



AMERICAN MUSEUM OF NATURAL HISTORY

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AMERICAN MUSEUM OF NATURAL HISTORY ANNOUNCES 2012 YOUNG NATURALIST AWARDS FOR STUDENT SCIENTISTS

THIRTEEN STUDENT WINNERS FROM ACROSS THE UNITED STATES INCLUDE TWO TEEN SCIENTISTS FROM NEW YORK

NEW YORK, June 1, 2012 – Can pumpkin waste clean polluted waters? What native species returned after the Arizona wildfires of last year? Are non-native fish endangering brook trout in Lake Champlain? These are some of the questions that 13 student scientists explored through the American Museum of Natural History’s **15th Annual Young Naturalist Awards**, a nationwide science-based research competition for kids in grades 7 through 12 supported by Alcoa Foundation.

This year’s winners included students from Arizona, California, Maryland, Michigan, New York, Oregon, Pennsylvania, Tennessee, Vermont, and Virginia who were recognized today at an awards ceremony and luncheon at the Museum and spent the day at behind-the-scenes tours at the Museum. Each winner also received a cash award of up to \$2,500.

“The Young Naturalist Awards are a superb example of students using the scientific process to engage in creative and original investigations of the world around them,” said Ellen V. Futter, President of the American Museum of Natural History. “We are proud to help foster a love of science and nature in all the participants and especially in the outstanding winners, who are to be congratulated for their exceptional work.”

The 2012 winners are:

Grade 7

- **Tiffany Logan**, Mayfair Middle School, Bellflower, California
 - Investigated the feeding preferences of a pet parrotlet
- **Alexander Fletcher**, Holy Trinity Episcopal Day School, Laurel, Maryland
 - Tested the water quality around the Sandy Hill landfill

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Grade 8

- **Justin Myhre**, Woodcrest Christian Middle School, Riverside, California
 - Analyzed whether gray foxes are more likely to mark their territory in the presence of healthy rivals
- **Sterling Fisher**, Pi Beta Phi Elementary School, Sevierville, Tennessee
 - Found that the highest elevation streams in Great Smoky Mountain State Park were not necessarily healthier than low elevation streams

Grade 9

- **Kalia Firester**, Hunter College High School, New York, New York
 - Determined that filters based on living plants effectively removed household pollutants from waste water
- **Meagan Bethel**, Tuscan High Magnet School, Tuscon, Arizona
 - Researched the effects of the Arizona wildfires of 2011 on actual wildlife species populations

Grade 10

- **Rachel Rounds**, Ewart High School, Ewart, Michigan
 - Researched dung beetles and the role they play in reducing methane emissions from cattle dung
- **Meghana Rao**, Jesuit High School, Beaverton, Oregon
 - Found that the benefits of biochar for carbon sequestration depend on the manipulation of particle size and feedstock.
- **Alan Booth**, Hampton High School, Hampton, Virginia
 - Investigated the effects of oil dispersants on the health of the Eastern oyster

Grade 11

- **Lauren Hodge**, Dallastown Area High School, Dallastown, Pennsylvania
 - Determined that prepared pumpkin waste could remove chromium and lead from polluted water
- **Markie Palermo**, Essex High School, South Hero, Vermont
 - Found that the eggs of native brook trout populations in the Lake Champlain basin were being fertilized by non-native brown trout producing tiger trout, infertile hybrids

Grade 12

- **Danielle P. Ethington**, San Clemente High School, San Clemente, California
 - Collected and tagged more than 700 monarch butterflies to study the spread of an invasive protozoan parasite
- **Rebecca Policello**, Ossining High School, Ossining, New York
 - Studied Eastern Redback salamanders in several New York area locations to reveal environmental conditions contributing to the decline of certain amphibians

Judges from the Museum's scientific, educational, and editorial staff used the following criteria to evaluate student essays: originality; demonstration of the ability to gather data;

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thoughtfulness in analyzing and interpreting findings; and creativity and clarity in written and visual presentation. The winning entries will be published on the Museum's website at amnh.org/yna.

"Alcoa Foundation is proud to sponsor the 2012 Young Naturalists Awards and honored to recognize such exceptional students for their outstanding work, enthusiasm and commitment to the environment," said Paula Davis, President, Alcoa Foundation. "To address the challenges posed by population growth, urbanization and climate change, now more than ever, we must prepare young people for careers in science, technology, engineering and math (STEM)."

The **Young Naturalist Awards** is a program of the National Center for Science Literacy, Education, and Technology (NCSLET), part of the Museum's Department of Education. Founded in 1997, NCSLET taps the Museum's unparalleled scientific resources – a vast physical collection, cutting-edge research, and dynamic and engaging exhibitions – and makes them available to a global audience. The **Young Naturalist Awards** program was developed by the Museum to promote young people's active participation in the sciences and to recognize excellence in biology, ecology, Earth science, and astronomy.

"The winners of the Young Naturalist Awards demonstrate a true passion for science research and communication," said Rosamond Kinzler, director of NCSLET. "Whether these young people studied the spread of a protozoan parasite in local Monarch butterflies or investigated the effects of oil and detergents on Eastern oysters, their essays reveal the same dedication to the practice of science as our Museum scientists. The Museum is committed to inspiring and supporting young people like this year's winners in their quest to use the scientific process to learn more about the world around them."

The awards ceremony featured remarks by Dr. Kinzler; Mr. Peter Hong, vice president and treasurer of Alcoa Corporation; and Christopher Raxworthy, associate curator in the Department of Herpetology and associate dean of science for Education and Exhibitions. Dr. Raxworthy spoke to the 13 young winners about his own journey to become a scientist and about the parallels between their fieldwork and original research conducted at the Museum.

Following are summaries of the winning projects with brief excerpts:

Tiffany Logan
Age 12, Grade 7

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Mayfair Middle School**Bellflower, California*****Comparison of a Parrotlet's Seed Preference***

To discover the feeding preferences of parrotlets, Tiffany experimented with Gilligan, a pet parrotlet. Measuring out three small bowls of groats, sunflower, and safflower seeds, she hypothesized that Gilligan would choose the sunflower seeds, which are higher in fat. After three trials, which involved leaving the three bowls in the bird cage for three hours at a time, Tiffany found that Gilligan ate over 40 percent of the groats in each trial, showing that it was the most popular choice. The second most consistent choice after the groats was the sunflower seeds, while the bitter safflower seeds were never a preference.

“It would be interesting to study this subject further. For a future experiment I would use multiple parrotlets instead of just one. I realize my sample size was small because I had access to only one parrotlet. It would be interesting to compare what they eat and see if I would get the same results with a larger sample size.”

Alex Fletcher**Age 12, Grade 7****Holy Trinity Episcopal Day School****Laurel, Maryland*****Testing Water Quality Near a Public Landfill***

Although a nearby landfill had been closed for many years, Alexander wondered whether dangerous chemicals were leaching into the soil and well water. He hypothesized that water samples taken at various points near the landfill would be contaminated. He collected water samples and had them tested for contaminants. His data showed that while the amount of elements in the water fell within safe levels, the water collected nearest the landfill had higher concentrations.

“My mother has a garden and I wondered if the landfill would contaminate the vegetables she grows. I wondered what kinds of chemicals could be leaking out into the woods around the landfill and if the animals got poisoned by drinking out of the streams and puddles.”

Justin Myhre**Age 13, Grade 8****Woodcrest Christian Middle School****Riverside, California*****Selective Territoriality Among Foxes***

Nighttime images he took using his new motion-activated camera inspired Justin to investigate two animals: the gray fox and the coyote. He questioned whether the gray fox would defend its territory from a coyote if it thought that the coyote suffered from an ailment and was therefore less of a threat. Justin purchased 6 pints of coyote urine and added protein powder – to mimic the urine of an ailing coyote – to three of the pints. He distributed both types of urine at four sites and set up cameras. His data showed that while the foxes responded to both types of urine, they exhibited a rubbing behavior in response to the urine without proteinuria, and a urinating behavior when exposed the urine with proteinuria.

“The first night I put it (game camera) outside, I was shocked in the morning to find that it had photographed a passing coyote. It was in that instant that I realized the wild creatures that I once found so rare to see were suddenly in my view just because of my second set of eyes, electronic, motion-

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activated eyes, that is. Suddenly my interest to film and research wildlife was skyrocketed further than ever before, and I was inspired to continue, even deeper, into the world of North American wildlife.”

Sterling Fisher

Age 14, Grade 8

Pi Beta Phi Elementary School

Sevierville, Tennessee

Living Waters: A Study of the Effects of Elevation on Water Quality and Biota in Great Smoky Mountains National Park

His love for the outdoors and the Great Smoky Mountains National Park led Sterling to investigate the health of the park’s streams. He chose 25 streams in all: 10 streams at elevations above 2,000 feet and 15 streams at elevations below 2,000 feet. He hypothesized that streams at higher elevations would be of higher quality than those at lower elevations. For each stream he did a biological assessment and measured pH factor and dissolved oxygen. His findings showed that streams with elevations between 1,700 and 2,000 feet had healthier biodiversity than streams at lower and higher elevations.

“As an aspiring fly fisherman, I have a deep love and concern for protecting the streams in Great Smoky Mountains National Park. I thoroughly enjoy spending time in the park’s streams trying to snag a sizeable trout or simply watching all the water creatures and absorbing the park’s peace and natural beauty. Water is a vital resource for the park, as it is to all living creatures.”

Kalia Firester

Age 14, Grade 9

Hunter College High School

New York, New York

Using Plant-based Biofilters to Purify Household Wastewater

Kalia wondered whether living plants, could be used as biofilters to remove household pollutants from water. She built one biofilter, using water-based plants, and one using land-based plants, then used them to purify water polluted with laundry detergent. She tested the wastewater on live daphnia, a type of water flea, and conducted tests to measure nitrites, nitrates, pH, ammonia, and phosphates. Both biofilter methods improved water quality, particularly the one with land-based plants. The treated wastewater sustained the live daphnia as did the tap water in the control group.

“I hypothesized that natural filters utilizing plants and their associated growth media (and microflora) could filter common household pollutants from wastewater. While not yielding potable water, the filtered water might be clean enough to release safely into the environment or re-use (e.g., to flush a toilet or wash a car.) A natural filter has many benefits, and could be a future alternative for water filtration.”

Meagan Bethel

Age 14, Grade 9

Tuscan High Magnet School

Tuscan, Arizona

A Pre-Post Analysis of the Effects of Wildfires on the Biodiversity of Southern Arizona Wildlife

In 2011, when wildfires burned over 1 million acres of Arizona forest and grassland, Meagan decided to investigate the effects on the area's wildlife. She gained access to remote sensing cameras located in a park that had been affected by the fire and compared them with photographs taken from her own cameras in an area unaffected by the fire. Meagan examined approximately 2,000 photographs from each camera, noting the animals that appeared for 148 days prior to the fire, 17 days during the fire, and 148 days following the fire. When she compared the data she found wide fluctuations in the rate of reappearance and recovery for each type and number of species in the fire-affected area, but little fluctuation at the control location.

“Wildfires destroy entire ecosystems over the course of a few short weeks. Entire species are displaced, and their offspring may never recover in numbers prior to the fire and the ensuing floods (Christe, 2011). This may be the case in two species that never returned following the fire, the turkey, which is already endangered in the sky island region of the Southwest, and the bobcat. It will be interesting to see whether, (in the) longer-term, either of these species returns.”

Rachel Rounds

Age 16, Grade 10

Evart High School

Evart, Michigan

The Effects of Coprophilous Beetles (Coleoptera: Scarabaeidae, Geotrupidae, and Hydrophilidae) on Methane Emission Rates and a Six-month Species Composition Survey

Greenhouse gas emissions from agriculture are a growing concern worldwide. An estimated 0.7 percent of methane emissions in the U.S. come from manure pats in cattle pastures. Rachel wondered if dung beetles' natural activities would result in a reduction of methane emissions from cattle dung deposits. She set up treatments in a pasture at Michigan State University. Gas samples from each site were captured using flux chambers and stored in vials for analysis with a gas chromatograph. Rachel hypothesized that the treatments with beetles added would have lower methane emission rates compared to treatments that were covered to prevent colonization. Her findings showed that the “beetles added” treatment did not affect emissions on days one through three, but did impact emissions on days four and five.

“Cattle manure surrounds my every step, so I have no trouble amassing the remaining dung needed for my experiment. I am eager to further investigate coprophilous beetles, since I learned about their benefits to the pasture ecosystem in previous research. I now wonder how these dung-feeding insects affect methane emissions from cattle dung through their natural activities.”

Alan Booth

Age 15, Grade 10

Hampton High School

Hampton, Virginia

The Effects of Oil and its Dispersants on Crassostrea virginica

After the Deepwater Horizon oil spill disaster in April 2010, Alan was intrigued by how the overharvested Eastern oyster (*Crassostrea virginica*) would be affected by crude oil or oil dispersants added to the waters of the Chesapeake Bay. He took 16 ten-gallon tanks each containing 20 oysters and proceeded to introduce (in various concentrations) Motor Oil 6 and

dishwater detergent. At the end of the trial period, Alan discovered that neither the oil dispersant nor the oil slick had any significant effect on the mortality of the Eastern oyster.

“This data supported the results of previous experiments, in which the eastern oyster was shown to be extremely resilient to variations in the environment. With recent discussion in offshore drilling, this data would prove to be invaluable in the event of a Chesapeake Bay oil spill.”

Meghana Rao

Age 15, Grade 10

Jesuit High School

Beaverton, Oregon

Biochar Carbon Sequestration: The Effect of Feedstock and Particle Size on Physical and Chemical Stability

Biochar is a carbon-rich charcoal that is naturally present in soils due to forest fires. Biochar stores about 50 percent of a plant’s original CO₂ and decomposes at a much slower rate than biomass, thus reducing CO₂ emissions. Meghana investigated how raw material and particle size affected the physical and chemical stability of biochar. She hypothesized that larger particles would be more stable. She built a stove, set it up in her backyard and used it to make biochar from hazelnut shells and Douglas fir woodchips. She then conducted experiments to determine the physical and chemical stability of both biochar samples. Her results showed that particle size and raw materials did not affect physical stability, but that particle size did affect chemical stability with small particles being less stable than large particles.

“The increasing dependence on burning fossil fuels and deforestation has resulted in massive amounts of carbon dioxide in the atmosphere. This is causing erratic climate changes in the ocean and on land. I chose to study biochar carbon sequestration, because sustainable biochar systems are carbon negative. They sequester a vast amount of carbon into the soil and result in net reduction from atmospheric levels.”

Markie Palermo

Age 17, Grade 11

Essex High School

South Hero, Vermont

Genetic Analysis of the Brown, Brook, and Tiger Trout Populations in the Lake Champlain Basin

Markie’s investigation came out of concern that native brook trout populations were declining in the Lake Champlain Basin. She hypothesized that this was occurring because brook trout eggs were being fertilized by stocked brown trout, producing a sterile hybrid tiger trout. The DNA of the three types of trout collected from the Lake Champlain area was assessed using six genetic markers to determine whether this was the case. The results showed that the proposed tiger trout did have DNA alleles that were consistent with both brook trout and brown trout.

“One of the many effects that the study itself has had on me was in highlighting my ongoing (and disturbing) observation that introducing non-native species of anything (be it plants, animals, insects, etc.) into a new environment can have disastrous effects on that habitat and throw the ecosystem way off-balance. In this example, if stocking Lake Champlain with non-native brown trout is resulting in the production of a sterile tiger trout, this means that not only is there a whole new species of fish in

Lake Champlain that came out of this, but also the longevity of the native brook trout species is in danger."

Lauren Hodge

Age 16, Grade 11

Dallastown Area High School

York, Pennsylvania

Pumpkin Purifier: Removal of Toxic Metals from Water Using Curcubita Agricultural Waste

Could prepared pumpkin waste be used to remove metal ions from wastewater?

Lauren experimented with two different masses of pulverized pumpkins, filtering two different concentrations of chromium and lead in solution. All samples were analyzed using an ICP, or Inductively Coupled Plasma Spectrometry. She supported her hypothesis that pumpkin waste would successfully absorb the metals because of the high cellulose content and the presence of carboxylic acids in the pumpkins. Lauren found 85 percent of lead and 40 percent of chromium was removed following the pumpkin treatment.

"This project has enormous applications in two areas: wastewater treatment and contaminated freshwaters. Although further research is needed, pumpkin waste shows promising results at being able to absorb metals. Using an estimated average mass obtained from this research (200 g from each pumpkin), five pumpkins would generate 1 kg of biomass and would cost \$0.19 to dehydrate. Other substances are significantly greater in cost."

Rebecca Policello

Age 17, Grade 12

Ossining High School

Ossining, New York

Effects of Urbanization on Cutaneous Bacteria as Inhibitors of the Amphibian Fungal Pathogen Batrachochytrium dendrobatidis

A concern with the worldwide decline of amphibians led Rebecca to study Eastern Redback salamanders and the effects of urbanization on native ecosystems. These salamanders have cutaneous bacteria that inhibit the growth of the fungal pathogen BD. Rebecca hypothesized that urbanization would result in decreased numbers of these bacteria, and that the strains would be unique to each of the four locations she studied. Her results showed that urbanization did not affect the cutaneous bacteria's ability to inhibit fungal growth, but did show that bacterial distinctness was greater in rural locations than the urban ones.

"Despite the importance of cutaneous bacteria and the sensitivity of salamanders to environmental changes, studies thus far have failed to examine how the environment influences the presence of inhibitory bacterium. Therefore, the effect of urbanization on the presence of bacteria with the ability to inhibit B. dendrobatidis remains unknown."

Danielle P. Ethington

Age 17, Grade 12

San Clemente High School

San Clemente, California

The Prevalence of Ophryocystis elektroscirrha Infections in the Monarch Butterfly (Danaus plexippus): A Study of the Protozoan Parasite in a Wild Population of Western Monarchs

Danielle's curiosity and passion for nature led her to initiate a year-long scientific study that concentrated on the host-parasite relationship between monarch butterflies (*Danaus plexippus*) and *Ophryocystis elektroscirrha* (a protozoan parasite usually fatal to the host) infactions transmitted between butterflies and to the environment. At the conclusion of her study, Danielle analyzed scale samples from 746 wild monarchs in 17 test gardens in coastal San Clemente and found the average annual rate of infection in to be 41 percent, with a seasonal high of 81 percent by November. Both these figures represent substantial increases over the 30 percent annual average estimated for migrating monarchs in California during winter.

"Now that a baseline average infection rate and seasonal population statistics have been established for the southern region, additional collection years may correlate monarch cycles and migration with climate change. Further research needs to be done to verify whether or not monarchs from the southern region migrate. If not, are the causes the environment or human behavior?"

American Museum of Natural History (amnh.org)

The American Museum of Natural History, founded in 1869, is one of the world's preeminent scientific, educational, and cultural institutions. The Museum encompasses 45 permanent exhibition halls, including the Rose Center for Earth and Space and the Hayden Planetarium, as well as galleries for temporary exhibitions. Five active research divisions and three cross-disciplinary centers support 200 scientists, whose work draws on a world-class permanent collection of more than 32 million specimens and artifacts, including specialized collections for frozen tissue and genomic and astrophysical data, as well as one of the largest natural history libraries in the Western Hemisphere. Through its Richard Gilder Graduate School, it is the first American museum authorized to grant the Ph.D. degree. In 2012, the Museum will begin offering a pilot Master of Arts in Teaching with a specialization in earth science. Approximately 5 million visitors from around the world came to the Museum last year, and its exhibitions and Space Shows can be seen in venues on five continents. The Museum's website and collection of apps for mobile devices extend its collections, exhibitions, and educational programs to millions more beyond its walls. Visit amnh.org for more information.

About Alcoa Foundation

Alcoa Foundation is one of the largest corporate foundations in the U.S., with assets of approximately \$446 million. Founded more than 50 years ago, Alcoa Foundation has invested more than \$550 million since 1952. In 2011, Alcoa Foundation contributed more than \$20 million to nonprofit organizations throughout the world, building innovative partnerships, engaging its people to improve the environment and educating tomorrow's leaders. The work of Alcoa Foundation is further enhanced by Alcoa's thousands of employee volunteers who share their energy, passion and purpose to make a difference in the communities where Alcoa operates. Through the company's signature Month of Service program, in 2011, a record 56 percent of Alcoa employees took part in more than 1,200 events across 24 countries, reaching 81,000 children, serving 9,000 meals, planting 34,000 trees and supporting 1,800 nonprofit organizations. More information can be found at www.alcoafoundation.com.

At the American Museum of Natural History

The Museum offers a broad array of programs for adults, children, families, students, educators, and scientists. These range from special exhibitions to symposia, lecture series, workshops, and film festivals. Highlights include *Creatures of Light: Nature's Bioluminescence* (March 31, 2012-January 6, 2013), which introduces visitors to the astonishing variety of bioluminescent creatures; *Beyond Planet Earth: The Future of Space Exploration* (November 19, 2011–August 12, 2012), which offers a vision of the future of space travel as it boldly explores our next steps in our solar system and beyond; and the Space Show *Journey to the Stars*, narrated by Whoopi Goldberg.

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