

# YALE ENVIRONMENTAL NEWS

The Yale Peabody Museum of Natural History, Yale School of Forestry & Environmental Studies, and the Yale Institute for Biospheric Studies

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## F&ES' New Ultra-Green Home





# YALE OPENS ULTRA-GREEN KROON HALL



A

*Yale University has completed construction of a new ultra-green building—designed to use 50 percent less energy than a comparably sized modern building—for its School of Forestry & Environmental Studies (F&ES). Kroon Hall achieves its remarkable energy savings from a host of design elements and technical strategies molded to fit the building's New England weather and climate.*

A. The horizontal Douglas-fir louvers on the eastern façade deflect heat and glare during the summer.

B. The cavernous Knobloch Environment Center is meant for socializing, but students have also embraced it as a study space.



B









D

C. The building's east-west orientation maximizes solar heat gain during the winter. A 100-kilowatt rooftop array of photovoltaic panels provides 25 percent of the building's electricity.

D. The red oak wood paneling along the central staircase reminds visitors that forestry is still central to the school's program 109 years after its founding.



“Yale’s most sustainable building to date reflects the School’s mission and the intellectual passion of its faculty and students,” said Yale President Richard C. Levin. “It is an extraordinary design, and we hope its energy-saving concepts will be emulated widely and inspire others to advance green building even further.”

Designed by Hopkins Architects of Great Britain in partnership with Connecticut-based Centerbrook Architects and Planners, the new \$33.5 million home for F&ES is expected to achieve a platinum rating in the green-building certification program, Leadership in Energy and Environmental Design (LEED).

“More than a decade ago, F&ES set out to achieve an unconventional—even audacious—agenda, focused on building social capital, breaking with the past, and speaking to the future of environmentalism,” said former F&ES Dean Gus Speth. “We wanted a healthy place to study and work, but also wanted to bridge the gap between nature and people even in

the middle of the city. We have achieved that with this very special place. Our thanks go to Deputy Dean Alan Brewster and Professor Stephen Kellert. Their inspired leadership and hard work made possible a new home for the School that expresses in physical form our best traditions, values and aspirations.”

The building, located in the area of the University known as Science Hill, is named

*Half of Kroon Hall’s red oak paneling—15,000 board feet—came from the 7,840-acre Yale-Myers Forest in northern Connecticut, which is managed by the School and certified by the Forest Stewardship Council.*

for the family of benefactor and Yale College alumnus Richard Kroon. Providing 58,200 square feet of space, it is 57 feet wide and 218 feet long. With its high barrel-vaulted gable ends, simple lines, and curved rooftop, Kroon is a modernist blend of cathedral nave and Connecticut barn.

“Kroon Hall is on course to be among the greenest buildings in the United States,” said

Hopkins Director Michael Taylor. “True sustainability, however, is about more than improved quantitative performance. We have striven to create a piece of contemporary architecture that belongs in the context of the historic Yale campus. We think it will encourage interaction among its occupants and stand up to several generations of intense use. Using natural materials, such as Briar Hill Stone and red oak

from the University’s own sustainably harvested forests, we have tried to create a building that is warm in character, and a place where the School will instantly feel at home. Seeing how the faculty, staff, and students have immediately adopted the building is very satisfying.”

The building’s tall, thin shape and east-west orientation provide most of the heating and cooling. The lowest floor is set into a





E. A view of Kroon Hall from the southeast corner of Science Hill.

F. Looking up at photovoltaic panels embedded in glass in the building's skylight.

G. The Dean's office looks out onto Sachem's Wood, a green quad, and the south courtyard that links Kroon to Osborn Memorial Laboratories.



hillside, with only its south side exposed, providing thermal insulation, minimizing northern exposure and increasing the amount of natural light that enters the building from adjacent courtyards. The long south facade maximizes solar gain during the winter, and Douglas-fir louvers covering glass facades on the east and west ends keep out unwanted heat and glare. The building's shape, combined with the glass facades, enables daylight to provide much of the interior's illumination. Light and occupancy sensors dim artificial lighting when it is not needed.

Half of Kroon Hall's red oak paneling—15,000 board feet—came from the 7,840-acre Yale-Myers Forest in northern Connecticut, which is managed by the School and certified by the Forest Stewardship Council. Kroon's pale yellow exterior, composed of sandstone from Ohio, echoes other Yale buildings.

A 100-kilowatt rooftop array of photovoltaic panels will provide about 25 percent of the electricity for the building. Four 1,500-foot-

*A rainwater-harvesting system channels water from the roof and grounds to a garden in the south courtyard, where aquatic plants filter out sediment and contaminants.*

deep wells use the relatively constant 55-degree temperature of underground water to heat and cool the building, replacing the need for conventional boilers and air conditioning in the all-electric building. Four solar panels embedded in the southern facade provide the building with hot water. Renewable Energy Certificates have been purchased to provide the additional electricity needed for the building, reducing to zero the greenhouse gas emissions from Kroon Hall's operation. The estimate of Kroon Hall's energy use compared to a typical modern building is based on standards set by the American Society of Heating, Refrigerating and Air-Conditioning Engineers.

Exposed concrete walls and ceilings provide thermal stability by retaining heat in winter and cooling in summer. Fifty percent of the concrete mix is blast slag, a postindustrial recycled material. Instead of air being forced through overhead ducts, an energy-saving displacement ventilation system moves warm and cool air through an air

plenum and multiple diffusers in elevated floors. Low-velocity fans in the basement keep the air circulating throughout the building.

In winter, the ventilation system also transfers the heat from exhaust to incoming fresh air. In summer, air handling units spray water on the exhaust, reducing its temperature by up to 18 degrees through evaporation, and transfer the chilled air to incoming fresh air. In mild weather, Kroon's occupants assist in the ventilation by opening windows in response to an electronic, color-coded prompt system.

A rainwater-harvesting system channels water from the roof and grounds to a garden in the south courtyard, where aquatic plants filter out sediment and contaminants. The grey water, held in underground storage tanks, is then pumped back into Kroon for flushing toilets and is also used for irrigation. The system is expected to save 500,000 gallons of potable city water annually and to reduce the burden on city sewers by lessening the amount of storm runoff. A single driveway brings all vehicle traffic into a service node beneath the south courtyard, centralizing all pickups for trash and recycling and deliveries for the southwest corner of Science Hill.

The building's north and south courtyards add greatly to Kroon Hall's attractive environment for work and study. Centerbrook architect Mark Simon said the courtyards are almost as important as the building itself in creating a community from disparate buildings on Science Hill. "The courtyards are quintessentially Yale," said Simon. "We wanted to create great outdoor spaces where people want to go. For the first time in a century, people passing through the arch at Osborn Memorial Laboratories have a destination." The south courtyard is a raised platform, with a green roof of soil one-foot deep. The Olin Studio of Philadelphia landscaped the courtyards with 25 varieties of native plantings.

President Levin directed in 2005 that Yale reduce its greenhouse gas emissions from its facilities by 43 percent within 15 years. The University is making progress toward its goal through green construction such as Kroon Hall, campus-wide conservation measures and renewable energy projects.

## Sir Peter Crane Appointed F&ES Dean

Sir Peter Crane, a distinguished evolutionary biologist, has been appointed dean of the Yale School of Forestry & Environmental Studies.

Crane, John and Marion Sullivan University Professor in the Department of the Geophysical Sciences at the University of Chicago, is the former director of England's renowned Royal Botanic Gardens, Kew. Earlier in his career he also led the scientific programs at the Field Museum of Natural History in Chicago.

"Peter's impressive record of research and conservation achievements and his stellar leadership of important scientific organizations will make him a superb dean of Yale's environment school," President Richard Levin said. "I am confident that he will add to the school's century-long legacy of leading research and education in an era when advancing knowledge of the natural world and mankind's impact on it has never been more important."

Crane's research is focused on the diversity of plant life, including its origin and fossil history, its current status and its conservation and use. Seeking to understand large-scale patterns and processes of plant evolution, he has worked extensively on questions relating to the origin and early diversification of flowering plants and, together with Paul Kenrick, published *The Origin and Early Diversification of Land Plants: A Cladistic Study* in 1997. He has written several other books and authored nearly 200 articles and essays.

Prior to his current appointment at the University of Chicago, Crane served from 1999 to 2006 as director and chief executive of Kew, one of the most influential botanical gardens in the world. At Kew, which has the world's largest and most comprehensive collection of living plants, Crane worked on the initial establishment of the Millennium Seed Bank Project and a variety of other programs in plant conservation.

He directed the Field Museum from 1995 to 1999, where he established the Office of Environmental and Conservation Programs and had overall responsibility for the muse-

um's work in science and conservation. His association with the Field Museum began in 1982, and he served as curator, department chair and vice president. At the University of Chicago, Crane was a professor in the Department of the Geophysical Sciences from 1992 to 1999.

He holds a B.Sc. and a Ph.D. in botany from the University of Reading, United Kingdom. He is a fellow of the Royal Society, a foreign associate of the U.S. National Academy of Sciences, a foreign member of the Royal Swedish Academy of Sciences and a member of the German Academy of Sciences Leopoldina. He was a Senior Mellon Fellow of the Smithsonian Institution and

serves on the board of the Smithsonian's National Museum of Natural History. Crane also serves on the boards of the Global Crop Diversity Trust, based at the United Nations Food and Agriculture Organization in Rome, and the Gaylord and Dorothy Donnelley Foundation, which facilitates land conservation in the Chicago area and low country of South Carolina.

He was knighted in the United Kingdom in 2004 for

services to horticulture and conservation. His many awards include the Schuchert Award of the Paleontological Society, the Henry Allan Gleason Award of the New York Botanical Garden, the Hutchinson Medal of the Chicago Botanic Garden and the Botanical Society of America Centennial Award.

Crane's appointment at Yale as Carl W. Knobloch, Jr. Dean is effective September 1, and he succeeds Dean Gus Speth, who, Levin said, has provided "superb leadership" since 1999.

"The new dean will inherit a school that has seen remarkable growth in faculty, student applications and the availability of scholarship assistance over the past 10 years," Levin said. "Dean Speth, a passionate advocate for a greener Yale, has played a key role in increasing national and international awareness of climate issues."







**LETTER FROM JEFFREY J. PARK,  
DIRECTOR OF THE YALE INSTITUTE  
FOR BIOSPHERIC STUDIES**

The year 2009 is a watershed. As the global economy struggles to emerge from the deepest financial crisis in the lifetimes of most, we will discover whether our concern for the natural world retains the priority it had when our personal and institutional futures seemed more secure. Yale is leading by example, even as it places hard limits on immediate expenditures. Campus-wide budget cuts cannot be made without trauma, but University officers are cautiously optimistic that the trauma will be transient. Plans for the West Campus and the Yale Climate and Energy Institute (YCEI) continue to take shape, promising a steady investment in “biospheric” activities on campus. YIBS will facilitate the launch of YCEI by funding one of its postdoctoral awards.

The scope of YIBS activities continues to grow, even in a year of restrained budgets. The Yale Department of Anthropology and the School of Forestry & Environmental Studies have concluded a successful search for a YIBS-supported assistant professor in environmental anthropology. Two new junior-faculty searches have begun in the same two academic units: climate-change-impacts science (F&ES) and evolutionary demography (Anthropology). YIBS supports a multi-departmental search in the general area of microbial sciences, expected to commence in Fall 2009. Eight Donnelley and YIBS fellows were invited to campus next fall to begin two-year postdoctoral appointments for research projects ranging from a census of dinosaur teeth to the microbial remediation of polluted groundwater. Three YIBS research centers sponsored symposia this spring. Durland Fish and the YIBS Center for Eco-Epidemiology organized a two-day international symposium “Zoonoses: Diseases From Nature” that drew speakers from as far away as Mongolia. Richard Bribiescas and the YIBS Center for Human and Primate Reproductive Ecology and Elisabeth Vrba of the YIBS ECOSAVE Center each hosted one-day symposia that brought together researchers on campus, as well as

selected outside speakers, to share research results and ideas. The YIBS Faculty Council approved a research proposal by Associate Professor Peter Raymond to make long-term measurements of environmental data from Long Island Sound as part of the YIBS Center for Field Ecology.

Looking forward in 2009 YIBS will partner with YCEI and its new Director Rajendra Pachauri to sponsor a series of colloquia on how Yale, the United States and the world can best plan for future challenges in securing energy resources while managing the effects of climate change. YIBS also looks forward to securing a foothold for environmental and/or exobiological research as part of a projected West-Campus mecca for microbial sciences. In each enterprise YIBS will foster interdepartmental collaboration. Many voices in academia see peril in the rising tide of specialization in university research. Via its seminar series, postdoctoral appointments and faculty hires across the biospheric disciplines, YIBS swims against this tide.

The year 2009 brings a new administration in Washington DC, which promises fresh opportunities to apply the fruits of YIBS-supported environmental scholarship to important policy questions. One hazard that joins this promise, however, is when a new administration poaches big game from Yale’s faculty and staff. Professor Paul Anastas, the director of Yale University’s Center for Green Chemistry and Green Engineering, will soon take a leave from Yale’s chemistry department and School of Forestry & Environmental Studies to become Assistant Administrator for Research and Development in the Environmental Protection Agency. Paul’s guidance of students and colleagues in the white magic of sustainable technology will be missed at Yale, but will catalyze progress in Washington. Professor Anastas is not the only member of the YIBS community who will serve the nation in coming years. Others will be called. We wish them well.



# CONFERENCES, SEMINARS, SYMPOSIA



## YIBS ADDS FOUR CLIMATE AND ENERGY SEMINARS TO ITS FALL 2009 SCHEDULE

The Yale Institute for Biospheric Studies (YIBS) continues its sponsorship of the weekly YIBS/ESC Friday Luncheon Seminars that are held in the Class of 1954 Environmental Science Center (ESC) during the fall and spring semesters, and are a popular offering for students and faculty.

This fall, YIBS Director Jeffrey Park is happy to announce that the Fall 2009 schedule will include four seminars co-sponsored by the new Yale Climate and Energy Institute (YCEI) that will specifically address issues relating to climate and energy. These four seminars will be held in Kroon Hall, the new School of Forestry & Environmental Studies building on Prospect Street, and we are pleased to have Rajendra Pachauri as the first speaker in the fall who is the YCEI director. Dr. Pachauri will speak on Friday, September 11, 2009 on *Climate Change and Copenhagen: Scientific and Ethical Imperatives*.

For the full fall 2009 schedule, please visit the YIBS Web site at [www.yale.edu/yibs](http://www.yale.edu/yibs).

## The Spring 2009 list of speakers and their topics were:

**Rick Prum**, Chair and William Robertson Coe Professor of Ecology & Evolutionary Biology; Curator Vertebrate Zoology Peabody Museum; Professor, School of Forestry & Environmental Studies, *Self Assembly and Evolution of Color Producing Nanostructures in Bird Feathers* ■ **Gary Brudvig**, Eugene Higgins Professor, Chemistry & Molecular Biophysics & Biochemistry; Chair, Chemistry, *Solar Energy for Fuel Formation: Natural and Bioinspired Artificial Processes*; **Jennifer Marlon**, Research Assistant, University of Oregon Department of Geography, *Global fire history since the Last Glacial Maximum* ■ **David Beerling**, Professor, University of Sheffield; Edward P. Bass Distinguished Visiting Environmental Scholar, Yale University Department of Geology & Geophysics, *Co-evolution of stomata and land plants: from molecules to the Earth system* ■ **Chris Gilbert**, Gaylord Donnelley Postdoctoral Environmental Fellow, *Evolutionary History and Biogeography of A New Genus of African Monkey (Rungwecebus)* ■ **Alexey Fedorov**, Professor, Geology & Geophysics, *El Nino and global climate change: from the Pliocene to the future* ■ **Marta Wells**, Lecturer, Department of Ecology & Evolutionary Biology; Research Scientist, UCONN; *Canciones de Amor: Vibratory signals*

*in cryptic species of green lacewings (Neuroptera: Chrysopidae: Chrysoperla)* ■ **Michael Benton**, Professor of Vertebrate Paleontology, Department of Earth Sciences, University of Bristol; Edward P. Bass Distinguished Visiting Environmental Scholar, Yale University Department of Geology & Geophysics, *Investigating evolutionary radiations* ■ **Mary Beth Decker**, Research Scientist, Ecology & Evolutionary Biology; Lecturer, School of Forestry & Environmental Studies, *Jellyfish Blooms in Changing Coastal and Estuarine Ecosystems* ■ **John Grim**, Sr. Research Scientist, School of Forestry & Environmental Studies; Sr. Lecturer, Divinity School, *The Emerging Alliance of Religion and Ecology* ■ **Paul Turner**, Professor, Department of Ecology & Evolutionary Biology, *Biodiversity and Biogeography of Viruses* ■ **Michael Dodd**, Gaylord Donnelley Postdoctoral Environmental Fellow, *Photochemical Generation of Reactive Halogen Species under UVA Light and their Interactions with Dissolved Organic Matter in Saline Waters* ■ **Jih-Pai (Alex Lin)**, Yale Institute for Biospherics Studies (YIBS) Postdoctoral Environmental Fellow, *From a fossil assemblage to a paleoecological community: Time, organisms and environment based on the Kaili Biota and coeval Cambrian deposits of exceptional preservation*.



## Conference on Animal Diseases Presented at Yale School of Medicine

By Melissa Pheterson and Rose Rita Riccitelli



On April 3 and 4, 2009, a group of prominent researchers from around the globe gathered at Yale for the international forum *Zoonoses: Diseases from Nature*. Sponsored by the Yale Institute for Biospheric Studies (YIBS) and the YIBS Center for Eco-Epidemiology (CEE), the forum was organized by Dr. Durland Fish, professor in the division of Epidemiology of Microbial Diseases, to foster a cross-disciplinary approach to tracking and controlling zoonoses on a global scale. Fish also serves as CEE director, which sponsors forums on topics that integrate ecology with epidemiology to address issues pertaining to environmental and human health. "The overall objective was to bridge ecology with epidemiology, and we've put some planks in that bridge over these two days," said Fish.

Infectious disease experts, zoologists and biostatisticians from Cambridge to Kazakhstan convened at the Yale School of Public Health for its first conference on zoonoses, infectious diseases with the potential to spread from animals to humans. Rabies, Lyme disease, *Ebola* virus and avian flu were just a few of the illnesses discussed over the two days, through the lenses of both forecast modeling and surveillance and intervention.

"We're very committed to an interdisciplinary approach," Dean Paul Cleary told dozens of scientists and students gathered in Winslow Auditorium. "We need experts across the spec-

trum of science to build our work against the spread of infectious diseases."

Maria Diuk-Wasser, assistant professor in the division of Epidemiology of Microbial Diseases, presented research that pointed to climate as a reliable predictor of the risks of contracting Lyme disease, the U.S.'s most frequently reported vector-borne disease in humans. (Vector-borne zoonoses are transmitted through invertebrates such as insects.) Diuk-Wasser's research identified two main areas of Lyme-causing ticks, known as *Ixodes scapularis* nymphs: the Northeast and Upper Midwest. Based on tick samples and weather station data in 304 locations, a climate-based prediction of the nymphs' population density emerged to help estimate the risk of humans acquiring different strains of the disease in different severities. "Our model can be used by the public, physicians and public health agencies to better target Lyme disease prevention and control efforts," said Diuk-Wasser.

Alumna Annie Gatewood (Ph.D. '08), now a fellow at Children's Hospital Boston at Harvard Medical School, discussed climate modeling to predict the distribution of different genotypes of the bacteria that causes Lyme diseases in humans. Like Diuk-Wasser, with whom she collaborated, Gatewood underscored the importance of weather in gauging tick population and behavior, and subsequent risk of human infection. "Given all the discus-

sion of climate change, it's a relevant topic," said Gatewood.

Delegates from the centers of infectious diseases in Kazakhstan and Mongolia discussed their country's struggles with tracking outbreaks of plague and tick-borne zoonoses. Closer to home, Meg Flanagan, a researcher at the Defense Threat Reduction Agency in the U.S. Department of Defense, called for a multi-disciplinary strategy of "predictive virus surveillance" in countering the threat of viruses—which are classified as weapons of mass destruction (WMDs). "Emerging viruses may inflict harm upon humans, crops, livestock, economies and our stability," she said. To anticipate and control potential damage, she said, expert guidance is crucial for "looking in the right places, the right populations and the right viruses"—including zoonotic viruses proliferating in the wild.

Affirming the value of alliances, Peter Rabinowitz, director of clinical services for the Yale School of Medicine's Occupational and Environmental Medicine program, invoked the urgent need to combine federal agency data-banks tracking illnesses in humans and animals, in order to forecast outbreaks of diseases such as avian flu. "At issue is the limited sharing of data among health agencies, and the limited use of animal data to predict human risk," he said.

His talk, like many others, highlighted the need for collaboration among various disciplines to protect populations from animal-borne diseases. "The potential for an outbreak in the U.S. is low—but any outbreak should be regarded and addressed as a public health crisis," said Heinz Feldmann of the National Institutes of Health, referring to *Ebola* but echoing the exhortations of other speakers.

Speakers, their affiliations and their topics were: Mike Begon, Ph.D., National Center for Zoonosis Research, University of Liverpool, UK, *Zoonotic Coinfections*; Heinz Feldmann, M.D., National Institutes of Health (NIH), Rocky Mountain Laboratory, *Filoviruses: Ebola, Marburg*; Sarah Cleaveland, Ph.D., Department of Ecology & Evolutionary Biology, University of Glasgow, *Rabies – Africa*; Annie Gatewood Ph.D., Children's Hospital Boston at Harvard Medical School, *Climate modeling to predict the distribution of different genotypes of the*



*bacteria that causes Lyme diseases in human*; Rebecca Eisen, Ph.D., Bacterial Zoonoses Branch CDC, The Division of Vector Borne Infectious Diseases (DVVID), *Plague – US*; Sarah Randolph, D. Phil., Department of Zoology, Oxford University, UK, *Tick-borne Encephalitis Europe*; Jim Mills, Ph.D., Medical Ecology Unit, CDC Special Pathogens Branch, *Hantavirus – Americas*; Daniel Bausch, M.D., Department of Tropical Medicine, Tulane University, *Lassa fever – Africa*; Juergen Richt, DVM, Ph.D., National Animal Disease Center, USDA Agricultural Research Service, *Swine Influenza – US*; William Karesh, DVM, Field Veterinary Program, Wildlife Conservation Society, *Avian Influenza – Asia*; Uriel Kitron,

Ph.D., Department of Environmental Studies, Emory University, Atlanta, GA, *West Nile Virus – US*; Herwig Leirs, Ph.D., Evolutionary Biology Group, University of Antwerp, *Hantavirus – Europe*; Elizabeth Fichet-Calvet, Evolutionary Ecology Group, University of Antwerp, *Lassa fever – Africa*; Kenneth Gage, Ph.D., Bacterial Zoonoses Branch, CDC Division of Vector-Borne Infectious Disease, *Plague – US*; Maria Diuk-Wasser, Ph.D., Center for Eco-Epidemiology, Yale School of Public Health, *Lyme Disease – US*; Meg L. Flanagan, Ph.D., Advanced Systems and Concepts, Defense Threat Reduction Agency, Pennsylvania State University, *Predictive Virus Surveillance*; Leonid Burdelov, Ph.D., Center for Quarantine and

Zoonotic Diseases, Almaty, Kazakhstan, *Plague – Central Asia*; Bolaramaa Galdan, M.D., National Centre for Infectious Diseases, Ulaanbaatar, Mongolia, *Tick-Borne Zoonoses – Mongolia*; Gregory Glass, Ph.D., Bloomberg School of Public Health, Johns Hopkins University, *Hantavirus – US*; Peter Rabinowitz, M.D., Center for Epidemiology, Yale School of Medicine, *Avian Influenza – Global*.

The forum was recorded and the videos of the presentations are available on the Center's Web site at <http://www.yale.edu/yibs/research/CEE>.



#### YIBS ECOSAVE CENTER PRESENTS ALL-DAY SYMPOSIUM

On Friday, April 24, the YIBS ECOSAVE Center (ECOlogy and Systematics of Animals on the Verge of Extinction) presented an all day symposium *New Explorations, New Species, and New Systematic and Conservation Research*. Speakers and the topics they presented were:

**Rob DeSalle**, Curator of Invertebrate Zoology and Co-Director of Molecular Labs at the Museum of Natural History, *Whole genomes: the only way towards a robust Tree of Life?*; **Jeffrey Powell**, Professor of Ecology & Evolutionary Biology, *Conservation genetic work on Giant Galapagos tortoises* ■ **Gisella Caccone**, Senior Research Scientist and Lecturer, Yale Department of Ecology & Evolutionary Biology, School of Forestry & Environmental Studies and Epidemiology & Public Health and Director of the ECOSAVE Conservation Genetics Laboratory, *Conservation Genetic work on Galapagos marine iguanas* ■ **Jacques Gauthier**, Professor in the Yale Departments

of Geology & Geophysics and Ecology & Evolutionary Biology and Curator at the Yale Peabody Museum of Natural History, *The "Assembling the Tree of Life" initiative* ■ **Elisabeth Vrba**, Professor in the Yale Department of Geology & Geophysics Curator Vertebrate Paleontology at the Yale Peabody Museum of Natural History, and Faysal Bibi, Ph.D., *Paleontological exploration and research in East Africa and the Arabian Peninsula* ■ **Richard Prum**, William Robertson Coe Professor and Chair, Yale Department of Ecology and Evolutionary Biology, Curator Vertebrate Zoology, Yale Peabody Museum of Natural History, and Professor at the Yale

School of Forestry & Environmental Studies, and **Jake Musser**, *Using DNA sequence variation to estimate sexual selection in lekking birds*; and **Michael Donoghue**, Vice President of West Campus Planning & Program Development, Curator of Botany at the Peabody Museum of Natural History, G Evelyn Hutchinson Professor of Ecology & Evolutionary Biology and Professor of Forestry & Environmental Studies, and **Wendy Clement**, Postdoctoral associate in Ecology & Evolutionary Biology, *Pollination Ecology of the figs and close relatives in Papua New Guinea and Tanzania*.



## Center for Human and Primate Reproductive Ecology Symposium a Success!



On April 17, 2009, the Center for Human and Primate Reproductive Ecology (CHaPRE) held a day-long symposium in the Yale Class of 1954 Environmental Science Center and Department of Anthropology. The goal of the symposium was to assess current and future research directions in reproductive ecology and human evolutionary biology. The confer-

ence was attended by approximately fifty scholars and included speakers from the Yale faculty, graduate students and postdoctoral fellows, as well as scholars from Harvard University, the University of Pennsylvania, and the University of Nevada, Las Vegas. Topics covered a wide spectrum of research initiatives that have been supported by CHaPRE, including hormonal aspects of paternal investment among fathers in Jamaica, the reproductive ecology of wild chimpanzees in Uganda, and the effects of environmental hazards and risks on development among pre-school children in Puerto Rico.

The symposium began with opening remarks by CHaPRE director Professor Richard Bribiescas, who reported that over the past three years, CHaPRE sponsored research has resulted in over a dozen peer reviewed articles in several scientific journals and has

supported numerous faculty, graduate and undergraduate research and training initiatives, as well as facilitated domestic and international collaborations. The symposium was capped by a lecture by Professor Stephen Stearns of the Department of Ecology and Evolutionary Biology, Yale University. Stearns presented ongoing research on evidence for natural selection and evolution in a contemporary human population. According to Stearns, patterns of fertility and mortality drawn from the demographic database derived from the Framingham Heart Study shows that natural selection is indeed occurring within modern populations and that evolutionary demography and reproductive ecology research are integral for the advancement of human evolutionary biology. The symposium was sponsored by YIBS and the Department of Anthropology. For additional information, contact Professor Richard Bribiescas ([richard.bribiescas@yale.edu](mailto:richard.bribiescas@yale.edu), 203-432-3671).



### DR CRISTIÁN SAMPER DELIVERS BASS DISTINGUISHED LECTURE

On May 6, the Yale Institute for Biospheric Studies (YIBS) hosted a lecture by Dr. Cristián Samper, Director of the Natural History Museum at the Smithsonian Institution. His presentation, *Biodiversity in a Rapidly Changing World*, gave the audience a perspective of our natural world as it was in the past, a view of what it is now, and an insight of what we must accomplish in the future to ensure that it is preserved for future generations.

This lecture was sponsored by YIBS through the Edward P. Bass Distinguished Lecture Series.

Dr. Samper's lecture can be viewed by visiting the Yale Institute for Biospheric Studies Web site at [www.yale.edu/yibs](http://www.yale.edu/yibs)





# YALE PEABODY MUSEUM OF NATURAL HISTORY



## EVENTS

### PEABODY SUMMER YOUTH PROGRAMS

July and August 2009

Another summer of twelve fun, week-long programs for students entering 1st to 9th grade, on topics such as biodiversity, astronomy, natural science illustration, ancient survival skills, ancient cultures and archaeology. See the Yale Peabody Museum of Natural History Web site for details. [www.peabody.yale.edu](http://www.peabody.yale.edu)

### BIOBLITZ

July 31 & August 1, 2009

The Yale Peabody Museum of Natural History teams up with Connecticut's Beardsley Zoo in Bridgeport for our third annual BioBlitz—a 24-hour race to identify as many living organisms as possible in a specific area, in this case the town of Stratford. Join us on Saturday at the zoo just outside the entrance for the chance to observe scientists sorting and identifying collected specimens. For those interested in helping, field trips in Stratford are planned for both days. Visit [www.peabody.yale.edu/explore/bioblitz/](http://www.peabody.yale.edu/explore/bioblitz/) for details.

### DARWIN: 150 YEARS OF EVOLUTIONARY THINKING

On view through August 23, 2009

The Yale Peabody Museum of Natural History commemorates the occasion of the bicentenary of Charles Darwin's birth and the 150th anniversary of *On the Origin of Species* with a new original exhibition that places Darwin in the context of his times—including the influence of his contemporaries at Yale, James Dwight Dana and Othniel Charles Marsh—and explores how Darwin's ideas, and the concept of natural selection in particular, continue to support critical discoveries by scientists today.

### SUSTAINABLE CHOICES

On view through August 23, 2009

This interactive exhibition encourages visitors to rethink the effect of their daily activities on Earth and its resources, examines issues involving laundry, recycling, composting, light bulbs and transportation, and explains how to calculate your carbon footprint. Information about Yale's own sustainability initiatives is also highlighted.

### HALL OF MINERALS, EARTH, AND SPACE



The new multimedia gallery of the Yale Peabody Museum of Natural History's newest permanent hall explores our dependence on the Earth's mineral resources, highlights Connecticut's geology and showcases the diversity of minerals, ores and gemstones from the world-renowned collections in the Museum's Division of Mineralogy, including specimens that have not been on display for decades. (See pages 14–17 for the article on this exhibit in this issue). Supported by the National Science Foundation.

Information and updates at (203) 432-5050 and [www.peabody.yale.edu](http://www.peabody.yale.edu)

*The Age of Reptiles*, a mural by Rudolph F. Zallinger. ©1990, 2001, Peabody Museum of Natural History, Yale University, New Haven, Connecticut USA. All rights reserved.



### LAZO-WASEM NAMED EASTERN FELLOW

Eric Lazo-Wasem, Senior Collections Manager of the Yale Peabody Museum of Natural History's Division of Invertebrate Zoology, was among the first group of alumni welcomed back to Eastern Connecticut State University to participate in its new Eastern Fellows program, which recognizes ECSU alumni in the sciences who have distinguished themselves in their careers.

Lazo-Wasem participated with other alumni in a panel discussion at ECSU's Willimantic campus as part of the celebration of the opening of its new science building on October 21, 2008. The Eastern Fellows program is aimed at introducing current undergraduates to the specialized academic and work experiences of alumni.



# The Geologic Wonders of HoMES

By Jay Ague, Yale Professor of Geology & Geophysics and Curator, Division of Mineralogy

The Yale Peabody Museum of Natural History's (YPM) new permanent Hall of Minerals, Earth, and Space (HoMES) is designed to foster an appreciation for the wonders of our planet and, at the same time, show how our survival is dependent on global interactions among the solid Earth, its oceans and atmosphere.

The Museum gratefully acknowledges the Benjamin (Yale '62) and Barbara Zucker Family for their generous support of the Hall.

The first section of HoMES focuses on Earth and the Solar System, geology and Earth forces, and atmospheres, oceans and climate. The second gallery showcases YPM's world-class mineral collection, together with the story of Connecticut geology.

HoMES offers the opportunity to display much more of YPM's significant meteorite collection, the oldest such collection in the United States. This part of the hall describes what meteorites are, where they come from, and what they tell us about the history of our Solar System. It includes some of the Museum's most important specimens from its Division of Meteorites and Planetary Science,

among them a sample from the very first documented meteorite fall in the Americas, in Weston, Connecticut, in 1807, and the famous meteorite that crashed into a house in Wethersfield, Connecticut, in 1982.

A highlight of the meteorite story told here is the largest specimen on display, a historic 1,635-pound iron from Texas. An 826-pound iron from Meteorite Crater in Arizona accompanies a section that shows what happens when a giant meteorite strikes Earth. Also in this area are pieces of rock from Mars and the Moon, and a live feed from NASA with constantly changing information about our Solar System, the night sky, and other astronomical information.

The dynamic nature of Earth's systems can be seen in two interactive displays.

A spectacular four-foot globe based on the latest satellite imagery depicts the deepest ocean trenches, the most active volcanoes, the regions of greatest earthquake hazard, and the highest mountains, among other points of geologic interest. A digital video globe, the *Magic Planet*®, displays real-time weather and earthquake information and shows a dramatic animation of the shifting continents from 600 million years ago to today.

Earth's changing atmosphere is illustrated by a new diorama of the giant invertebrates of the Carboniferous Period 290 to 363 million years ago that were able to grow so large (a five-foot millipede-like arthropod and a dragonfly-like insect with a three-foot wingspan!) because of the high concentration of oxygen in the air at that time.

The long and distinguished history at Yale of the study of minerals has resulted in one of the world's most important collections. The "World of Minerals" in HoMES opens with some of the most spectacular specimens from the holdings in YPM's Division of Mineralogy, including asbestos fibers more than four feet

A



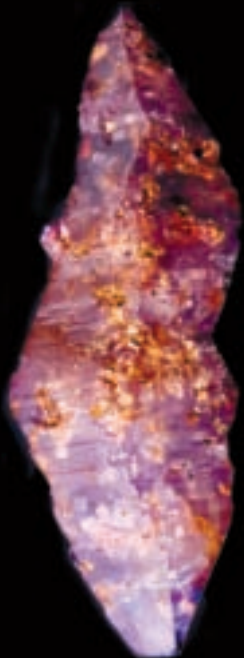
B

long, a giant twinned crystal of calcite, and an enormous mass of barite crystals weighing over 300 pounds. With more than 200 specimens, some of which have not been on display for decades, this gallery provides a complete overview of the amazing diversity of these natural objects. An interactive kiosk also explores some of these minerals in more detail, in particular their importance to human society. Intriguing properties such as fluorescence and radioactivity are explained and demonstrated. A special feature is the spectacular gemstones and jewelry from the Benjamin ('62) and Barbara Zucker Family Collection and the C. R. Beesley Collection, including the "Yale" blue sapphire, rare antique jewelry illustrating the history of diamond cutting, and suites of rubies and sapphires from around the globe.

Connecticut is a geologic jigsaw puzzle that was slowly assembled from great masses of continental crust, some ripped from what are today South America and Africa. A large interactive map of the state depicts the roots of ancient volcanoes and earthquake faults, together with other sites of interest such as the active Moodus earthquake zone. Spectacular Connecticut specimens, including the famous



C







#### CAPTIONS/CREDITS

**A.** The gem sapphires collected from near Ratnapura, Sri Lanka, are colored varieties of the same mineral – corundum – which, when pure, contains only aluminum and oxygen and is colorless. Blue sapphires have traces of iron and titanium, yellow sapphires contain iron, and purple sapphires have chromium, iron and titanium. The color changes from tip to tip because of different amounts of impurities in each crystal. Zucker Family (RCZ) Collection. Photo: Jerry Domian

**B.** The Crab Nebula. Photo credit: NASA

**C.** The “What Is A Meteorite?” exhibit in the Peabody’s new Hall of Minerals, Earth, and Space. The spectacular interactive four-foot globe that uses the latest satellite images to depict geologic forces is in the foreground. Photo: Sally Pallatto

**D.** View of Earth from the Mediterranean Sea to the Antarctica south polar ice cap, as seen by the crew of Apollo 17 traveling toward the Moon on December 7, 1972. Photo: NASA

**E.** Malachite from Bisbee, Arizona, USA. Photo: Terry Dagradi

**F.** Wulfenite from Red Cloud Mine, La Paz County, Arizona, USA. Photo: Terry Dagradi

**G.** This 17th century starburst European brooch in a silver setting contains a beautiful array of stunning rose cut diamonds. The rare, historical jewelry pieces in the exhibition are examples of how the art of gem cutting and polishing has developed through the centuries. Probably British, c. 1700. On loan from the Zucker Family (RCZ) Collection. Photo: Terry Dagradi

**H.** Kyanite with staurolite from Pizzo Forno, Ticino, Switzerland. Photo: Terry Dagradi

**I.** Rubies are red sapphires, which get their color from chromium trace impurities. These two natural uncut rubies embedded in marble are from Vietnam. C. R. Beesley Collection. Photo: Terry Dagradi

**J.** Silver from Kongsberg, Norway. Gigot d’Orcy Collection. Photo: Terry Dagradi

**K.** This group of barite crystals weighs well over 300 pounds (140 kilograms). The orthorhombic crystal form of barite and the three directions of cleavage are clearly visible. This magnificent specimen from Cheshire, Connecticut, was presented to the Yale Peabody Museum by Rollin Sanford (Yale B.A., 1831). Photo: William K Sacco

**L.** Calcite. Photo: Terry Dagradi



National Science Foundation  
Grant no. GEO-08078864

copper ore minerals from Bristol, illustrate the wealth of minerals in our own backyard.

In addition to the exhibits themselves, HoMES is also vital to the development of several new K–12 geology programs that will serve schools from around the state. With the support of a grant from the National Science Foundation, the Museum has created the Peabody Fellows Earth Science Program, a professional development opportunity for middle school educators. The program is training teachers and producing curriculum resources that focus on the interpretation of landforms that result from geologic forces in the state of Connecticut and across Earth. Working with

local teachers, Museum staff is producing curriculum materials that will include lesson plans, content information, model student assessment instruments, hands-on specimens and field trip activities (including web-based virtual fieldtrips!). These materials will be the basis of an intensive summer institute for teachers.

The Hall of Minerals, Earth, and Space shows us that we live on a dynamic, ever-changing planet. It explores the amazing geologic forces operating over billions of years that have shaped the Earth we know and will continue to do so for billions of years to come.

**E**



**F**



**G**



**H**



**I**

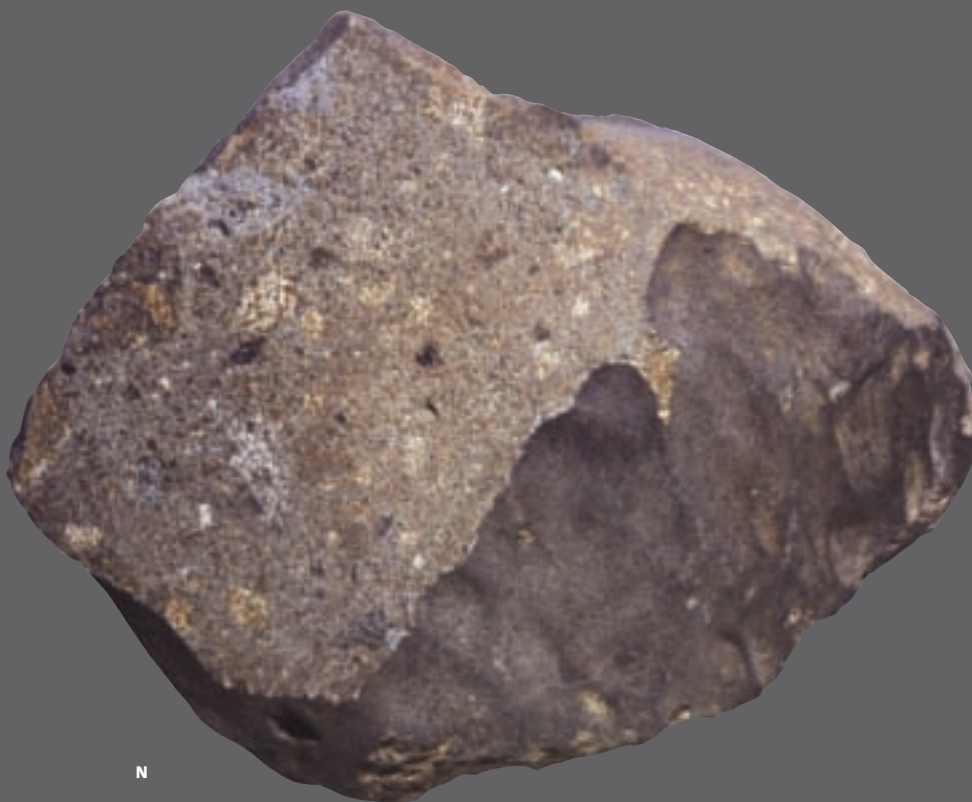


**M.** These garnet crystals are found in metamorphic rocks (schists) from Roxbury, Connecticut. Garnet is the Connecticut state mineral. Photo: Terry Dagradi

**N.** The first recorded fall of a meteorite in the New World, in 1807, was in Weston, Connecticut. The acquisition of specimens of this meteorite was the beginning of Yale's collection, the oldest in the United States. Photo: William K Sacco

**O.** The iron and titanium impurities in the "Yale Blue" Sapphire give it its deep rich color. This crystal was found near Mogok, Myanmar. Zucker Family (RCZ) Collection. Photo: Terry Dagradi

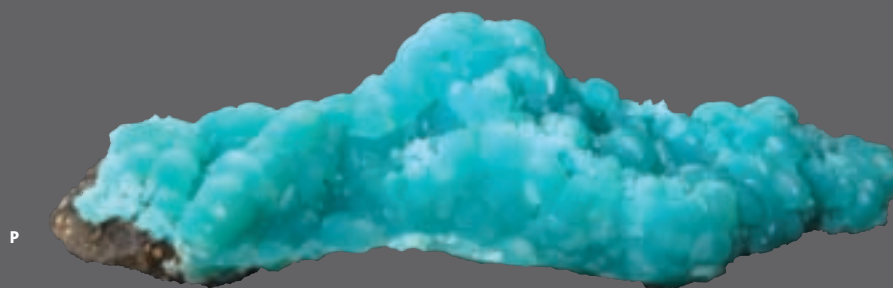
**P.** Smithsonite from Kelly Mine, Magdalena, New Mexico, USA. This mineral is named for mineralogist and chemist James Smithson, whose estate financed the establishment of the Smithsonian Institution in Washington, D.C. Photo: Terry Dagradi



N



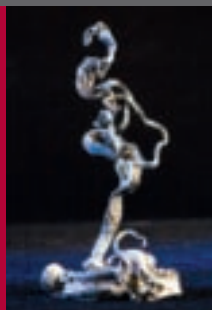
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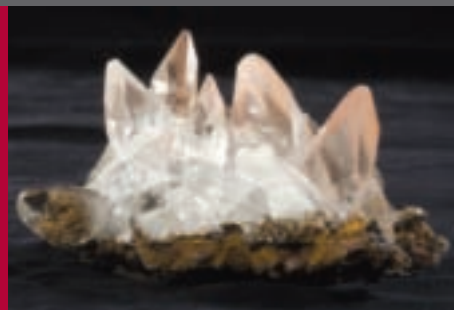
J



K



L



M







A specimen of the Cherry Darter, *Etheostoma etnieri*, collected in 2008 from the Caney Fork River System in Tennessee, USA.  
Photo credit: Thomas J. Near



This specimen of an Antarctic Plunderfish, *Pogonophryne barsukovi*, was collected in 2009 at the South Orkney Islands, Antarctica.  
Photo credit: Thomas J. Near

## Ichthyology Swims Along at the Yale Peabody Museum of Natural History

In a survey of museum fish research collections by the American Society of Ichthyologists and Herpetologists (ASIH) published in 1995 in the journal *Copeia*, the Yale Peabody Museum of Natural History's (YPM) ichthyology collection ranked ninth out of 118 participating collections in the percentage of its holdings represented by primary type specimens. Overall, the YPM collection was listed among the important ichthyology collections. This designation was due largely to the early 20th century work of the Bingham Oceanographic Foundation at Yale and other groups.

Activity in ichthyology picked up again at YPM with the arrival in 2006 of Thomas J. Near as an assistant professor in Yale's Department of Ecology & Evolutionary Biology. Near, whose research focuses on the evolutionary biology of fishes, was subsequently appointed an assistant curator in YPM's

Division of Vertebrate Zoology. Since then the ichthyology collection has grown from just over 15,100 specimen lots to over 21,000 specimen lots (an increase of approximately 39%), mainly through the activities of Near and the students and postdoctoral researchers in his laboratory group.

Notable recent additions to YPM's rapidly growing fish collection include new type specimens, 569 taxa new to the Division's fishes collection (including new genus and family names), approximately 13,400 tissue samples, and more than 420 specimen lots from Antarctica. In fact, specimens from Antarctica now outnumber ichthyology specimens from Europe!

The Division of Vertebrate Zoology holds collecting permits for fishes in more than half of states in the United States. Fieldwork typically begins as early as January each year and

includes behavioral observations and the collection of tissue samples for genetic analyses. Back home at YPM, Yale undergraduate students, divisional staff, graduate students, postdoctoral researchers, curatorial affiliates and Dr. Near sort, identify and catalogue these specimens into the state-of-the-art storage of the Class of 1954 Environmental Science Center. As a result of this process, a new darter species *Percina williamsi* was described by Near in 2007 from specimens in the YPM ichthyology collection.

In line with efforts to make its research collections more widely available to students, scientists and others, YPM will soon be a partner in FishNet, an international database of ichthyology collections where georeferenced data from YPM's ichthyology holdings will be publicly available. In 2007 YPM again participated in the ASIH survey of collections. Although the data are still being reviewed, the resurgence of activity in recent years in the Division of Vertebrate Zoology has already improved the scientific value of YPM's renowned ichthyology collection.

## Displays Celebrate Amphibians in Art and Science

A new exhibition of natural history works, on view from January through June in the first floor exhibition space at Yale's Class of 1954 Environmental Science Center, featured North American amphibians. Inspired by the Chinese "Year of the Frog" in 2008, *Amphibians of the Eastern United States* contains 34 works in a variety of media by members of the Greater New York Chapter of the Guild of Natural Science Illustrators ([www.gnsi.org](http://www.gnsi.org)), a professional nonprofit organization that strives to further the profession through education.

These juried works depict the complex set of behaviors, life-cycle patterns, unique ecological niches and even the evolutionary history of amphibians of the Northeast with a wide variety of styles and media, in both black and white and color, all researched to be scientifically accurate. Each painting and drawing has an explanation of its subject written by the artist.

Accompanying this exhibition was a display of specimens from the herpetology collections of the Yale Peabody Museum of Natural History's (YPM) Division of Vertebrate Zoology. *North America: Home of the Salamanders* discussed the recent fossil discoveries in China that bolster the case for an Asian origin of salamanders. But it was in North America, and especially in the Appalachians, where salamanders, an important and ancient element of our biota, came into their own: nine of the 10 living families of salamanders are found in North America, and five of those were found nowhere else. Learn more about YPM's collections at [www.peabody.yale.edu/collections/vz/](http://www.peabody.yale.edu/collections/vz/).

The Class of 1954 Environmental Science Center is an ideal location to showcase art and illustration in the natural sciences. YPM invites applications from artists willing to exhibit their work for up to six months.

For information and submission guidelines visit [www.peabody.yale.edu/collections/esc/esc\\_art.html](http://www.peabody.yale.edu/collections/esc/esc_art.html).



**Pine Barrens Tree Frog**  
(*Hyla andersonii*)  
Oil on canvas © 2008 Elayne Leighton. All rights reserved. This beautiful little frog, shown here on Stagger-bush (*Lyonia mariana*) in an Atlantic White Cedar (*Chamaecyparis thyoides*) bog, is native to the Pine Barrens of New Jersey, in a few isolated regions of New York State, and in southeastern states. Found in woodlands around vernal pools and bogs where the water has a relatively low pH, its habitat is threatened by residential and commercial development and by the effects of runoff.



**Northern Red-backed Salamander**  
(*Plethodon cinereus*)  
Watercolor and gouache on watercolor paper  
© 2008 Joanne K. Martin. All rights reserved. The most common amphibian species in Connecticut, this terrestrial salamander is 3 to 5 inches long from its nose to the tip of its tail when full grown. It is one of the 12 species found in Connecticut, and one of the four species found exclusively in the Northeast. Because it lives under leaf debris in wooded areas and urban yards and has a slender red to dark grey body with tiny legs, it can at first glance be mistaken for an earthworm.





A



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C

**A.** Yale graduate student Alex Dornburg on board the R/V *Victor Loosanoff* at the end of Saturday's trawl.  
Photo: Greg Watkins-Colwell

**B.** Neil Duncan, of the Division of Vertebrate Zoology at the American Museum of Natural History, and other members of the mammal team used traps to survey for small mammals.  
Photo: Jessica Slawsky

**C.** Camera traps and bait are used to capture images of mammals. Photo: Greg Watkins-Colwell

## Bioblitzing in Winter

By Gregory Watkins-Colwell, Museum Assistant, Division of Vertebrate Zoology

On an unseasonably warm February 27, 2009, scientists from the Yale Peabody Museum of Natural History (YPM) joined forces with staff from the Connecticut Audubon Society and others in the first winter bioblitz of Stratford, Connecticut. In fact, it was warmer during that day than it was on the first Stratford bioblitz in May 2007! The sunshine of early afternoon nevertheless soon gave way to colder weather, with wind and rain arriving just in time for the 3:00 p.m. start of the 24-hour event.

The goal of a bioblitz is to gather data on the biodiversity of a specific location by surveying and identifying as many plant, animal and fungi species as possible in the area within 24 hours. For the last several years YPM has collaborated with Connecticut's Beardsley Zoo, with significant help from many organizations, to organize bioblitz events in Stratford. A unique feature of this effort is the survey of the same town at different seasons, a strategy that aims to provide a better understanding of the seasonal variation in species diversity. Because scientists look at the same places repeatedly, and through different seasons, we can get a more complete picture of the total species diversity within the town.

Teams participating in the winter bioblitz covered all the same taxonomic groups surveyed in spring or summer, but used some different survey methods. For example, in winter freshwater fish cannot be surveyed with seine nets because water is frozen, and butterfly nets were not needed for the insect survey. Some teams benefited from the snow and mud. The mammal team found tracks much more easily and the botany team could account for some plant species that were likely present in May but were more easily seen without their leaves.

As with past surveys, the local National Oceanic and Atmospheric Association (NOAA) National Marine Fisheries Service once again allowed bioblitz volunteers on the R/V *Victor Loosanoff* to trawl for fish and invertebrate species offshore near Stratford, and also to survey for waterfowl. This effort counted only four

species of fish, but a very large group of ducks: approximately 5,000 white-winged and surf scoters.

In total, we found 257 species during the 24 hours of this winter bioblitz. This is quite a bit lower than the two previous Stratford surveys in 2007 and 2008, each done during the month of May, when we counted 637 and 914 species, respectively. However, of the 257 species counted during winter, 53 had not been found in previous surveys of Stratford. While most of these 53 species were birds or fungi, during the winter bioblitz we found at least one species from every group (except amphibians and reptiles) that had not previously been seen.

Later this year teams will again descend on Stratford to do it all over again, this time in the heat of summer. The public is invited to participate in some field events in Stratford and to observe the field teams' processing of specimens at their base of operations at Connecticut's Beardsley Zoo in Bridgeport.

For details and directions visit [www.peabody.yale.edu/explore/bioblitz/](http://www.peabody.yale.edu/explore/bioblitz/).



ABOVE: Excavating the fossil skeleton of a small crocodile from the Baynunah, United Arab Emirates, with Peabody preparator Marilyn Fox (left).

LEFT: Faysal Bibi.

## The 2009 Simpson Prize Recognizes Research on Miocene Fossils

The Yale Peabody Museum of Natural History (YPM) is pleased to present its 2009 George Gaylord Simpson Prize to Faysal Bibi, a doctoral student in the Yale Department of Geology & Geophysics, for his 2007 paper “Dietary niche partitioning among fossil bovids in late Miocene C<sub>3</sub> habitats: Consilience of functional morphology and stable isotope analysis,” published in *Palaeogeography, Palaeoclimatology, Palaeoecology* 253(3-4):529–538.

Faysal Bibi’s research investigates the evolutionary history of mammals over the last 10 million years of life history through his work on fossils, mainly from Ethiopia, Kenya, Pakistan and the United Arab Emirates. For his doctoral thesis, Faysal focused on the fossil record of bovids (antelopes, sheep and oxen).

One particular avenue of this work concerns the adaptation of herbivores such as

bovids to changing vegetational habitats. For example, major environmental changes that took place around 7 million years ago produced the earliest tropical grassland ecosystems, akin to those of modern savannas, and also was the time of the earliest representatives of modern grazing bovids such as bovins (buffalo, cattle, yak, bison and banteng, among others).

Faysal is studying the way in which these animals evolved adaptations to survive in grassland environments. His work has proposed a southern Asian origin for the bovine group, and dispersal from southern Asia to Arabia and Africa in conjunction with the global spread of tropical grasses at low latitudes around 7 million years ago. Faysal also works on describing new bovid fossils from Kenya, Ethiopia and Turkey.

Additionally, Faysal Bibi is co-director with Andrew Hill, the J. Clayton Stephenson Professor of Anthropology and Curator of Anthropology at YPM, of the Baynunah Paleontology Project that leads annual expeditions to recover fossils from the deserts of Abu Dhabi, United Arab Emirates.

The George Gaylord Simpson Prize is awarded annually by YPM to a Yale University graduate student or recent doctoral candidate for a paper concerning evolution and the fossil record. The prize is named for George Gaylord Simpson (1902–1984; Yale Ph.D. ’26), the most influential paleontologist of the 20th century and a major proponent of the modern evolutionary synthesis.





the female  
darker yellow  
the male  
green back  
yellow throat

# Endless Forms, Shared Spaces

The Yale Peabody Museum of Natural History (YPM) and Yale Center for British Art (YCBA) collaborate on the occasion of Charles Darwin's bicentenary birthday and the 150th anniversary of *On the Origin of Species*.

In 2009 the YCBA brought together art and science in its exhibition *Endless Forms: Charles Darwin, Natural Science and the Visual Arts*, which explored artwork depicting the scientific themes of the 18th and 19th centuries, ideas current when Charles Darwin worked as a geologist and naturalist. More than one hundred institutions, including the Tate Britain, the British Museum, the National Gallery, London, and the Smithsonian American Art Museum, loaned over two hundred paintings, drawings, sculptures, early photographs, caricatures and illustrated books to the exhibition. Also displayed at YCBA were natural objects from the Yale Peabody Museum of Natural History — including mounted birds, feathers, invertebrate, vertebrate and plant fossils, minerals and beetles — that illustrate some of the principles embodied by the artwork. These were shown beside works by J. M. W. Turner, Thomas Cole, Thomas Moran, Paul Cézanne and Claude Monet. While the juxtaposition of art and science at first may seem fanciful, the two were deeply intertwined in Victorian intellectual society. The scientific discoveries of Darwin and his contemporaries provided inspiration to artists of the time. In turn, scientists were greatly influenced by art.

Preparation for the exhibition itself blurred the lines between art and nature. One object, an ornate fan from the Gallery of Costume, Manchester City Galleries, is constructed of feathers, beetles and a stuffed hummingbird. Kristof Zyskowski, collections manager of YPM Division of Vertebrate Zoology, was able to identify the many bird feathers and beetles used in the fan, so that the object could be shipped in compliance with the regulations of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which restricts the transport of endangered species.

The combination of natural objects with art and books on display also required consid-

eration. Precautions were needed to minimize the contact between several Galápagos finches placed in the same case with rare books. The birds were sealed within an internal Lucite® display chamber and had been frozen to eliminate any microorganisms or pests, a common practice observed when ornithological specimens return from loan or exhibit, and when they first arrive from field collection.

The two Yale museums also collaborated on public events centered on the *Endless Forms* exhibition. A graduate student symposium held at the YCBA included a breakout session in the gallery with Elisabeth Fairman, curator of the exhibition and the YCBA's Senior Curator of Rare Books and Manuscripts, and Susan Butts, Collections Manager of the YPM Division of Invertebrate Paleontology, who discussed the difficulties and many benefits of the collaboration. Symposium registrants were given tours of the YPM collections and its conservation laboratory. Susan Butts and Yale Professor of Geology & Geophysics Brian Skinner led gallery talks. The exhibition has also been used as a forum for Professor Richard Prum's Ornithology laboratory in the Yale Department of Ecology & Evolutionary Biology, and for the Biology of Gender and Sexuality laboratory in Yale's Women's, Gender, and Sexuality Studies Program.

*Picture This! Widgeons and Pigeons!* was a two-part family program held at both museums. The first part at YPM featured live pigeons bred for variations in color and feather formations. The following weekend families came to the YCBA to see footage of the incredible courtship ritual of the argus pheasant and to create mixed media three-dimensional bird models of their own.

*Endless Forms: Charles Darwin, Natural Science and the Visual Arts* was on view at the Yale Center for British Art through May 3, 2009. Additional information about the Darwin exhibition can be found at [www.darwinendlessforms.org](http://www.darwinendlessforms.org).

For other events at Yale during the Year of Darwin visit <http://opa.yale.edu/sp/darwin/>.



B



C

A. John William Inchbold, *Suggestive Study, Paradise* (Head of a Girl and a Bird of Paradise), 1864–1965, watercolor over graphite, Tate, London. Purchased as part of the Oppé collection, with assistance from the National Lottery through the Heritage Lottery Fund, 1996. Bird of Paradise feathers and stuffed specimens from the Peabody collections, including a historical specimen in which a bird of paradise head and feathers were dyed black for a mourning costume, were on display beside Inchbold's *Suggestive Study, Paradise*.

B. "Ideal Section of a Portion of the Earth's Crust" from *Geology and Mineralogy Considered with Reference to Natural Theology: Bridgewater Treatise* (detail) by Rev. William Buckland, London: William Pickering, 1836, vol. 2, hand-colored lithographic engraving, private collection. Buckland's geologic cross-section of the crust recognized the application of fossils in providing relative ages for the rock units they are contained within. Buckland recognized the similarities between extinct and extant organisms, but denied that extant species could occur from the "gradual transmutation of one species into another."

C. Robert Farren, *Duria Antiquior (An Earlier Dorset)*, ca. 1850, oil on canvas, Sedgwick Museum of Earth Sciences, University of Cambridge. Many Peabody vertebrate fossils, collected near or at Dorset, are on display alongside Farren's painting, *An Earlier Dorset*.





## Michael Donoghue Named First Vice President for Yale's West Campus

Michael Donoghue, the G. Evelyn Hutchinson Professor of Ecology and Evolutionary Biology and past director of the Yale Peabody Museum of Natural History, has been named the first Vice President for West Campus Planning and Program Development.

In this newly established position, a three-year appointment that began October 1, 2008, Professor Donoghue is responsible for developing an overall blueprint for program initiatives on Yale's new West Campus. Yale acquired the 136-acre West Campus property straddling Orange and West Haven, formerly the Bayer HealthCare complex, in 2007 as part of its \$1 billion commitment to strengthening science and medical research at the University. The property features 17 buildings with more than half a million square feet of state-of-the-art laboratory space alone, in addition to offices, warehouses and other facilities. A full-time childcare center and some ongoing laboratory work are already on the site.

Donoghue is working with faculty to develop the specific details of new research programs and core facilities, and also coordinating the program for library, museum and other initiatives at West Campus. "Michael's background as both a leading scientist and a museum director makes him uniquely qualified for this newly created position," said President Richard Levin in announcing the appointment. A series of multidisciplinary research institutes that focus on specific topics like cell biology and microbiology will draw on the resources of the core facilities, and will also attract scientists to the University to join in collaborative research efforts with current faculty.

The West Campus programs will not only greatly expand on the biomedical research at Yale, serving as a nexus for interdisciplinary research programs addressing crucial issues affecting human health and quality of life, but Donoghue also plans to promote a "collections campus," again organized into core facilities, to encourage synergy among Yale's museums, libraries and arts communities. These would

include a digitization facility for 3-D imaging of objects from across a range of Yale's collections and a shared conservation center for the care of art objects and archaeological artifacts. About 60,000 square feet of the West Campus space has already been set aside for specimens from the Peabody Museum of Natural History's collections.

Donoghue joined the Yale faculty in 2000, serving as chair of the Department of Ecology & Evolutionary Biology from 2001 to 2002. He also holds faculty appointments in Yale's Department of Geology & Geophysics and in the School of Forestry & Environmental Studies. Since joining Yale, Donoghue has been a member of dozens of scientific committees, including the Yale Institute for Biospheric Studies, the Environmental Science Center Committee, the Biological Sciences Advisory Committee and the Yale Center for International and Area Studies, in addition to serving on the board of directors for New Haven's International Festival of Arts and Ideas.

His research, which has taken him to Latin America and China, focuses on the diversity and evolution of plants. A leader in the movement to reconstruct the entire Tree of Life, he is the author of more than 180 scientific papers and has received some 40 research grants. For the past decade he has played a prominent role in DIVERSITAS, an international scientific organization focused on biodiversity and global change. In addition to his outstanding research, he has supervised dozens of graduate students and has served on several national scientific councils and committees throughout his career. He was a Senior Mellon Fellow at the Smithsonian Institution from 1992 to 1994 and became a Fellow of the American Association for the Advancement of Science in 1997. In 2005 he was elected to the U.S. National Academy of Sciences and, in 2008, as a Fellow of the American Academy of Arts and Sciences.

# Peabody Collections Go West

By Christopher A. Norris, Senior Collection Manager, Division of Vertebrate Paleontology, and Tim White, Assistant Director for Collections and Operations



A

Yale's opening of the Class of 1954 Environmental Science Center (ESC) in October 2001 heralded an interdisciplinary approach to research and teaching designed to encourage collaboration among faculty, researchers and students pursuing environmental studies. By housing the curators, staff and collections of the Yale Peabody Museum of Natural History (YPM) together, the ESC places comprehensive YPM holdings in botany, entomology, herpetology, ichthyology, mammalogy, ornithology, invertebrate zoology and paleontology, and paleobotany at the fingertips of faculty and students from the departments of Ecology & Evolutionary Biology, Geology & Geophysics, and Anthropology, and the Yale School of Forestry & Environmental Studies. The ESC is also the home of the Yale Institute for Biospheric Studies.

The interdisciplinarity fostered in the ESC's laboratories, classrooms, offices and curatorial spaces enables groups of researchers to tackle problems, like climate change, too complex



B



C



D

or vast for the tools of a single discipline. It can sustain areas of inquiry neglected in the traditional disciplinary structure of academia, such as conservation or land use. And, it can especially be applied in teaching team-taught courses in which students learn a subject using multiple traditional disciplines.

The ESC has the three main elements needed to achieve successful and sustainable interdisciplinarity: The first is people, by bringing together faculty and students from different disciplines for new perspectives on research problems. The second is resources, by providing equipment, data and collections with which new insights can be quickly explored. And finally there is proximity, with offices, labs, collections and classrooms designed to be easily accessible and connected to both YPM and the Kline Geology Laboratory buildings, facilitating easy communication and academic interaction.

In June 2008, Yale's purchase of the 136-acre West Campus provided an opportunity for YPM to try its hand at interdisciplinarity again, on a new stage. As part of the University's plans to foster both the sciences and the arts at West Campus, development of new collections facilities will bring together holdings from YPM, the Yale University Art Gallery and Yale's Seeley G. Mudd Library. These materials will be under the same roof in new state-of-the-art accessible storage areas connected by a web of corridors that allow for easy movement from one to another.

The diverse resources at West Campus come along at an opportune time when YPM is driven by a need for space.

The Museum was due to lose some of its storage areas on Central Campus because of the impending demolition of the building at 175 Whitney Avenue, where around 60% of YPM's anthropology collections are housed, and because of the renovations to the basement of the Kline Geology Laboratory, which holds collections and work areas for the divisions of Anthropology, Historical Scientific Instruments, Invertebrate Zoology, Mineralogy (Petrology), Vertebrate Paleontology and Vertebrate Zoology. Also to be displaced is YPM's Archives. So the initial focus on planning for the West Campus storage that became available was necessarily on space—how much was needed, how it should be equipped, and how would the collections be moved into it?

Space is something that West Campus has in abundance. YPM's collections will share some of the more than 300,000 square feet in Building A21, a former pharmaceuticals manufacturing plant equipped with security and environmental controls that would be the envy

**A.** Samantha Wentworth and Nick Drew pack some of the smaller artifact lots in the anthropology collections kept at 175 Whitney Avenue. Photo: Annette Van Aken

**B.** Building A21 at West Campus houses several Yale Peabody collections. Photo: Christopher Norris

**C.** Five canoes stored in the Division of Anthropology collections area at 175 Whitney Avenue made the seven-mile trip by truck to West Campus. L to R: Paul Panamarenko, Selby Gunter, Jessica Slawski and Annette Van Aken. Photo: Stephanie Teasley

**D.** Each of the thousands of artifacts moved needed to be inventoried and carefully packed before being transported to the new West Campus storage. L to R: Annette Van Aken, Brooke Mealey and Tamara Jaeger. Photo: Stephanie Teasley





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**E.** Assistant Director for Collections and Operations Tim White in the new home of the Peabody Archives. Photo: Christopher Norris

**F.** Tim White and Judy Steinis, security manager for West Campus, examine cabinets in the Division of Vertebrate Zoology osteology collection. Photo: Christopher Norris

**G.** Tim White and Judy Steinis looking at the taxidermy mount of a dog, one of the specimens in the Division of Vertebrate Zoology osteology collection moved to new storage at West Campus. Photo: Christopher Norris

of many modern museums. So this location provides one of the three elements for successful interdisciplinarity—proximity.

In support of the grouping of organizations that will be sharing this space, the University will establish state-of-the-art service centers as resources that will foster interdisciplinarity. One of these will be a conservation facility to be shared by YPM, the Yale University Art Gallery and Mudd Library. While these various collections may seem very different, the techniques used to ensure the preservation of their objects, specimens and artifacts are common to a wide range of materials. This means, for example, that advances in paper conservation driven by the needs of a library could apply to artwork or even natural history specimens, and vice versa, but conservators in different institutions are often physically isolated from each other and may have limited opportunities to meet and share ideas. A unified research facility at West Campus could break down barriers to the wider application of these advances and provide for cross-institutional joint projects.

Some of this conservation research could bring new approaches and insights to research already underway at YPM. Could some of the spectrographic approaches used to analyze the historical use of pigments in paintings be applied to ongoing research on natural pigments in birds and butterflies, a current research interest of Curator of Vertebrate Zoology Richard Prum, the William Robertson Coe Professor of Ornithology in the Department of Ecology & Evolutionary Biology, and his co-workers? And could the physical chemistry techniques required for conservation research also be used in work by Curator of Invertebrate Paleontology Derek Briggs, the Frederick William Beinecke Professor of Geology & Geophysics and YPM Director, and his colleagues, on the role of iron sulfides in the preservation of soft tissues in some fossil invertebrates? Such synergies across art, vertebrate zoology, entomology and invertebrate paleontology, to give just a few examples, are possible when collections are on a single site with easy access to conservation research facilities.

Digitization is another area of interest at West Campus. Through its Office of Digital Assets and Infrastructure, Yale is making a considerable investment to digitize and increase accessibility to its collections across campus, including plans for a multi-use digital imaging service center at West Campus. Such a facility would allow for the sharing of large and specialized equipment too expensive for any one museum. However, digitization goes beyond simply capturing images of objects and specimens from collections. It also requires creating and testing infrastructure that pulls data and images from disparate online databases and developing software tools to allow users to interact with and share these digital assets in meaningful ways, thus necessitating cooperation among multiple institutions at Yale.

Digitization will provide online visitors virtual access to Yale's rich collections, but also improves our ability to give users direct physical access to these holdings. Bringing the public "behind-the-scenes" is not always easy in the confined spaces of most museums. Some institutions have actively promoted the idea of "open" collections by constructing new facilities, such as at the Natural History Museum's Darwin Centre in London. There, tours given by collections staff and scientists allow the museum to teach about its underlying mission of collections care and research in ways that might not be possible with conventional exhibits. A venue like West Campus, which combines multiple collections from widely differing disciplines, may be able to go much further with the idea of browsable storage. Allowing visitors to move among the different collections would provide them with a sense of the breadth of Yale's unique collections and would also encourage them to begin to draw their own links between objects and specimens.

West Campus also offers significant potential for teaching. With an existing K–12 education center right at the front gate, and more than 35 acres of woodland nature reserve bordering the Oyster River on site, YPM is already developing environmental programs at West Campus for both teachers and students from local schools and beyond. Broadening these

programs to include classes that access and teach about collections would also provide an unparalleled opportunity to develop truly novel educational programs that encourage connections between disparate collections.

Offering both proximity and resources, West Campus presents significant opportunities for research, teaching and public access to collections. But what about the third element of interdisciplinarity, people? People are, perhaps, both the most critical and the most challenging element. At the Class of 1954 Environmental Science Center, the Yale Institute for Biospheric Studies research centers, such as the Center for Earth Observation, the Molecular Systematics and Conservation Genetics Laboratory, and the Earth System Center for Stable Isotopic Studies, have been magnets drawing scientists and students to the ESC that might not otherwise have come. These researchers have discovered the potential of YPM's collections and divisional resources to the benefit of both. Paradoxically, this success on Central Campus may make it difficult to convince some to switch to the West Campus location. It will be important to develop infrastructure and facilities not just to support collaboration at Yale, but also to attract others, and the proposed organization of research at West Campus will provide training opportunities for graduate students, postdoctoral fellows and junior faculty.

The seven-mile journey from YPM's Central Campus locus to the newly envisioned complex in West Haven and Orange is not an unbridgeable gulf. This is only the beginning of Yale's long-term development of the promise of West Campus.

## The Peabody Welcomes New Curatorial Staff



### SHUSHENG HU

The Yale Peabody Museum of Natural History (YPM) has named Shusheng Hu as Collections Manager in its Division of Paleobotany. Hu received his doctorate from the University of Florida in 2006. Before coming to YPM, Hu worked as a postdoctoral associate for two years in paleobotanist David Winship Taylor's laboratory at Indiana University Southeast.

Hu will focus his efforts on reorganizing YPM's plant fossil holdings, and will lead field trips to expand the collections. Currently he is in charge of the conservation and digitization of the 10,000 cards in the Division's one-of-a-kind catalog of illustrations and descriptions for the identification of fossil plants species, the Compendium Index of North American Mesozoic and Cenozoic Type Fossil Plants, a project that will allow researchers and the public online access to the collections. Another focus will be to apply for grants to conserve and digitize slides in the National Cleared Leaf Collection, a reference collection of over 6,500 cleared, stained and mounted extant leaves.

Hu's research interests include the evolutionary history of flowering plants and ferns, based on plant fossils from Cretaceous clay deposits; flowering plant-pollinator co-evolution as revealed by the study of angiosperm fossil pollen clumps; and the paleoecology, paleoenvironments and vegetation succession history of the geological past as seen in plant microfossils (pollen and spores) and mesofossils.



### CHRISTOPHER A. NORRIS

Chris Norris joined the Yale Peabody Museum of Natural History (YPM) as Senior Collections Manager for the Division of Vertebrate Paleontology in January 2009 after 10 years at the American Museum of Natural History (AMNH), most recently as Director of Collections and Archives for Paleontology. By training he is a mammal systematist (his doctoral dissertation at the University of Oxford focused on the evolution and biogeography of marsupials from New Guinea and its surrounding islands), and much of Norris's work today revolves around developing tools to improve online accessibility of collections through the application of Web 2.0 technologies and to deliver training and other collection management resources through the worldwide web. He is currently working with colleagues at the AMNH on developing streamlined collection assessment methodologies for incorporation into collection improvement projects at Yale and in the wider natural sciences collections community.

"Yale's vertebrate paleontology collections are a priceless resource for researchers and also a powerful tool for public education," Norris explains. "The challenge for us, given relatively limited resources, is to find a way to bring these collections to the widest possible audience in ways that maximize their utility while ensuring their physical well-being and long-term stability. The Peabody has so much potential, especially with the developments at West Campus. It's an exciting time to be here."



# RESEARCH AND PROGRAM HIGHLIGHTS

## Survey Finds Americans Lack Consensus on Global Warming

Americans fall into six distinct groups regarding their climate change beliefs, attitudes and behaviors, according to a new report, “Global Warming’s Six Americas,” by researchers at Yale and George Mason universities. The researchers, who surveyed 2,129 American adults last fall, found that these “six Americas” include:

The Alarmed (18 percent of American adults) are the most convinced that global warming is happening, caused by humans and poses a serious and urgent threat to people in the United States and future generations. They rate global warming as a very high national pri-

ority and strongly support a variety of climate change policies, such as regulating CO<sub>2</sub> as a pollutant.

The Concerned (33 percent) believe global warming is a serious problem and support an active national response, but, compared to the Alarmed, rate it as personally less important and have taken fewer actions to save energy at home or on the road. They do, however, express a willingness to make purchasing decisions based on whether companies are enacting or opposing steps to reduce global warming.

The Cautious (19 percent) are somewhat convinced that global warming is happening,

but say they could change their minds. They have only thought a little about the issue, do not consider it personally important and tend not to worry about it, largely because they believe the impacts won’t occur for at least 35 years.

The Disengaged (12 percent) are not at all sure global warming is happening and have not thought much about the issue. Only a third believes that global warming is caused by human activities, and they overwhelmingly say they simply don’t know whether global warming will harm future generations.

The Doubtful (11 percent) say they don’t know whether global warming is happening or

## F&ES Study Finds Most Polluted Ecosystems Recoverable

Most polluted or damaged ecosystems worldwide can recover within a lifetime if societies commit to their cleanup or restoration, according to an analysis of 240 independent studies by researchers at the Yale School of Forestry & Environmental Studies (F&ES). Their findings appeared in May in the journal *PLoS ONE*.

The F&ES researchers found that forest ecosystems recovered in 42 years on average, while ocean bottoms recovered in less than 10 years. When examined by disturbance type, ecosystems undergoing multiple, interacting disturbances recovered in 56 years, and those affected by either invasive species, mining, oil spills or seabed trawling recovered in as little as five years. Most ecosystems took longer to recover from human-induced disturbances than from natural events, such as hurricanes.

“The damages to these ecosystems are pretty serious,” said Oswald Schmitz, Oastler Professor of Population and Community Ecology and co-author of the meta-analysis with F&ES Ph.D. student Holly Jones. “But the

message is that if societies choose to become sustainable, ecosystems will recover. It isn’t hopeless.”

The F&ES analysis focuses on seven ecosystem types, including marine, forest, terrestrial, freshwater and brackish, and addresses recovery from major anthropogenic disturbances: agriculture, deforestation, eutrophication, invasive species, logging, mining, oil spills, overfishing, power plants and trawling and from the interactions of those disturbances. Major natural disturbances, including hurricanes and cyclones, are also accounted for in the analysis.

The researchers analyzed data derived from peer-reviewed studies conducted over the past century that examined the recovery of large ecosystems following the cessation of a disturbance. The studies measured 94 variables that were grouped into three categories: ecosystem function, animal community and plant community.

The researchers quantified the recovery of each of the variables in terms of the time it took for them to return to their pre-disturbance state as determined by the expert judgment of each study’s author. The F&ES analysis found that 83 studies demonstrated recovery for all variables; 90 reported a mixture of recovered and non-recovered variables; and 67 reported no recovery for any variable. Schmitz said 15 percent of all the ecosystems in the analysis are beyond recovery. Also, 54 percent of the studies that reported no recovery likely did not run long enough to draw definitive conclusions.

In addition, the analysis suggests that an ecosystem’s recovery may be independent of its degraded condition. Aquatic systems, the researchers noted, may recover quickly because species and organisms that inhabit them have shorter life cycles whereas, for example, forests habitats take longer to regenerate after logging or clear-cutting.

The researchers point out that a potential

not, but if it is, it is caused by natural environmental changes and won't harm people in the United States for at least 100 years.

The Dismissive (7 percent) are sure that global warming is not happening, thus they do not worry about it or support most policies to reduce greenhouse gas emissions. They do, however, support several policies that help individuals save energy, like tax rebates for people who purchase energy efficient vehicles or solar panels.

"When we talk about 'the American public' and its views on global warming, that's a misnomer," said Anthony Leiserowitz, director

of the Yale School of Forestry & Environmental Studies Project on Climate Change and a co-author of the report. "There is no single American voice on this issue."

The six groups, however, sometimes actually behave in similar ways, albeit for different reasons, said Leiserowitz. For instance, the respondents in each group support actions that save them money, with the Dismissive just as likely to have made energy efficiency improvements to their homes as the Alarmed. Likewise, all six groups support rebates for the purchase of solar panels and fuel-efficient cars, including the Dismissive.

"Too many climate change education and awareness campaigns have been like throwing darts in a dark room," said Leiserowitz. "Climate change is ultimately a human problem. If we want to constructively engage Americans in the solutions, we have to first know our audience."

The full report can be found at [environment.yale.edu/uploads/6Americas2009.pdf](http://environment.yale.edu/uploads/6Americas2009.pdf). The study was conducted by the Yale F&ES Project on Climate Change and the George Mason University Center for Climate Change Communication. It was funded by the Yale Center for Environmental Law & Policy, The Betsy and Jesse Fink Foundation, the Surdna Foundation, the 11th Hour Project, The Pacific Foundation and the Robert Wood Johnson Foundation.

"pitfall" of the analysis is that the ecosystems may have already been in a disturbed state when they were originally examined. Many ecosystems across the globe that have experienced extinctions and other fundamental changes as a result of human activities, combined with the ongoing effects of climate change and pollution, are far removed from their historical, natural pristine state. Thus ecologists measured recovery on the basis of an ecosystem's more recent condition. The Yale analysis points out the need for the development of objective criteria to decide when a system has fully recovered.

The researchers said the analysis rebuts speculation that it will take centuries or millennia for degraded ecosystems to recover and justifies an increased effort to restore degraded areas for the benefit of future generations. "Restoration could become a more important tool in the management portfolio of conservation organizations that are entrusted to protect habitats on landscapes," said Schmitz.



Jones added: "We recognize that humankind has and will continue to actively domesticate nature to meet its own needs. The message of our paper is that recovery is possible and can be rapid for many ecosystems, giving much hope for a transition to sustainable management of global ecosystems."

The analysis, "Rapid Recovery of Damaged Ecosystems," is available online at <http://dx.plos.org/10.1371/journal.pone.0005653>.



## Pachauri to Head New Climate and Energy Institute at Yale



Rajendra K. Pachauri will lead the newly established Yale Climate and Energy Institute (YCEI), University President Richard C. Levin has announced.

Pachauri has chaired the United Nations Intergovernmental Panel on Climate Change (IPCC) since 2002 and has been director general of The Energy and Resources Institute (TERI) since 2001. He will retain these positions while taking up his new half-time position at Yale. Pachauri has been an active leader in the global climate policy debate and played a major role in laying the groundwork for the 1997 Kyoto Protocol.

"We are fortunate to attract one of the world's foremost climate change experts to lead this ambitious new institute," Levin said. "No one has a more comprehensive grasp of the science and policy of climate change or has done more to bring attention to this urgent issue."

Pachauri accepted the Nobel Peace Prize in 2007 on behalf of the IPCC, sharing the honor with former Vice President Al Gore. Under his leadership, TERI has become India's most prominent center for research and education in the field of sustainable development. He has authored 23 books and more than 100 academic articles, and has held numerous positions at academic and research institutes. In addition to having taught a semester at Yale's School of Forestry & Environmental Studies in 2000, he received an honorary degree from Yale in 2008. In 2008, the government of India awarded Pachauri the Padma Vibhushan, among the nation's highest civilian honors.

Levin made the announcement at the International Scientific Congress on Climate Change in Copenhagen, where he spoke along with Pachauri.

"Climate change has now become an important part of government policy worldwide, and the Yale Climate and Energy Institute has enormous potential to fill the need for objective analysis of mitigation options," Pachauri said. "As an institution with a global

focus and international reach, Yale can also pursue research on impacts of climate change in different parts of the world and develop suitable adaptation measures, particularly in the most vulnerable regions. Institutions like YCEI are needed to find new directions and solutions that will address human-induced climate change and move us toward sustainable development."

YCEI will provide seed grants, support postgraduate study, sponsor conferences and workshops, and foster interdisciplinary research that spans from basic atmospheric science to public policy. Nearly 100 Yale scientists, engineers, physicians, social scientists and policy experts have joined together to launch the enterprise.

Initial projects will focus on a diverse array of topics. Examples include forecasting climate variability and its impacts on water supplies, studying the spread of infectious diseases, searching for microbial-based alternative fuels, and the science and economics of carbon sequestration.

Long term, YCEI will support research and outreach, international collaboration, partnerships with business and industry, and green design efforts that can be implemented and tested within Yale and the surrounding region.

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To learn more about the Yale Climate and Energy Institute's mission, long-term vision and potential projects, go to their Web site at <http://www.climate.yale.edu/>



### Paul Anastas to Head EPA Research

President Obama has nominated Paul Anastas, Teresa and H. John Heinz III Professor in the Practice of Chemistry for the Environment, to lead the U.S. Environmental Protection Agency's (EPA's) Office of Research and Development.

Anastas is currently director of the Center for Green Chemistry & Green Engineering at Yale where he holds joint appointments in chemistry, chemical engineering and at the School of Forestry & Environmental Studies. His research focuses on the design of safer chemicals and chemical processes to replace the use of hazardous substances.

"I am tremendously honored to be considered for this important position," Anastas said. "Strong science is at the heart of EPA's mission, and it is my highest priority."

Anastas previously served as chief of the Industrial Chemistry Branch and director of the U.S. Green Chemistry Program at the EPA, where he coined the term "green chemistry" in 1991. From 1999 to 2004 he served in the White House Office of Science and Technology Policy, most recently as assistant director for the environment. He then served as director of the Green Chemistry Institute, headquartered at the American Chemical Society in Washington, D.C. While there, he established 24 green chemistry chapters in countries around the world. He joined Yale in January 2007.

"Paul is the right person at the right time for this critical position," said former Dean Gus Speth. "We need a return to science-based environmental regulation, and Paul is the person to help lead that effort."

Anastas earned his B.S. from the University of Massachusetts at Boston and his M.A. and Ph.D. in chemistry from Brandeis University. He has written widely about science and sustainability, including his seminal work with co-author John Warner, *Green Chemistry: Theory and Practice*, which outlines the 12 principles of green chemistry and engineering. He has earned numerous awards, including the EPA's Joseph Seifter Award; Canada's inaugural Green Chemistry Medal; the Greek Chemical Society Award; the Nolan Sommer Award; the Vice President's Hammer Award; the Scientific American 50 Award; and the Heinz Award in the Environment.

Anastas will be on leave from Yale during his time at the EPA, but promised that the Center for Green Chemistry & Green Engineering will continue to advance its research, policy and education initiatives toward the development and implementation of sustainable technologies that meet both environmental and economic goals.



### Brenda Bradley Joins Anthropology Faculty

Brenda Bradley has joined the faculty in Anthropology as Assistant Professor of Anthropology and Director of the Molecular Anthropology Laboratory. She received her Ph.D. at Stony Brook University in 2003.

Her research uses genetic analyses to answer questions about the behavior, ecology, and evolution of primates. This includes work on the genetics of primate adaptation examining links between genotype, phenotype, and fitness in wild primate populations. Current projects focus on the evolution of coat color variation in primates, and color vision in lemurs. Genetic analyses are also used to examine aspects of behavioral ecology and sociality (e.g., kinship networks, mating strategies) in wild primate, especially gorilla, populations. Brenda will teach lecture and laboratory courses on anthropological genetics and primate molecular ecology and evolution.



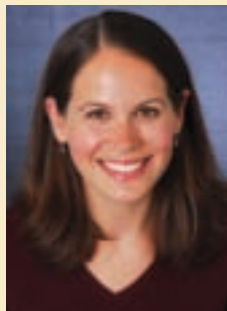


## Geographer Named Leopold Fellow

Karen Seto, associate professor in the urban environment at F&ES, is one of 19 environmental researchers from across North America to be awarded Leopold Leadership fellowships for 2009.

Seto's research is on the dynamics of urban land-use change, with a particular emphasis on urban development in China. She is co-chair of the Urbanization and Global Environmental Change Project of the United Nation's International Human Dimensions Programme, and is a recipient of the National Aeronautics and Space Administration New Investigator Program Award, the National Science Foundation Career Award, and a National Geographic Society research grant.

The fellows are chosen for outstanding scholarship, leadership, and an interest in communicating science beyond traditional academic audiences. Based at Stanford University's Woods Institute for the Environment, the Leopold Leadership Program was founded in 1998 to help academic scientists make their research accessible to decision makers.



## Maureen Long Joins Faculty in the Department of Geology & Geophysics

Maureen D. Long joined the Yale Geology & Geophysics faculty in January of 2009 as an assistant professor. She earned her Ph.D. in Geophysics from the Massachusetts Institute of Technology in 2006 and subsequently joined the Department of Terrestrial Magnetism at the Carnegie Institution of Washington. Dr. Long is an observational seismologist whose primary scientific interests lie in mantle anisotropy and deformation, subduction zone dynamics and processes, and the integration of seismology with mineral physics and geodynamics.

In her research, Dr. Long brings a variety of tools to bear on the problems of how deformation is accommodated in the mantle and how constraints on mantle dynamics can be gleaned from seismological observations. This includes work on methodologies for measuring shear wave splitting (an indicator of seismic anisotropy) and the development of a method for shear wave splitting tomography to image anisotropy in the upper mantle. Much of her research on mantle anisotropy focuses on subduction zones, with the goal of characterizing the mantle flow field in regions associated with subduction. This work has led to models for subduction zone anisotropy on both regional scales (with a focus on complex anisotropy beneath Japan) and on a global scale. Another major focus of Dr. Long's research is the integration of seismological observations with constraints from other disciplines, such as geodynamics and mineral physics. In particular, she performs numerical modeling of mantle deformation associated with a downgoing slab; these models are compared with shear wave splitting observations and integrated into a framework for splitting tomography. In the mineral physics realm, her interests include laboratory studies of deforma-

tion and anisotropy in lower mantle minerals. These experimental results are used to place constraints on plausible models for anisotropy in the D" region, and to design seismological experiments to characterize better the cause of anisotropy in this region.

Dr. Long's current and future research projects include 1) further development and application of techniques for shear wave splitting tomography, 2) investigations of global interactions of subducting slabs with the mantle flow field, 3) array studies of mantle structure and deformation beneath recent volcanism in Oregon's High Lava Plains, 4) comparing numerical and laboratory models of subduction with observations, and 5) seismological investigations of anisotropy at the base of the mantle and interpretation using experimental constraints. More generally, her research plans incorporate further collaborations with geodynamicists and mineral physicists to integrate constraints from these disciplines with seismological observations. Dr. Long's research program includes a substantial field seismology component, which will be enhanced by a new observational seismology facility at Yale that will consist of 20 broadband seismometers to be deployed in temporary arrays around the world, with a focus on subduction zone regions.



## Paul Sabin, Assistant Professor of Environmental History

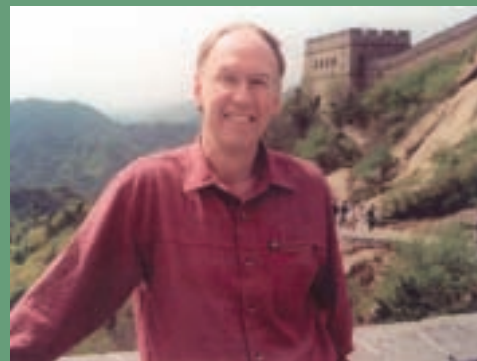
Paul Sabin is Assistant Professor of Environmental History in the Department of History, and has been named Director of Undergraduate Studies for the Environmental Studies Program.

His research and teaching focus on United States environmental history, energy politics, and political and economic history, including natural resource development in the American West and overseas. Professor Sabin graduated from Yale in 1992 with a B.A. in History and Studies in the Environment and received his Ph.D. in American History from the University of California-Berkeley in 2000.

Professor Sabin's book, *Crude Politics: The California Oil Economy, 1900–1940* (2005), examines how politics and law shaped a growing dependence on petroleum in California and the nation. Professor Sabin has written scholarly articles on environmental and legal history and U.S. overseas expansion for *Environmental History*, *Pacific Historical Review*,

and other journals. His essays on energy politics and leadership development have been published in the *Boston Globe*, *Chronicles of Higher Education*, *Chicago Tribune*, *Legal Affairs*, *Sacramento Bee*, and *Slate Magazine*.

Professor Sabin previously was a visiting lecturer and senior research scholar at Yale and a Newcomen Postdoctoral Fellow at the Harvard Business School. He also served for nine years as the founding executive director of the non-profit Environmental Leadership Program, which has created a collaborative national network of more than 350 talented public leaders from higher education, government, businesses, and non-profit organizations. He presently serves on the Environmental Leadership Program's Board of Trustees.



## Peter Purdue Joins Faculty in the History Department

Peter C. Purdue joined the faculty in the History Department at Yale, coming from the Massachusetts Institute of Technology (MIT). Professor Purdue has a Ph.D. (1981) from Harvard University in the field of History and East Asian Languages. He is the author of *Exhausting the Earth: State and Peasant in Hunan 1500-1850 A.D.* (Council on East Asian Studies, Harvard University, 1987) and *China Marches West: The Qing Conquest of Central Eurasia* (Harvard University Press, 2005). He has also written on grain markets in China, agricultural development, and environmental history.

Professor Purdue's research interests lie in modern Chinese and Japanese social and economic history, history of frontiers, and world history. He is a recipient of the 1988 Edgerton Award and the James A. Levitan Prize at MIT, and was elected to the American Academy of Arts and Sciences in 2007.



# STUDENT NEWS



Yale students create art using recycled materials during GreenFest.

This year, the Yale Student Environmental Coalition (YSEC) has made great strides in its mission to promote environmental awareness and action both at Yale and within greater the New Haven community.

YSEC started off the year with GreenFest, a festival co-sponsored by the Student Taskforce for Environmental Partnership (STEP) in which hundreds of students gathered to learn about environmental resources on campus while enjoying a gorgeous fall day complete with food, music, and art projects. In the theme of collaborating with student groups, YSEC members have also worked with the Yale College Council (YCC) to create a campus-wide bike-sharing program, with pilot

programs starting this spring in several residential colleges.

In addition, YSEC also has three subgroups that focus on more specific projects. The “Green Team” promotes environmental awareness on campus. In the fall, the group focused on the role of the environment in the presidential elections, including dressing up as presidential candidates who talked to Yale students about their environmental positions as well as co-hosting a forum with panelists Dean Gus Speth, Professor John Wargo, and Research Scientist Tony Leiserowitz from the School of Forestry & Environmental Studies.

The team also organized and successfully implemented Water Week, a week in the end

of February with a number of events to spread awareness about the environmental problems surrounding water resources, including a movie documentary, panel, and trivia contest with Yale professors. For the remainder of the year, the Green Team worked on organizing events for Earth Day as well as creating this year’s version of a “Green Grads” guide, a booklet of information on living sustainably that has been given to graduating seniors for the past two years.

The New Haven group works on collaborating with New Haven residents to create a greener and more “environmentally just” city. They successfully campaigned to pass city-wide green cleaning legislation in the fall,

and are now working on organizing a series of neighborhood workdays and environmental tours during which Yalies and other New Haven residents will help to clean up and plant in local community areas and be given environmental tours of the city.

The Environmental Education group prepares lesson plans and teaches elementary school students in local public schools about pertinent environmental issues. The group currently works with four fourth-grade classes at Vincent Mauro Elementary School and Fair Haven Elementary School where YSEC members teach on a monthly basis, focusing on a particular issue each visit. Topics include waste and recycling, water quality, air pollution, climate change, energy, and food. The group hopes to expand in the fall, with plans to work with high school students at the New Haven Academy.

YSEC has seen an increase in membership and general student interest in environmental issues this year, especially among freshmen and sophomores. We are excited to harness this energy going forward, and are grateful to the Yale Institute for Biospheric Studies (YIBS) for their generous support of our goals. If you'd like to learn more about YSEC and stay updated about our plans, check out [www.yale.edu/ysec](http://www.yale.edu/ysec).

## 2009 Gaylord Donnelley Prize

Each year the faculty in the Program in Environmental Studies awards the Gaylord Donnelley Prize to the author of a distinguished piece of interdisciplinary scholarship in Environmental Studies. The Prize is presented to a senior at commencement. It is funded by an endowment from the Gaylord and Dorothy Donnelley Foundation and the Donnelley Family, in memory of Mr. Gaylord Donnelley, a conservationist dedicated to advances in research and education.

The recipient of the Gaylord Donnelley Prize for 2009 is Kevin Thomas Currey (B.A. '09, Saybrook College) for his senior essay *"We're Iñupiat, We're Hunters: Subsistence, Petroleum Development, and Cultural Identity in Nuiqsut, Alaska."*

**Kevin Currey** explores how industrial oil development in Arctic Alaska affects subsistence and the cultural identity of the 400 Iñupiat residing in the small village of Nuiqsut. Currey states that subsistence "may refer to a physical practice (e.g. hunting, fishing), a state of reliance on natural resources, a system of economic production, a legal right, a cultural or social value, a custom or tradition." While subsistence is hard to define, there is no argument that subsistence is very important to Iñupiat. Through a combination of secondary research that provides a detailed account about the history of the Iñupiat and the discovery of oil on the North Slope, and primary research in the form of participant observations and in-depth interviews with people associated with the North Slope, environmental organizations, petroleum companies, and government agencies, Currey discovers that

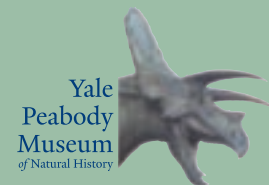
oil and gas development have altered the practice of subsistence. While there are now more opportunities for wage employment, the importance of subsistence activities to the Iñupiat has not diminished. The Iñupiat have adapted to disruptions in subsistence caused by industrial development because the Iñupiat continue to associate the practice of subsistence to their indigenous cultural identity. In the context of policies surrounding the North Slope oil and gas activities, the federal government uses a decision-making process that does not acknowledge the cultural ramifications of the people of Nuiqsut, which causes tension between the two sides. However, Currey argues that the Iñupiat have been raising "very real political questions" and have been able to use subsistence discourse strategically and politically in their long-standing struggle for control. It is the opinion of Currey that the Iñupiat will continue to successfully contest, negotiate, and adapt to larger forces, such as the North Slope oil and gas development, in their fight for autonomy.



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