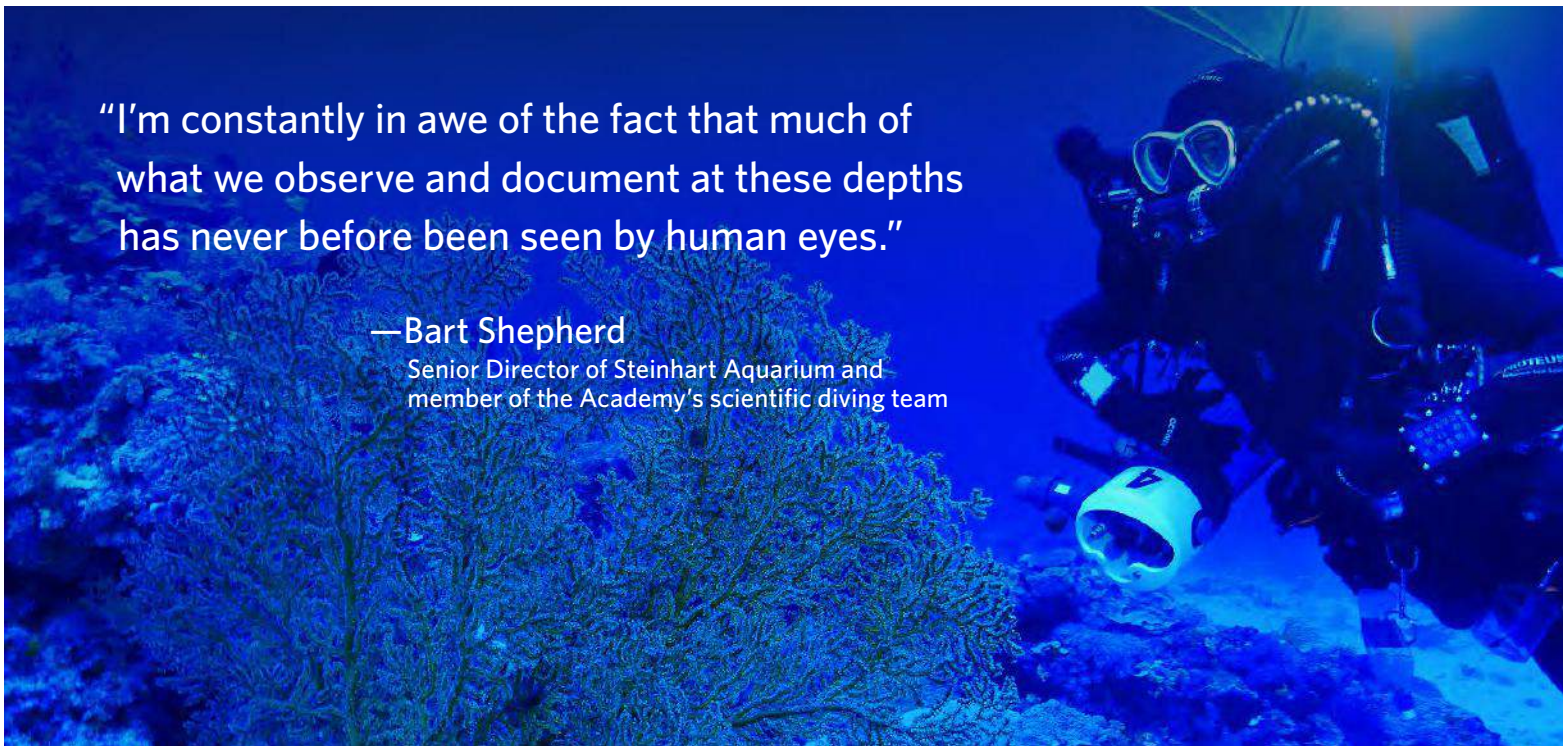
We are investing more in our fundamental science than ever before, and our reputation as a leading research institution is attracting world-class talent. In early 2016, more than 400 scientists applied for our curator-level research positions in key areas including: coral reefs and aquatic biology; western North American botany; tropical plants; herpetology; and big data synthesis. In June 2016, leading marine biologist, Dr. Rebecca Albright, joined the Academy as an Assistant Curator to research the impact of ocean warming and acidification on coral biology. This new hire is part of our bold initiative to explore, study, and heal our coral reefs.

Coral Reefs: Our Unique Role

The Academy's Advancing Coral Reef Science and Conservation Initiative builds on strong assets, including the largest and deepest indoor coral reef in the world and one of the most advanced aquarium life-support facilities. Our museum has one of the most comprehensive research collections of coral reef fishes and invertebrates. We have extensive expertise in coral reef biology, a global network of scientific collaborators, and a new genomics facility for studying coral evolution. Furthermore, our world-leading scientific diving operation is capable of exploring regions well beyond the reach of traditional SCUBA equipment.

In November 2015, the Academy deep diving team ventured to Vanuatu to explore "twilight zone", or mesophotic (100–500 feet below the surface), coral reefs. Our scientists developed new mixed-gas rebreathers to safely bring back species from these depths, which included a new species of fish and several new species of hermit crabs and sea cucumbers.

An Academy team, funded in part by the National Science Foundation, traveled to the Philippines in March and April 2016 to collect specimens from unexplored mesophotic reefs for scientific research and display in a new exhibit gallery in Steinhart Aquarium. These dives yielded three new marine species and several new records of species not previously seen in these locations. The team also collected specimens of the fascinating harp comb jelly, Lyrocteis imperatoris, previously only exhibited in Japan. Our scientists documented significant human impacts to reefs, such as sedimentation, plastic waste, and abandoned fishing gear. Additionally, they counted nearly 10,000 fishes from 180 species during the dives. These data will be used to study how the response of fish communities to changing oceans may vary with depth. Other expedition goals included community outreach and capacity building on topics such as biodiversity and conservation, which strengthened our Philippine partners and reached more than 400 people.

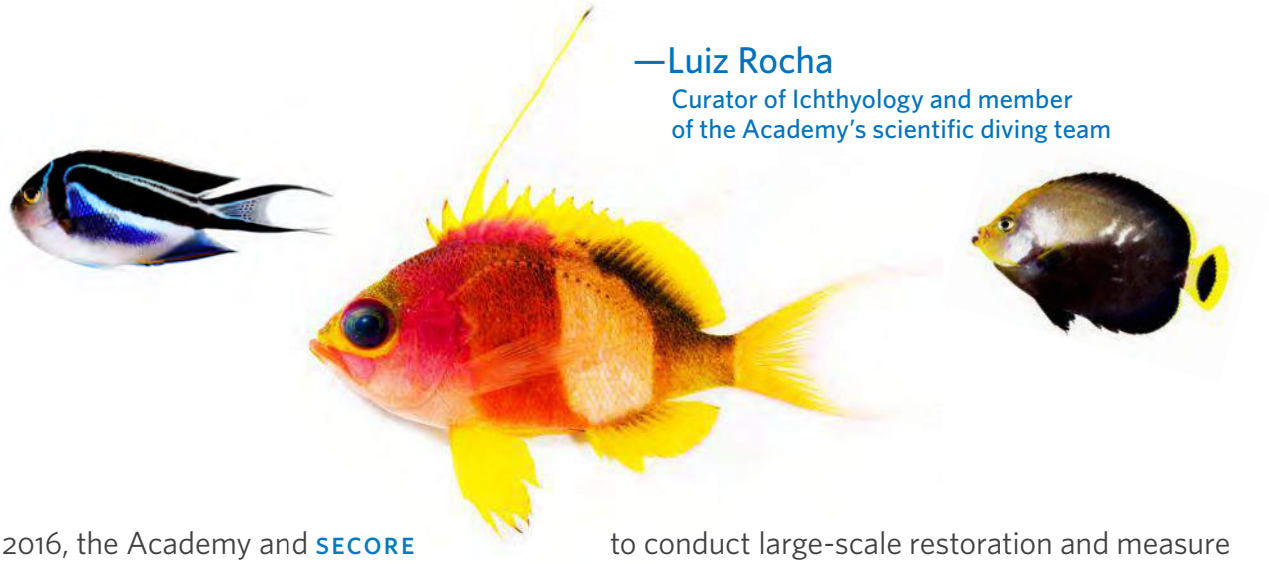


"I'm constantly in awe of the fact that much of what we observe and document at these depths has never before been seen by human eyes."

—Bart Shepherd
Senior Director of Steinhart Aquarium and member of the Academy's scientific diving team

"Everywhere we go, about half of the fish are not known. They don't have a scientific name—the other half, we didn't know that they went that deep. So, these are all new records, either new records of depth extensions or range extensions, or new species."

—Luiz Rocha
Curator of Ichthyology and member of the Academy's scientific diving team



In June 2016, the Academy and SECORE (SExual COral REproduction) formalized a partnership to advance coral biology research and develop techniques for large-scale coral restoration efforts. The partnership provides support for SECORE scientists in major field locations, overall project needs, and travel to coral spawning field locations over the next five years. Through this partnership, Steinhart Aquarium biologists will continue exchanging coral husbandry techniques with a global network of partners through workshops, coral spawning fieldwork, and experimental work in aquaria. We are also establishing several monitoring sites to conduct large-scale restoration and measure long-term success.

In the same month, we held an all-day symposium with Academy and SECORE coral reef biologists, curators, and educators. The symposium was a key step in advancing our immediate and long-term coral restoration work in the lab and in the field. Presentation topics included mesophotic reef discoveries; ocean acidification impacts on different life stages of corals; coral restoration techniques and initiatives at the Academy; and research and education partnerships in the Philippines.

Research Abroad and at Home

In addition to our decades of marine research in the Philippines, the Academy conducts multiple international expeditions each year. Curator of Entomology, Brian Fisher, studied the ants of Mozambique and the Southwest Indian Ocean, combining new findings with specimens amassed over 20 years. This longitudinal research will be used to uncover the evolutionary relationships, origins, and diversification of ants in this region. Irvine Chair & Senior Curator of Anthropology, Zeray Alemseged, and Director of Global Initiatives & Lindsay Chair of Botany, Meg Lowman, explored our evolutionary heritage and relationships with biodiversity in Ethiopia alongside Academy friends and supporters. A team led by Assistant Curator & Follett Chair of Ichthyology, Luiz Rocha, surveyed the reefs of São Tomé, an island off the west coast of Africa, for fish diversity. These are just a few examples of our scientists in action around the world.

Closer to home in California, we have built a large community of citizen scientists, or members of the public that contribute to scientific research by identifying, monitoring—and ultimately valuing and protecting—biodiversity. In April, we hosted the first City Nature Challenge, a citizen science initiative with iNaturalist (the Academy's crowdsourcing scientific observation platform). In a single week, over 20,000 natural history records and more than 2,000 species observations were generated in Los Angeles County and the San Francisco Bay Area. In May, the National Park Service Centennial Bioblitz was held in partnership with iNaturalist and featured real-time, nationwide observation results from 126 parks, projected on two jumbotrons along the National Mall in Washington, D.C. There are now nearly 250,000 worldwide participants in the iNaturalist network, with more than three million observations.

In 2015, 83,469 new specimens were added to the collections, 1,035 visitors used or toured the collections, and 34,823 collection specimens went out on loan for scientific research.

The Academy is a convener, bringing diverse audiences together to highlight pressing issues. In January 2016, our standing-room-only Women in Science Summit featured discussions and panels focused on improving diversity in the sciences. The event was livestreamed (our most-viewed livestream video ever) and later available online to increase accessibility and inclusion on this very important topic. Similarly, the Academy's Summer Systematics Institute research program for undergraduates encourages applications from groups underrepresented in the sciences. Established in 1995 and funded by the National Science Foundation, the annual eight-week program offers a paid research internship opportunity for students to explore museum-based research methods and gain professional experience alongside working scientists. For many students, the program serves as a stepping stone to pursue further graduate work.

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Explain:

An Accessible Forum for Science

Regardless of their language, cultural background, or educational level, the Academy engages millions of visitors with the wonders of nature and science. Inside our jaw-dropping building—the only place with a world-class aquarium, planetarium, and natural history exhibits in a single location—visitors can gain a shark's-eye view of a 212,000-gallon coral reef tank and its 1,000 colorful fish species, observe the path of asteroids in the planetarium, walk among butterflies and birds in the rainforest, spot a red-tailed hawk swoop through redwoods from the living roof, or come nose-to-beak with frisky penguins. Academy docents engage visitors in the science behind the dioramas and displays and encourage them to ask their own probing questions. This balance between education and entertainment is what makes the Academy one of the most-visited spots in San Francisco.

The Academy is becoming a leading source of online teacher training, courses, digital media, and high-quality science education materials, reaching millions of people each year.

Environmental Literacy: Creating a Society Fluent in Science Solutions

The Academy is also leading the charge in improving science education in California, the nation, and the world. Within northern California, the Academy is a leading K–12 science educator. Nationally and now globally, the Academy is becoming a leading source of online teacher training, courses, digital media, and high-quality science education materials, reaching millions of people each year.

Our Environmental Literacy Initiative seeks to remove key roadblocks to achieving widespread environmental literacy for K–12 audiences and take new solutions to scale. The Academy has demonstrated the power of afterschool learning through Science Action Club, which leverages national citizen science programs and hands-on activities in a fun, club-like setting for middle-schoolers. During the 2015–2016 school year, the program trained 600 afterschool staff and reached 4,300 students. We are launching Science Action Club in ten additional states in September 2016, with several more states and dozens of new urban areas slated to be added over time.

Habitat Earth in the Classroom continues to be a popular resource for teachers, garnering nearly 100,000 views since its launch in August 2015. This collection includes a high-definition version of our award-winning planetarium show, *Habitat Earth*, redesigned specifically for use in K–12 classrooms. Building on our expertise in delivering in-person teacher training on the Next Generation Science Standards (NGSS), the Academy launched *NGSS Demystified: A Toolkit for Training Teachers*. This resource base shares our library of well-tested activities that have been used to train hundreds of Bay Area teachers on the NGSS.

Flipside Science, a new youth-powered video series with more than 70,000 views in FY16, is helping to connect teens with critical environmental topics such as food, water, and energy in an exciting "for youth, by youth" digital format. Videos in the series are hosted by teens from Academy youth programs and highlight diverse perspectives in an upbeat, classroom-friendly way that encourages viewers to make choices that positively impact their own communities—and in turn, the planet.

The Academy is working with national distribution partners to extend the reach of our educational content—which already spans 41 states and more than a million website views. Through these efforts, we will make a positive and profound difference in environmental literacy at multiple scales: locally, regionally, statewide, and beyond. We believe that our efforts to improve science and environmental literacy will create a more informed citizenry, and ultimately a more sustainable future.

Exhibits, Science Visualization, and the Public Floor Experience

With more than 116,000 in attendance in FY16, NightLife remains a hugely popular event for an important demographic of visitors, combining science learning, culture, and entertainment. This year, our weekly NightLife program for the 21+ crowd introduced its first event dedicated solely to SF Beer Week, where we launched a beer collaboration with Magnolia Brewing Co. using plant types found on the Academy's living roof. The result: Aliciella Bitter, a beer named after Alice Eastwood, the heroic scientist who rescued the Academy's botany collection during the 1906 earthquake and fire.

After a highly successful exhibit in July 2015, our BigPicture photo competition launched its third year with a new category: Photo Essays on the theme of Coral Reefs. The competition continues to be highly rated in the industry, with more than 5,000 entries and featured winners from 27 countries. *'Tis the Season for Science* has become another annual tradition for the Academy community, continuing to draw visitors in its fifth year during the holiday season with live reindeer, indoor snow flurries, and the snowman theater. December 30th was one of our highest days of attendance in 2015 with more than 8,500 visitors.

3D Earth: Rainforests, an all-new, Academy-produced 3D show exploring stunning views of the Amazon rainforest opened in February. From towering canopies to the lush forest floor, visitors follow Academy scientists as they explore the vast biodiversity within these rich, tropical environments. Real satellite imagery provides a new perspective on the impact of rainforests on Earth's water, energy, and carbon cycles, illustrating the critical need to sustain these vital ecosystems that help to power our planet. Each show features a live presenter-led update to dive deeper into current rainforest research around the world.

Incoming!, the Academy's latest planetarium production, opened in March. Narrated by George Takei, *Incoming!* explores the past, present, and future of our solar system. Audiences discover how asteroids and comets have collided with our planet throughout history, changing the course of life on Earth and shaping the world we know today. During every show, a presenter delivers a live update, featuring the latest real-time data from current NASA missions. *Incoming!* was shown at the Immersive Festival (Madrid, Spain), the Fulldome Festival (Jena, Germany), and the International Planetarium Society Fulldome Festival (Brno, Czech Republic)—where it won the Director's Award, following our win last year for the Academy's *Habitat Earth*. A suite of thematic public programs launched with the show, including *Galaxy of Worlds*, which explored how solar systems form, and *Asteroid Adventure*, in which visitors took on the role of an asteroid and hurtled toward Earth. Our Visualization Studio is working on re-purposing *Incoming!* to be viewed as a 3D virtual reality experience.

The only exhibit of its kind in the world, *Twilight Zone: Deep Reefs Revealed* opened in June 2016. The exhibit is housed within a larger theme—*Coral Reefs of the World*—focused on the unique biology of coral reefs and why these critical ecosystems warrant further exploration and protection. The Academy's Big Bang Gala 2016 celebrated our coral reef work and raised a record $2.8 million, including nearly $550,000 in crowdfunding for the exhibit.

In the new exhibit, visitors are learning about the Academy's research on "twilight zone", or mesophotic, reefs at depths of 100–500 feet. Fewer people have explored these reefs than have walked on the moon! An area devoted to dive technology provides an evocative portrait of extreme exploration, showcasing the technical gear, mental poise, and detail required to work safely at such tremendous depths. The gallery features a wealth of new live animal displays, including charismatic twilight zone fishes and invertebrates collected on recent Academy expeditions. We also launched new public programs and special events in support of the exhibit, including enhanced dive shows, hands-on investigation with specimens, and real-time ocean acidification experiments.

An Academy for All

Bay Area students do not have equal science education experiences, leaving many without the tools to succeed. Launched in FY16, the Academy for All initiative is committed to providing access to quality science education for every Bay Area youth under our living roof.

This year, the initiative served nearly 225,000 children and their families through free admission programs, free and subsidized school and youth fieldtrips, and youth programs supporting diverse teens traditionally underrepresented in the sciences.

Our youth programs cast a wide net, inviting a diverse group of young people to learn, create, and share scientific knowledge. These programs include Teen Advocates for Science Communication (TASC Force), for youth in grades 8–12 who create and design performing arts–inspired programs for our visitors; the Digital Learning program, which equips youth to tell science and sustainability stories through digital media; and Teen Science Night, when the Academy welcomed more than 1,700 teenagers from 200+ high schools for a free night of youth-created science in August 2015.

Our Careers in Science program serves highly motivated teenagers who aspire to enter science, technology, engineering, and math (STEM) careers. In FY16, the program provided in-depth, long-term mentorship to 53 talented high school students from groups traditionally underrepresented in the sciences. In contrast to our wide-access programs, this year-round program pairs youth with our scientists and educators for three to four years as paid interns, equating to over 600 hours of training. The Academy has been refining this program for 20 years and has tracked the progress of its 220 graduates; the overwhelming majority go on to attend four-year universities and many go into STEM fields.

With stunning visuals and long-form narratives, bioGraphic is engaging and inspiring readers from across the world.

bioGraphic

Our new online magazine, *bioGraphic*, is breaking the mold for environmental journalism. Launched in April 2016, it combines engaging storytelling with powerful imagery and meaningful data visualization to offer both hope and solutions for a sustainable future. With stunning visuals and long-form narratives, *bioGraphic* is engaging and inspiring readers from across the world.

As a trusted institution with deep scientific and storytelling expertise, the Academy was perfectly positioned to fill a void in the online media landscape by providing hopeful and inspiring stories about nature. Through our own channels, social sharing, and a network of distribution partnerships with established outlets—including *Discover*, *Scientific American*, *The Guardian*, and *Gizmodo*—*bioGraphic* stories have reached more than 300 million people since its launch in April. More than 50 percent of site visitors are between 25 and 54 years of age, and nearly 10 percent are between the ages of 18 and 24. These numbers mean we are achieving our goal—to reach today's and tomorrow's leaders with authentic science and sustainability content.

Sustain:

A Future-Facing Culture

The urgency of environmental crises has made sustainability a central focus of the Academy's mission and leadership. All of our exhibits, education programs, scientific research, and online media put a deliberate emphasis on understanding the threats and solutions to environmental degradation. Through these venues we highlight hopeful stories and successful conservation measures, public policy, and personal actions that can ameliorate these threats. In 2017, we will launch a new visitor-centric program, *Planet Lessons*, to actively engage the public in this cause. By capturing the hearts and minds of millions of our onsite and online visitors, we can lead a global conversation on sustainability and empower the next generation of scientists, media communicators, and educators to be well-informed decision-makers and stewards of our planet.

Thank You

Science is an essential tool capable of overcoming today's challenges. Through cutting-edge science and expeditions, exhibits and educational media, we continue to advance science and sustainability literacy across the world. This year at the Academy would not have been possible without your support and partnership.

Thank you for exploring, explaining, and sustaining life with us.