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TechTalk

S E R V I N G T H E M I T C O M M U N I T Y

‘Academic year has begun in earnest’

Hockfield stresses knowledge, innovation and leadership in letter to community



PHOTO / RICK FRIEDMAN

Susan Hockfield, 16th President of MIT

President Susan Hockfield addressed the entire Institute community in a letter welcoming new and returning faculty, students and staff to MIT. Sent on Sept. 7, her greeting is printed below.

“To new faculty, students and staff, welcome! And to returning members of the community, welcome back. While we can hope for a few more glorious weekends of late-summer weather over the next month and a half, we’ve already felt that fall snap in the air, and our academic year has begun in earnest. At the start of the year, perhaps more than at other times, when I enter the Main Group at 77 Massachusetts Avenue I cast my eyes upward and am freshly inspired by the statement of MIT’s mission that rings the dome: “Established for advancement and development of science, its application to industry, the arts, agriculture, and commerce.” As we continue to advance our founding mission through education and research, I hope that everyone in the MIT community will feel proud of our many successes in the last year, and inspired to carry that momentum forward into the coming year.

Welcoming new arrivals

“The strength of MIT depends on our exceptional faculty and students, and those arriving this fall will continue our tradition of excellence. Last week I had the good fortune to welcome the new members of our faculty. They bring to MIT remarkable accomplishments and represent in a real way our ongoing commitment to attracting talent from diverse backgrounds. Of the 52 members of the faculty hired since last fall, 19 (36.5 percent) are women and 6 (11.5 percent) are members of under-represented minority groups. One way to measure our progress is to recall that last fall, women constituted 18 percent of the faculty, and underrepresented minorities 4

percent. We also extend a special welcome to this year’s eight Dr. Martin Luther King Jr. Visiting Professors and Scholars, a greater number than in any previous year of this program.

“As the provost and I announced to the faculty last week, we will establish a new position of associate provost for faculty equity in the Provost’s Office to build on our momentum and accelerate our progress in enhancing the diversity of the faculty.

“The Class of 2010 is every bit as remarkable as its recent predecessors. Applications for the Class of 2010 increased 9 percent over the previous year, to an all-time high of 11,373, and 67 percent of those accepted chose to enroll—another record. Of the 1,005 exceptional students now enrolled as MIT freshmen, 44 percent were valedictorians, and 89 percent graduated in the top 5 percent, of their high school classes. They come from 49 states, two territories and the District of Columbia, and from 51 foreign countries; 46 percent of them are women, bringing our undergraduate population to 44 percent women.

“Over the summer, a number of leadership changes have brought new faces and new strengths to the Provost’s Office. At the beginning of July, Professor Philip S. Khoury left the deanship of the School of Humanities, Arts and Social Sciences to serve as associate provost. At the beginning of August, Professor Alice P. Gast left MIT to assume the presidency of Lehigh University. Associate Provost Claude R. Canizares has succeeded Dr. Gast as vice president for research and associate provost, while Professor Lorna J. Gibson took on a new role as associate provost.

“Professor Khoury will oversee MIT’s programs in the arts, work to strengthen

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MIT innovators make Tech Review’s top 35

Elizabeth Thomson
News Office

Three MIT faculty and eight alumni are among the TR35, Technology Review magazine’s compilation of the 35 top innovators worldwide under the age of 35.

“The TR35 is an amazing group of people. Their accomplishments are likely to shape their fields for decades to come,” said Jason Pontin, editor in chief of Technology Review.

The innovators will be featured in the September-October issue of the magazine; the story went online Sept. 8.

The MIT faculty to receive the award are Manolis

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Ready, set, go: Class of 2010 leaps into action

Sasha Brown
News Office



PHOTO / DONNA COVENEY

Freshman Tish Scolnik scrubs a jungle gym as part of the CityDays playground clean-up effort in Cambridge.

Tish Scolnik is one of 1,000 freshmen making their debut on campus this fall. The Class of 2010 comes from varied backgrounds and from all over the United States and the world to study at MIT. They have officially been here since Aug. 30, when orientation began.

Scolnik, of Waccabuc, N.Y., was expecting her courses, which started Sept. 6, to be a bit different than her first weeks, spent at the Freshman Leadership Program on Thompson Island in Boston Harbor and then at freshman orientation. “I have had a lot of fun these past weeks,” Scolnik said.

With a planned schedule that includes joining the MIT-EMS ambulance corps and running for class council, Scolnik was realistic about what her academic future holds. “I see at

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PICTURE PERFECT

Students pick museum-quality artwork for their dorm rooms.

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THAR SHE BLOWS

New idea for offshore wind turbines really floats.

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LEARNING MECHANISM

Picower researchers find evidence supporting the idea that neural connections get stronger when we learn.

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DESERT WONDER

MIT researchers study a cloud forest in arid Oman.

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'Father of molecular medicine,' Vernon Ingram, dies at 82

Anne Trafton
News Office

Vernon Ingram, an MIT biology professor known as the "father of molecular medicine," died Aug. 17 from injuries suffered during a fall. He was 82.

Ingram was best known for his discovery, during the 1950s, that a single amino acid substitution is responsible for the molecular abnormality that leads to sickle cell anemia.

The find was "one of the absolutely seminal discoveries in the history of molecular biology," said Graham Walker, MIT professor of biology.

Walker, who was Ingram's friend and colleague for 30 years, said that Ingram was "one of the greatest men I have met in my life. An extraordinary scientist, an extraordinary intellect, and an absolutely wonderful human being."

In recent years, Ingram focused his research on neuroscience, especially Alzheimer's disease. Though in his 80s, he still ran a small laboratory at MIT and was constantly pursuing new research, Walker said.

"He was a dyed-in-the-wool, inveterate experimentalist," Walker said. "He was going at full speed right up until the end."

Ingram and his wife, Elizabeth, served as housemasters at Ashdown House from 1985 until a few years ago.

"They were just extraordinarily dedicated to their students," Walker said.

Ingram was also a dedicated teacher and had served as director of the Experimental Studies Group (ESG).

Holly Sweet, current director of ESG, described Ingram as an "inspirational teacher, and a compassionate and spirited man who promoted the professional growth of his staff. As far as his legacy to ESG is concerned, he was the guiding force behind our ever-growing seminar series. He truly put the 'experimental' into the Experimental Study Group. We will miss him a great deal."

Ingram was born in Breslau, Germany, in 1924. He studied at Birkbeck College at the University of London, earning his B.Sc. in chemistry in 1945 and his Ph.D. in



PHOTO / DONNA COVENEY

In a photo from 2002, Professor Vernon Ingram holds up cell cultures that he and senior technical associate Barbara Blanchard worked with during their research on the beta-amyloid plaques that attack the brains of Alzheimer's patients.

organic chemistry in 1949. He then spent two years in the United States preparing and crystallizing proteins at the Rockefeller Institute and studying peptide chemistry at Yale.

In 1952, Ingram returned to England, where he studied protein chemistry in the Cavendish Laboratory of Cambridge University. He focused on the genetics of hemoglobin, the molecule that carries oxygen in the blood. Those studies led to his discovery that the misshapen hemoglobin molecules that characterize sickle cell anemia are caused by a single mutation.

Ingram joined the MIT faculty in 1958 and was one of a distinguished group of professors who started a world-renowned center for the study of molecular and cell biology. He originally planned to stay at MIT for only one year, but "I liked it so much that I stayed," he told the National Academy of Sciences in 2002, the year he was elected to that society.

In 1961, Birkbeck College awarded him the D.Sc. degree.

He enjoyed art, music and photography, and was very involved with the Rockport Chamber Music Festival (RCMF).

RCMF Artistic Director David Deveau, who is also a pianist and a senior lecturer in music at MIT, worked closely with Ingram for the past decade.

"Vernon served with great distinction on the board of directors of the RCMF and brought a wonderful energy and commitment to our enterprise. He and Beth attended most of the festival concerts, enjoyed hosting musicians, talking music and throwing wonderful parties. Vernon brought his natural scientific curiosity to everything he undertook, and music was no exception. We often had substantive conversations about the merits of a given performance or composition," Deveau said.

Ingram is survived by his wife; a son, Peter; and a daughter, Jennifer.

A memorial service was held at MIT on September 10.

Xiwen Zhong, research engineer, dies at 71

Xiwen Zhong, a research engineer at the MIT Plasma Science and Fusion Science Center, died Aug. 1 after a long illness. He was 71.

Zhong was a dedicated engineer who made important contributions to many aspects of the Alcator C-Mod project, including power system control, radio frequency, heating circuit and general electronic circuit design, prototyping and testing.

Born in Hebei Province, China, Zhong graduated from Tsinghua University with a B.S. in electrical engineering in 1959. From his graduation until 1992, he conducted scientific research at the Institute of Automation at the Chinese Academy of Sciences. From 1979 to 1984, he worked at the Space Research Center of the Chinese Academy of Sciences. Before joining the MIT Plasma Science and Fusion Center in 2000, he was a visiting electrical engineer at the center from 1992 to 1995.

Zhong is survived by his wife, a daughter, a son and four grandchildren.

LINCOLN LAB

Louis P. Rainville

Louis P. Rainville, a retired employee of MIT's Lincoln Laboratory and Haystack Observatory, died Sept. 3 at the Kaplan Family Hospice House in Danvers, Mass. He was 80.

Rainville worked at MIT for 35 years, retiring in 1986. Born and raised in Salem, Mass., he was a graduate of Northeastern University and a veteran of World War II and the Korean War.

He was the husband of the late Frances P. (Gillespie) Rainville. He is survived by three sons, Thomas A. Rainville of Salem, Mass., Michael R. Rainville of Norton, Mass., and Donald V. Rainville of Camden, Maine; two daughters, Carol A. Rainville of Salem and Patricia M. Mazzola of Westboro; three brothers, Roger Rainville of Salem, Mass., Andre Rainville and Robert Rainville of Florida; a sister, Rita Finiss of Salem, Mass.; eight grandchildren and many nieces, nephews and cousins.

He was also the father of the late David J. Rainville and was predeceased by his brother George Rainville and his sister Anita Oliver.

Karl E. Adler

Karl E. Adler, who worked at Lincoln Laboratory for 31 years, died July 16 at the Life Care Center of Acton. He was 88.

Adler, a Navy veteran of World War II, worked at several boat-building shops before joining Lincoln Laboratory as a cabinet maker.

He is survived by his wife, Miriam (Frost) Adler; a son, Karl E. Adler Jr. of Newburyport; three daughters, Christine Fernsler of Annandale, Va., Sigrid Lambert of Merrimack, N.H., and Susan (Frost) Warner of Calverton, N.Y.; a sister, Hazel Wilson of Lexington; six grandchildren and one great-grandchild.

A memorial service was held at the First Parish Unitarian Universalist Church in Bedford on July 29.

Donations may be made to the Alzheimer's Association, 311 Arsenal St., Watertown 02472.

Bill Dickson '56, retired senior vice president, dies

Anne Trafton
News Office

William R. Dickson, a retired senior vice president who supervised major building projects that tripled the size of MIT's campus, died Aug. 14 after suffering a heart attack. He was 71.

Dickson worked at MIT for nearly 40 years, starting in Physical Plant and working his way up to senior vice president, a title he held for 16 years before retiring in 1998. As senior vice president, he was responsible for most of the operations of the Institute and much of the financial planning and activities.

During his tenure, he was involved in a number of building projects, including Kresge Auditorium, the Green Building, Eastgate, Westgate, McCormick, the Whitaker Building, Building 16 and the Stata Center.

"Bill was a bridge from the MIT of the 1950s to the MIT of the 21st century. We all benefited from his dedicated work, his straight talk and his inherent wisdom," said MIT President Emeritus Charles Vest.

Dickson graduated from MIT in 1956 with a degree in building construction and

engineering (Course 17). He spent two years as a staff engineer at Lincoln Laboratory then became an associate scientist at Avco Corp. in Wilmington. He returned to MIT as assistant to the director of Physical Plant in 1960 and became director of Physical Plant in 1971. In 1980, he was appointed vice president for operations, and he was named senior vice president in 1982.

When Dickson retired, he told The Tech student newspaper that his proudest accomplishment was helping the Institute grow from 3.5 million square feet of built space in 1960 to 10 million square feet at the time he left.

MIT's co-generation plant, which is named for Dickson, was built after he initiated the project to combine hot water production with electricity generation in one plant.

President Emeritus Paul Gray, who appointed Dickson senior vice president in 1982, said that Dickson was recognized early in his career as "not only an outstanding engineer but also an effective motivator and manager of others."



William R. Dickson

Institute Professor John Deutch said, "I think Bill Dickson is probably one of the best examples of what an MIT person is—he had devotion to the place, and devotion to dealing with every individual to try to solve their problems and make their experience better."

Dickson was a lifelong resident of Framingham and a 1952 graduate of Framingham High School. He served as chair of the MetroWest Medical Center board of trustees for 12 years.

He is survived by his wife, Ann (Lingley) Dickson; two sons, Christopher Dickson of Medway and Jeffrey Dickson of San Francisco; a daughter, Julie Ferrari of Framingham; a brother, Lee Dickson of Florida; and seven grandchildren.

An afternoon remembrance was held at the family home on Aug. 27.

Donations may be made to the William R. Dickson Scholarship Fund, at giving.mit.edu, account number 3296600; or The Friends of the Framingham Heart Study, 73 Mount Wayte Ave., Framingham, MA 01702-5827.

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MIT community offers reflections on Sept. 11, 2001

Sasha Brown
News Office

On Monday, Sept. 11, the MIT Police Department honor guard conducted a remembrance honoring all those who were killed in the attacks of Sept. 11, 2001, and a student group, Forum on American Progress, held a memorial vigil on the steps of the Student Center.

The guard stood at attention on the steps of the Stratton Student Center at

8:46 a.m. and 9:03 a.m., the moments when American Airlines Flight 11 and United Airlines Flight 175 struck the two World Trade Center towers in New York.

The U.S. flag on Killian Court flew at half-staff all day.

The Rev. Amy McCreath, MIT's Episcopal chaplain, spoke at the evening vigil. "9/11 was a very powerful event for the MIT community when it happened, and there is so much that we still have to learn from it," McCreath said.

Recognizing and revisiting the pain

of five years ago is part of the Forum on American Progress's (FAP) overall mission, FAP president Ali Wyne said. "While anniversaries of this nature are painful, they offer important and, in many ways, unique opportunities for reflection," he said. "At a time when short-term demands are numerous and urgent, important historical dates like September 11th can compel citizens and leaders alike to think beyond the immediate future."

The FAP planned the vigil to provide

an opportunity to ask many questions, Wyne said. "How can the United States prevent the recurrence of an attack on the scale of September 11th?" he asked. "We should ask, 'How can the United States restore the position of leadership that it once enjoyed? How can it defend its security and advance its interests in a manner that enhances the welfare of the global community?'"

The anniversary of the 9/11 attacks is an important time for people to talk and learn, Wyne said.

TR35

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Kellis, Marin Soljacic, and Alice Ting.

Kellis is an assistant professor in the Department of Electrical Engineering and Computer Science who holds the Class of 1964 Distinguished Alumni Career Development Chair; Soljacic is an assistant professor in the Department of Physics; and Ting is the Pfizer-Laubach Career Development Assistant Professor of Chemistry.

Kellis, 29, was cited for developing "algorithms and techniques for analyzing the entire genomes of different species, the better to understand those genomes," according to Technology Review.

"After validating his methods in yeast, Kellis has moved to the human genome, which he has so far compared with those of the mouse, rat, and dog. His work is providing an intimate understanding of the human genome that may give drug developers new points of entry in their attempts to combat viruses and other causes of disease."

Soljacic, 32, won for his work on modeling the flows of light. "By calculating the behavior of light in structures called photonic crystals, Soljacic is paving the way for devices that can process information at ultrafast speeds using light alone," the magazine reported.

He has also "shown how photonic crystals can enable light beams to interact and to control one another, so that photonic devices can carry out logic operations."

Ting, 31, was cited for her work on "cellular movies" that "reveal the minute inner workings of cells in unprecedented cinematic detail," according to Technology Review.

She is currently working to "fluorescently image the junction between nerve cells, illuminating a biochemical process that appears to play a key role in learning and memory. So it may be possible one day to see an actual film of how a brain learns."

MIT alumni among the TR35 are Kellis, Soljacic, Edward Boyden, Seth Coe-Sullivan, Roger Dingledine, Eddie Kohler, Ling Liao and Michael Wong.

The honorees are selected by the editors of the magazine in collaboration with a prestigious panel of judges from major institutions and corporations such as Boston University, Hewlett-Packard Labs, the Lawrence Livermore Laboratory, Caltech and Applied Materials.

Bustani seminars focus on Mideast

The Emile Bustani Middle East Seminar at MIT will celebrate its 21st anniversary this fall with a single lecture on contemporary Middle Eastern affairs. On Sept. 19, Professor Augustus Richard Norton of Boston University will speak on "Requiem on the 2006 Israel-Lebanon War."

The seminar is funded by the Bustani family of Beirut, Lebanon, in memory of the late Emile M. Bustani, who received the S.B. in civil engineering in 1933. "Mr. Bustani was one of the Middle East's most prominent businessmen and philanthropists until his premature death in 1963. He was the founder and chairman of the Contracting and Trading Co., a leading construction and engineering firm with projects in the Middle East, Africa and the Far East," said Philip S. Khoury, associate provost and chair of the Bustani Seminar. This session is sponsored by the Center for International Studies and the Technology and Culture Forum.

The lecture will take place at 4:30 p.m. in Room E51-345 (Bowen Hall) and is open to the public. For further information on the Bustani Middle East Seminar, contact Laurie Scheffler at x3-3121.



PHOTO / UCR/CARLOS PUMA

Chris Abani

Exiled Nigerian novelist to read from works on campus

Award-winning Nigerian novelist, poet and jazz musician Chris Abani will begin an artist's residency at MIT on Sept. 18 with a free reading.

Abani's works include the acclaimed 2004 novel, "Graceland," the story of a teenage Elvis impersonator trying to get out of the slums of Nigeria; and "Kalakuta Republic," a collection of poems inspired by the torture Abani endured in jail.

"Abani's poems are the most naked, harrowing expression of prison life and political torture imaginable," said play-

wright Harold Pinter of "Kalakuta Republic." "Reading them is like being singed with a red-hot iron."

Abani published his first novel at 16, but the political thriller was deemed subversive by the Nigerian government and landed him in the notorious maximum security prison Kiri Kiri.

By the age of 21 he had been imprisoned and tortured twice for his novels and plays.

Now living in exile in the United States, Abani will give a reading and talk Sept. 18

at 7 p.m. in the Lewis Music Library. He will be on campus from Sept. 18 to 22.

While at MIT he'll meet with faculty and graduate students in arts, humanities and science-related areas, from those taking an advanced poetry class to members of the Computer Science and Artificial Intelligence Lab.

Abani teaches at the University of California at Riverside and at Antioch University in Los Angeles.

For more information, call x3-2341.

— Mary Haller



PHOTO / DONNA COVENY

MIT researchers have shown that certain key connections among neurons get stronger when we learn. From left are Mark F. Bear, Picower Professor of Neuroscience; postdoctorate associate Jonathan R. Whitlock; research scientist Arnold J. Heynen and research affiliate Marshall G. Shuler.

MIT provides first evidence for learning mechanism

Deborah Halber
News Office Correspondent

Finally confirming a fact that remained unproven for more than 30 years, researchers at MIT's Picower Institute for Learning and Memory report in the Aug. 25 issue of Science that certain key connections among neurons get stronger when we learn.

"We show what everyone has always believed: LTP (long-term potentiation) is indeed induced in the hippocampus when learning occurs," said Mark F. Bear, Picower Professor of Neuroscience. "This is a big deal for neuroscientists because such evidence has been absent for the 30-plus years we have known about LTP."

The findings described in the Bear paper and in a second, separate paper in the same issue of Science "substantially advance the case for LTP as a neural mechanism for memory," wrote Tim Bliss of the MRC National Institute for Medical Research in the United Kingdom, Graham Collingridge of the University of Bristol, and Serge Laroche of the Université Paris Sud in a commentary on the work.

LTP is an example of plasticity—the amazing ability of the brain to change in response to experience. LTP builds up synapses, or the connections between neurons, while its counterpart, long-term depression, or LTD,

pares unused synapses.

Since LTP was discovered in the late 1960s, thousands of papers have been published based on the assumption that the phenomenon is an important learning and memory mechanism in the hippocampus, the memory center of the brain.

Researchers had found that electrical stimulation of neurons, mimicking the electrical impulses that zap around the brain when it responds to sensory input, strengthens the connections among synapses. The assumption was that LTP occurs in the hippocampus as a consequence of learning, but there had never been conclusive evidence that learning was directly tied to LTP.

Using techniques pioneered by MIT's Susumu Tonegawa, director of the Picower Institute, neuroscientists began to pinpoint exactly which genes and proteins are involved in learning.

This created a "big thicket of correlations, but it never proved causality," said Bear, who also holds an appointment in MIT's Department of Brain and Cognitive Sciences. "Our contribution was that we had learned enough about LTP and the traces it leaves in the brain to track changes in proteins."

This work is supported by the Howard Hughes Medical Institute and the National Institute for Mental Health.

For full text, visit web.mit.edu/newsoffice/2006/ltp.html.

Acoustic data may reveal hidden gas, oil supplies

Deborah Halber

News Office Correspondent

Just as doctors use ultrasound to image internal organs and unborn babies, MIT Earth Resources Laboratory researchers listen to the echoing language of rocks to map what's going on tens of thousands of feet below the Earth's surface.

With the help of a new \$580,000 US Department of Energy (DOE) grant, the earth scientists will use their skills at interpreting underground sound to seek out "sweet spots"—pockets of natural gas and oil contained in fractured porous rocks—in a Wyoming oil field. If the method proves effective at determining where to drill wells, it could eventually be used at oil and gas fields across the country.

A major domestic source of natural gas is low-permeability or "tight" gas formations. Oil and gas come from organic materials that have been cooked for eons under the pressure and high heat of the Earth's crust. Some underground reservoirs contain large volumes of oil and gas that flow easily through permeable rocks, but sometimes the fluids are trapped in rocks with small, difficult-to-access pores, forming separate scattered pockets. Until recently, there was no technology available to get at tight gas.

Tight gas is now the largest of three unconventional gas resources, which also include coal beds and shale. Production of unconventional gas in the United States represented around 40 percent of the nation's total gas output in 2004, according to the DOE, but could grow to 50 percent by 2030 if advanced technologies are developed and implemented.

One such advanced technology is the brainchild of Mark E. Willis and Daniel R. Burns, research scientists in the Department of Earth, Atmospheric and Planetary Sciences (EAPS), and M. Nafi Toksoz, professor of EAPS. Their method involves combining data from two established, yet previously unrelated, means of seeking out hidden oil and gas reserves.

To free up the hydrocarbons scattered in small pockets from one to three miles below ground, oil companies use a process called hydraulic fracturing, or hydro-frac, which forces water into the bedrock through deep wells to create fractures and increase the size and extent of existing fractures. The fractures open up avenues for the oil and gas to flow to wells.

To monitor the effectiveness of fracturing and to detect natural fractures that may be sweet spots of natural gas, engineers gather acoustic data from the surface and from deep within wells. "Surface seismic methods are like medical ultrasound. They give us images of the subsurface geology," Burns said. Three-dimensional seismic surveys involve creating vibrations on the surface and monitoring the resulting underground echoes. "When the echoes change, fractures are there," Willis said.

A method called time-lapse vertical seismic profiling (VSP) tends to be more accurate because it collects acoustic data directly underground through bore holes. "Putting the receivers down into a well is like making images with sensors inside the body in the medical world," Burns said. "The result is the ability to see finer details and avoid all the clutter that comes from sending sound waves through the skin and muscle tissue to get at the thing we are most interested in seeing."

Time-lapse VSP is expensive and not routinely used in oil and gas exploration. The EAPS research team, working with time-lapse VSP data collected by industry partner EnCana Corp., came up with unique ways to look at the data together with microseismic data from the tiny earthquakes that are produced when the rock is fractured. "If we record and locate these events just as the US Geological Survey does with large earthquakes around the world, we get an idea of where the hydro-frac is located. Then we look at the time-lapse VSP data at those spots and try to get a more detailed image of the fracture," Burns said.

The MIT team hopes to show that this new approach is the most effective way to find sweet spots. "If we can demonstrate the value of time-lapse VSP, this tool could be used in a wider fashion across the United States on many fields," Willis said.

Deep-sea oil rigs inspire giant wind turbines

Nancy Stauffer

Laboratory for Energy and the Environment

An MIT researcher has a vision: Four hundred huge offshore wind turbines that provide onshore customers with enough electricity to power several hundred thousand homes, though nobody standing onshore can see them. The trick? The wind turbines float on platforms a hundred miles out to sea, where the winds are strong and steady.

Today's offshore wind turbines usually stand on towers driven deep into the ocean floor. But that arrangement works only in depths of about 15 meters or less. Proposed installations are therefore typically close enough to shore to arouse strong public opposition.

Paul D. Sclavounos, a professor of mechanical engineering and naval architecture, has spent decades designing and analyzing large floating structures for deep-sea oil and gas exploration. Observing the wind-farm controversies, he thought, "Wait a minute. Why can't we simply take those windmills and put them on floaters and move them farther offshore, where there's plenty of space and lots of wind?"

In 2004, he and his MIT colleagues teamed up with wind-turbine experts from the National Renewable Energy Laboratory (NREL) to integrate a wind turbine with a floater. Their design calls for a tension leg platform (TLP), a system in which long steel cables, or "tethers," connect the corners of the platform to a concrete-block or other mooring system on the ocean floor. The platform and turbine are thus supported not by an expensive tower but by buoyancy. "And you don't pay anything to be buoyant," said Sclavounos.

According to their analyses, the floater-mounted turbines could work in depths ranging from 30 to 200 meters. In the Northeast, for example, they could be 50 to 150 kilometers from shore. And the turbine atop each platform could be big—an economic advantage in the wind-farm business. The MIT-NREL design assumes a 5-megawatt experimental turbine now being developed by industry. (Onshore units are 1.5 megawatts, conventional offshore units, 3.6 megawatts.)

Stable enough for towing

Ocean assembly of the floating turbines would be prohibitively expensive because of their size: the wind tower is fully 90

meters tall, the rotors about 140 meters in diameter. So the researchers designed them to be assembled onshore—probably at a shipyard—and towed out to sea by a tugboat. To keep each platform stable, cylinders inside it are ballasted with concrete and water. Once on site, the platform is hooked to previously installed tethers. Water is pumped out of the cylinders until the entire assembly lifts up in the water, pulling the tethers taut.

The tethers allow the floating platforms to move from side to side but not up and down—a remarkably stable arrangement. According to computer simulations, in hurricane conditions the floating platforms—each about 30 meters in diameter—would shift by one to two meters, and the end of the turbine blades would remain well above the peak of even the highest wave. The researchers are hoping to reduce the sideways motion still further by installing specially designed dampers similar to those used to steady the sway of skyscrapers during high winds and earthquakes.

Sclavounos estimates that building and installing his floating support system

should cost a third as much as constructing the type of truss tower now planned for deep-water installations. Installing the tethers, the electrical system, and the cable to the shore follows standard procedure. Because of the strong offshore winds, the floating turbines should produce up to twice as much electricity per year (per installed megawatt) as wind turbines now in operation. And because the wind turbines are not permanently attached to the ocean floor, they are a movable asset. If a company with 400 wind turbines serving the Boston area needs more power for New York City, it can unhook some of the floating turbines and tow them south.

Encouraged by positive responses from wind, electric power and oil companies, Sclavounos hopes to install a half-scale prototype south of Cape Cod. "We'd have a little unit sitting out there and...could show that this thing can float and behave the way we're saying it will," he said. "That's clearly the way to get going."

This research was supported by the National Renewable Energy Laboratory.

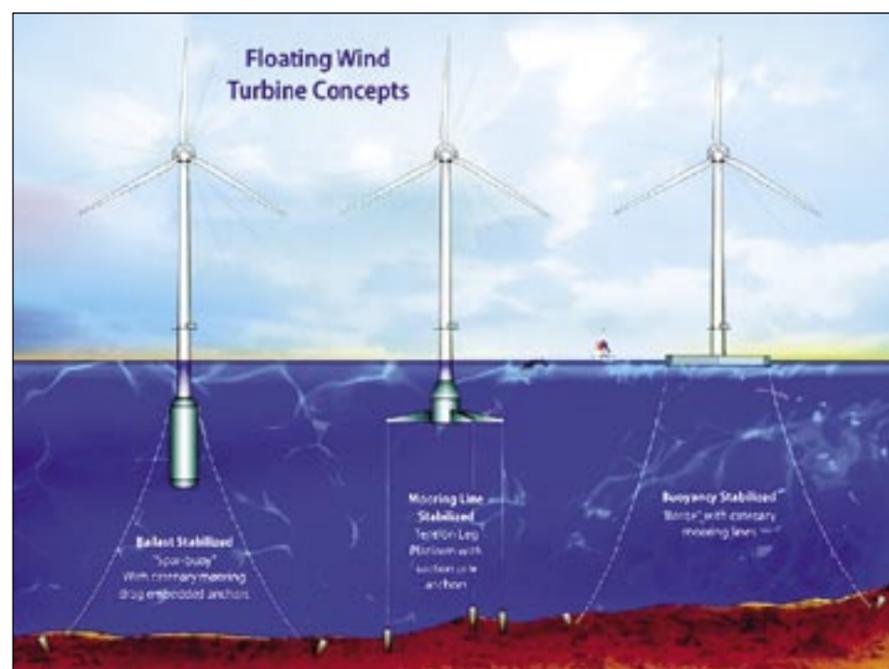


FIGURE COURTESY / NATIONAL RENEWABLE ENERGY LABORATORY

Among three designs for floating giant wind turbines in the deep ocean, MIT research is focusing on the tension leg platform (center), a system that oil companies use for deep-water rigs.

Grad student's Hyperbow makes music to measure

Robin H. Ray

News Office Correspondent

A Ph.D. candidate in the Hyperinstruments Group of the MIT Media Lab has developed a new electronic sensing system to measure minute changes in the position, acceleration and strain of a violin bow.

The system can be used to evaluate different bowing techniques and may expand the expressive possibilities of the violin by electronic means, according to Diana Young, who built the gesture-sensing system for the Hyperbow.

Young recently spoke about her work at the 151st meeting of the Acoustical Society of America (ASA) in Providence, R.I., and at the sixth International Conference on New Interfaces for Musical Expression in Paris.

The Hyperbow is an enhanced bow, used in conjunction with a Hyperviolin. The latter, another product of the MIT Media Lab, is an instrument that makes no sound but creates an electronic output when played. The Hyperviolin can readily be played by anyone used to an acoustic violin.

"Electronic music is a way of combining my interests in music and engineering," Young said.

Young, who has a B.A. in music from Johns Hopkins University and a certificate in violin performance from the Peabody Conservatory, built the gesture-sensing system for her master's degree, which she received from MIT in 2001. Designed as



PHOTO / DONNA COVENEY

Ph.D. candidate Diana Young puts her Hyperbow into action with a Hyperviolin in June. Young developed the Hyperbow at the MIT Media Lab to measure differences in bowing technique.

a performance interface for professional violinists, the Hyperbow includes a set of accelerometers, gyroscopes and force sensors all installed on a carbon fiber bow.

Because the system is wireless, it interferes only minimally with the violinist's bowing.

Both the Hyperbow and the Hyperviolin have been played in concert, by the renowned violinist Joshua Bell, among others; several composers, including MIT's Tod Machover, have created new compositions for them.

The Hyperbow premiered at the 2002 Conference on New Instruments for Musi-

cal Expression in Dublin. (Hear samples of Hyperviolin music on the Toy Symphony web site, www.toysymphony.net, then follow links for "Sound and Images" and "Dublin—National Symphony Orchestra.")

The Hyperbow is just the latest in a series of Media Lab inventions on the vanguard of musical expression. Hypercello and Hyperinstruments were developed at the Media Lab by Joe Paradiso, Neil Gershenfeld and composer Tod Machover in the 1990s.

An abstract of Young's paper is available via the ASA web site.



PHOTO / SLOAN KULPER

Sloan Kulper (S.B. 2003) and Audrey Roy (S.B. 2005) have designed a building in the shape of a cell for the Institute for Nanobiomedical Technology and Membrane Biology in Chengdu, China. This illustration shows the exterior in daytime. Protrusions in the facade provide meeting areas attached directly to interior laboratories.

Three at MIT conceive building in shape of cell

Novel architecture planned for China

Sarah H. Wright
News Office

An innovative cell-shaped building will house a new biomedical research institute in Chengdu, China, thanks to an unusual crossdisciplinary collaboration between Shuguang Zhang, a world-renowned bioengineer and scientist at MIT, his former student, architecture major Sloan Kulper, and computer science and electrical engineering major Audrey Roy.

Kulper (S.B. 2003) and Roy (S.B. 2005) designed the cell-shaped building for the Institute for Nanobiomedical Technology and Membrane Biology in Chengdu, China, the regional capital of Sichuan province in southwestern China. The proposed new facility will contain 170,000 square feet of laboratory, research and meeting spaces; it is slated for construction over the next three years. The building is intended to look like a cell from the outside and to include an assortment of forms inspired by molecular biology inside.

Shuguang Zhang, associate director of the Center for Biomedical Engineering, will serve as founding advisor of the new Nanobiomedical Institute, to be sited at Chengdu's Sichuan University, where Zhang received his undergraduate degree in biochemistry.

Zhang met Kulper in 2002, when he took Zhang's course, "Molecular Structure of Biological Materials: Structure, Function and Self-assembly."

In the class, Zhang frequently discusses the striking similarities between architecture and biological structures, he said. "Nature has produced abundant magnificent, intricate and fine molecu-

lar and cellular structures through billions of years of molecular selection and evolution.

"These invisible molecular and cellular structures cannot be seen by the naked eye, but can only be observed with the most sophisticated scientific tools, such as X-ray diffraction and nuclear magnetic resonance, or modeled with advanced computers. But if they can be amplified billions of times as in a building, then these molecular structures can be seen, touched and admired. At that large scale, they can also be very educational for people of all ages," Zhang said.

According to Zhang, the pioneering design for the cell-shaped building was inspired by "elegantly folded protein structures and their simple and beautiful structural motifs. The cell-shaped building attempts to combine the architecture and the biology structures," he said.

Kulper said the design of the building also arose from the pioneering spirit he discovered among life scientists and biological engineers. "They are always working at the threshold of understanding," Kulper said.

"When I took Shuguang's course, I was thrilled to learn that structural biologists had developed such an amazing language for describing new and complex forms. Also, structural biology is basically concerned with the sort of geometries that architects and designers often work with, though on a completely different scale. It's a very visual field that communicates more through illustration than through symbol," Kulper said.

The seeds of Kulper's involvement

See **CELL BUILDING**

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MIT team describes unique 'cloud forest'

Trees that live in an odd desert forest in Oman have found an unusual way to water themselves by extracting moisture from low-lying clouds, MIT scientists report.

In an area that is characterized mostly by desert, the trees have preserved an ecological niche because they exploit a wispy-thin source of water that only occurs seasonally, said Elfatih A.B. Eltahir, professor of civil and environmental engineering, and former MIT graduate student Anke Hildebrandt.

After studying the Oman site, they also expressed concern that the unusual forest could be driven into extinction if hungry camels continue eating too much of the foliage. As the greenery disappears it's possible the trees will lose the ability to pull water from the mist and recharge underground reservoirs.

A report on their research was published in a recent issue of *Geophysical Research Letters*. They are also advising the Omani government on handling the problem.

The forest is especially unique, said Eltahir and Hildebrandt, because it "is a water-limited seasonal cloud forest" that is kept alive by water droplets gathered from passing clouds — ground fog. The water dribbles into the ground and sustains the trees later when the weather is dry. The MIT work suggests the trees actually get more of their water through contact with clouds than via rainfall.

In general, cloud forests are not really rare. But they occur most frequently in moist tropical regions where there is ample rainfall. So it is unusual, the researchers said, to find a cloud forest in a region known for chronic dryness.

The researchers studied the area in Oman to learn how the Dhofar Mountain

ecosystem "functions naturally, and how it may respond to human activity" that could lead to desertification and the need for reforestation.

Eltahir and Hildebrandt, who is now at the UFZ Center for Environmental Research, in Leipzig, Germany, said the unusual forest is an interesting remnant "of a moist vegetation belt that once spread across the Arabian Peninsula" in the distant past. At that time the regional climate was generally wetter.

The forested area in the Sultanate of Oman is now semi-arid, and most of the ancient tree vegetation is gone. This small remnant has managed to survive in the Dhofar Mountains. But it is under threat.

Although many Omanis have moved into cities and towns as the country has grown rich on oil, Eltahir explained, a family's prestige still comes from owning many camels, and people now tend to keep more camels than they need, which is part of the problem facing the forest.

"It is an unusual place," Eltahir said. "It's a very good example of a unique and fragile ecosystem," where constant pressure from over-grazing can have consequences beyond defoliation. In fact, the forest illustrates how small changes can lead to major impact on far bigger systems, Eltahir said.

The trees in wetter ecosystems would likely recover from small amounts of over-grazing, Eltahir said, but "in this location, due to the nature of the interaction of the canopy structure with the clouds, the trees may not recover."

The two said the forest probably would not regenerate naturally once it is gone. Grass, even if abundant, cannot collect enough moisture from fog to let a forest regrow.



PHOTO / DONNA COVENEY

Research led by MIT professor Elfatih Eltahir indicates that trees in a desert forest in Oman survive by extracting moisture from low-lying clouds.

West Coast native crab nabbed; circumstances fishy

Andrea Cohen
MIT Sea Grant

MIT researchers have confirmed the first sighting of a Dungeness crab in the Atlantic Ocean. The male, whose species is common on North America's West Coast, was caught off Thatcher Island, Mass., on July 19 by Lou Williams, captain of the fishing vessel Orin C.

The origin of the crab is not known. One possibility is that it may have been purchased from a live seafood market and released. The size of the crab (18 centimeters) and its gender suggest it most likely arrived as an adult exotic species. Also known as invasive species or bioinvasers, exotic species are of concern because they can establish themselves in a new ecosystem, where they can proliferate and push out native species.

The crab was caught while Williams



PHOTO / BRANDY WILBUR, MIT SEA GRANT

This Dungeness crab, a West Coast species, was caught by Captain Lou Williams of the Orin C two miles east of Thatcher Island, Massachusetts, on July 19. It's about 18 cm wide.

was gillnetting for groundfish at 45 fathoms. Suspecting the crab to be a Dungeness, he took it to Brandy Wilbur, aquaculture specialist for MIT Sea Grant, and Eric

Sabo, educator at the Gloucester Maritime Heritage Center, for verification.

After distributing photographs of the crab to several scientists, the researchers received confirmation of the species, Cancer magister, from several experts: Julie Barber, Massachusetts Division of Marine Fisheries; Thomas C. Shirley, Texas A&M University at Corpus Christi; David Tapley, Salem State College; and Richard Strathmann and Eugene Kozloff, the University of Washington's Friday Harbor Laboratories.

Judy Pederson, MIT Sea Grant's manager for coastal resources and an expert on marine invasives, said that the finding of a female crab would have raised greater concerns about the possibility of a marine bioinvasion. In the West Coast fishery for Dungeness crab, only males may be caught and sold. Pederson adds that the chance of two species of crabs cross mating is highly unlikely. However, she points

out that the male crab could carry hitchhikers, such as native Pacific barnacles, or diseases that could harm native crustaceans, such as Jonah and rock crabs.

While the crab's method of entry is unknown, Pederson notes that the capture underscores the importance of not releasing any seafood into natural waters. In addition, Wilbur notes that this finding should put seafood distributors and fishermen on watch.

MIT Sea Grant will be producing and distributing "most wanted" posters to help those who might come across a Dungeness crab identify it and alert authorities.

Suspected sightings can be reported to Judy Pederson, MIT Sea Grant, at jpедerson@mit.edu or 617-252-1741. For more information about marine bioinvasions, visit massbay.mit.edu/exoticspecies; for information about the hazards of dumping seafood, visit massbay.mit.edu/seafood.

HOCKFIELD

Continued from Page 1

major interdepartmental initiatives, and help to develop and implement a strategic plan for our international engagement. Professor Canizares will have overall responsibility for research policy as well as oversight of several major interdepartmental laboratories and centers and of MIT Lincoln Laboratory. Professor Gibson will be responsible for academic and space planning and for faculty affairs; she will also play a lead role in issues involving graduate education, working in close collaboration with the Graduate Students Office.

"Associate Dean Deborah K. Fitzgerald is serving as the interim dean of the School of Humanities, Arts and Social Sciences. And Professor Steven R. Lerman, who served as chair of the faculty from 1999 to 2001, has generously and graciously agreed to serve out Professor Gibson's unexpired term as chair this year.

"In June, the provost announced that Dr. Eric D. Evans would succeed Dr. David L. Briggs as the next director of MIT Lincoln Laboratory. And I announced that Director of Resource Development Stephen A. Dare would serve as interim vice president for resource development.

Strengthening MIT's resources and systems

"We continue to develop the financial resources needed to sustain excellence. Private support plays a critical role, especially in allowing us to maintain financial policies that make MIT accessible to all admitted students—policies such as the MIT Pell Matching Grant established last spring. During the past year, we built on the extraordinary pace in fund raising achieved during the successful Campaign for MIT. The Class of 2006 set a marvelous example with its Senior Gift: More than 50 percent of the class made gifts or pledges, vastly exceeding the previous record of 39 percent participation. Resource Development also had a banner year, reaching the second-highest level in the history of the Institute for both cash receipts and new gifts and pledges. New gifts and pledges topped \$300 million—up more than 40 percent from the previous year.

"The successful transition to a new payroll system at the beginning of July marked a significant milestone in our continuing implementation of state-of-the-art administrative systems. Large-scale system transitions always carry the potential for disruption, but feedback from the community has been very positive. One staff member in the Office of the Dean for Student Life went so far as to say, "I really LOVE the new time sheet system. Thank you so much for all the hard work put in by everyone involved to get this up and running. GREAT job!"

"Staff throughout the Institute—not just in Information Services and Technology, the Payroll Office, the HR-Payroll Service Center and Human Resources, but reaching through many academic and administrative areas—collaborated on this complex implementation, and its success depended on the participation of the community in countless ways. Controller James L. Morgan played an absolutely critical role in leading the effort; special thanks also go to Charlotte Watson of the HR-Payroll Service Center and Leslie Wright in Payroll, who helped ensure broad understanding and participation in the project. This is truly an example of how collaboration among administrative and academic departments can drive MIT's success.

"A working group led by Executive Vice President and Treasurer Sherwin Greenblatt is now turning the important recommendations of the Task Force on Medical Care for the MIT Community, issued last November, into action. Information on the progress of the working group is now available online at web.mit.edu/task-force/medical/. In the challenging context of the current healthcare environment, we must focus our resources where they are most needed and where they can create the greatest impact. The working group will issue its next progress report in October.



PHOTO / DONNA COVENEY

President Hockfield greets incoming freshman Katie Mingo of Minnesota at the Aug. 27 Freshman Convocation.

Building a new northwest campus neighborhood

"Progress continues on projects that are transforming the northwest sector of the campus. Site work is now underway for the new graduate residence at 235 Albany St. (building NW35), which is scheduled to open in late summer 2008. This new building, designed by the award-winning firm headed by alumnus William Rawn (M.Arch. 1979) will provide housing for more than 550 graduate students, with social facilities and courtyard spaces that will further strengthen the vibrant graduate community emerging in the neighborhood. When NW35 is complete, more than 1,700 graduate students will live in the northwest campus; to strengthen this emerging graduate community, we have involved the other graduate residences in our planning for NW35.

"The development of NW35 represents an intensively collaborative design process that has brought together students, faculty and staff and has generated a strong commitment to sustainability as well as to community building. Efforts like these will advance our goal of knitting together our residential and student life activities.

"We will begin another project that will also enhance the community in the northwest part of campus in a few weeks, when we will break ground for the second phase of the renewal of Vassar Street, extending the renovation of the streetscape through the campus west of Massachusetts Avenue. The project will make the entire length of Vassar Street bicycle-friendly and pedestrian-scaled. We are enormously grateful to the family of Corporation member Richard P. Simmons '53 for making possible a project that will unify the campus visually and improve the quality of student life.

Reaching from MIT to the world

"In the spirit of service that defines MIT, members of the Institute community have engaged in efforts to repair the ravages of Hurricane Katrina, which struck New Orleans and the Gulf Coast just over a year ago. Among them is a team from the Department of Urban Studies and Planning that was recently selected by the U.S. Department of Housing and Urban Development to help plan a new 900-home development in the historic Tremé/Lafitte neighborhood. The \$35-million project aims to re-house the former community in a manner that is equitable, affordable and sustainable.

"Katrina reconstruction efforts are just one of the many ways that MIT serves the nation and world, and, while no

single ranking system captures accurately all that a university does well, it was a pleasure to see our commitment to service recognized recently by MIT's No. 1 ranking in Washington Monthly's annual survey.

"An essential complement to service is leadership, and one of our critical tasks as an educational institution is to offer students opportunities to lead and to reflect on and learn from those experiences. We are working now to bring greater coherence and visibility to these opportunities, and to increase their range and depth. International experience has a particularly important role in educating leaders for an increasingly globalized world.

"My own travels last year brought home to me that MIT is viewed around the world as a model for the university of the future. Our own international programs have continued to flourish. The pioneering MIT-China Management Education Project sponsored by the MIT Sloan School of Management celebrated its 10th anniversary in June. In July, Singapore's Research, Innovation and Enterprise Council approved a new concept for a major collaborative

research initiative, the Singapore-MIT Alliance for Research and Technology (SMART) Center. The SMART Center is expected to launch its first research programs during this academic year.

Looking ahead

"As we look ahead to the new academic year, we can anticipate continued progress on crucial initiatives. In May, the Institute-wide Energy Research Council released its recommendations on how to amplify and build on MIT's current strengths and growing interest in energy supply for the developed and the developing world. The council highlighted three broad areas: developing new technologies for global energy systems; making today's energy systems more effective, secure and sustainable; and fueling a rapidly developing world. Enthusiasm for tackling energy challenges is evident all across campus. In one example this summer, the student-initiated and -driven MIT Vehicle Design Summit brought together student solar car designers from 21 universities to develop vehicles capable of traveling at least 500 miles on a gallon of fuel. We will capitalize on the MIT community's enthusiasm for energy-related work as we move ahead to implement the ERC's recommendations and will announce details of the next steps in this important initiative in the coming weeks.

"In July, Dean for Undergraduate Education Daniel E. Hastings announced administrative and organizational changes in response to a DUE-wide strategic plan that will strengthen the work of his office and support the implementation of the forthcoming recommendations of the Task Force on the Undergraduate Educational Commons. The new organization will further strengthen the office's connections to faculty and its outreach to students. Dean of Science Robert J. Silbey and his colleagues on the task force will soon complete the final draft of their report, and will present their conclusions at the October meeting of the faculty. Their work will ensure that MIT's undergraduate education gives our students the knowledge and experiences, as well as the curricular flexibility, that they need to become leaders for the nation and the world in the decades ahead.

"This great Institute has a unique impact on the world—in generating new knowledge, in fueling innovation, and in educating the next generation of leaders. I look forward to working with all of you this year, as we continue to bring knowledge to bear on the world's great challenges."

CLASSIFIED ADS

Tech Talk runs classified ads in the first issue of each month. Members of the MIT community may submit one classified ad per month. Ads should be 30 words maximum; they will be edited. Submit by e-mail to ttads@mit.edu or mail to Classifieds, Rm 11-400. Deadline is noon Wednesday the week before publication.

HOUSING

Three BR apt. in 2-family house in Brookline; 1 bath, fireplace in LR, sunroom, new kitchen, parking. \$2250/month, utilities not incl. No pets or smoking. Great street, schools. kesner@psfc.mit.edu.

Cambridge, 2 BR apt for rent, walk to Harvard Sq, 2 miles to MIT, hdwd floors, washer & dryer, back yard, no pets, utilities not incl, \$1500/month, call Ellen at x3-3547.

Wakefield - 2 BR duplex, off street parking, w/ d hkup., close to commuter rail, no pets, non smkg. hshld. \$1400/month. No utils. 781-245-8875.

Melrose English Colonial, 6 miles to Cambridge. Move-in condition, FP, 3 BR, hdwd throughout, updated Corian kitchen, 1.5 baths, dining-room built-ins, 3 season porch, momm Rail/MBTA. \$449,000. Call 617-548-8453.

Condo near Harvard Sq for sale. 2-level TH w/ open living space; custom shelving; high ceilings. High-end cabinetry, gas stove & granite countertops in kitchen. Large private yard.

Recently renovated. Near HSq, Harvard & MIT, amenities, T. Contact: akiko@media.mit.edu or 617-497-2050.

West Cambridge, \$625/month furnished bedroom, utilities included, shared kitchen & bath w/ 2 other people. No smoking, no pets or overnight guests. Quiet, clean, great place. Call Trisha at (617) 792-9499.

No. Andover, new condo top floor (built 2004) 2BR, 2 baths, hardwood floors, C/A, washer/drier, balcony w/private view, specious wide unit, contemporary, light. Clubhouse, fitness center pool. \$318,900. Call Elaine Carson at (978) 502-2552.

Two heated apartments on the T for rent. Studio w/ full kitchen and a large 2BR town house style. Within walking distance to Boston, the Galleria mall and Museum of Science. Call 860-796-4722.

VEHICLES

1997 Subaru Outback Wagon. Automatic, AWD, ABS, power steering/locks/windows, heated seats/mirrors, AM/FM cassette radio, newer tires, new brakes, 126K miles, clean interior/exterior. Runs good. \$3,200/bst. E-mail lrussell@mit.edu.

Grandma's car: 1991 Oldsmobile Custom Cruiser Wagon 4D, 52,524 miles, one owner, garaged, no rust, no accidents, AM/FM stereo, AC, excellent condition. \$2500/bst. E-mail ecrocker@mit.edu.

1996 Windstar LX 114K. It's drivable (as is) or it could be repaired. Call to find out what it needs. Driven daily. Priced for quick sale. \$950. x8-3458 days or 978-535-0270 nights.

2002 Honda Civic LX 4-dr, black, 49K, AC, AM/FM/tape, year old tires, excel cond., \$10,950. Contact llapide@mit.edu or 617-258-6083.

FOR SALE

Sailboat, 1970 Bristol 22, sleeps 4+, roomy cockpit, dinette, head, cushions, VHF radio, shore power, recent allgripping, 5 HP Mariner outboard, roller furling, great starter boat. \$4000. Contact Linda at 3-4449.

Domain Brass, queen-sized bed w/ new Stearns and Foster mattress. Images avail. \$1200. Crate & Barrel Mission cherry dining table (42"x66") plus two 18" leaves and custom-made pads. Perfect cond. Images avail. \$1250. Contact: 617-923-1288 (7pm-9pm), or MIT LL, x-2994 (days).

Moving sale: organ (Minnet 544, built-in speaker), bed, microwave oven, fridge (medium), table, chairs, lamps, carpets, kitchen items. Call x8-7372 or e-mail bongkim@mit.edu.

TV \$325, desk \$360. Sony Triniton Color TV, Model KV-27F13, 28"x20.25"x25".

Teak rolltop desk, 34"x21"x45.25", pull-out

writing surface. Both in excellent condition. Contact asgarl@csail.mit.edu or 617-492-2102.

VACATION

Cape Cod. Craigville Beach. 3 BR Cape fully furnished house. Close to beach. Available weeks or weekends in Sept/Oct. Call 978-276-0158.

WANTED

Wanted: Volumes of the MIT Radiation Laboratory series (the original burgundy ones, published by McGraw-Hill), especially volumes 2, 3, 5, 7, 10, 26, and 28. E-mail klund@ll.mit.edu.

MISCELLANEOUS

Do you need an assistant, help with research, data entry, typing notes or getting organized? I'm an MIT administrative assistant available for weekend and after 5pm work. E-mail brendar@mit.edu.

Writing your thesis? Submitting a paper to a journal? MIT-affiliated editor/w/ extensive experience can fix grammar, improve style, and enhance the clarity of your document. Flexible rates. E-mail wordplayer06@yahoo.com.

At MIT, dorm décor has a museum quality

Lynn Heinemann
Office of the Arts

Approximately 400 original posters, prints and photographs by such famous artists as Nancy Spero, Jasper Johns and Roy Lichtenstein are now on display at the List Visual Arts Center.

And when the show is over, MIT students will take the works off the wall and walk out the door with them.

"This is definitely not a traditional museum show," said Steven Moga, a graduate student in urban studies and planning, who came back to the gallery this year to choose another piece after "winning" the lithograph "Stumblers' Paradise" by David Storey last year. "I'll never forget when I came out carrying the work under my arm and seeing all the other students doing the same, all of us with gleeful expressions."

Nearly 1,000 students are expected to participate in the List Visual Arts Center's Student Loan Art Program this year, competing, by lottery, for work by artists the likes of Berenice Abbott, Louise Bourgeois, Joan Miro, Nam June Paik and Cindy Sherman.

The program began in 1966, but more and more students are taking advantage of the opportunity to live with signed artwork for a year, according to John Rexine, registrar of MIT's permanent collection. The number has nearly doubled in recent years, he said, and the collection has grown as well, with about 100 new works



IMAGE COURTESY / MIT'S LIST VISUAL ARTS CENTER

Students visit MIT's List Visual Arts Center to view art available for loan through the Student Loan Art Program. The collection of artworks for loan—about 400 pieces—may be viewed at the List through Sept. 17.

added in the last five years.

Until the artworks are snapped up by MIT students, all visitors to the List can view the eclectic collection at the annual salon-style Student Loan Exhibition

through Sept. 17.

"I thought it would be cool to pick up Edgerton's bullet through the apple," said Benjamin Switala, a sophomore in electrical engineering and computer science,

who walked through the exhibition last week, lottery slip in hand. But Switala said he also liked the idea of having an abstract piece in his room at New House — "something simple that makes you think a lot."

William Ho, a graduate student in urban studies and planning and the Center for Real Estate Development, had his eye on Sarah Sze's lithograph, "Near Site," remarking on what he called its "chaos and disorder." "I love the intricacy and detail and how it relates to city planning," he said. "There's something that's seemingly simplistic about it."

Students who do not receive art through the lottery will have another opportunity to win one of the pieces for a year. Works that are not claimed by the last distribution day are made available to students on a first-come, first-served basis, said David Freilach, administrative officer for the List Center. Students often start lining up in front of the gallery early in the morning in the hopes of acquiring an unclaimed work.

Each year, new pieces are added to the collection to expand the breadth of offerings. The 17 latest acquisitions, which will be available for loan next year, can be seen on display on the third-floor mezzanine of the Student Center.

Gallery hours are noon to 6 p.m. daily for this exhibition. On Sept. 14 from 5 to 7 p.m., a special reception will be held in the gallery for graduate students.

For more information, call x3-4680 or visit web.mit.edu/lvac/www/collections/slap/slap_genl.html.



PHOTO / STEPHANIE MITCHELL

A glimpse of Bali

Young dancers from a children's gamelan in Singaraja gather on stage in Stephanie Mitchell's photo 'Singaraja Spirits,' part of the 'Back to Bali' exhibition on view at the Cambridge Multicultural Arts Center through Oct. 20. Mitchell's work documents the Gamelan Galak Tika's first Bali tour.

Five new department heads, two chairs named at SHASS

Five new heads in the School of Humanities, Arts and Social Sciences have been named, effective July 1, 2006.

Professor James Poterba has been appointed to serve as head of the Department of Economics, succeeding Bengt Holmstrom. Poterba received the D.Phil. from Oxford in 1983; he has been the Mitsui Professor of Economics since 1996 and has served as associate head of the Department of Economics since 1994. Poterba's research specialty is the economics of the public sector, with an emphasis on the interplay between taxation, financial markets and the financial decisions of households and firms.

Professor Anne McCants will succeed Harriet Ritvo as head of the history faculty. McCants arrived at MIT as an assistant professor of history in 1991, after receiving her Ph.D. from the University of California at Berkeley. Her research focuses on the economic and social history of the later Middle Ages and early modern Europe, with particular interests in wealth and income inequality, as well as global trade networks and the emergence of European consumerism. She was the recipient of the Edgerton Faculty Achievement Award in 1996 and was named a MacVicar Fellow in 2004.

Professor Susan Silbey has been appointed to serve as head of the anthropology program, succeeding Jean Jackson. Silbey received the Ph.D. at the University of Chicago in 1978 and joined MIT in 2001 as professor of sociology and anthropology. Her areas of research include the sociology of science and socio-legal studies.

Professor Janet Sonenberg will succeed Evan Ziporyn as head of the music and theater arts section. Sonenberg received an M.F.A. from New York University in 1978 and joined MIT in 1992 as assistant professor of theater arts. Her areas of interest include actor training and play direction. She has developed an original acting methodology, put forth in her most

recent book, "Dreamwork for Actors."

Professor David Mindell has been appointed to serve as director of the Program in Science, Technology and Society, succeeding Rosalind Williams. The Diner Professor of the History of Engineering and Manufacturing, and professor of engineering systems, Mindell received the Ph.D. in the history of technology at MIT in 1996 and joined the MIT faculty as assistant professor that year. His research interests focus on the history of human relationships with machinery.

Chairs appointed

Deborah Fitzgerald, interim dean of SHASS, also announced two new appointments to chairs in SHASS:

Agustin Rayo, associate professor in the Department of Linguistics and Philosophy, has been appointed to the Ford Foundation Career Development Professorship. Rayo received his Ph.D. from MIT in 2000 and joined the faculty in 2005. His areas of interest include philosophical logic, philosophy of language and the philosophy of mathematics.

This professorship was established by the Ford Foundation to encourage research and scholarship in the areas represented in SHASS.

Jonathan Rodden, associate professor in the Department of Political Science, has been appointed to a Ford Foundation International Professorship in Political Science. Rodden received his Ph.D. from Yale University in 2000 and joined MIT immediately as an assistant professor. His areas of interest include comparative and international political economy, public finance and the European Union, and economic and political geography.

The Ford professorships were established to encourage research and scholarship in the international aspects of such areas as political science, economics, history, management and urban studies.

Shareholder committee discusses investments

The Advisory Committee on Shareholder Responsibility (ACSR) met on Sept. 7 and began its deliberations regarding MIT's investments in multinational companies that may be doing business in the Sudan. The committee's charge is to make a recommendation to the MIT Executive Committee about whether any action should be taken with regard to these investments, and if so, what that action should be. The committee welcomes thoughtful input from the members of the community as it continues discussions in the next several weeks. Given the constraints of time and logistics, written communications would be preferred and can be sent to acsr@mit.edu.

Members of the committee are: Alan Spoon, chair of the ACSR and member of the Corporation; Barrie Zesiger, member of the Corporation and the Executive Committee; Richard Lester, professor of nuclear science and engineering and director of the MIT Industrial Performance Center; James Poterba, professor of economics and head of the economics department; Ann Wolpert, director of the libraries; Allan Bufferd, treasurer, emeritus; Andrew Lukmann, Undergraduate Association president; Eric Weese, president of the Graduate Student Council.

Staff to the committee: Beth Ogar, director of finance and administration, Resource Development.

CELL BUILDING

Continued from Page 5

in the Sichuan University project began in conversations he had with Zhang, a known admirer of architecture, during the year in which he took Zhang's course.

The next year, Zhang contacted Kulper with the news that he was now the found-

ing advisor of a new research institute at Sichuan University.

Zhang said he challenged Kulper with incorporating "as many biology motifs as possible" into his design and with using realistic construction materials.

Zhang then sent Kulper to spend three

summer months in Beijing with Roy, where they collaborated on a preliminary design for the building with architects at Tsinghua University's Architectural Design and Research Institute.

Together, the international architecture team "developed sketches and mod-

els while simultaneously studying cellular structures that had formal similarities to the spaces we were designing. We worked with images of proteins, membranes and organelles alongside photos and textbook images of glazing systems and cantilevers," Kulper said.

MIT ranks first in engineering

Deborah Halber
News Office Correspondent

MIT ranks fourth among national universities, first in undergraduate engineering and second in undergraduate business programs, according to the 2007 US News & World Report guidebook, "America's Best Colleges." The rankings appear today online and the guidebook will be available on newsstands Aug. 21.

MIT shares the number four slot with Caltech and Stanford. Princeton, Harvard and Yale, respectively, are ranked the top three schools.

Among the key criteria for judging schools is selectivity as gauged by the lowest acceptance rate (MIT's is 14 percent), and class size as gauged by the highest proportion of classes with fewer than 20 students (MIT's is 68 percent).

MIT's School of Engineering is the top-rated undergraduate program in engineering nationally, and the Sloan School of Management ranks second in undergraduate business programs. In engineering specialties, MIT was ranked first in more disciplines than any other school — five out of 12.

In undergraduate engineering specialties, MIT ranked first in aerospace/aeronautical/astronomical; chemical; computer engineering; electrical/electronic/communications; and mechanical engineering. In environmental/environmental health engineering, MIT ranked second, and the Institute ranked fourth in civil engineering, tied with Stanford and University of Texas at Austin. MIT tied for fourth with Georgia Institute of Technology in biomedical engineering and tied for second with the University of California at Berkeley in materials engineering.

In undergraduate business specialties, MIT was ranked first in management information systems, production/operations management and quantitative analysis/methods; second in supply chain management; and fifth in entrepreneurship and finance.

MIT is one of 15 schools noted in the "Programs to Look For" category for having a senior capstone project in which students integrate and synthesize material they've learned as undergraduates.

In campus diversity, where a rating of 1.0 is the highest, MIT's diversity index is 0.64. Its largest minority is Asian Americans, who make up 29 percent of the student body.

MIT also ranked high in economic diversity, measured by the percentage of undergraduates receiving federal Pell grants, typically awarded to undergraduates with family incomes less than \$40,000. Fifteen percent of MIT undergrads receive Pell grants.

MIT ranked fifth among national universities in the "Best Value" category because 60 percent of its students received need-based financial aid in 2005. This ranking relates a school's academic quality to the net cost of attendance for a student who receives the average level of financial aid.



PHOTO / DONNA COVENEY

Community cleanup is a class act

More than 700 freshmen volunteered at dozens of community agencies in the Cambridge and Boston area on Sept. 1 as part of the 15th annual campus-wide CityDays Festival sponsored by the MIT Public Service Center.

Some of this year's service projects included cleaning debris and underbrush from the banks of the Charles River (above), carpentry work at a local children's center, landscaping at the Stone Zoo, yard work at a senior center, and assisting with a preschool graduation.

"Traditionally, this event kicks off the school year at MIT," said Heather Trickett, volunteer and outreach coordinator in

the Public Service Center.

"CityDays provides service agencies with volunteers and with the opportunity to inform participating students about issues facing the community at large. With the energy, creativity and determination of the student volunteers, tasks of all sizes can be accomplished. Organizations and students have the chance to establish strong initial bonds leading to future service commitments," Trickett said.

CityDays 2006 was coordinated by Daniel Mokrauer-Madden, a junior in mathematics.

International events highlight MISTI Week

Sasha Brown
News Office

Chinese lions, Mexican dance and Indian yoga are all in the lineup for MISTI Week, a showcase of MIT's international program offerings that kicks off Sept. 18.

The annual celebration of the MIT International Science and Technology Initiatives (MISTI) highlights the increasing importance of international education at MIT, said Bernd Widdig, director of the MIT Germany Program and MISTI's associate director.

The week's events will expose students to a variety of cultures while introducing them to MISTI, which matches undergraduate and graduate students with professional internships around the world.

"An international experience is not just a valuable addition to a student's resume, it's also one of the most educationally

meaningful, intellectually stimulating and fun things students can do during their time at MIT," Widdig said.

Established in 1994 to give MIT students work, study and research experience in another culture, MISTI currently runs eight country programs — in China, Japan, India, France, Germany, Italy, Spain and Mexico — as well as pilot programs in Africa and Singapore.

MISTI educates students in the language and culture of a host country before placing them in positions.

MISTI is the largest international opportunity program for students on campus, sending roughly 200 students abroad per school year.

MISTI Week will start with a cultural fair on Sept. 18 featuring Indian dance, Mexican mariachi, Chinese lion dance, Japanese taiko drumming and Spanish flamenco at the Student Center beginning at noon.

Throughout the week, both graduate and undergraduate students will be able to attend panels and discussions, including "First-Hand Perspective on International Careers" on Sept. 19, where representatives from different industries will discuss the pros and cons of working outside the United States. The panel will run from 7 to 9 p.m. in Room 4-370.

Another highlight of the week will be a screening of "An Inconvenient Truth," Al Gore's documentary on global warming, on Sept. 22. The film will be followed by a discussion with Professor Ernest J. Moniz, co-director of the Laboratory for Energy and Environment and co-chair of the MIT Energy Research Council. The event begins at 6 p.m. in Room 26-100.

MISTI will also hold orientation sessions for its different programs throughout the week.

For more information, visit web.mit.edu/misti.

FRESHMEN

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least a couple of sleepless nights in my future," she said.

Still, Scolnik said she would not have it any other way. The passion she saw in the students was a large part of what drew her to MIT, she said. "Even if their interests are not the same as mine, it was their passion that really impressed me."

Freshman Zachary Bjornson is also planning a full plate at MIT. He is scheduled to take a full course load and also plans to enroll in an undergraduate research opportunity (UROP).

"I figured I might as well challenge myself since all the courses are pass/fail in freshman year," Bjornson said.

No stranger to challenges, the San Francisco native built a lab in his basement because he wanted to advance his school's science program at home. Stocked with a modified bioreactor and a \$10,000 incubator he bought on eBay for \$200,



Zachary Bjornson

was seriously injured," Bjornson said with a laugh.

While at MIT, he plans to continue his lab work. "I am really a hands-on learner," Bjornson said. "I have known my future was in science since the fifth grade. MIT seemed like an all-encompassing place."

Bjornson's home lab was a good place for him to run experiments. Still, it was not without mishaps. A centrifuge he constructed in his lab broke apart and a piece flew across the room and hit his mother.

"No one



PHOTO / DONNA COVENEY

Building bridges

Professor Jan Wampler of architecture tests the strength of a truss constructed by students for one of the architecture department's pre-orientation activities, held Aug. 26 in front of Kresge Auditorium. Teams were charged with creating a 6-foot beam out of string, tape and cardboard, and a 6-foot truss out of newspaper, tape and string.