THE ACADEMY OF NATURAL SCIENCES

2009 ANNUAL REPORT
Dear Friends of the Academy,

“It was the best of times; it was the worst of times.” So begins the very well-known story of *A Tale of Two Cities* by Charles Dickens. While Dickens was writing about the French Revolution in the late 1700s, the same can be said about the Academy of Natural Sciences in 2009. The less-than-favorable economic climate created a situation where it was difficult for revenues to cover expenses, and we made a number of changes throughout the Academy to mitigate this problem. At the same time, we had one of our best years with respect to scientific work, education programs, and events for both children and adults.

In 2012, we will celebrate our 200th anniversary. In preparation for this historic birthday, we completed in 2009 a multi-year master plan for a major renovation of all of our physical facilities. While it may take many years to complete all elements of this plan, we are excited and eager to get started. The development of the master plan, funded by the Barra Foundation, the William Penn Foundation, and several of our Trustees, complements our commitment to our physical home, the activity inside it, and the foundations on which it sits.

The Academy’s collections, research, library, educational programming, and exhibits create a synergy for world-class work in the natural sciences. These foundational pieces of the Academy are the result of our deep history and the efforts of generations of tremendously dedicated people who have worked here during the past two centuries.

Just like our founders, we are constantly in search of a better understanding of life on earth. We continue our exploratory and collecting work in all corners of the globe. Natural history, however, is a changing field in terms of questions and methods in the scientific areas, as well as in the value that society places on building and disseminating knowledge of the natural world. The Academy is focused on staying current by embracing technology that can help answer new, more complex questions about organisms and ecosystems. We work to show the importance of understanding the way that humankind and nature coexist, now and in the future.

The research performed by our scientists occurs locally, regionally, nationally, and internationally. As part of their research, Academy scientists, as well as those from other institutions, regularly access our collections of more than 17 million biological specimens. Use of our collections enables scientists to answer questions about changes in climate, the percentage of different gases in the atmosphere, the growth or decline of the population of a particular species, and much more. Without access to the specimens in our collections—some of which were collected by Lewis and Clark, Thomas Jefferson, and John Audubon—conclusions on these issues would not be possible.

As always, we are committed to building the Academy family, and we sincerely thank you for being a part of it. The success of the Academy is possible only because of the support of our members and donors and the hard work of our talented staff. We offer our deep appreciation to all of you, and look forward to your continuing support in 2010 and beyond.

Sincerely,

Ted Daeschler  
R. James Macaleer  
Acting President & CEO  
Chairman of the Board
The history of the Academy of Natural Sciences reveals some rather curious timing. Founded by a group of amateur naturalists, the Academy was born just a few months shy of the War of 1812. After outgrowing several Philadelphia addresses in its early years—from a room above an apothecary to a renovated church to a newly constructed hall—the Academy laid its permanent foundation at Logan Circle in 1876, in the wake of the American Civil War. No matter the challenge faced by the nation, the Academy’s founders were determined to form and nurture this society dedicated to the study of natural science.

In 2009, in the middle of a global economic recession, the Academy solidified an ambitious master plan to propel the institution forward through its bicentennial in 2012 and into its third century. Together with architectural experts, Academy staff and board members explored and surveyed the building from the foundation up and designed a plan that will enable the Academy to reach its full potential in the years to come. The master planning process revealed that the Academy is a remarkable, problematic, irreplaceable building ideally located right in the heart of Philadelphia’s cultural district.

This annual report celebrates the physical foundation of the Academy and its five foundational centers of activity that carry out the Academy’s mission of the “encouragement and cultivation of the sciences.” The five core foundations of the Academy are:

**Collections:** The Academy’s 17 million specimens serve as a library of life on earth.

**Research:** Groundbreaking discoveries and advances in environmental science and biodiversity are made at the Academy every day.

**Education:** The Academy’s educational programs and events are designed to spark an interest in nature in people of all ages.

**Exhibits:** Informative and engaging displays bring the Academy’s behind-the-scenes collections and research to the public.

**Library:** More than 200,000 volumes and more than one million archival materials make the Academy’s Ewell Sale Stewart Library one of the finest in the country.

“Foundations” is a look at the past year and the Academy’s talented staff and scientists who work to continue the mission set out by the Academy’s founders nearly 200 years ago.
“The uses for these collections are infinite. We’re just tapping into the wealth of information that these specimens hold.”

— Dr. Ted Daeschler, Acting President and CEO
Collections

The Academy’s research collections contain specimens of some of the oldest, rarest, and most amazing things on earth. Once just a handful of specimens belonging to the Academy’s founders, the collections have grown to contain more than 17 million insects, mollusks, birds, mammals, fish, plants, and fossils—a vast biological catalog of past and present life on earth.

The Academy does more than just hold these specimens. More than 2,500 scientists from around the world accessed the Academy’s collections in 2009. These visiting researchers work alongside the Academy’s own scientists, who expand, curate, and study the collections every day. Every specimen represents a moment in time on earth and can answer questions about diversity, climate change, environmental degradation, and more. The earth and its ecosystems are changing, and these specimens help us understand how this change is taking place over time.

In 2009, the Academy’s collections increased by more than 200,000 items, including biological specimens, permanent diatom slides accessioned into the Diatom Herbarium, and images added to the Visual Resources for Ornithology (VIREO) bird image bank. These collections continue to be sources of data for new scientific endeavors.

Last year, Dr. Daniel Otte, senior curator in the Entomology Department, authored *Caribbean Crickets*, a 792-page monograph in which he describes 458 new cricket species and 19 new genera of crickets. In the past 35 years, he has added thousands of new specimens to the Academy’s Entomology Collection and created an online catalog of all of the world’s grasshoppers, crickets, katydids, and their relatives—some 24,570 species and counting. For his dedication to this field of natural science, as well as to the Academy, Otte was awarded the Joseph Leidy Award for scientific excellence last year. Awarded periodically to recognize excellence in the natural sciences, it is the Academy’s highest honor.

2009 also marked the official close of the All Catfish Species Inventory, a multi-institutional project began in 2003. The completion of this National Science Foundation-funded project resulted in a complete inventory of all the world’s catfish—one of the most successful groups of fish on the planet.

Whether in the field collecting or at a desk creating an online database, Academy scientists are committed to building knowledge of the living world and sharing it with the community.

Collection digitization efforts like Otte’s continued in other areas of the Academy in 2009. In the Botany Department, an Andrew W. Mellon Foundation grant funded a second year of the Latin American Plant Initiative (LAPI). Since the start of this type specimen digitization project in 2008, the Academy has added more than 6,000 of its type specimens to an international database of information from the world’s major herbaria.

LEFT: Elana Benamy, curatorial assistant in the Botany Department, carefully mounts delicate specimens on herbarium sheets.
“The Academy’s current research is vital in understanding how we impact our world. It will lead to a better understanding of how we can help to improve the planet for our children.”

— Dr. David Velinsky, Vice President for the Patrick Center for Environmental Research
Research

Academy scientists study the diversity of life found on our planet, the ecosystems in which they live, and how both species and ecosystems change over time. Results from Academy research provide a critical baseline of knowledge useful for determining human impacts on the environment, the effects of climate change, the water quality of streams, rivers, and wetlands, and understanding the evolution of life.

In 2009, Academy scientists conducted research expeditions as close as the banks of the Delaware River and as far as China, the Philippines, Mongolia, and Chile.

Locally, scientists in the Academy’s Patrick Center for Environmental Research studied sediment cores collected from marshes along the Delaware Bay. These muddy cores contain hundreds of years of information about the Delaware Estuary’s environmental past. Chemical analysis of the cores enabled scientists to “read” the changes that occurred in the estuary’s past, and make predictions about its future. The data will be used to guide the recovery of contaminated sites and by the officials who craft environmental regulations.

In our Ichthyology Department, Dr. Katriina Ilves is studying fishes from more tropical waters. Hired last year as the Academy’s Chaplin postdoctoral scientist, Ilves is assessing fish populations in Bahamian reefs to evaluate the effects of a half century of human impacts on the diversity of reef fishes, a project started 60 years ago by prominent Academy ichthyologists James Böhlke and Charles Chaplin. As part of her research, Ilves has peered into more than 800 jars of Bahamian fishes in the Ichthyology Collection as a first step in determining changes in a species’ community composition and whether the changes can be linked to any specific variable, like where a fish is on the food chain or climate change.

Ilves’ research will eventually take her into the field to survey new sites in the Bahamas, as well as to sites sampled decades ago by Böhlke and Chaplin.

Farther south, the Patrick Center’s Dr. Jerry Mead and Roger Thomas spent three weeks in southern Chile in early 2009 identifying field sites to test Mead’s hypothesis that the relationship between the width of a stream and riparian forest cover (trees on the banks of a natural waterway) can be attributed to human disturbance within the watershed. Mead and Thomas made a return trip in early 2010 to continue their field study. Future work in Chile includes mapping forests using field data and satellite images—these new maps will be a major advancement for conducting research and conservation in these rare and threatened areas.

They travel by boat, wade through streams, and scuba dive in crystal blue waters. While their methods vary, the focus of our scientists’ efforts is clear—to gather as much knowledge as possible about the power and fragility of the world’s ecosystems and use the information to aid in their protection and restoration.
“Science education at the Academy is designed to inspire and inform people about our natural world. These scientifically literate citizens will be the ones who really make a difference.”

— Jacque Genovesi, Senior Director of Education
large part of the excitement and importance of learning about the natural world is sharing that knowledge with the public. The Academy aims to ignite a passion for the natural world in visitors young and old. Just as the field of natural science evolves, so does the way in which the Academy educates the public.

The Academy is an advocate of hands-on, discovery-based learning. This educational style was the design for the new Academy Explorers Camp, a spring break and summer camp program for children ages 5-12. In its first summer last year, the program attracted 120 campers who made new friends and, together with Academy scientists and teacher-naturalists, explored themes from fossils to environmental sustainability.

In 2009, the Academy continued to extend its reach in Philadelphia and beyond. In collaboration with other local science institutions, the Academy established Science on Tap, a monthly science café held in an Old City bar where featured scientists spark conversation among interested citizens. The Academy participates in this program through the Center for Environmental Policy, now in its second year of existence, thanks to a William Penn Foundation grant awarded in 2009. The Center is a non-partisan, science-based forum where people—more than 5,700 in 2009—can discuss and examine key issues of environmental policy from both an academic and practical perspective.

Our educators know how important it is to teach science to children at an early age. It is equally critical for Philadelphia’s teachers to have a sound education in science. Additional funding from the Barra Foundation and PNC Grow Up Great with Science last year made possible the Academy’s continuation of A Head Start on Science: A Grow Up Great with Science Program, which was launched in 2008. This teacher development program—which is a collaboration between the Academy, the Please Touch Museum, and the School District of Philadelphia—aims to raise the standard for science education at the preschool level.

People of all ages can be inspired by science in any setting—a local taproom, in the weeds of the New Jersey Pine Barrens, in the Academy’s formal auditorium, or in Dinosaur Hall. No matter the place, Academy educators have a genuine passion about natural science and work to share that excitement with the public.
The number one question visitors ask in our exhibit galleries is “Is it real?” When we say yes, their eyes grow wide and all these great questions come tumbling out.

— Barbara Ceiga, Vice President for Public Operations
Exhibits

From the start, the Academy’s collection grew at a fantastic rate. After relocating in the 1820s, the Academy finally had the space to display its treasures for the public. At first, the Academy’s exhibits consisted mainly of cabinets filled with minerals and geological specimens. Later, the displays became more magnificent. In 1868, the Academy became the first museum in the world to display a fully articulated dinosaur skeleton—that of Hadrosaurus foulkii, discovered in New Jersey in 1858 by William Parker Foulke. This was an attraction so popular that the Academy had to institute its first admission fee in an attempt to manage the crowds.

Today, nearly 200 years later, the Academy creates exhibits that will inspire a lifelong passion for natural science in our visitors. Many exhibits showcase the science that is actively being pursued by Academy researchers. The Exhibits Department marries rare, beautiful, and scientifically important specimens from our collections with current research in order to craft intriguing stories and engaging experiences for our visitors. The Academy’s permanent displays, like our historic dioramas and the exhibits in Dinosaur Hall, represent important discoveries and expeditions made by Academy scientists over the past two centuries.

In 2009, the Academy established something rather unexpected in a science museum—an art gallery. Called the Art of Science Gallery, this space was created to encourage visitors to look at the natural world in a slightly different way. The gallery features regularly rotating displays by contemporary artists and from the Academy’s own art collection, and visual imagery created by Academy scientists in the course of their research. Within its first few months, the gallery featured stunning nature images by photographer Feodor Pitcairn, unique chalk drawings of undersea life by Philadelphia artist Caryn Babaian, and powerful black-and-white portraits of the Academy’s live animals by students from the University of the Arts.

Also transformed last year was the Academy’s main entrance, thanks to funds from the William Penn Foundation and the City of Philadelphia. Renovations revealed the lobby’s original marble and terrazzo floor from 1908, and included a new ADA-compliant admissions desk, energy-efficient lighting, and a dramatic first impression in the form of a skeletal mount of Elasmosaurus, a marine reptile described by Academy curator Edward Drinker Cope in 1868. The original fossils of this specimen are held in the Academy’s research collection. Flanking the cast of Elasmosaurus are displays featuring specimens representing every major department at the Academy, providing visitors with an exciting preview of what’s to come as they enter the museum.

The Academy’s exhibits strike a delicate balance between the classic and modern to highlight the science of the Academy—both past and present—in a way that will be remembered by visitors young and old.
“The Academy’s Library holds an extraordinary record of scientific thinking from the 16th century to the present day. It is both the starting point for any investigation and the final repository of any discoveries made.”

— Robert McCracken Peck, Senior Fellow of the Academy
The Academy’s Ewell Sale Stewart Library was established in 1812 at the founding meeting of the institution, starting with only five books and two maps. Today, scientists, visiting scholars, filmmakers, genealogists, students, and historians research all aspects of natural history through more than 200,000 published volumes and an Archives collection encompassing more than one million items. Arguably one of the finest natural history libraries in the country, its holdings span the last five centuries.

The international stature of the Academy’s Library was further enhanced last year when it joined the Biodiversity Heritage Library project, a worldwide effort by 12 major science institutions to digitize the legacy literature of biodiversity. This collaboration has to date digitized more than 80,000 volumes of biodiversity literature collected over 200 years and made it available online to anyone in the world. The Library’s extensive collection of biodiversity literature and digitization expertise made it a perfect candidate for the project, which offers an important new way to provide access to its collections.

Visitors and researchers have yet another unique resource in the Library thanks to the 2009 hire of Clare Flemming, the Academy’s Brooke Dolan Archivist. Flemming spends her days identifying and making available to researchers this collection of one-of-a-kind manuscripts, art, artifacts, film, photos, field notes, illustrations, and more. Flemming has more than 17 years of experience in the field and a deep knowledge of natural history developed through her previous positions at the American Museum of Natural History and the Explorer’s Club. The Archivist position was made possible by a generous grant from the Arcadia Foundation and a number of individual donors. It is named in honor of Brooke Dolan (1908–1945), a former Academy Trustee whose collections can be found in almost every department of the Academy.

The Academy’s Library holds some of the most beautiful and scientifically important works in the world—and some of the most rare. In 2009, the Academy published a full-color facsimile of the Arcana or Museum of Nature, which was originally published privately by amateur naturalist George Perry in London between 1810–11. It features beautiful color plates and eclectic text about mammals, birds, fishes, insects, shells, and fossils. Only 13 complete sets are known, one of which can be found in the Academy’s Library. The Academy’s facsimile edition features a full collation and systematic review by Richard E. Petit, a leading authority on the history of zoology, and brings the Arcana’s contents up to date.

The collections of the Ewell Sale Stewart Library and Archives form the foundation of natural science research at the Academy. The Academy’s Library is among the best in the world, supporting not only the work of Academy staff and scientists, but also other scholars, authors, and artists from around the globe.
JANUARY

22
Staff celebrates the Academy’s 197th birthday at the annual Founders’ Day celebration. Fifteen employees receive awards for reaching service milestones.

FEBRUARY

5

9
In the rotunda of the Capitol in Harrisburg, Academy scientists and staff meet with state legislators to discuss current research and treasures from the collections.

11
The Academy is the site for a public meeting for the Mayor’s Institute on City Design, featuring Mayor Michael Nutter.

14–16
The Academy offers the first Paleopalooza festival, a weekend-long celebration of fossils and dinosaurs. More than 4,600 visitors of all ages were wowed by the paleontological expertise of Academy scientists and dazzled by all things fossiliferous.

FEbruary (cont.)

16
Dannyelle Combs, an alumna of the Academy’s Women in Natural Sciences (WINS) program and graduate of Franklin & Marshall College, begins as the new WINS Coordinator.

18
The Academy announces the return of Academy Explorers Camp, a series of spring and summer science-themed camps. In its first year, the new program welcomes 120 campers.

MARCH

12

23
The Academy extends the popular special exhibit *Hadrosaurus foulkii: The Dinosaur That Changed the World* due to positive response from the public.

24
The Academy hosts the premiere of “Ocean Odyssey,” a high-definition underwater film by Feodor Pitcairn, a leading underwater videographer and former Academy board member.

27
Improvements to the Library Reading Room are complete—elegant new chairs, tables, and lamps make for a more attractive room and a more comfortable library experience.
The Academy participates in the first Science on Tap program, a monthly science café for those interested in discussing engaging science topics. The program is sponsored by the Academy, the American Philosophical Society, the Wagner Free Institute of Science, the Chemical Heritage Foundation, and the Mütter Museum.

The Academy Library is the setting for a hearing before a delegation of state legislators about the Academy’s capabilities in modeling restoration efforts on state streams and rivers with its Streamlined Watershed Integration Model (SWIM) program.

Volume 158 of the Proceedings of the Academy of Natural Sciences is published. It contains 15 scientific articles authored by 13 Academy staff and associates and descriptions of eight new species and a new genus.

Volunteer Coordinator Lois Kuter is elected president of the Board of the American Association for Museum Volunteers, a national network of museum volunteer program directors and volunteers.

The Academy co-sponsors a U.S. Congressional Field Hearing on Green Infrastructure with state representatives Alyson Schwartz and Chaka Fatah.

At its annual meeting, the Board of Trustees makes a motion to endorse the vision of the recently completed Master Plan, developed with SaylorGregg Architects and Ralph Appelbaum Associates.

The Academy opens the Geckos—Tails to Toepads exhibit. More than 75 live geckos representing 18 species of geckos are on display for visitors to admire. Crowds totaling more than 53,000 came to see these unique creatures in natural habitats during the exhibit’s 14-week run.

The Academy submits a self-study review to the American Association of Museums (AAM) reaccreditation committee.

The Academy holds a free screening of the new documentary, “The End of the Line” in an effort to raise global awareness of the impact of overfishing in our oceans.

A grant from the Andrew W. Mellon Foundation funds an international gathering at the Academy of the chief executives of eight leading natural history institutions located in the U.S., United Kingdom, France, the Netherlands, and South Africa. Among the topics discussed are possible new uses for science collections, digitization of type specimens, and better access to museum information.
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<th>JULY</th>
<th>AUGUST</th>
<th>OCTOBER</th>
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<td><strong>2</strong></td>
<td><strong>The Academy announces its participation as a contributing member to the Biodiversity Heritage Library, a group of 12 international natural history museum and botanical libraries and research institutions dedicated to digitizing the published literature on biodiversity.</strong></td>
<td><strong>15-16</strong></td>
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<td><strong>24-26</strong></td>
<td><strong>The Academy celebrates “Art of the Gecko,” an art-filled weekend dedicated to the unique beauty of the gecko. Members of a local art gallery and the general public create artwork inspired by the Geckos exhibit.</strong></td>
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<td><strong>SEPTEMBER</strong></td>
<td><strong>24</strong></td>
<td><strong>The second annual Shell Show Preview Party is held at the Academy the evening before the Shell Show opens to the public. The event raises more than $25,000 to support the Academy’s Malacology Department and the Center for Molluscan Studies.</strong></td>
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<td><strong>The Academy kicks off its new series of adult programs with “An Evening with Richard Wiese.” Wiese is an Emmy-winning journalist, outdoorsman, and respected field scientist, and a former president of the Explorers Club. His talk highlighted ways to live an active and nature-filled life.</strong></td>
<td><strong>10-11</strong></td>
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OCTOBER (cont.)

11 Dr. Ruth Patrick is inducted into the National Women’s Hall of Fame for her pioneering work in watershed science and freshwater ecology. October 11 is declared Ruth Patrick Day in the state of Kansas, Dr. Patrick’s home state.

12 The Academy presents its highest honor, the Joseph Leidy Award for scientific excellence, to Dr. Dan Otte, curator of the Entomology Department for the past 35 years and a world authority on crickets.

23 More than 650 Academy members brave rainy weather to meet staff and scientists and peek behind the scenes at the second annual Members’ Night event.

NOVEMBER

12 The Academy presents its highest honor, the Joseph Leidy Award for scientific excellence, to Dr. Dan Otte, curator of the Entomology Department for the past 35 years and a world authority on crickets.

17 The Academy’s Center for Environmental Policy hosts “An Evening with Polar Explorer Lonnie Dupre” describing his journey to the North Pole flying the Academy Expedition Flag.

15 The Academy hosts the Philadelphia International Sustainability Conference. More than 125 people attended, including government officials, business leaders, and delegates from Hunan Province, China.

DECEMBER

1 The Academy teams up with Temple University Press to reprint a facsimile edition of one of the world’s rarest works on natural history, George Perry’s Arcana or Museum of Nature. Only 13 complete sets of this early 19th-century nature magazine are known to exist; the Academy has one of them.

23 BirdsEye, a new birdwatching application for the iPhone, features images from the Academy’s VIREO collection.

3 The George Washington Carver exhibit opens. During its run at the Academy, it receives approximately 30,000 visitors.
On behalf of the Academy’s Board of Trustees, we wish to recognize and thank those supporters who have contributed to the Academy between January 1 and December 31, 2009. Your generosity helps to fund the Academy’s many programs of research and education, and we are tremendously grateful for your support.

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Lendemer, J.C., J. Kocourkova, and K. Knudsen. 2009. Studies in Lichens and Lichenicolous Fungi: more notes on taxa from...


**Financials (as of December 31, 2009)**

**Revenue and Support 2009**

- Admissions, Sales, and Fees: $2,470,270
- Contributions, Bequests, and Memberships: $2,735,449
- Endowment Income: $3,326,665
- Investment Activity: $4,903,408
- Research and Education Funding: $4,053,851
- State Appropriation: $204,600
- Other Income: $661,977
- **Total Revenue**: $18,356,220

**Expenses 2009**

- Collections and Research: $4,633,491
- Education and Exhibits: $3,650,104
- Building: $1,836,919
- Fundraising and Communications: $1,011,761
- General and Administrative: $1,648,326
- Depreciation and Other: $712,237
- Library: $602,961
- **Total Expenses**: $14,095,799
**Endowment Growth**

Year-end Endowment Market Value (MM)

- 2000 ....... $42,690
- 2001 ........ 39,794
- 2002 ......... 41,146
- 2003 ........ 47,463
- 2004 ........ 51,066
- 2005 ........ 53,230
- 2006 .......... 57,827
- 2007 .......... 64,743
- 2008 .......... 43,115
- 2009 .......... 47,439

**Net Assets**

Net Assets, Beginning of Year .... $62,313,142
Net Assets, End of Year ......... $66,573,563
Change in Net Assets .......... $4,260,421
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