YALE Environmental NEWS

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Yale Environmental News is a tip sheet on environmental research, teaching and outreach at Yale University. It is produced by the Peabody Museum of Natural History (PM), the School of Forestry & Environmental Studies (F&ES), and the Yale Institute for Biospheric Studies (YIBS), who work in partnership towards common programmatic and development goals.

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We welcome submissions from faculty, staff and students. The deadline for the Spring issue is May 5, 2000. To submit an item, please contact Rose Rita Orcutt at 432-9856.

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YALE ANNOUNCES $500 MILLION SCIENCE AND ENGINEERING FACILITIES IMPROVEMENT

As the new Environmental Sciences Facility begins to take shape, it will take its place as the Gateway to Science Hill. In January, Yale President Richard C. Levin announced a plan to invest $500 million in the construction of five new buildings. In addition to the Environmental Science Facility already under construction, the University will construct new facilities for Engineering, Chemistry, Molecular, Cellular & Developmental Biology, and the School of Forestry and Environmental Studies. These new facilities, together with renovated laboratories and classrooms in existing buildings, will propel science education and research at Yale into the 21st Century and beyond. The entire project is targeted for completion in the next six to eight years.

Artist's rendering of the new Environmental Sciences Facilities building.

The Study of Earth in the Next Millennium

Op-ed by Karl K. Turekian, as it appeared in the January 11, 2000 edition of The Hartford Courant

The history of geology has been the consequence of the pursuit of two main goals. One was the quest for wealth through the discovery and exploitation of natural resources. The other was the attempt to conform the stories of Creation and the Flood in the Bible to observations of the rocks and the fossils contained in them.

Through these latter studies, there gradually developed awareness that the story in rocks was not the record of the simple but elegant allegory of the Bible but was richer in detail and process. This awareness eventually led to a better knowledge of the history of the Earth and the life thereon. The consequence of the first goal was to affect the environment in a number of ways including scarring of the landscape, releasing acids into the atmosphere and the increasing so-called greenhouse gases, such as carbon dioxide, in the atmosphere. These effects have grown dramatically as the human population has increased to more than 6 billion by the end of the millennium and the demand for energy, mainly from fossil fuels, has grown.

The benefits of this exploitation of Earth's resources must not be underestimated or taken for granted. It has resulted in the development of a robust economy and an intricate infrastructure that has permitted the enhancement of the human weal. During the next millennium, we will have to accommodate the impact we are having on the environment. The spread of humans into every corner of the globe and the massive population growth in certain regions of the world must all be factored into our equation for an acceptable future.

The two greatest needs to sustain the activities of humans in an ever more complex world are fresh clean water and energy. Everything else derives from the adequate supply of these two commodities. The problem for the new millennium is not unlike that for the last millennium except we have learned that the limit to development globally is now water and energy.

As fossil-fuel energy availability diminishes by design or ultimately by depletion, other sources of energy must be tapped. Even after we have developed the most efficient ways of exploiting solar energy in its various manifestations, we will still be left with a deficit on a global scale with the growing demands in the developing regions. The accelerated development of some form of nuclear energy seems to be required. Whether it is fission, the way it is now, or ultimately fusion, which is still a remote prospect, the development of this energy source as a major component of the mix seems inevitable. If this is indeed the case, there are two major concerns, but the safety of nuclear reactors is not really one of them; that can be met by careful design and monitoring.

The major concerns, rather, are the following: How do we get rid of radioactive waste generated by nuclear power plants so that it does not impinge on future generations for tens of thousands of years? And, how do we prevent rogue nations from converting their nuclear power capabilities into nuclear weapons of mass destruction? The problem of nuclear weapon proliferation is one that responsible agencies must continue to evaluate. This may be more a problem of intelligence and political deterrence than something to which earth scientists can contribute except in their capacity to identify violators through seismic and atmospheric analyses.

The development of distribution and purification systems for the world's water supplies is a very important part of the agenda for earth scientists for this millennium. We have some insights from the distribution of water in California and the Western states. Disasters in Asia and former Soviet Union lands are evident now, and prospects for the future are not very bright. The distribution and purity of water are major concerns in China, India and Bangladesh, to name a few obvious trouble spots.

Geological studies in the late 18th and all of the 19th century grew out of the tension between a literal interpretation of the biblical Creation and Flood stories and the data extracted from the rocks. One can argue that it was this tension that provided the groundwork for the present understanding of the history of Earth. With the advent of radioactive dating techniques and the acceptance of Darwin's theory, the antiquity of Earth and of life on the planet was unambiguously established.

Recent activities of school boards of some states to deny the information gathered on the history and age of Earth and its life do not provide, in this day and age, a useful tension to push forward our knowledge of Earth, as was the case in the 19th century. This millennium would be served best if the hard-won scientific knowledge of the last millennium were not so easily discarded.

MUSEUM EXHIBITS

Children's Nature Books: Connecticut's Legacy

The Peabody Museum of Natural History (PM) offers an enchanting exhibit that brings the world of nature alive through the stories, illustrations, and rare memorabilia of Connecticut authors and illustrators Samuel Goodrich, Worthington Hooker, and Harriet Beecher Stowe in the 19th century, and 20th century notables Hugh Lofting, John Himmelman, Lynn Reiser, and Jean Zallinger.

Children, parents, and grandparents alike will delight in reading the original whimsical letters of Doctor Dolittle's creator, Hugh Lofting, to his children, and viewing his original drawings never before exhibited to the public. In the imaginative illustrations of Lynn Reiser and John Himmelman, viewers see the world through the eyes of children and the beauty of wildlife in its natural state that is captured in the creative vision of Jean Zallinger. *Children's Nature Books* teaches a reverence of and responsibility for the natural world, and lessons of respect and care for all the creatures in it. The exhibit is sponsored by Fleet Bank and runs through July 4, 2000.

Martian Perspectives: 3-D Images of the Red Planet

Viewed through 3-D glasses provided to visitors of the Peabody Museum of Natural History (PM), the maps in the exhibit *Martian Perspectives: 3-D Images of the Red Planet* achieve the illusion of three-dimensionality. Spectacular detail views of the canyons of Mars are revealed, dominated by the six-mile high Tharsis Bulge and the volcano *Olympus Mons* with a peak reaching a height of nearly 11 miles (Mt. Everest, in comparison, is 5.5 miles). For thousands of years people have been making maps and seeking ways to combine measurement and artistic vision that allow us to see the complex three-dimensional reality of the world using only two dimensions. A wealth of scientific study and aerial and satellite photography have yielded maps of unprecedented detail, allowing planetary surfaces to be portrayed in three dimensions with a precision unimaginable to previous generations of mapmakers. This technology is behind Ambroziak Infinite Perspective Projection™, a revolutionary cartographic technique that allows viewers wearing ordinary 3-D glasses to view planetary surfaces without distortion. The Ambroziak Infinite Perspective Projection™ images in this exhibit are provided courtesy of Ambroziak Third Dimension Technologies, Inc. Underwriting for the 3-D glasses used in the exhibit has been provided by Wiggin & Dana. The exhibit opened on January 22, 2000 and will run indefinitely.

Environment School Dean Launches New Century Fund to Educate Next Generation of Leaders

Yale School of Forestry and Environmental Studies (F&ES) Dean James Gustave Speth has announced an unprecedented multi-year initiative for building new leadership to meet global environmental challenges. Major investments in faculty development, student scholarships, research and policy analysis, university-wide initiatives, and improved facilities are planned over the next several years.

Under the initiative, F&ES will add 8 to 10 faculty to its current 30. These appointments will strengthen the School's engagement in critical areas such as energy and climate change, environmentally sustainable development in low-income countries, population, land use, and ethical dimensions of human interactions with nature. Immediate plans include hiring several new faculty members and developing new graduate and undergraduate course offerings.

Working with Yale College to strengthen the environmental education program for majors and non-majors alike is a primary objective of the initiative, with six new undergraduate level courses to be offered through a two-year cycle beginning in the fall of 2000. Senior F&ES faculty will teach the following courses: *Human Health and the Environment; Ecology and Ecosystems Conservation and Management; Environmental Economics; Environmental Policy and Politics; Nature and Human Nature: Environmental Perception, Values and Motivation; and Global Environmental Challenges in the New Century.*

Speth, a graduate of Yale College and Law School, remarked that educating the next generation of society's leaders is the most important investment we can make to solve the complex environmental problems the world faces. A noted leader in the environmental field who founded the World Resources Institute and most recently was Administrator at the United Nations Development Program, Dean Speth admits that in spite of the increased awareness of environmental concerns since the 1970's and progress on selected issues, "in some large sense we have failed." Not only have the pre-dictions of environmental decay become reality, but poverty keeps growing—the gap between the world's richest and poorest 20% has more than doubled. He contends that environmentalism in all sectors—from scientists, consumers, and environmentalists, to business and government leaders—needs to look past regulating isolated problems to a human, holistic global approach that can address root causes. Speth believes the School, with its tradition of providing integrated problem-oriented training, has a vital role and obligation within and outside of Yale University to ensure that the next generation of business, government, and non-profit leaders can find solutions to global environmental challenges.

The initial implementation of this initiative is made possible by the generous support of friends of the School. For information on the New Century Fund contact Carol Kinzler at (203) 432-9361.

Pilot Environmental Sustainability Index (ESI) Unveiled at Davos-United States in the Middle of Top Half

A prototype index for ranking societies on their environmental results and circumstances was released at the annual meeting of the World Economic Forum in Davos, Switizerland. Dan Esty, F&ES Associate Professor of Environmental Law and Policy and Director of the Yale Center for Environmental Law & Policy, developed the index with colleagues from Columbia University's Center for International Earth Science Information Network, and the Global Leaders for Tomorrow Environment Task Force of the World Economic Forum. ESI developers hope that the index's use over time will help to ensure that governments do not become narrowly focused on economic results (such as Gross Domestic Product growth), but pay attention as well to other issues critical to public welfare.

Norway came in first in this initial ranking, followed by Iceland and the rest of northern Europe. The United States ranked high in air and water quality but was pulled down by its low ranking as a large producer of greenhouse gasses and solid waste. Poorer third-world countries make up the bulk of the bottom half, with Vietnam coming in last.

For more information visit: http://www.yale.edu/envirocenter/research/esi.html

AWARDS

PM Awarded Institute of Museum Library Services Conservation Project Support Grant

The Yale Peabody Museum of Natural History (PM) has been awarded an Institute of Museum and Library Services (IMLS) Conservation Project Support Grant of $49,955 that will be matched by Yale University. The grant will enable the PM to provide a better environment for its significant collection of marine gastropods, echinoderms and soft corals, including starfish, sea urchins, and sea fans, by purchasing and installing new storage cabinets and acid-free trays. This collection consists of nearly 300,000 marine, fresh water and terrestrial shells acquired in connection with research conducted by Yale faculty and graduate students over the course of the PM's history. This irreplaceable collection is worldwide in scope and includes material of considerable historical importance such as thousands of specimens from the landmark collection amassed by the U.S. Fish Commission along the Atlantic seaboard in the late 19th century. According to Richard L. Burger, PM Director and Professor of Anthropology, Yale University, "The IMLS grant provides much needed support to increase accessibility of the collections for teaching and

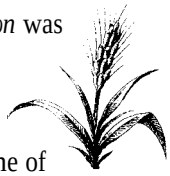
research purposes as well as to ensure their preservation for the next century."

Charles A. & June R. P. Ross Endowment

Thanks to the generosity of Charles A. and June R. P. Ross, the Yale Peabody Museum of Natural History (PM) is the recipient of the *Charles A. Ross and June R. P. Ross Endowment* in support of invertebrate paleontology. The endowment allows the PM to revitalize efforts to showcase the significance of the collections and to bring in scholars for their study and research. An additional gift of an impressive collection of invertebrate materials was also given by Charles and June Ross and includes related printed documents. The endowment and related gift will make a substantial and long-lasting impact on the important work of the Division of Invertebrate Paleontology.

Bay Foundation Supports Museum Collection

The Yale Peabody Museum of Natural History (PM) has been awarded $8,695 by the Bay Foundation to acquire and curate the *S. Wildfield Herbarium Collection*. This excellent historical and scientifically valuable botanical collection, featuring specimens collected in the early 1900s, complements and enhances the present collection in the Yale Herbarium at the PM. The *S. Wildfield Herbarium Collection* was originally acquired by Charles H. Bissell, an early Connecticut botanist who died in 1925. Bissell was one of the founding members of the Connecticut Botanical Society and many of his specimens are now housed in the Yale Herbarium.



Environmental Excellence Award

Mr. John H. Bridges III, REM, CHMM, Environmental Compliance Coordinator of United States Postal Service and 1998 graduate of the Yale School of Forestry and Environmental Studies' Corporate Environmental Leadership Seminar program (CELS) received the 1999 Environmental Excellence Award from the National Association for Environmental Management (NAEM), and was selected as the Environmental Manager of the Year.

NAEM noted that Mr. Bridges has contributed substantially to the U.S. Postal Service's environmental consciousness. He has changed the focus of environmental protection from a staff function to a line function involving all employees in ways that are changing the internal culture of the organization, establishing the highest environmental ethic, and promoting the concepts of sustainable development inside and outside of the organization. His strong leadership qualities and management acumen integrates supply chain management, uses enterprising concepts as set forth in ISO 14001, and employs economic value added and activity-based management into the Postal Service's management systems of Customer Perfect! which aligns all facets of postal operations. Mr. Bridges provides positive corporate environmental excellence throughout the organization and the communities while serving as a member of the President's Council on Sustainable Development (PCSD) Environmental Management Task Force for the formulation of guidance on sustainability.

Gaylord Donnelley Environmental Fellowships Announced

Because of the vision and generosity of the family of Gaylord Donnelley, a conservationist dedicated to advances in research and education who died in 1992, an endowment was created in 1995 to support extraordinary research in the field of environmental sciences. In 1997, Dr. Joseph Kiesecker was awarded the first Gaylord Donnelley Environmental Fellowship, with Drs. Ofer Ovadia and Douglas Gollin awarded fellowships in 1999.

Professor Karl Turekian, Director of the Yale Institute for Biospheric Studies is happy to announce that two more fellows were recently selected and will begin their two-year term in the summer of 2000 — Dr. Claudio Ciofi from the Institute of Zoology, Zoological Society of London, nominated by Dr. Jeffrey Powell and Dr. Gisella Caccone from the Department of Ecology and Evolutionary Biology; and Dr. Campbell Webb, from the Arnold Arboretum of Harvard University, nominated by Dr. Mark Ashton from the Yale School of Forestry and Environmental Studies, and Dr. Michael Donoghue, who will soon join the Department of Ecology and Evolutionary Biology.

Dr. Ciofi will focus on applying molecular genetic techniques to the conservation of island populations of two endangered species of giant reptiles: the largest living tortoise *Geochelone nigra*, endemic to the Gálapagos islands, and the Komodo dragon *Varanus komodoensis*, the world's largest monitor lizard.

Dr. Webb will continue and expand his studies on the phylogenetic structure of forest tree communities in Indonesian Borneo and at selected comparative sites in Asia and Central America. This work has the potential to significantly deepen our understanding of forest evolution and ecology, which will be of value in both forest management and in understanding plant evolution and community ecology.

Should We Mine Landfills?

The National Science Foundation has awarded a three year grant to Thomas Graedel, F&ES Professor of Industrial Ecology, Robert Gordon, Professor of Geology & Geophysics, and Reid Lifset, Associate Director of the F&ES Industrial Environmental Management Program for their work to look at the resource budgets for some commonly used materials. The Stocks and Flows (STAF) Project will evaluate current and historical flows of specific materials and

estimate the stocks available in different reservoirs, especially industrial and municipal stockpiles and landfills. The information will then be used in conjunction with environmental impact data to develop scenarios for future resource management and limitation of associated environmental impacts.

ACADEMIC PROGRAMS

Global Problems of Population Growth

In the spring 2000 semester, the popular course, *Global Problems of Population Growth* focuses on the human and environmental dimensions of population pressure. It covers demographic history; economic and cultural causes of demographic change and the spread of contraception; environmental carrying capacity and limits to growth; and the political, religious and ethical issues surrounding fertility. It is offered to undergraduate and graduate students from a variety of disciplines including Molecular, Cellular and Developmental Biology, Ecology and Evolutionary Biology, Public Health, Studies in the Environment, and the Yale School of Forestry and Environmental Studies, introducing students to demography and population policy, balancing theory and analysis with studies of individual humans and communities. Material from the US and other developed and developing countries is used. Controversies on the causes, cures and effects of rapid population change are discussed by Molecular, Cellular, and Developmental Biology Professor Robert Wyman and Lecturer Frederick Meyerson, who teach this extremely relevant and important course.

CONFERENCES & SEMINARS

State of the World Population

Frederick Meyerson, Global Change Policy Project director at the Yale Center for Environmental Law and Policy, was one of the writers of the *State of World Population 1999*, the United Nation's globally distributed annual report published in 22 languages. He gave two congressional briefings last year on climate change and population dynamics, and on U.S. international population assistance policy, for the Congressional Coalition on Population and Development. Meyerson was also interviewed on population and the environment on 35 radio programs in 22 states, as well as National Geographic News, as part of the media coverage surrounding the Day of Six Billion. The UN report can be accessed on the web at http://www.unfpa.org/swp/swpmain.htm

Conference Linking Science, Religion and the Natural World

An extraordinary gathering of scientists, religious and spiritual leaders, conservationists, and resource practitioners will occur at Yale on May 11-14 to explore *The Good in Nature and Humanity: Connecting Science, Religion, and the Natural World.* The meeting is a collaborative effort of the Yale School of Forestry and Environmental Studies, the Yale Divinity School, The Wilderness Society, and the National Religious Partnership for the Environment. Among the scheduled speakers are Wendell Berry, Terry Tempest Williams, Strachan Donnelley, Gary Nabhan, Sylvia Earle, Paul Gorman, Steve Kellert, and Carl Safina. For more information contact: www.yale.edu/natureandhumanity or Professor Stephen Kellert at (203) 432-5114.

F&ES Corporate Environmental Leadership Seminar

The Corporate Environmental Leadership Seminar (CELS) will be held from June 4 to June 15 this year at Yale University. Now in its ninth year, CELS has become the leading executive program in the U.S. on environmental issues. The intensive two-week session offers high-level, integrated, problem-oriented training in environmental management and policy. For more information call: (203) 432-6953 or E-mail: michelle.portlock@yale.edu

Molecular Conservation Genetics Symposium

A symposium, *Molecular Conservation Genetics: Future Trends in the Accelerating Extinction Crisis*, will be held at Yale on June 18th as part of the annual meeting of the Society for Molecular Biology and Evolution (SMBE). The symposium will address the role of molecular markers and genetic techniques, looking in depth at the issue of what molecules can and cannot do in conservation biology. Symposium speakers include Oliver Ryder from the Center for Reproduction of Endangered Species, Zoological Society in San Diego, CA; Robert Fleischer from the National Zoological Park, Smithsonian Institution, Washington, DC; and Robert DeSalle from the American Museum of Natural History, New York, NY. It was organized Dr. Gisella Caccone, Director of the ECOSAVE Conservation Genetics Laboratory and lecturer in the Department of Ecology and Evolutionary Biology (EEB), and George Amato from the Wildlife Conservation Society, New York, NY and is being supported by funding from the Yale Institute for Biospheric Studies (YIBS) and The Wildlife Conservation Society. The SMBE Annual meeting, from June 17th through June 20th, was organized by Professor Jeffrey Powell of EEB. A list of other topics being presented and information on attending this conference can be obtained at web site http://frog.biology.yale.edu/smbe or by calling Maureen Cunningham at 203-432-3837.

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PUBLICATIONS

Carnivores in Ecosystems: The Yellowstone Experience

The recently published book, *Carnivores in Ecosystems: The Yellowstone Experience* was edited by Tim W. Clark, Yale School of Forestry and Environmental Studies (F&ES) Adjunct Professor of Wildlife Ecology and Policy, A. Peyton Curlee, Steven C. Minta, and Peter M. Kareiva (Yale University Press, 1999). The book examines the current status, management, and conservation of carnivores in the Greater Yellowstone Ecosystem.

Forest Certification

The growing acceptance of forest certification as a tool to encourage environmentally acceptable management of forests makes a new book, *Forest Certification: Roots, Issues, Challenges, and Benefits*, (CRC Press, 1999) by F&ES faculty Kristiina Vogt, Bruce Larson, John Gordon, Daniel Vogt, and doctoral candidate Anna Fanzeres, a timely and important contribution to the field. The overview of certification includes overlooked topics —analysis of the scientific basis for the certification standards and the success of the different standards in assessing the environmental, social, and economic implications of the managed system.

Student Poet-1999-2000

One of the greatest rewards for any educator is knowing that something you did or said provided the inspiration for some singular achievement in the life of a student. Harmony Scaglione of Meriden, Connecticut, and a junior at Southern Connecticut State University, recently won the title of Student Poet of Connecticut, 1999-2000, from SCSU. She wrote a poem about one of the mummys on exhibit in the Egypt Hall at the Peabody Museum that we would like to share with our readers.

For the Egyptian Woman, on Display at the Peabody Museum

She paled to the Brontosaurus,
her bones too thin
to impress me on those afternoons spent
gaping at vertebrae like boulders,
femurs like trees.
Just the three plain bracelets
on her crumbled wrist
struck my fancy; nine years old.
I puzzled that
this one, curled
into a fetal curl, an ash,
her rags and skin
like something carved from clay then left
to crumble in the sun—
that this one should wear bracelets.

Her gallery was decked
with scripted stone, myths painted
and engraved by hands
then kept
by the desert. The runes
raised jackals and cats to godhead,
crooned the new voice,
began the search. And she,
one of the first ones,
she knew the Nile's hum,
and how the wind groaned
when it bloated with sand
and tore across the desert.
It caught her out, and took her,
curled and kept her,
put sand where her blood was,
unleased dry time on her skin.

Fifteen years; the dinosaurs slept
as I remembered. Their fossils rumbled
low sounds, alien, the ghosts
of an abandoned scripture.
I could not touch
their ends, what lured them to graze
or how they howled when they fell
from the hunter's jaw
to the gums of the swamp. But this one,
she walked in the desert;
and her bracelets knocked softly, lending rhythm
to the dark. She'd left her child
sleeping, her husdand sick. Wooed
by the vastness and silence and pulse,
she stopped, shook her hair out,
threw her arms out, and spun
until the wind grew teeth.