Those of us who work in natural history museums confront a significant paradox.

On the one hand, there arguably has never been a better time to be a comparative and evolutionary biologist. The rate of discovery of new, unnamed species is higher than ever before. We have at our disposal an array of cutting-edge tools and technologies that may yield answers to fundamental questions about evolutionary patterns and underlying mechanisms that the scientific community has pondered for decades, if not centuries. Yet, threats to Earth’s biodiversity are increasing every day. These threats, if unchecked, will lead to a global loss of species in our lifetimes that may rival the global mass extinctions of prehistoric times. This paradox contributes to a heightened sense of urgency that underlies all we do. At the very least, these are exciting times.

The MCZ remains relevant by maintaining research programs of broad intellectual scope, which focus on contemporary scientific and societal problems. It continues to train generations of comparative and evolutionary biologists of all stripes and to instill an understanding and appreciation of the natural world in countless undergraduates. It is thus with enormous pleasure that I present this latest annual report, which highlights the research, education and related initiatives conducted by MCZ faculty, staff, students and visitors during the 2011–2012 academic year.

The opening pages of this report chronicle what often prove to be life-changing experiences for Harvard undergraduates and graduate students. Several Organismic and Evolutionary Biology (OEB) department courses led by MCZ faculty-curators offer enrolled students all-expense-paid field trips to the tropics during spring break. The university underwrites the entire cost of these trips, largely from MCZ discretionary funds but with key additional support from OEB, the David Rockefeller Center for Latin American Studies and other sources within the Faculty of Arts and Sciences. These unforgettable experiences convince many students to choose the OEB concentration, some to go to graduate school in comparative biology and others to become committed environmentalists, but everyone benefits in important ways.

Recent activity in MCZ’s collections has furthered our multiyear effort to improve environmental conditions for specimen conservation, increase storage capacity and enhance access. As I write this message, most of the mammal collection is being rehoused in our state-of-the-art facility in the Northwest Building. Another example is our new Cryogenic Collection in MCZ Laboratories, which will provide a common, shared facility for maintaining frozen samples for genetic analysis. Finally, ongoing initiatives in biodiversity informatics are generating additional means of sharing collections data worldwide.

MCZ’s strength as a research and teaching institution lies not only in its strong intellectual foundation and its excellent facilities, but also in the largely unheralded efforts of its many faculty-curators, staff and students, who together push the frontiers of scientific learning and discovery. Hence, I commend and thank everyone once again for the work they do to make the MCZ the essential and relevant institution that it is today.

James Hanken
Director
Students Experience Tropical Biodiversity Firsthand

Whether netting birds in Panama, searching out reptiles in Costa Rica or diving for sea stars, the 2012 spring break took students into the field to experience what they could never learn through textbooks and museum specimens alone.

Three classes from the Organismic and Evolutionary Biology department—taught largely by MCZ faculty-curators—offered all-expense-paid trips for their undergraduate and graduate students. For some, it was their first journey out of the country. For most, it was their initial exposure to the diverse environments of the Neotropical region—rainforest, cloudforest, savannah, coastal wetlands—or distinctive marine habitats like mangrove forests and coral reefs.

Even though specimens from the MCZ collections are studied in classroom settings, observing a live animal’s behavior in its natural habitat is an entirely different experience. Seeing species alive and up close facilitates the learning process, bringing scientific terms and phylogenetic groups figuratively and literally to life.

Experiences in the field also engender a deeper understanding of—and sense of awe for—these rapidly disappearing ecosystems.

The spring field trips will convince some students to choose an OEB concentration, to attend graduate school in some area of comparative biology, or become committed conservationists. These trips imbue students with a respect for the planet’s biodiversity and ignite career paths, creating lifelong environmentalists and inspiring many to make a deep impression on many, and most loved the arboreal herpetological experience for the students and teaching staff alike.”

Collecting Invertebrates in Panama

The goal for OEB 167: Herpetology was to show the 14 students the sheer abundance and diversity of invertebrate animals in the wild and how these animals function and behave in their natural settings. Professor Gonzalez Giribet and Associate Professor Cassirand G. Giribet led the trip, assisted by two teaching fellows, Ben Ewen-Campen and Giselle Kawauchi.

Each day, the group traveled by boat to a variety of habitats that included coral reefs, mangroves, muddy sediment, sandy-bottom habitats and rock walls. Students, equipped with full-body wetsuits and snorkels, experienced a dizzying array of animal life in marine habitats covered in live sponges, corals, brittle stars, sea urchins and other species too numerous to mention.

Students were initially introduced to the most abundant and charismatic of the marine invertebrates—enormous sea stars, brightly colored sea anemones and coral reef species—and then tried to identify as many organisms as possible from different invertebrate phyla, including the small and the difficult-to-classify. During the week they spent hours collecting live animals to examine at the well-equipped laboratory facilities at the Smithsonian Tropical Research Institute in Bocas del Toro.

Students especially liked the incredible out-of-this-world plankton creatures, consisting largely of larval forms of many animals that look nothing like the final forms of the adults.

“Observing invertebrate phyla in their natural habitat revealed behavior, distribution and beauty in a way that a fact sheet never could,” says Ananta Carter, Class of 2014. “Being out in the field gave us passion and energy for dissecting specimens in the lab and learning about them in the classroom. Our enthusiasm even spread to my other classes and experience of Harvard as a whole.”

Before departing for Costa Rica, Professors James Hanken and Jonathan B. Losos led the trip, assisted by teaching fellow Alexis Harrison and Losos lab members Martha Muñoz, Ambika Kamath and Katie Boronow.

OEB 167: Herpetology took 21 students to Costa Rica’s La Selva Biological Station, operated by the Organization of Tropical Studies, Veragua Rainforest Station, an ecotourist educational facility; and Pacuare Nature Reserve on the northeastern coast of Costa Rica.

Students continued birding throughout the day, experiencing the Canal Zone rainforest, mid- and high-elevation cloudforest, savannah and coastal wetlands. During periods of lower bird activity, the class toured research facilities; observed and assisted in mist-netting, the primary method of catching birds in ornithological research; and visited nearby towns. Species sighted included the spectacular Resplendent Quetzal, a large bird with a metallic green back and extremely long tail streamers; antbirds; tocorzas; hummingbirds; and the Three-wattled Bellbird. The students were treated to a rare occurrence in field research when they were able to observe the Bellbirds courting and mating in the wild.

“Observing in vertebrate phyla in their natural habitat revealed behavior, distribution and beauty in a way that a fact sheet never could,” says Ananta Carter, Class of 2014. “Being out in the field gave us passion and energy for dissecting specimens in the lab and learning about them in the classroom. Our enthusiasm even spread to my other classes and experience of Harvard as a whole.”
Edwards is actively engaged in several efforts to enhance the diversity of the scientific workforce, both in and outside of Harvard. He strives to create a new cadre of scientists who are comfortable both in the field as well as using cutting-edge genomic technologies that are transforming evolutionary biology.

Brian D. Farrell
Professor of Biology
Curator of Entomology
Prof. Farrell’s research is broadly concerned with whether the diversity of species on Earth is a cause or consequence of the diverse roles different species play in ecosystems, particularly interactions between insects and plants.

The Farrell lab serves as a base for the Beetle Tree of Life project, a collaborative and comprehensive phylogenetic study of this most diverse group of animals.

The guiding principles of his lab’s research include population genetics, systematics and field observations of diversity and behavior. His research emphasizes applying the methods of genomics to understand the history of populations, species and larger evolutionary groups of birds. In recent years, several members of his lab have conducted genomic studies of relicts to find clues to what the ancestral avian genome may have looked like. A major ongoing project focuses on the evolutionary consequences of a new host-pathogen association brought about in 1994, when a bacterial pathogen, Mycoplasma gallisepticum, switched avian hosts from poultry to House Finches, a common North American songbird. Edwards has also helped develop new analytical approaches to estimating phylogenetic trees, an important method of genomics to understand the history of populations, species and larger evolutionary groups of birds.

Edwards has conducted fieldwork throughout Australia and North America and has worked extensively in seabird colonies in Hawaii and Nova Scotia. He strives to create a new cadre of scientists who are comfortable both in the field as well as using cutting-edge genomic technologies that are transforming evolutionary biology.

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His research, with an emphasis on Anolis lizards in the Caribbean Islands, combines field observations, laboratory studies of lizard physiology and DNA, and field experiments to study evolutionary changes in nature. Prof. Losos has spent decades conducting fieldwork that charts the evolution of multiple species of lizards in real time. By conducting rigorous biological and behavioral analyses of animals on small isolated islands, Losos has produced detailed empirical scientific evidence documenting how evolution occurs in natural populations. His research has demonstrated rapid changes based on introduced predators, altered competition and even hurricanes, proving that evolution can occur very rapidly and evolutionary biology can, in fact, be an experimental science.

The Losos laboratory consists of six postdoctoral researchers, seven graduate students and four undergraduates, as well as a number of visiting foreign graduate students. The lab employs approaches across the disciplines of systematics, ecology, behavior, genetics and functional morphology, taking both observational and experimental approaches in the field and in the laboratory. A major focus has been the evolutionary radiation of Caribbean Anolis lizards, but increasingly the focus of the lab is turning toward the evolution of mainland anoles, as well as other lizard radiations.

An evolutionary geneticist, Prof. Lewontin pioneered the field of molecular population genetics by merging molecular biology and evolutionary theory, as well as the philosophical and social implications of genetics and evolutionary theory. Prof. Lewontin’s current research involves computer simulation and evaluation of statistical tests for selection. Among his many books are *The Genetic Basis of Evolutionary Change*, *Biological Nomenclature: The Doctrine of DNA*, *Human Diversity*, and *The Triple Helix: Gene Organism and Environment*. He served as President of the Society for the Study of Evolution, the American Society of Naturalists and the Society for Molecular Biology and Evolution.

A former Curator of Arachnology, Prof. Levi’s research focuses on the taxonomy of New World orb weavers, specifically spider genera. The author of *Spiders and Their Kin*, as well as numerous articles on various spider genera, his research has made possible identification of 1,500 species in 66 genera in the Americas. Prof. Levi served as president of the International Society of Arachnology and, in 2007, won the ISA’s Eugene Simon Award for lifetime achievement for his immense influence on spider research.

Prof. Wilson is considered the founder of sociobiology and evolutionary psychology and has developed the basis of modern biodiversity conservation. He has received many of the world’s leading prizes in recognition of his research and environmental activism. He was awarded two Pulitzer Prizes for his books *The Ants* (1996, with Bert Hölldobler) and *On Human Nature* (1978). In 2007, Prof. Wilson received the Technology, Entertainment, Design (TED) Prize, where he articulated the concept of the Encyclopedia of Life—a contemporary, dynamic Web page for every named species.
Courses in 2011–2012 Led by MCZ Faculty-Curators

Organismic and Evolutionary Biology
OEB 51: Biology and Evolution of Invertebrate Animals (undergraduate)
Gonzalo Giribet (and Cassandra G. Extavour)
Introduction to invertebrate diversity, with special emphasis on the broad diversity of animal forms, their adaptations to different ecosystems and how these phenomena shape animal evolution.

OEB 53: Evolutionary Biology (undergraduate)
Hopi E. Hoekstra (and Andrea A. Buerger)
Micro- and macroevolution, ranging from population genetics through molecular evolution to the grand patterns of the fossil record.

OEB 57: Animal Behavior (undergraduate)
Naomi E. Pierce (and Benoît P. Ovelczky)
A review of the behavior of animals under natural conditions, with emphasis on both mechanistic and evolutionary approaches.

OEB 118: Biological Oceanography (undergraduate and graduate)
James J. McCarthy
Examines the ocean as an ecological system, with focus on environmental-organismal interactions that regulate plankton production and transfer to higher trophic levels.

OEB 121a: Research in Comparative Biomechanics (undergraduate and graduate)
Andrew A. Biewener, George V. Lauder (and Daniel E. Lieberman, Stacey A. Combes)
Introduction to experimental techniques used to investigate the structure and physiology of vertebrates, where each instructor offers research projects that are undertaken in their laboratory.

OEB 121b: Research in Comparative Biomechanics (undergraduate and graduate)
Andrew A. Biewener, George V. Lauder (and Daniel E. Lieberman, Stacey A. Combes)
Optional extension of initial project undertaken in OEB 121a into a thesis research project.

OEB 141: Biogeography (undergraduate and graduate)
Gonzalo Giribet
Biogeography aims to explain distributions of organisms through historical and ecological factors. This course focuses on the history of biogeographic research, developments in the area of historical biogeography, and ecological processes that affect distributions of whole clades.

OEB 150: Vertebrate Evolution and Development (undergraduate and graduate)
Farish A. Jenkins, Jr. (and Abigail Alhazzoon)
A survey of the evolution and development of major groups of vertebrates, integrating the paleontological record of their origin with current understanding of the genetic, cellular and developmental mechanisms that underlie these transformations.

OEB 155r: Biology of Insects (undergraduate and graduate)
Naomi E. Pierce (and Michael R. Confield)
Introduction to the major groups of insects—life history, morphology, physiology and ecology—through a combination of lecture, lab and field exercises.

OEB 167: Herpetology (undergraduate and graduate)
James Hanken and Jonathan Losos
Introduction to the biology of amphibians and reptiles. Lectures and laboratories examine the morphology, systematics, natural history, behavior, ecology, evolutionary relationships and biogeography of all major taxa.

OEB 173: Comparative Biomechanics (undergraduate and graduate)
Andrew A. Biewener (and Jacques Dumais)
An exploration of how animals and plants contend with their physical environment, considering their biomaterial properties, structural form and mechanical interactions with the environment.

OEB 190: Biology and Diversity of Birds (undergraduate and graduate)
Scott V. Edwards
Introduction to the biology of birds, covering fossil record and theories for avian origins, physiology and anatomy, speciation processes, nesting and courtship behavior, vocalizations, breeding, demography and conservation.

OEB 275r: Phylogeography and Geographic Variation in the Era of Genomics (graduate)
Scott V. Edwards
Explores the ways in which comparative genomics can inform phylogeny and genomic adaptation, surveying recent methods for harnessing thousands of loci for phylogenetic reconstruction.

OEB 296: Conservation History, Values and Law (graduate)
Jonathan Losos (and David R. Foster)
Examines the history of the conservation/preservationist movements, focusing on how various constituencies value nature, and the legal system for protecting nature.

Graduate Courses of Reading and Research
OEB 307: Biomechanics, Physiology and Musculoskeletal Biology
Andrea A. Buerger

OEB 310: Metazoan Systematics
Gonzalo Giribet

OEB 320: Biomechanics and Evolution of Vertebrates
George V. Lauder

OEB 323: Advanced Vertebrate Anatomy
Farish A. Jenkins, Jr.

OEB 325: Marine Biology
Robert M. Woolcott

OEB 334: Behavioral Ecology
Naomi E. Pierce

OEB 341: Coevolution
Brian D. Farrell

OEB 345: Biological Oceanography
James J. McCarthy

OEB 355: Evolutionary Developmental Biology
James Hanken

OEB 362: Research in Molecular Evolution
Scott V. Edwards

OEB 367: Evolutionary and Ecological Diversity
Jonathan Losos

OEB 370: Mammalian Evolutionary Genetics
Hopi E. Hoekstra
**Freshman Seminar**

**FRSEMR 31v: The Beasts of Antiquity and Their Natural History**
Farish A. Jenkins, Jr. (and Kathleen M. Coleman)
A study of the animals of the ancient Mediterranean Basin, offering parallel introductions to the classics and organismal and evolutionary biology. Includes firsthand study of specimens in the MCZ and coins and artifacts from Harvard’s collection of antiques.

**Life Sciences**

**LIFESCI 1b: An Integrated Introduction to the Life Sciences: Genetics, Genomics and Evolution (undergraduate)**
Hopi E. Hoekstra (and Maryellen Ruvolo, Andrew J. Berry)
This course uses an integrated approach to show how genetics and evolution are intimately related, together explaining the patterns of genetic variation we see in nature, and how genomics can be used to analyze variation.

**LIFESCI 2: Evolutionary Human Physiology and Anatomy (undergraduate)**
George V. Lauder (and Peter T. Ellison, Daniel E. Lieberman)
Explores human anatomy and physiology from an integrated framework, combining functional, comparative and evolutionary perspectives on how organisms work.

**General Education**

**Science of Living Systems 18: Evolutionary Biology: Sex, Survival and the Orgy of Species (undergraduate)**
Jonathan Losos
Examines theories of how evolution occurs, including runaway sexual selection, sperm competition, adaptive radiation, disruptive selection, sympatric speciation and host-parasite interactions.

**Science of Living Systems 22: Human Influence on Life in the Sea (undergraduate)**
Robert M. Woollacott and James J. McCarthy
Over-harvested fish stocks, pollution and anthropogenic climate change affect the stability and productivity of marine ecosystems. This course asks what we need to know about the causes and effects of anthropogenic change to best protect marine ecosystems and ensure sustainable harvests from the sea.

**Harvard Extension School and Harvard Summer School**

**BIOS S-74: Marine Life and Ecosystems of the Sea (undergraduate)**
Robert M. Woollacott
The life history and adaptations of marine life and the ecosystems of the sea, with emphasis on understanding the fragility and resilience of marine systems in the face of anthropogenically driven perturbations.

**BIOL S-115: Study Abroad at Oxford: Darwin and Contemporary Evolutionary Biology**
Naomi E. Pierce (and Andrew Berry)
The history of evolutionary biology in the post-Darwinian world, following strands of thought either introduced or ignored by Darwin in *On the Origin of Species* through to the present.
**Significant Acquisitions and Upgrades Enhance MCZ Collections**

The past year has brought important enhancements to the MCZ collection through expeditions, private donations and curatorial upgrades.

**MCZ Expedition Collects Mongolian Birds**

Despite some holdings in U.S. museums and older specimens in Russia, Mongolian birds are otherwise poorly represented in the world’s museum collections, especially modern, data-rich specimens. In June 2012, Scott V. Edwards, and colleagues traveled to Mongolia to improve the global collection of high-quality voucher specimens of Mongolian birds. The expedition was funded by a Putnam Expedition Grant and the MCZ’s Blake Fund.

Edwards—Curator of Ornithology, Professor of Organismic and Evolutionary Biology and Alexander Agassiz Professor of Zoology—was accompanied by graduate student Allison Shultz, Edwards lab postdoctoral fellow Nicolas Backström and Curatorial Associate Jeremiah Trimble. The team was hosted by leading Mongolian ornithologist and conservationist Sundev Gomboostaaar from the National University of Mongolia, his students and staff.

Three seeds were spent collecting specimens in the drier foothill steppe near the capital Ulaanbaatar (such as around Hultai National Park), taiga forest near Terelj National Park to the north, thickets and riverbanks of the Oron River Valley, in the hills around Baulder Sum and the vast steppes of the far eastern regions.

The group collected about 150 specimens, meticulously preparing tissue samples and voucher specimens that will inhabit MCZ trays in the collection. Some of the most exciting and colorful were Bearded Reedlings (Luscinia calliope), Eurasian Wrynecks (Jynx torquilla), a primitive type of woodpecker found only in the Old World, and Eurasian Three-toed Woodpeckers (Picoides tridactylus).

As a general collection the Mongolian vouchers, tissues and spread wings will be available for use by researchers worldwide. The specimen data will be deposited in the museum’s database, MCZBase, and will eventually be accompanied by digital photographs of habitats, photos of live birds and field notes. These collections are important for future studies in phylogeny, which focuses on geographic variation within species.

**Malacology Collection Receives Important Donations**

This year, the MCZ’s collection of 10 million shells was supplemented by just over 10,000 mollusk lots given to the Department of Malacology by Owen Gingerich, Domenick Nicolaci, Gonzalo Giribet and the family of Joseph George Claud-Mantle.

The Joseph George Claud-Mantle Collection was received in June 2011. It contains 5,200 shells representing almost 400 species acquired between 1880 and 1950, including the ultimate rare and valuable seashell, a sinistral sacred chank shell (Turbinella pyrum) from India.

In 2008, Claud-Mantle’s great-granddaughter Laura Ferrera and her cousins Deborah Lannier and Cindy Arenselt began the four-year project to clean and document the collection, taking inventory using their great-grandfather’s original logbooks and creating an electronic database and online photo gallery of the shells.

According to Adam J. Baldinger, Curatorial Associate of Malacology, “It isn’t unusual to receive collections from private collectors, but I have rarely seen a collection that was so diligently catalogued. The collection’s true value is scientific and lies in the precise way Claud-Mantle recorded data about each of his shells.”

The extremely rare sinistral, or left-handed, chank is revered as a religious object in Hindu temples, and it has been estimated that there are only three specimens in North America. In January 2012 a previously unknown specimen was discovered in the Claud-Mantle collection, and it became the subject of a paper by Baldinger and Edward Nieburger in American Conchologist.

Additionally, 1,117 specimen lots were received from Domenick Nicolaci from North Dartmouth, Massachusetts. The collection contains specimens collected from around the world and includes the rare golden form of the cowrie Zaira friendii from Australia and a rather large specimen of the volute Cymbiola (Cymbiola) thalassina from northeast Australia.

Owen Gingerich, former Research Professor of Astronomy and the History of Science at Harvard University, is an amateur shell collector and longtime member of the Boston Malacology Club. His shell collection contains many unique specimens, including several listed in Guinness World Records. Gingerich began donating parts of his collection to the MCZ in 2009, and in 2011, the MCZ received 773 specimens representing 23 different families.

From 2010 to 2012 Gonzalo Giribet, Curator of Invertebrate Zoology and Professor of Organismic and Evolutionary Biology, donated his collection of 3,041 specimen lots. The collection’s emphasis is on the Mediterranean region and nearby Atlantic, but also includes specimens from other oceans and continents around the world.

This collection was amassed during more than 30 years, and unlike many other private collections, a large portion of specimens were micro-mollusks, many collected directly by Giribet during zoological and ecological surveys in the northwest Mediterranean. The collection’s emphasis is on the Mediterranean region and nearby Atlantic, but also includes specimens from other oceans and continents around the world.

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Over the years the MCZ has received more than 800,000 fishes from Woods Hole Oceanographic Institution cruises. Jim Craddock, a former MCZ associate, removed the otoliths—ear bones—from many of those specimens to use in the study of the food habits of marine mammals. After his death in 2009, his wife Thelma Fenster donated 3,000 sets of fish otoliths from about 450 individual species, many from voucher specimens already housed at the MCZ. The collection has been completely inventoried and organized, and Curatorial Assistant Andrew Williston is entering collection data, including the original locality data, into MCZbase. Ichthyology intern Rex Passion completed the collection inventory and collection data review.

“Otoliths are a valuable resource in defining fish species and studying fish ecology,” says Williston. “Growth rings in otoliths can be studied for aging individual fish. They can be used to identify fish remains in the stomach contents of marine predators like dolphins, and fish diets can be studied using stable isotope analysis of otoliths. And since otoliths are often fossilized, they can be compared to modern otoliths to better understand the diversity of fossil fishes.”

Crinoid Collection Upgrades

The recent work of Curatorial Assistant Penny Benson and temporary employee Beryl Lipton has brought specific parts of the MCZ Department of Marine Invertebrates collection up to and beyond modern day best-practice standards. This past year the curatorial upgrades were focused on the crinoid (sea lily and feather star) and holothurian (sea cucumber) collections and included confirmation of specimen collection data, taxonomy and type status utilizing MCZbase, and rehousing specimens into new jars and trays along with updated archival labels.

“The history, species diversity and number of types represented within the MCZ crinoid and holothurian collections are truly amazing. And now with collection data available electronically, interest and use of the collection has definitely increased,” says Curatorial Associate Adam J. Baldinger.

Otolith Collection Enhancements

The new MCZ Cryogenic Collection includes a preparation laboratory and adjoining freezer room where genetic samples will be barcoded and stored in one of three liquid nitrogen cryovats, each accommodating 40,000 samples.

And the Gold Goes to… Speedos, Silicone or Shark Skins?

Biomimetics refers to employing inspiration from biological systems to help design or improve human-made materials and machines. One such inspiration comes from the skin of sharks, whose tiny toothlike denticles have long been suspected of improving the animals’ swimming speed and efficiency. To test this hypothesis—and to evaluate purported shark skin-like materials for boats, aircraft and racing swimwear—George V. Lauder and Johannes Oeffner conducted a series of experiments using a robotic flapping foil device, high-speed lasers and minute particles in the water to measure any increase in self-propelled swimming speed due to the drag-reducing properties of the surface texture.

The results, reported in The Journal of Experimental Biology, found that skins from fast-swimming mako and porbeagle sharks increased swimming speed by 12.5%. Silicone riblet material, created to reduce drag on sailboats and improve the fuel consumption of airplanes, was found to be 7.2% more efficient than smooth-surfaced silicone. But the “shark skin-like” Speedo® Fastskin II material generated no increase in speed when compared to that of a regular swimsuit.

And the Gold Goes to… Speedos, Silicone or Shark Skins?

The multi-year experiment involves eight enclosures, 150-foot square, four constructed on dark soil and four on sand dunes. The enclosures—each stocked with around a hundred mice, half with dark and half with light coats—are otherwise natural mouse habitats subject to predation.

To track each individual’s survival and reproductive success, every mouse is photographed and its coat color measured with a spectrophotometer, then visually tagged and radio chipped, and finally genetically sampled by the researchers. Every six weeks traps will be laid in the pens to check the frequencies of genetic variants and monitor changes. This data will help the researchers understand how genes are linked to physical appearance, and how both are linked to fitness and how quickly evolution occurs under these conditions. A review of the study design was published in Nature Reviews Genetics.


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Genetic Analysis Resolves the Evolutionary Relationships of Mollusks

Mollusks—snails, octopuses, clams and their relatives—are some of the most numerous and best studied of all animal groups. However, ill-defined relationships among the diverse mollusk species have stymied the search for answers to many evolutionary questions, such as whether shell-less mollusks diverged before the development of their shielded brethren, or if they originally had shells but lost them later in their evolution.

Results of advanced and extensive genetic analysis—and completion of the most comprehensive evolutionary tree for Mollusca to date—were reported by Gonzalo Giribet and colleagues in Nature.

The team sequenced nearly every gene in dozens of mollusk species before selecting 1,800 genes to be compared across them, thus reconstructing the mollusk phylogeny, or how all mollusk species are related evolutionarily.

Understanding the phylogeny of an animal is a critical first step in establishing homology among its morphological characters and determining how it developed and evolved over millions of years. The research also serves as proof-of-concept, demonstrating how genomic techniques can be successfully employed to answer difficult and elusive evolutionary questions even when using non-model organisms.

The researchers found, somewhat surprisingly, that bivalves, such as clams and oysters, are most closely related to gastropods like limpets, snails and slugs. They also determined that monoplacophorans, an ancient group of mollusks thought to be extinct for hundreds of millions of years until their rediscovery in the early 1950s, are most closely related to cephalopods like the chambered Nautilus, octopuses and squid.

Pigeon Flight Resembles That of Helicopters and Hummingbirds

To avoid obstacles, chase prey or evade predators, the ability of an animal to turn is of the utmost importance. Turning consists of changes in the path of travel and body orientation. For birds and other flying animals, this is achieved by modulating aerodynamic forces relative to gravity. Understanding how birds coordinate aerodynamic force production relative to their body position is the subject of research conducted by Ivo G. Ros and Andrew A. Biewener.

Ros and Biewener constructed a netted hallway containing a 90°-degree turn and trained pigeons (Columba livia) to fly between perches on either end. The pigeons’ bodies were marked in 16 places, and high-speed synchronized cameras were used to measure net aerodynamic force changes in body orientation as the birds flew and executed the turn at slow speeds. Surprisingly, the pigeon’s upstroke generated aerodynamic forces that were approximately 50% of those generated during the downstroke, nearly matching that of hummingbirds. They found that the pigeons used body rotations to change flight paths and continued to flap their wings as if they were flying straight ahead, analogous to helicopters and many flying insects.

The findings were reported in Proceedings of the National Academy of Sciences of the USA.

Fulbright Scholar Brian Farrell

From July 2011 to July 2012, Brian Farrell was in the Dominican Republic as a Fulbright Scholar to the Universidad Autónoma de Santo Domingo. Founded in 1538, it was the first university in the western hemisphere. Together with MCZ Associate Prof. Ruth Bastardo, Farrell established a UStyle learning laboratory where Dominican and visiting American undergraduates can work with natural history collections. They expanded the scope of lab-based activities so that there are now five students digitizing and curating their collections alongside their thesis work on topics ranging from fungi to bioacoustics.

Farrell curated two cabinets of MCZ specimens housed at USD that he collected in earlier years and established a 200-volume library of references for entomology/botany and evolution/biography and ecology. He hosted workshops in bioacoustics and bee systematics, and coauthored a biology textbook that draws on many examples and case studies from Hispaniola.

Farrell and Bastardo also inaugurated a new phase in the joint digital imaging program, a collaborative project to inventory insects in the National Botanical Garden. The program is modeled after the effort with the MCZ entomology type specimens and the Boston Harbor Islands in which students are trained by former students.

“This kind of cultural and scientific exchange, connecting small museums and universities with larger ones, is the future of natural history collections, as well as education in biology,” says Farrell. “Everyone benefits.”

Farrell’s efforts were funded by the US Fulbright Scholars Program, the David Rockefeller Center for Latin American Studies at Harvard, the National Science Foundation and the US Embassy in Santo Domingo.

MCZ History: Alfred Russel Wallace

Among Louis and Alexander Agassiz’s many important contributions to the world of natural history museums was the idea of designing public exhibits according to biogeography—clustering species from the collections based on where they occur naturally. This novel idea was immediately appreciated among its morphological characters and determining how it developed and evolved over millions of years. The research also serves as proof-of-concept, demonstrating how genomic techniques can be successfully employed to answer difficult and elusive evolutionary questions even when using non-model organisms.

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Ros and Biewener constructed a netted hallway containing a 90°-degree turn and trained pigeons (Columba livia) to fly between perches on either end. The pigeons’ bodies were marked in 16 places, and high-speed synchronized cameras were used to measure net aerodynamic force changes in body orientation as the birds flew and executed the turn at slow speeds. Surprisingly, the pigeon’s upstroke generated aerodynamic forces that were approximately 50% of those generated during the downstroke, nearly matching that of hummingbirds. They found that the pigeons used body rotations to change flight paths and continued to flap their wings as if they were flying straight ahead, analogous to helicopters and many flying insects.

The findings were reported in Proceedings of the National Academy of Sciences of the USA.

Fulbright Scholar Brian Farrell

From July 2011 to July 2012, Brian Farrell was in the Dominican Republic as a Fulbright Scholar to the Universidad Autónoma de Santo Domingo. Founded in 1538, it was the first university in the western hemisphere. Together with MCZ Associate Prof. Ruth Bastardo, Farrell established a UStyle learning laboratory where Dominican and visiting American undergraduates can work with natural history collections. They expanded the scope of lab-based activities so that there are now five students digitizing and curating their collections alongside their thesis work on topics ranging from fungi to bioacoustics.

Farrell curated two cabinets of MCZ specimens housed at USD that he collected in earlier years and established a 200-volume library of references for entomology/botany and evolution/biography and ecology. He hosted workshops in bioacoustics and bee systematics, and coauthored a biology textbook that draws on many examples and case studies from Hispaniola.

Farrell and Bastardo also inaugurated a new phase in the joint digital imaging program, a collaborative project to inventory insects in the National Botanical Garden. The program is modeled after the effort with the MCZ entomology type specimens and the Boston Harbor Islands in which students are trained by former students.

“This kind of cultural and scientific exchange, connecting small museums and universities with larger ones, is the future of natural history collections, as well as education in biology,” says Farrell. “Everyone benefits.”

Farrell’s efforts were funded by the US Fulbright Scholars Program, the David Rockefeller Center for Latin American Studies at Harvard, the National Science Foundation and the US Embassy in Santo Domingo.

MCZ History: Alfred Russel Wallace

Among Louis and Alexander Agassiz’s many important contributions to the world of natural history museums was the idea of designing public exhibits according to biogeography—clustering species from the collections based on where they occur naturally. This novel idea was immediately appreciated among its morphological characters and determining how it developed and evolved over millions of years. The research also serves as proof-of-concept, demonstrating how genomic techniques can be successfully employed to answer difficult and elusive evolutionary questions even when using non-model organisms.

The researchers found, somewhat surprisingly, that bivalves, such as clams and oysters, are most closely related to gastropods like limpets, snails and slugs. They also determined that monoplacophorans, an ancient group of mollusks thought to be extinct for hundreds of millions of years until their rediscovery in the early 1950s, are most closely related to cephalopods like the chambered Nautilus, octopuses and squid.

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The findings were reported in Proceedings of the National Academy of Sciences of the USA.
**Projects & Initiatives**

In May 2012, EOL (eol.org) reached the milestone of one million species pages, just over half of the 1.9 million recognized species on Earth. The EOL Learning + Education Group (education.eol.org), headquartered at the MCZ, is charged with developing tools to facilitate the use of EOL data and to develop innovative ways that EOL can be integrated into biodiversity learning.

**Updated Educational Tools**

EO Learning + Education Group released a major update to its education tools and applications (fieldguides.eol.org) with the redesigned Field Guide tool, the new Ecosystem Explorer (beta), and the new Bingo Game generator, all using the EOL collections. The EOL Field Guide tool organizes EOL species information by creating customized guides for individual projects or interests. Ecosystem Explorer allows anyone to build and explore ecosystems of species through an interactive graphing tool. Middle and high school students can build an “ecosystem” by providing a list of taxa and then defining the interactions. The Bingo Site is a fun way to interact with an EOL collection, especially for younger audiences, through the creation of an online or print format bingo game of EOL images. EOL Rubenstein Fellow

Rosario Castriota, a postdoctoral fellow in Herpetology and member of the Louse Lab, is a 2012 EOL Rubenstein Fellow. The program supports the research of scientists for up to one year to translate biodiversity research, databases and media into rich, online resources through the Encyclopedia of Life. Castriota is an evolutionary biologist who integrates data collected in the field, laboratory and museum collections. Her research interests are phylogenetics, population genetics, character evolution, conservation and taxonomy of Anolis lizards. During her fellowship she will create content, revise and complement previous EOL pages for all species of Anolis lizards.

**Education Innovation Challenge**

The EOL Education Innovation Challenge is an international competition that aims to stimulate the development and implementation of educational software tools, services, games and applications involving the Encyclopedia of Life. The Challenge is to use EOL content and services to create an engaging and educational application that will promote global learning activities focused on discovering and understanding the living world. The competition seeks to highlight the most scalable and innovative applications that facilitate learning, participation and sharing of information about biodiversity, ecological relationships and natural history.

**Google Earth Tours & Podcasts**

A new EOL Collection of Biodiversity on the Move Google Earth Tours uses scientific and geographic data to tell stories about biodiversity and empowers video to make the natural world come alive.

**Ernst Mayr Library's Visual Treasures**

Natural history illustrations are a rich source of knowledge for a broad spectrum of scholars and educators. Aside from their aesthetic qualities, detailed illustrations of plants and animals are critical, even today, for biologists tracing the taxonomic history of an organism or as documentation for lost or discarded specimens. Before the advent of photography, botanical and zoological artists were necessary partners for documentation of scientific expeditions.

“For centuries, natural history illustrations provided a window to biodiversity around the world for scientists and the public who could not travel,” says Constance Rinaldo, Librarian of the Ernst Mayr Library. “Thus artwork is integral to a natural history library collection.”

Notable recent acquisitions are two framed original prints from Audubon’s *Quadrupeds of North America* and original hand-colored engravings by Mark Catesby from The Natural History of Carolina Florida & the Bahama Islands, circa 1754. Dr. George C. Gorman (PhD in Biology, Harvard University '68) donated the prints.

To display the Ernst Mayr Library's historic illustrations, the Library is mounting periodic “flash” exhibits featuring priceless treasures that are generally not available for viewing. These exhibits have showcased ichthyological drawings, engravings and manuscripts from Special Collections such as the watercolors of Jacques Baptiste from the Thayer Expedition to Brazil (1865–1866) and the works of Andrew Garrett (1823–1887). Another exhibit of original illustrations and rare books for “Save the Frogs Day” featured images from John Edwards Holbrook’s *The Quadrupeds of North America* (1836).

And, in the next evolution of natural history illustration, Library staff plan to contribute to a new project centered at the Missouri Botanical Garden, called the “Art of Life.” The results of this project will include new software tools for the automated identification and description of visual resources to “liberate natural history illustrations from the digitized books and journals in the online Biodiversity Heritage Library.”

In Spring 2012, thanks to a gift by Roger Fleishmann (Harvard University ’56 and Harvard Law School ’59), Robert Young, Special Collections Librarian, and Gwendolyn Fougy Henry, Library Assistant and Archivist, started the year-long process of organizing, arranging, researching, conserving, describing, digitizing and assigning metadata to the negatives. Once digitized, the EML will link the images to publications and specimen images in the MCZ collections, making them available online for reference and research. The gift also enabled the purchase of a number of rare books, including a volume of the first edition of *De la nature* by Jean Baptiste René Robinet from 1761-1766.
Mollusks: Shelled Masters of the Marine Realm

The amazing diversity and history of mollusks are explored in a new exhibition curated by Gonzalo Giribet. Mollusks: Shelled Masters of the Marine Realm opened at the Harvard Museum of Natural History on February 18, 2012, and will run through February 2014. Featuring recent discoveries about mollusk evolutionary history and ongoing research by Prof. Giribet, colleagues and students in the Giribet laboratory, the exhibition engages the general public in the evolution of mollusks, their ecology and the many ways their lives intersect with ours.

Mollusks—nautiluses, clams, squid and other invertebrates—comprise almost a quarter of all known marine species. The exhibition includes hundreds of shells from the collections in the MCZ’s Department of Malacology, selected with the help of dozen or so visiting professionals. The MCZ’s collection, with close to 10 million specimens, is the largest in the world. Visitors can also see a limited selection of newly restored glass models of an octopus and other mollusks created in the mid to late 19th century by Leopold and Rudolph Blaschka.

Prof. Giribet delivered the exhibition’s opening lecture, “The Biology and Evolution of Mollusks,” on February 16.

Renovated Fishes Exhibition Opens

The redesigned Fishes exhibition, curated by George V. Lauder, with Karsten Hartle and Andrew Williston of the ichthyology department, opened at the Harvard Museum of Natural History on June 2, 2012. The new gallery features a refurbished space and displays that explain both fish biology and the science being conducted on the topic at Harvard. Fishes combines abundant real specimens with 3-D models, colorful graphic displays and an interactive multimedia station profiling the research of faculty, staff and students in the Lauder laboratory. Exhibition topics include the evolution of fish, in the world. Visitors can also see a limited selection of newly restored glass models of an octopus and other mollusks created in the mid to late 19th century by Leopold and Rudolph Blaschka.

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**Invertebrate Systematics**

*The evolutionary and biogeographic history of the armoured harvestmen—Laniocranius longibrachiatum based on ten molecular markers, with the description of two new families of Opiliones (Arachnida)* by Prashant Sharma and Gonzalo Giribet was the cover story in Invertebrata Systematica.

**General**

**George V. Lauder and colleagues covered the cover story**

“Bioinspiration from fish for smart material designs and functions” to Smart Materials and Structures.

**Matthias Gwinner and colleagues covered the cover story**

“Bioinspiration from fish for smart material designs and functions” to Smart Materials and Structures.

**MCZ PUBLICATIONS: CALENDAR YEAR 2011**

**MCZ PUBLICATIONS: CALENDAR YEAR 2011**

**ANNUAL REPORT 2011–2012**

**For the cover story of the Journal of the Royal Society Interface, George V. Lauder and colleagues published**

“Aquatic mimicking with compelling propaganda toxins to a novel locomotory strategy.”

**Roger Vila, Benjamin Goldman-Huetra, Naomi E. Pierce, Charles Marshall and colleagues contributed**

“Phylogeny and palaeoecology of Polyplectrotus blue butterflies show Beringia was a dynamic climate-regulated gateway to the New World” as the cover story of Proceedings of the Royal Society B.
**MCZ Grant Recipients**
**Academic Year 2011–2012**

Grants-In-Aid of Undergraduate Research (GUR)
These grants support research by Harvard undergraduates under faculty supervision. Priority is given to projects that utilize MCZ and Harvard University Herbaria (HUH) research collections, laboratories and facilities. Support for these grants comes from the MCZ's Myvanwy M. and George M. Dick Scholarship for Students and from HUH.

<table>
<thead>
<tr>
<th>Recipient</th>
<th>Faculty Sponsor/ Academic Dept.</th>
<th>Project Title</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicholas F. Brazeau</td>
<td>Zarin Machanda/ Human Evolutionary Biology</td>
<td>The effects of small-scale habitat heterogeneity on chimpanzee growth and body size</td>
<td>$2,500</td>
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<tr>
<td>Alexander M. Kim</td>
<td>Gonzalo Giribet/ Organismic and Evolutionary Biology</td>
<td>From the Gulf of Guinea to the bridge of the world: transoceanic dispersal and human-mediated invasion in two pantropical genera of freshwater prawns</td>
<td>$2,047</td>
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<tr>
<td>Young Mi Kwon</td>
<td>Hope E. Hoekstra/ Organismic and Evolutionary Biology</td>
<td>Paternal care of promiscuous Peromyscus maniculatus and monogamous Peromyscus polionotus</td>
<td>$1,925</td>
</tr>
<tr>
<td>Bianca M. Lec</td>
<td>Scott V. Edwards/ Organismic and Evolutionary Biology</td>
<td>The nose knows? Exploring the possibility of MHC-informed mate choice in a petrel</td>
<td>$2,500</td>
</tr>
<tr>
<td>Bonnie R. Lei</td>
<td>Scott V. Edwards/ Organismic and Evolutionary Biology</td>
<td>Multicellular phylogeography of the hairy woodpecker, Picoides villosus, in North America</td>
<td>$1,151</td>
</tr>
<tr>
<td>Amanda J. Lu</td>
<td>Scott V. Edwards/ Organismic and Evolutionary Biology</td>
<td>Recent changes in the genome of pathogen Mycoplasma gallisepticum in house finches</td>
<td>$2,293</td>
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<tr>
<td>Linda Y. Pan</td>
<td>Hope E. Hoekstra/ Organismic and Evolutionary Biology</td>
<td>The effects of cross-fostering on burrowing behavior ontogeny in deer mice (Peromyscus)</td>
<td>$2,060</td>
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<tr>
<td>Lauren L. Tomkinson</td>
<td>Naomi E. Pierce/ Organismic and Evolutionary Biology</td>
<td>Genentic and environmental effects on the social structure of the native pollinator, Augochlorella aurata</td>
<td>$2,100</td>
</tr>
<tr>
<td>Anna R. Veverica</td>
<td>Elena M. Kramer/ Organismic and Evolutionary Biology</td>
<td>Investigation of leaf morphology and development of transgenics in Apulegia</td>
<td>$2,500</td>
</tr>
<tr>
<td>Oliva G. Weeks</td>
<td>Ahef Abaharou/ Organismic and Evolutionary Biology</td>
<td>The molecular basis of dental development in the American alligator</td>
<td>$1,700</td>
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<tr>
<td>Total Awards</td>
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<td>$20,776</td>
</tr>
</tbody>
</table>

Putnam Expedition Grants
Putnam Expedition Grants are intended to support MCZ faculty-curators, postdoctoral fellows and graduate students in collecting specimens and data relating to the study of comparative zoology. Priority is given to projects that collect living specimens in regions where habitats are threatened or fossil specimens in regions most likely to hold important clues for unraveling evolutionary strategies. These grants are made possible by a gift from Mr. and Mrs. George Putnam, Jr., ’49.

<table>
<thead>
<tr>
<th>Recipient</th>
<th>MCZ Department</th>
<th>Project Title</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christopher C.M. Blake, Jack H. Boyle and Naomi E. Pierce</td>
<td>Entomology</td>
<td>Population genetics and ecology of African acacia ants</td>
<td>$8,749</td>
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<tr>
<td>Rowan D.H. Barrett</td>
<td>Mammalogy</td>
<td>Selection on genes in the wild</td>
<td>$14,350</td>
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<tr>
<td>Shane C. Campbell-Stotz</td>
<td>Herpetology</td>
<td>Physiological divergence within Anolis carinensis: an emerging reptile model</td>
<td>$9,088</td>
</tr>
<tr>
<td>James D. Craft</td>
<td>Entomology</td>
<td>Orchid bee movement in heterogeneous environments</td>
<td>$2,300</td>
</tr>
<tr>
<td>Vanessa L. Gonzalez</td>
<td>Invertebrate Zoology</td>
<td>Collecting Archichetodonida (Bivalvia: Heterodonta) in South Africa for resolving familial relationships within this group</td>
<td>$7,000</td>
</tr>
<tr>
<td>Christopher E. Laumer</td>
<td>Invertebrate Zoology</td>
<td>Surveying the diversity of protoclidid bathworms in temperate rainforests of the Pacific northwest</td>
<td>$6,244</td>
</tr>
<tr>
<td>Marie Manceau</td>
<td>Mammalogy</td>
<td>Pigment pattern evolution in beach mice</td>
<td>$3,230</td>
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<tr>
<td>Frank E. Rheindt</td>
<td>Ornithology</td>
<td>Collection of a new genus of tanager (Aves)</td>
<td>$2,230</td>
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<tr>
<td>Christian Rabeling</td>
<td>Entomology</td>
<td>The ants of Vanuatu: exploring the evolutionary ecology of an unknown island fauna</td>
<td>$15,610</td>
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<tr>
<td>Thomas J. Sanger</td>
<td>Herpetology</td>
<td>Why the long face? Field studies of the Crooked Island anole, Anolis brunnscus</td>
<td>$5,140</td>
</tr>
<tr>
<td>Total Awards</td>
<td></td>
<td></td>
<td>$73,941</td>
</tr>
</tbody>
</table>
Ernst Mayr Travel Grants in Animal Systematics

Ernst Mayr Grants support travel for research in animal systematics and are open to the scientific community worldwide. The principal objective of these grants is to stimulate taxonomic work on neglected taxa and/or poorly described species. Ernst Mayr Grants typically facilitate visits to institutional collections, with preference given to research that uses MCZ's collections. These grants are made possible by a gift from Professor and former MCZ Director Ernst Mayr.

<table>
<thead>
<tr>
<th>Recipient</th>
<th>Institutional Affiliation</th>
<th>Project Title</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brad J. Balukjian</td>
<td>University of California, Berkeley</td>
<td>Using integrative taxonomy to revise the radiation of Pseudolopes Kirkady (Heteroptera: Miridae) plant bugs from French Polynesia</td>
<td>$1,500</td>
</tr>
<tr>
<td>Diego Nunes Barbosa</td>
<td>Universidade Federal do Espírito Santo</td>
<td>Type analysis of the world Mesistinae (Hymenoptera: Bethylidae)</td>
<td>$1,500</td>
</tr>
<tr>
<td>Cristian F. Beza-Beza</td>
<td>Wichita State University</td>
<td>Revision of the Petrolipoidae orbicate species group (Coleoptera: Passalidae)</td>
<td>$1,500</td>
</tr>
<tr>
<td>Marek L. Borowiec</td>
<td>University of California, Davis</td>
<td>Generic revision of dorylomorph ants (Hymenoptera: Formicidae)</td>
<td>$1,500</td>
</tr>
<tr>
<td>Jimmy J. Cabra</td>
<td>São Paulo University, Instituto de Biociências</td>
<td>Revision and cladistics analysis of the ovipositing spider genus Glossothorax (Araneae, Tetragnathidae)</td>
<td>$1,500</td>
</tr>
<tr>
<td>Cheryang Cai</td>
<td>Nanjing Institute of Geology and Paleontology, Chinese Academy of Sciences</td>
<td>Taxonomic study on the Mesozoic Staphylinoidea beetles (Coleoptera) from China</td>
<td>$1,300</td>
</tr>
<tr>
<td>Andrew R. Cline</td>
<td>California Department of Food and Agriculture, University of California, Davis</td>
<td>Diversification of sap beetles (Coleoptera: Nitidulidae) in the neotropics: taking steps to unravel Darwin’s conundrum</td>
<td>$1,480</td>
</tr>
<tr>
<td>Yingying Cui</td>
<td>Capital Normal University, China</td>
<td>Investigation of intra-specific variability in selected Perman Gryllotalpidae from Carpenter's collection</td>
<td>$1,500</td>
</tr>
<tr>
<td>Liza E. Gomez Daglio</td>
<td>University of California, Merced</td>
<td>Hidden diversity of scyphozoan jellyfish</td>
<td>$1,450</td>
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<tr>
<td>Nataliya Dnestrovskaya (Parakalavina)</td>
<td>Moscow State University</td>
<td>Studies of polychaetous family Nephtyidae from the collection at the Museum of Comparative Zoology</td>
<td>$1,500</td>
</tr>
<tr>
<td>Regiane Salumino Ferreira</td>
<td>Universidade Federal de Piauí, Museu Paraense Emílio Goeldi</td>
<td>Polyrhachis collection: Examination of clubionids from Yale Peabody Museum of Natural History, New Haven</td>
<td>$998</td>
</tr>
<tr>
<td>Georg Fischer</td>
<td>California Academy of Sciences</td>
<td>Taxonomy of Malagasy Psephotula</td>
<td>$845</td>
</tr>
<tr>
<td>Lucia A. Fostowicz-Field</td>
<td>American Museum of Natural History</td>
<td>Taxonomic revision of a basal lagomorph, Palaearctos (Mammalia, Rodentia)</td>
<td>$750</td>
</tr>
<tr>
<td>Traci L. Gryzmal</td>
<td>University of California, Berkeley</td>
<td>Taxonomy and systematics of the Aderidae (Coleoptera: Tenebrionidae)</td>
<td>$1,333</td>
</tr>
<tr>
<td>Francisco Hita Garcia</td>
<td>California Academy of Sciences</td>
<td>Taxonomic revision of the procaraline genera Oxychymyna Roger, Procarabacterium Roger, and Phobosimyrma Mayr in the Malagasy zoogeographical region</td>
<td>$1,430</td>
</tr>
<tr>
<td>Ana Jassonik</td>
<td>University of Maryland, Smithsonian Institution</td>
<td>Taxonomic revision of the fungus-growing ant genus Seinoncythemax</td>
<td>$1,285</td>
</tr>
<tr>
<td>Gunther Kühler</td>
<td>Senckenberg Research Institute</td>
<td>Ants of Panama</td>
<td>$1,500</td>
</tr>
</tbody>
</table>

Miyata Grants

Miyata Grants are intended to enable herpetological fieldwork by MCZ graduate students and postdoctoral fellows. Non-herpetological fieldwork may be eligible when there are no deserving herpetological projects.

<table>
<thead>
<tr>
<th>Recipient</th>
<th>Institutional Affiliation</th>
<th>Project Title</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travis Ingram</td>
<td>Herpetology</td>
<td>A field study assessing the role of intraguild predation in interspecific interactions between Anolis lizards</td>
<td>$5,000</td>
</tr>
<tr>
<td>Zachary Lewis</td>
<td>Herpetology</td>
<td>Field trip to collect Hemidactylus scutulatus embryos on Cape Cod</td>
<td>$927</td>
</tr>
<tr>
<td>Martha Muñoz</td>
<td>Herpetology</td>
<td>Did Ernest Williams get it right? Testing the idea that behavior simultaneously impels and impedes evolution in Anolis cybotes (Squamata: Iguanidae)</td>
<td>$9,110</td>
</tr>
</tbody>
</table>

The Kenneth Miyata Endowment Fund in Herpetology was established in memory of Kenneth Miyata, Ph.D., 1980, and is made possible by gifts from Ken’s friends and colleagues.

<table>
<thead>
<tr>
<th>Recipient</th>
<th>Institutional Affiliation</th>
<th>Project Title</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexis Harrison</td>
<td>Herpetology</td>
<td>Impact of ornaments on evolution of the neotropical lizard genus Anolis</td>
<td>$5,000</td>
</tr>
<tr>
<td>Travis Ingram</td>
<td>Herpetology</td>
<td>A field study assessing the role of intraguild predation in interspecific interactions between Anolis lizards</td>
<td>$5,210</td>
</tr>
</tbody>
</table>

Total Awards $21,732
AWARDS & RECOGNITION

Emeritus
A.W. “Fuzz” Crompton was awarded the 2011 Romer-Simpson Medal of the Society of Vertebrate Paleontology. The society’s highest award honors sustained and outstanding scholarly excellence in the discipline of vertebrate paleontology.

Edward O. Wilson received the 2012 International Cosmos Prize. The prize is awarded to individuals whose research has achieved excellence and is recognized as contributing to a significant understanding of the relationships among living organisms.

Faculty
Scott Edwards was elected President of the Society for the Study of Evolution.

Gonzalo Giribet was elected a Fellow of the California Academy of Sciences and President of the Willi Hennig Society, and appointed as a Research Associate at the Field Museum of Natural History. Giribet also received a National Geographic Expeditions award for research in Amazonia.

Hopi Hoekstra received the 2011 Fannie Cox Prize for Excellence in Science Teaching. The award recognizes faculty who inspire students, instill in them a passion for science and effectively communicate complex ideas in introductory science courses.

Jonathan Losos received the Daniel Giraud Elliot Medal from the National Academy of Sciences in recognition of his research on adaptive radiation of Anolis lizards. Losos was also elected as a member of the American Academy of Arts and Sciences. The blog Anole Annals, edited by Losos and Loses, is named “Blog of the Week” by Rich Glor of the University of Rochester, and the blog Anole Annals was named “Blog of the Week” by Rich Glor of the University of Rochester, and the blog Anole Annals was named “Blog of the Week” by Rich Glor of the University of Rochester.

Postdocs
Rowan Barrett was recognized with the John Maynard Smith Prize from the European Society for Evolutionary Biology for his work on the genetics of adaptation to changing environments. He also received the Young Investigators Award from the American Society of Naturalists, the Natural Sciences and Engineering Research Council Banishing Fellowship, the Human Frontiers in Science Postdoctoral Fellowship and the National Geographic Research and Exploration Grant.

Prasad Sharma was declared the runner-up for his talk at the SICB DPCB meeting. Sharma also received a Certificate of Teaching Excellence from the Harvard Derek Bok Center, a National Science Foundation Postdoctoral Research Fellowship in Biology (PRFB) grant for research at the American Academy of Natural History and teaching at the City University of New York, and the Deakin-Royce Fellowship from the Australian Studies Committee for fieldwork in Queensland and Northern Territory, Australia.

The following graduate students received NSF Doctoral Dissertation Improvement Grants: Alexis Harrison, Emily Jacobs-Palmer, Hilary Metz and Martha Muñoz. In addition, Metz received the Robert A. Chapman Memorial Scholarship from Harvard and Muñoz received aSigma Xi Grant-in-Aid of Research. Katie Boronow, James Crall and Kara Fellich were given NSF Graduate Research Fellowships. Nicole Bedford received a James Mills Peirce Fellowship and a NSERC Postgraduate Scholarship. Ambika Kamath was given the Rufus B. Kellogg Fellowship from Amherst College. Evan Kingsley received the Merit/Graduate Society Early-career Research Fellowship and Robert A. Chapman Memorial Scholarship from Harvard.

Sarah Kocher received a USDA Postdoctoral Fellowship to study pollination biology of native bees.

Graduate Students
Elizabeth Sefton received the Derek B. Bok Award for Excellence in Graduate Student Teaching of Undergraduates. Chris Laumer is the winner of the Best Platform Presentation for his talk at the 2012 Society for Integrative & Comparative Biology Division of Phylogenetics and Comparative Biology (SICB DPCB) meeting.

In June, Farish A. Jenkins was honored in a symposium at the MCZ organized by Prof. Beth Brainerd (Brown University), Prof. Kenneth Dial (The University of Montana) and Prof. Neil Shubin (University of Chicago). The event, celebrating his 44-year career as a mentor, teacher and friend, included 19 presentations by Jenkins’s former students, lab members and colleagues. The presentations focused on themes consistent with his lifelong research in paleontology and functional morphology of transitional forms among major vertebrate clades.

Dial, a former postdoc in Jenkins’s lab, explains, “Farish’s profound impact on the lives and careers of countless students, postdoctoral fellows and research collaborators is acknowledged worldwide. His lectures are legendary, his teaching voice always articulate, passionate, focused and organized. Through his example, Farish’s colleagues have been shown the standard bar to the highest quality of teaching and research.” The papers will be integrated into chapters of an edited text in Jenkins’s honor.
FINANCIAL DATA
These charts describe the income and expenses of the Museum of Comparative Zoology in fiscal year 2012.

Endowment income funds much of the Museum's activities, including acquisition and maintenance of collections, faculty and staff salaries, capital projects, facilities renovation and maintenance. Included in Endowment income is the annual distribution, revenue generated from assets purchased through endowments and endowed funds decapitalized per donor request. Transfers include Harvard University-funded faculty research, financial support for the Ernst Mayr Library and other Harvard-funded projects. Other Income comprises miscellaneous income from publication subscriptions, royalties, sales and fees, and other cost recovery from other MCZ-sponsored activities. Reserves represent the amount of carry-forward balances used to cover an operating deficit. Overhead is funding paid from carry-forward balances to the MCZ to cover facilities and administrative costs for those projects. It is shown both as income (Overhead Earned) and expenses (Overhead Charged). Capital Projects include deployment of collections to the newly constructed space in the Northwest Building. Building expenses such as maintenance, facility improvements and utilities are captured in the Space & Occupancy category.

Operating Expenses consist of equipment purchases, supplies, consultant and conference fees, as well as annual subventions to the Department of Organismic and Evolutionary Biology (OEI) for administrative services. Support for MCZ-affiliated graduate students in OEI is included in Scholarships, Awards & Travel. Institutional Expenses are support for other University activities outside the MCZ, including the Faculty of Arts and Sciences, University initiatives and general operating support for the Harvard Museum of Natural History.