



AMERICAN MUSEUM OF NATURAL HISTORY

Media Inquiries: Department of Communications

Michael Walker, 212-769-5766; walker@amnh.org

www.amnh.org

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AMERICAN MUSEUM OF NATURAL HISTORY ANNOUNCES 2011 YOUNG NATURALIST AWARDS FOR STUDENT SCIENTISTS

TWELVE STUDENT WINNERS FROM ACROSS THE UNITED STATES INCLUDES FOUR TEEN SCIENTISTS FROM NEW YORK

NEW YORK, May 27, 2011 – Are dog tongues cleaner than human tongues? How do honeybees find their way home? Do baboons behave differently in the Prospect Park Zoo than in the wild? These are some of the questions that 12 student scientists explored through the American Museum of Natural History's **14th Annual Young Naturalist Awards**, a nationwide science-based research competition for kids in grades 7 through 12 funded by Alcoa Foundation.

The winners from Arizona, Arkansas, California, Colorado, Iowa, Michigan, Minnesota, New York and Virginia were recognized today at an awards luncheon at the Museum and received cash awards up to \$2,500 each. The winners are:

Grade 7

- **Aidan Dwyer**, Northport Middle School, Northport, New York
 - Designed an efficient solar energy collector using the Fibonacci sequence
- **Katelyn Boisvert**, Chandler Preparatory Academy, Chandler, Arizona
 - Investigated the feeding preferences of Painted Lady butterflies

Grade 8

- **Abby Walling**, Northwest Junior High School, Iowa City, Iowa
 - Discovered that dogs have less harmful bacteria in their mouths than humans
- **Kalia Firester**, Hunter College High School, New York, New York
 - Tested green chili and garlic as effective natural insecticides

Grade 9

- **Rachel Rounds**, Evart High School, Evart, Michigan
 - Studied the impact of different dung beetles on pasture grasses
- **George Maurakis**, Math Science Center at Cloverhill High School, Midlothian, Virginia

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- Discovered the heart rate of grass shrimp were affected by changes in pH levels and water temperature

Grade 10

- **Sara Volz**, Cheyenne Mountain High School, Colorado Springs, Colorado
 - Experimented with extracting fuel oil from algae
- **Henry Lim**, Baruch College Campus High School, New York, New York
 - Observed that baboons in captivity at Propect Park Zoo behaved similarly to baboons in the wild

Grade 11

- **Jill Dolowich**, [Jericho High School](#), Jericho, New York
 - Concluded that honeybee long-term memory diminished rapidly over 9 days
- **Joshua Shaw**, Hillcrest High School, Strawberry, Arkansas
 - Found fecal contamination in the Strawberry River, Arkansas

Grade 12

- **Ryan Heltemes**, Southwest High School, Minneapolis, Minnesota
 - Studied the effects of insect repellent on bioluminescent dinoflagellates
- **Marci Rosenberg**, Torrey Pines High School, San Diego, California
 - Analyzed an ocean water strider that lays its eggs in floating plastic debris

“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 the terrific winners, whom we congratulate for their truly exceptional work.”

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; thoughtfulness in analyzing and interpreting findings; and creativity and clarity in written and visual presentation. In addition to garnering a cash prize, the winning entries are published on the Museum’s website at amnh.org/yna.

“Alcoa is proud to sponsor the 2011 Young Naturalists Awards and honored to reward these exceptional students who demonstrate such enthusiasm, scientific curiosity and commitment to their environment,” said Paula Davis, president, Alcoa Foundation.

“Supporting programs like the Young Naturalist Awards that encourage students to explore science, technology, engineering and math careers is critical to the development of U.S. industry, academics and competitiveness. The private, community and public sectors must all

work together to inspire more young people to engage in these disciplines and understand how significant their individual contributions can be for our world,” said Davis.

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 the broadest possible audience across the nation and throughout the world. 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 feeding preferences of Painted Lady butterflies or investigated the secrets of growing algae as an effective biofuel, 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; Ms. Davis; and Christopher Raxworthy, associate curator in the Department of Herpetology and associate dean of science for Education and Exhibitions. Dr. Raxworthy spoke to the 12 young winners about his own journey to become a scientist and on the parallels between their fieldwork and original research conducted at the Museum.

Following are excerpts from their winning projects:

Aidan Dwyer

Age 13, Grade 7

Northport Middle School

Northport, New York

The Secret of the Fibonacci Sequence in Trees

While on a winter hiking trip, Aidan noticed a pattern in the way tree branches grew. His research showed that the pattern followed the Fibonacci sequence: $F_n = F_{n-1} + F_{n-2}$. The Fibonacci sequence appears in many forms in nature: the shape of a nautilus shell, falcon flight patterns, and more. To find out if the pattern enabled the tree to collect more sunlight, Aidan built a tree model copying the Fibonacci pattern of an oak tree. In place of leaves he used small photovoltaic solar panels. He also built a traditional PV solar panel as a control. His data

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showed that the tree model performed better than the flat panel. The tree design made 20% more electricity and collected 2.5 hours more of sunlight during the day.

“My investigation asked the question whether there was a secret formula in tree design and whether the purpose of the spiral pattern was to collect sunlight better. After doing research, I put together test tools, experiments, and design models to investigate how trees collect sunlight. At the end of my research project, I put the pieces of this natural puzzle together, and I discovered the answer. But the best part was that I discovered a new way to increase the efficiency of solar panels collecting sunlight!”

Katelyn Boisvert

Age 12, Grade 7

Chandler Preparatory Academy

Chandler, Arizona

Butterfly Buffet: The Feeding Preferences of Painted Ladies

After receiving a butterfly habitat as a gift, Katelyn was inspired to learn more about these insects. She decided to study Painted Lady butterflies, *Vanessa cardui*, because it is a common and widespread species and it lives year-round in warm areas. Her question focused on whether Painted Lady butterflies had a preference for specific flowers to feed on. Katelyn set up six butterfly garden habitats. She used one species of flower in four different colors and four other species with different structures. After conducting her investigation and analyzing the results she concluded that Painted Lady butterflies do show a preference for certain flowers rather than feeding randomly.

“I’ve always liked butterflies, but I really became interested when I got a habitat as a gift and raised five caterpillars. I became even more fascinated after a field trip to a butterfly exhibit. I really enjoyed learning about butterflies, so I decided to study them, with the hopes of one day doing a field conservation project to help them.”

Abby Walling

Age 13, Grade 8

Northwest Junior High School

Iowa City, Iowa

Are Dogs’ Tongues Really Cleaner Than Humans’?

Abby loves her dog and her dog’s kisses. But Abby’s mom warned that the dog’s tongue was full of bacteria. The warning led Abby to investigate bacteria in the mouths of dogs and humans. Abby requested and received a grant from the State Hygienic Lab at the University of Iowa. She began collecting data by testing five dogs and their owners in her neighborhood. She obtained saliva samples using swabs. She used Gram negative and Gram positive blood agar plates to grow the bacteria on the swabs. The dogs, overall, had less bacteria in their mouths than the humans. However, dogs have more types of bacteria than humans do.

“In conclusion, will I let my dog continue to lick me? The answer to the previous question is YES! I will feel guiltless letting my dog lick me because I found out that human and dog oral bacteria are different, so my dog’s bacteria will present no harm to me.”

Kalia Firester

Age 13, Grade 8

Hunter College High School

New York, New York

Plant Extracts as Natural Insecticides

Testing various concentrations of green chili (*Capsicum annuum*), garlic (*Allium Sativum*), and eastern hemlock (*Tsuga canadensis*), Kalia discovered that natural substances can effectively protect plants from insect pests. She sprayed the natural insecticides on populations of greater wax moth larvae (*Galleria mollenella*) divided into 10 habitats and counted up total mortality over the course of 15 days. Kalia supported her hypothesis that the green chili would be most effective with the highest concentration achieving 95 percent mortality by day 15. The garlic and hemlock killed 75-80 percent by day 15.

“Many plant species produce substances to protect them by killing or repelling insects that feed on them. It is possible to create effective, natural insecticides from these substances to protect domesticated crops, which unlike wild plants may have lost their capability to cope with pests, through cultivation.”

Rachel Rounds

Age 15, Grade 9

Evart High School

Evart, Michigan

Tiny Allies: The Effect of Coprophilous Beetles on Brassica rapa and Lolium perenne Growth and Biomass

Coprophilous beetles are instrumental in removing dung from pastures and incorporating it into the soil. Rachel wondered what sort of impact different species of coprophilous beetles had on pasture grasses. She collected three species of beetles and set up an experiment to determine which would have the most impact on the growth and biomass of two plant species: field mustard (*Brassica rapa*), a rapidly growing plant, and perennial ryegrass (*Lolium perenne*), a prairie grass. Six of each species of beetle were placed in pots that contained soil topped with cow dung. After 10 days, she removed the beetles and planted the pots with field mustard and perennial ryegrass and charted their growth for over a month. While her results did not support her hypothesis that the larger of the beetles would have the most impact on growth, there was one unexpected finding. Rachel was the first person to identify an *Onthophagus taurus* beetle in Michigan. Previously, its northernmost range was Pennsylvania.

“I take a breath of the fresh air wafting through the pasture. With the crisp scent of grass comes the unmistakable odor of manure. The source of this smell is why I am here. Ignoring the stench, I scoop dung into a bucket, and continue my quest for the creatures who call this dung home.”

George Maurakis

Age 14, Grade 9

Math Science Center at Cloverhill High School

Midlothian, Virginia

The Effects of pH, Salinity, and Water Temperature on Palaemonetes pugio Holthuis

George lives in the Chesapeake Bay watershed and has always been concerned about the bay's health. He learned that oceans and the Chesapeake Bay are becoming more acidified. George wanted to know if pH levels, temperature, and salinity had any effect on organisms living in bay, specifically two species of grass shrimp. He hypothesized that if water temperature, salinity, and pH change then the metabolism of the shrimp would not change. George collected grass shrimp from an area near the bay. He kept the shrimp in holding tanks

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and tested their heart rates after subjecting them to different pH concentrations, varying temperatures, and salinity concentrations. His findings showed that decreased pH levels caused a decreased heart rate in the shrimp, and that heart rate did vary with changes in water temperature. However, their hearts rates did not vary with changes in salinity.

“It is possible that if P. pugio had been tested at pH values below 6.5, than it may have been possible to better define effects of lower pH on heart rate and beats/mm. Also additional specimens may have increased confidence estimates. However, collecting specimens of P. pugio was difficult, as it took over three hours to get enough specimens to conduct the tests.”

Sara Volz

Age 15, Grade 10

Cheyenne Mountain High School

Colorado Springs, Colorado

Enhancing Algae Biofuels: The Effects of Nitrogen Limitation and Carbon Dioxide Infusion on Nannochloropsis Oculata

Growing up by the rich lakes and streams of Colorado, Sara often noticed dark masses of algae clouding the clear water. She wondered: Could algae help power modern society without the environmental drawback of fossil fuels? She focused her research on microalgae and the precise growing conditions necessary to optimize oil yield. Her investigation analyzed the effects of two growth stresses, nitrogen limitation and carbon dioxide infusion, on the biomass and lipid production of a microalgae strain, *Nannochloropsis oculata*. While the carbon infused samples initially grew well, they quickly died off. Yet she was able to partially support her hypothesis that nitrogen limitation did result in higher oil yield.

“The thought that a fast-growing, durable crop which can grow on non-arable land could produce the oil to fuel the modern world is, quite frankly, amazing, and algae biodiesel holds this promise. My results illustrate this potential. Even on an extremely small scale without commercial procedures and equipment, I was able to grow enough algae to obtain oil! My study also indicates the importance of further research into optimizing algae growth to make algae biodiesel truly practical for widespread use.”

Henry Lim

Age 15, Grade 10

Baruch College Campus High School

New York, New York

Hamadryas Baboons (Papio hamadryas) – Captive vs. Wild

Henry’s expedition took him to the Prospect Park Zoo in Brooklyn to discover whether captive hamadryas baboons mostly behaved similarly to the same baboons in the wild. Henry conducted a behavioral study of the baboons and compared his findings with research done by Larissa Swedell, a primatologist who studied these baboons in the wild. He also wanted to know which categories of behavior occurred most frequently among the captive baboons at the zoo. Henry examined 10 hamadryas baboons on six different days for four hours each visit for a total of 24 hours of observation. He was able to support his hypothesis that captive and wild baboons shared approximately 85 percent of the same behaviors differing only in activities related to fighting and sex. The most common category of captive baboon behavior was sitting which occupied 45 percent of their time.

“In my experiment, I observed 10 captive hamadryas baboons that were separated into two troops at the Prospect Park Zoo. For my primary question, I used a checklist to observe the behaviors of captive

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hamadryas baboons at the Prospect Park Zoo and later compared these behaviors to a checklist of wild behaviors observed by a primatologist (Swedell, 2006)."

Jill Dolowich

Age 16, Grade 11

Jericho High School

Jericho, New York

Memory Retention of Landscape Learning in Honeybees (Apis mellifera)

Can honeybees (*Apis mellifera*) use landmarks to help them navigate more rapidly to their hives? Jill collected 1,000 bees this past summer and selectively released them to find out. After carefully separating the bees into relay and control groups and painting their thoraxes blue and pink respectively to distinguish them, Jill began the first trial of her experiment. She released the bees first from 0.8 km from the hive site and then a day later 1.8 km from the site (the process was repeated day 3, day 6, and day 9). She repeated these trials using two other hives. Her results showed that honeybees released at shortly after the first release of each trial were more successful in navigating back to the hive than bees released several days after the first release. Based on her findings, Jill concluded that honeybee long-term memory diminished rapidly over a period of nine days.

"Honeybee memory is a primary source of honeybee prosperity. Therefore, determining the relationship between duration of memory to relay landscape learning is the main purpose of the study. Flight direction is an important factor in determining long-memory retention because of the landmarks located in that specific region."

Joshua Shaw

Age 17, Grade 11

Hillcrest High School

Strawberry, Arkansas

Evaluation of Fecal Contamination in Strawberry River and the Comparison of Fecal Microbial Indicators to Determine the Health Risk to Individuals Participating in Primary Contact Recreational Activities

Joshua reminisces about his favorite swimming hole, where, as a young boy, he used a rope to swing out over the Strawberry River and plunge in. When a wastewater treatment facility was built a half-mile up stream, things changed. Joshua wondered whether the swimming hole and river were still safe for humans. After researching the current water quality standards, he performed water testing at several sites to determine the risk to individuals during primary (full body contact) and secondary (contact below the knees or wading) contact with the river. He tested not only for *E. coli*, but also for *Enterococcus faecalis*. *E. faecalis* testing is a better source for measuring human fecal contamination because it is primarily found in humans and chickens. Joshua's results showed that for each site on each test date fecal contamination exceeded water quality standards for *E. faecalis*. His results also showed that on several test dates *E. coli* failed to indicate unsafe levels of fecal contamination.

"As a young child, I spent many hours enjoying the cool refreshing water of Strawberry River. My favorite swimming hole was below an old abandoned bridge...Fish abounded in the waters and everyone in the community picnicked in the shade by the sandy beach. It was the perfect spot to while away the summer. That is, until the Western Lawrence County Waste Water Treatment Facility (WLCWWTF) was constructed half a mile upstream. The wonderland where I spent so many hours as a

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child is deserted now and nobody swims or fishes in that section of the river. I decided to find out for myself if the WLCWWTF had indeed contaminated the water or if the community had overreacted.”

Ryan Heltemes

Age 17, Grade 12

Southwest High School

Minneapolis, Minnesota

The Effects of DEET on Bioluminescent Dinoflagellates

During a trip to Puerto Rico, Ryan and his family visited a bay where waters glowed with tiny marine organisms called bioluminescent dinoflagellates. Ryan was told that tourists soaked with insect repellent could not swim in the bay because they adversely affected the dinoflagellates. He decided to investigate whether this was true by adding different concentrations of DEET – an active ingredient in insect repellent – in solution to four flasks containing bioluminescent dinoflagellates (*Pyrocystis fusiformis*). His research showed that the microorganisms will rebound after exposure to small concentrations of DEET, but when the threshold of tolerance is passed, the dinoflagellates are indeed killed off.

“Because the bays require such exact conditions in order to form, there are few in the world and conservationists work tirelessly to preserve these unique phenomena. The single most harmful species to these dinoflagellates are human.”

Marci Rosenberg

Age 17, Grade 12

Torrey Pines High School

San Diego, California

Effect of Neustonic Microplastic Debris on the Pelagic Insect Halobates sericeus

Plastics are filling our world and unfortunately are slow to degrade, especially in the marine environment. Marci’s research focused on the effect of plastic debris on a unique marine insect, *Halobates sericeus*, a member of the water strider family. *H. sericeus* spends its entire life on the sea surface and uses floating matter in the ocean as a substrate to lay eggs. Marci’s investigation involved analyzing 90 water samples containing floating matter taken during four cruises off the coast of California, some dating back to the 1970s. Marci examined each sample and identified any *H. sericeus* (juveniles, adult males, adult females, newly molted, molts of organisms, and eggs) and/or plastic debris. Her results showed that in 2009 plastic debris in the NPCG (North Pacific Convergence Gyre) provided more opportunities for *H. sericeus* to lay its eggs. However, the relationship between *H. sericeus* and plastic debris was not observed through analysis of historical samples due to a much lower occurrence of plastic debris.

“Plastic debris has been documented throughout the world’s oceans but has never been linked to changes in zooplankton populations. This study represents the first research investigating the impacts of plastic on a marine invertebrate.”

American Museum of Natural History (amnh.org)

The American Museum of Natural History is one of the world’s preeminent scientific, educational, and cultural institutions. Since its founding in 1869, the Museum has advanced its global mission to explore and interpret human cultures and the natural world through a wide-reaching program of scientific research, education, and exhibitions. The Museum accomplishes

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this ambitious goal through its extensive facilities and resources. The institution houses 46 permanent exhibition halls, state-of-the-art research laboratories, one of the largest natural history libraries in the Western Hemisphere, and a permanent collection of more than 32 million specimens and cultural artifacts. The spectacular Frederick Phineas and Sandra Priest Rose Center for Earth and Space, which opened in February 2000, features the rebuilt Hayden Planetarium and striking exhibits about the nature of the universe and our planet. With a scientific staff of more than 200, the Museum supports research divisions in anthropology, paleontology, invertebrate and vertebrate zoology, and the physical sciences. With the launch of the Richard Gilder Graduate School at the Museum in 2006, the American Museum of Natural History became the first American museum with the authority to grant the Ph.D. degree. The Museum welcomed approximately 5 million on-site visitors from around the world last year and has produced exhibitions and Space Shows that can currently be seen in venues on five continents, reaching an audience of millions more. In addition, the Museum's website, amnh.org, and growing collection of apps for mobile devices extend its collections, exhibitions, and educational programs to millions beyond the Museum's walls.

About Alcoa Foundation

Alcoa Foundation is one of the largest corporate foundations in the U.S., with assets of approximately US\$436 million. Founded more than 50 years ago, Alcoa Foundation has invested more than US\$530 million since 1952. In 2010, Alcoa Foundation contributed nearly US\$20 million to nonprofit organizations throughout the world, focusing on promoting environmental stewardship, enabling economic and social sustainability, and preparing tomorrow's leaders through education and learning. The work of Alcoa Foundation is further enhanced by Alcoa's thousands of employee volunteers, who in 2010 gave more than 720,000 service hours. Through the company's signature Month of Service (October) program, Alcoa employees share their energy, passion and purpose to make a difference in our communities. In 2010, a record 49 percent of Alcoans took part in nearly 1,000 Month of Service events across 24 countries, reaching 59,000 children, serving 17,000 meals, planting 16,000 trees and supporting 3,000 nonprofit organizations. For more information about Alcoa Foundation, please access www.alcoa.com/foundation.

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 *The World's Largest Dinosaurs* (April 16, 2011–January 2, 2011), an exhibition exploring the amazing biology of a group of uniquely super-sized dinosaurs: the long-necked and long-tailed sauropods; *Brain: The Inside Story* (November 20, 2010–August 14, 2011), which gives visitors a new perspective and insight into the human brain using imaginative art, vivid brain scan imaging, and thrilling interactive exhibits; *Body and Spirit: Tibetan Medical Paintings*, an exhibition of hand-painted Tibetan medical paintings from the Museum's collection (January 25–July 17, 2011); *Frogs: A Chorus of Colors* (May 28, 2011–January 8, 2012), a delightful exhibition of 200 live frogs that introduces visitors to their colorful and richly diverse world; the Hayden Planetarium Space Show, *Journey to the Stars*, narrated by Whoopi Goldberg; *Highway of An Empire: The Great Inca Road* (October 17, 2009–September 2011), an exhibition of more than 35 striking photographs

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featuring roads and trails built by the Inca six centuries ago; *Vital Variety: A Visual Celebration of Invertebrate Biodiversity* (ongoing), an exhibition of 23 large-format color photographs highlighting the immense diversity of invertebrates; Space Show Double Feature (select Friday and Saturday evenings), shown in the Hayden Planetarium, with back-to-back screenings of the Museum's first two Space Shows: *Passport to the Universe* (narrated by Tom Hanks), which launches visitors on a thrilling trip through space and time, and *The Search for Life: Are We Alone?* (narrated by Harrison Ford), which explores whether life exists beyond Earth; a year-round calendar of engaging and educational **public programs** that feature dynamic encounters with living cultures and authentic science; and **One Step Beyond**, the popular monthly party series where guests can dance in the Museum's Dorothy and Lewis B. Cullman Hall of the Universe to sets by the biggest names in techno, electronica, hip-hop, and indie rock.

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