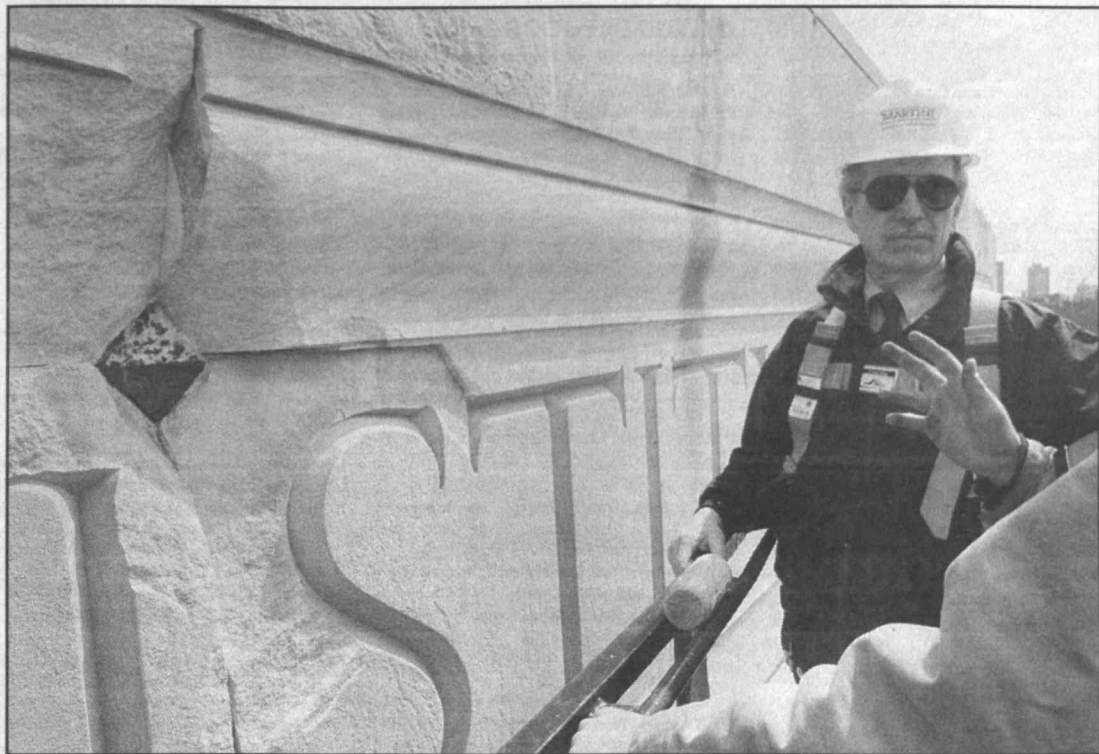
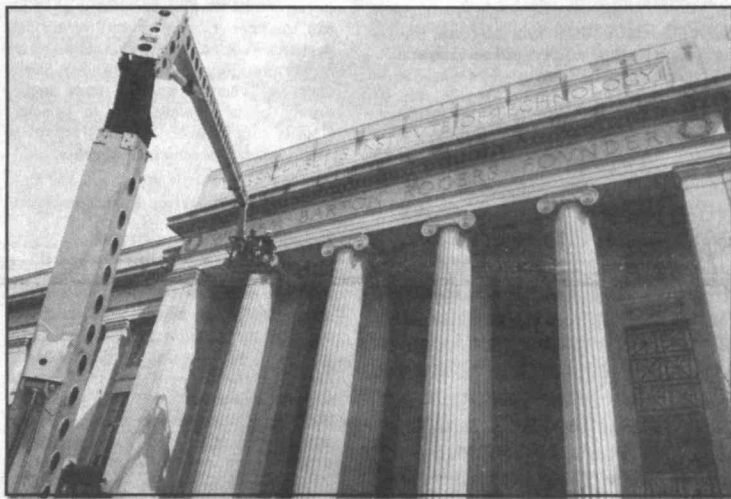


Making it letter-perfect



Project manager Ron Catella of Facilities (top photo) examines damage to the facade below the Great Dome. He did a close-up inspection with the help of one of the largest cranes on the East Coast (lower photo), which was brought to the crosswalk at 77 Massachusetts Avenue last Thursday. The diamond-shaped object in the top photo is an iron anchor that rusted and swelled, causing the stone in front to pop off. Workers will cut a matching piece of limestone and install it sometime this summer.

Photos by Donna Coveney



At age 40, WMBR keeps riding the waves

■ By Robert J. Sales
News Office

Ted Turner will be there in spirit.

Thanks in part to early support from the cable television pioneer, WMBR will celebrate 40 years of noncommercial FM radio at MIT on April 10.

"Ted Turner's generous contribution helped us update our technical equipment at a critical time," said Todd Glickman (SB 1977), president of the Technology Broadcasting Corp., which oversees the station. Mr. Glickman became the station's first meteorologist during his freshman year and has been involved ever since. "One thing that has remained the same over the years has been our members' dedication to bringing the MIT community innovative, alternative radio—commercial-free," he said.

WMBR is both a student activity and a community station; MIT provides an annual operating grant and listener contributions pay for capital improvements. The 200-person, all-volunteer staff includes MIT students, alumni and staff, as well as people from the community at large. No one has ever been paid.

Senior Christopher D. Avrich,

the current general manager, was introduced to WMBR by a friend as a sophomore. After training during IAP, he hosted a show during the spring term and has been on the air ever since. He now hosts "What It Is" from 10pm-midnight on Wednesdays.

"Having a show every week is a great way for me to unwind and de-stress," said Mr. Avrich, an electrical engineering and computer science major. "Even when I come into the station not really wanting to spend two hours there, I leave relaxed and glad that I did."

Program manager Joyce C. Yang, a graduate student in biology, hosts "Reel to Reel" on Tuesdays at 6am, which features music from the movies, with an eclectic playlist that ranges from Bach to Dylan. This reinforces her joy that radio is a democratic medium. "Radio makes no distinction between the person at the Newton golf club or the man walking down the street in Dorchester," she said. "It reaches everyone."

Ms. Yang was introduced to WMBR by former general manager Aron C. Ecklund, a friend and fellow biology graduate student who is a host of the long-running morn-

(continued on page 12)

NASA's Goldin to speak at MIT's Commencement

■ By Robert J. Sales
News Office

NASA Administrator Daniel S. Goldin, who revitalized the space agency during the post-Cold War era, will be the principal speaker at MIT's Commencement on June 8.

Mr. Goldin, who was named to his position in 1992, is the longest-serving administrator in the history of the National Aeronautics and Space Administration, holding the position through four administrations. He is credited with streamlining the agency's bureaucracy and providing a new

vision that stressed science and technology while reducing the budget for human space flights. He played a major role in the development of the International Space Station.

"Dan Goldin has been an unusually passionate and effective leader and advocate not only for the exploration of space, but for US technological leadership in general," said President Charles M. Vest, who was chair of the President's Advisory Committee on the Redesign of the International Space Station. "His strength of conviction and perseverance in both advocating sup-

(continued on page 12)

MIT engineering again #1 among grad schools

■ By Deborah Halber
News Office

For the 13th straight year, MIT's School of Engineering is ranked tops in the nation by US News and World Report.

The 2002 edition of the magazine's "Best Graduate Schools" hit the newsstands and the web on Monday. Many of the rankings will appear in the April 9 issue of US News and World Report, which also went on sale April 2.

In the School of Humanities and Social Science (SHASS), the Department of Economics was placed first, after years of tying for #1 with Harvard and Stanford. This year, Harvard, Princeton, Stanford and University of Chicago's economics departments are tied for second place.

"MIT economics has been the #1 PhD program for many years now," said Philip S. Khoury, SHASS dean and professor of history. "One need

(continued on page 9)

Genes for early sperm production found to reside on X chromosome

■ By Seema Kumar
Whitehead Institute

In an entirely counterintuitive result, MIT/Whitehead scientists and colleagues have found that nearly half of all genes related to the earliest stages of sperm production reside not on the male sex Y chromosome as expected, but on the X chromosome, a chromosome universally thought of as the female sex chromosome.

The finding, published in the April issue of *Nature Genetics*, comes as a big surprise and is causing scientists to rethink the "gender identity" of the X chromosome.

"Scientists and non-scientists alike are comfortable thinking about the Y chromosome as a specialist in male characteristics. By default, we've traditionally thought of the X chromosome as sexually neutral or as a specialist in female characteristics. Our findings indicate that the X chromosome has a specialty in sperm production much like the Y chromosome does," said Professor of Biology David Page, lead author on the paper and a researcher at the Whitehead Institute for Biomedical Research and Howard Hughes Medical Institute.

The finding also raises the speculation that infertility

(continued on page 9)

Jaenisch makes public case against human cloning

■ By Seema Kumar
Whitehead Institute

Professor of Biology Rudolf Jaenisch took an active role last week in standing up for responsible science and being a spokesperson against embarking on human cloning.

In media interviews, a testimony to a House subcommittee and an editorial in *Science* magazine, Professor Jaenisch told the public, Congress and scientists that we are not ready to clone humans.

"The successes in animal cloning have led some to suggest that the technology can now be applied to hu-

mans. Nothing could be farther from the truth. In fact, all research to date suggests that cloning is inefficient and is likely to remain so for the foreseeable future," said Professor Jaenisch, a Whitehead Institute researcher.

The hearing by the House Energy and Commerce Subcommittee on Oversight and Investigations was called after two groups announced plans to clone a human being.

To date, five mammalian species (sheep, mice, goats, cows and pigs) have been cloned, and the great majority of all clones (of all five species) died either at various stages of embry-

(continued on page 9)

Shull dies at 85



Professor Emeritus Clifford G. Shull, co-winner of the 1994 Nobel Prize in physics, has died. See obituary on page 4.

Friedman explains role of quarks, in Killian talk

■ By Deborah Halber
News Office

After more than a decade of disagreement and doubt in the scientific community, the quark is finally accepted as a basic building block of nature, says Institute Professor Jerome I. Friedman, Nobel laureate, professor of physics and the 2001 James R. Killian Jr. lecturer.

Professor Friedman, one of a team of physicists who proved these tiny components of the proton are real, said now that the battle of the quark is over, the next step is to learn more about the particle's structure. Does it have a measurable size? And if so, does it have internal constituents? It is conceivable, he said, that the next generation collider, the CERN Large Hadron Collider, which will be completed in 2005, could uncover radically new information about this quirky subatomic particle.

He delivered the Killian lecture, "Are We Really Made of Quarks?" to a packed Wong Auditorium on March 20.

"What brought me into science was a great curiosity about how the universe works," Professor Friedman said. "I must say, if I look back over my 40 years in the field, I find that I am as fascinated as ever, if not more so. I wish I were 20 years younger so I can keep participating in this great project."



Friedman

"Jerome Friedman is one of the giants of physics and, in his self-effacing manner, one of the gentle giants of MIT. His extraordinary accomplishments make him a worthy recipient of the James R. Killian Jr. Faculty Achievement Award," wrote the selection committee chaired by John de Monchaux, professor of urban studies and planning.

THE ELUSIVE QUARK

Ever since the modern era of atomic theory began in the 18th century, researchers have been unearthing clues about tinier and tinier constituents of the atom.

By the 1960s, technology such as high-energy particle accelerators and bubble chambers, which enabled scientists to observe particle collisions in great detail, helped unearth dozens of new particles.

Nobel laureate Murray Gell-Mann's "eightfold way" theory, also proposed by Yuval Ne'eman, brought order to the chaos created by the discovery of some 100 particles. Then he and (independently) George Zweig found that this successful classification scheme implied that all of those particles, including the neutron and

proton, are composed of fundamental building blocks that Gell-Mann named "quarks."

The hunt was on. Scientists searched for them at accelerators, looked in seawater, air, cosmic rays and in the Earth. Not a quark was found. Even Gell-Mann admitted it was difficult to believe in quarks, and wrote that even if quarks were not real, they were still a useful mathematical tool.

Professor Friedman, the late Professor Henry Kendall of MIT, Professor Richard Taylor of the Stanford Linear Accelerator Center (SLAC) and a team of researchers from MIT and SLAC performed a series of electron-scattering experiments over seven years that provided the first direct evidence that there are point-like objects inside the proton.

But these objects were smaller than could be measured, and still there was disagreement. Sure, there were things inside protons, but were they quarks?

The comparison of electrons and neutrinos scattering off these point-like particles unequivocally demonstrated that these particles have the fractional charges assigned to quarks. The physics community was finally forced by inescapable and compelling evidence to accept quarks.

There are six kinds of quarks: up, down, strange, charm, bottom and top. All decay into up and down quarks, and these comprise matter as we know it.

A LOT OF NOTHING

Scientists are now exploring the almost inconceivably powerful fields that hold these tiny bits together.

"The quark, like the electron, is point-like, so it occupies almost no space," Professor Friedman said. "We are made up of quarks, so we are mostly empty space, but this empty space is filled with fields."

"If you added up the weight of the up quarks, the down quarks and the electrons that make up an 150-pound individual, it would come to around three pounds. What accounts for the rest of the weight?"

"The quarks are moving around so fast that they give us weight. As Einstein pointed out in $E=mc^2$, energy is equivalent to mass." About half of our mass comes from the motion of the quarks, and about half from the force field that holds the quarks together in the proton. Fifteen tons of force hold two adjacent quarks together.

"If I push on this table, the electrons in my hand are being repelled by the fields in this table. Solidity comes from fields," Professor Friedman said.

The Killian faculty achievement award was established in 1971 "to recognize extraordinary professional accomplishments by full-time members of the MIT faculty." It is the greatest honor the faculty can bestow on one of its members.

A diamond as big as the Ritz

(This article by Phillip F. Schewe of the American Institute of Physics is scheduled for publication in an upcoming issue of Physical Review Letters.)

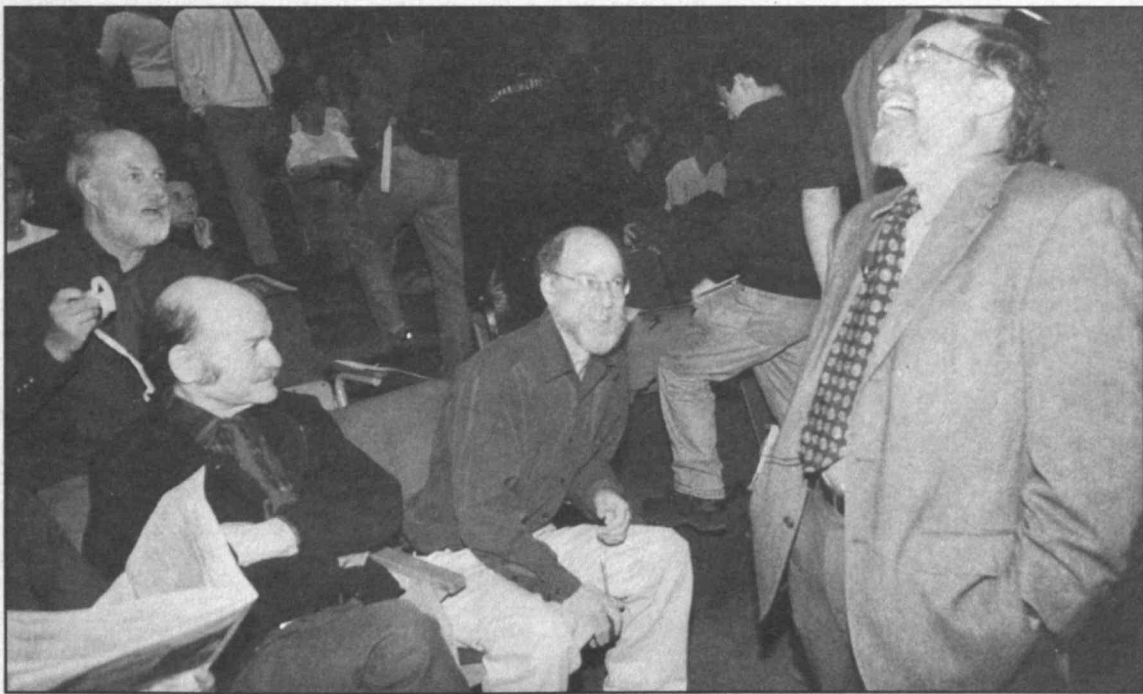
Life expectancy is not the same for all quarks. The "strange" quark, for example, is very unstable compared to the "up" and "down" quarks. However in the exotic high-density environment inside a neutron star, strange quarks are expected to fare better. A new study conducted by Assistant Professor of Physics Krishna Rajagopal and Frank Wilczek, the Herman Feshbach Professor of Physics, shows how much better.

Previously it was thought that the quark-matter collective (what you get by compressing matter to extraordinary densities, as with the RHIC accelerator, but keeping it cool) consisting of "up" quarks (each with an

electrical charge of $+2/3$), "down" quarks (charge $-1/3$) and a smaller number of "strange" quarks (charge $-1/3$) would have an overall positive electrical charge. This in turn was expected to attract electrons, making the quark glob metallic and opaque.

The MIT calculations show, however, that the strange quark population is on a par with the ups and downs, meaning the quark-matter part of the neutron star would be electrically neutral; it would in fact be a transparent insulator free of electrons.

"Thus it seems likely," says Professor Wilczek, "that inside each neutron star is 'a diamond as big as the Ritz,' actually much bigger, and a million billion times as dense." The core would not be a solid or crystal in the usual sense, and would not have facets, but it would reflect some light at its boundaries and would otherwise look like a diamond.



Nobelist David Baltimore (standing) a former MIT faculty member who is now president of Caltech, shares a laugh with biology faculty members (left to right) Richard O. Hynes, director of the Center for Cancer Research; Alexander Rich; and H. Robert Horvitz. Dr. Baltimore was on campus to give the Howard Hughes Lecture in biology.
Photo by Donna Coveney

Baltimore chats with MIT biology students and faculty during visit

■ By Deborah Halber
News Office

Cloning, the differences between MIT and the California Institute of Technology, and the pros and cons of being a university administrator were among the topics tossed around at MIT on March 23 by former faculty member David Baltimore, currently in his fourth year as Caltech's president.

Dr. Baltimore, who was awarded the Nobel Prize at age 37 for his work in virology, was invited to campus by the Biology Undergraduate Student Association (BUSA). He met casually with faculty, biology graduates and undergraduates and delivered the 2001 Howard Hughes Lecture on "The Many Facets of NF-Kappa3" to a full house in Rm 10-250.

After having coffee with faculty members, Dr. Baltimore met with mostly first-year graduate students and later had lunch with around 20 undergraduates. While chatting on a range of subjects, he said he believes the scientific community needs to make it plain that cloning is "OK to do with mice and learn from it, but it's much too early to do with humans."

He talked with graduate students about the potential positives of commercializing research discover-

ies. "We're spending public money and they're looking for the spinoffs" that will improve their lives, he said.

Dr. Baltimore told the graduate students that Caltech, about one-quarter MIT's size, is extremely focused on crossing departmental lines to create cross-disciplinary research subjects and teams.

He said he never thought he wanted to be an administrator ("I never wanted

"The stability and management of an institution provided the framework for doing science. Without institutions, science can't exist."

—Dr. Baltimore

to start wearing ties") until as a researcher at the Salk Institute in La Jolla, CA in the 1960s, he saw that "institutions were critical to science. The stability and management of an institution provided the framework for

doing science. Without institutions, science can't exist."

Nevertheless, he later added, "I think the rewards from doing research are the deepest rewards any human being can have." Dr. Baltimore maintains a 10-person laboratory at Caltech.

Called the most influential biologist of his generation, Dr. Baltimore has influenced national science policy on recombinant DNA research and AIDS. His areas of expertise span research, education, administration and public support of science and engineering.

At MIT, Dr. Baltimore's early investigations focused on how cancer-causing RNA viruses manage to infect healthy cells. One result of this research was the identification of the enzyme reverse transcriptase, hypothesized but considered far-fetched until June 1970, when Baltimore and Caltech alumnus Howard Temin published back-to-back papers about their independent and simultaneous identification of the enzyme.

Drs. Baltimore and Temin and former Caltech faculty member Renato Dulbecco (for other virological research) shared the 1975 Nobel Prize in physiology or medicine for their discovery, which has greatly expanded scientists' understanding of retroviruses such as HIV.

Faculty postpones vote on CUP proposals

■ By Robert J. Sales
News Office

At the March faculty meeting, a vote on proposals of the Committee on the Undergraduate Program on sophomore options, advanced placement credit and prerequisites was postponed until the April meeting. The faculty will also vote on a proposal to revise pass/no-record grading in the freshman year at the same time.

Noting that the votes are not binding, CUP chair Robert L. Jaffe said, "I have no problem with postponing the vote to enhance further discussion."

Annual reports on harassment and student discipline were also discussed at the meeting. In other business, the faculty accepted Professor Stephen C. Graves of the Sloan School of Management as a candidate for faculty chair for 2001-02 and approved changes to Rules and Regulations of the Faculty involving test scheduling for graduate students. The full slate of nominations for faculty officers and standing committees will be presented at the April faculty meeting.

Discussion of the CUP recommendations centered on when to implement a modified pass/fail system for

freshmen that would institute an A/B/C/no-record grading policy during the second semester of the freshman year. The committee recommended that it go into effect during the 2002-03 academic year.

Undergraduate Association (UA) president Peter A. Shulman asked that implementation be postponed a year, noting that all freshmen would be required to live on campus during 2002-03, with rush for fraternities, sororities and independent living groups held in October. "An additional year might make a big difference," he said.

Professors Alar Toomre and Arthur Steinberg wondered why the change was not scheduled to go into effect in September. Professor Jaffe said this was not possible because time was needed to advertise the changes.

CUP also recommended that a score of 5 on the College Board Advanced Placement Test or its equivalent on another exam be required for receiving MIT subject credit. Currently, the general cutoff for MIT credit is a score of 4. In addition, it suggested that oversight of the advanced placement policy be shifted from the Admissions Office to the Office of Academic Services. CUP reaffirmed a fac-

ulty member's power to enforce prerequisites and proposed that sophomores be permitted to designate one subject each semester as exploratory.

DISCIPLINE

Dean for Student Life Larry G. Benedict said 148 offenses were reported in 1999-2000, "a very, very, very small number in comparison to other universities the same size." These were handled informally and formally in mediation sessions and at dean's hearings. Forty of the 148 cases involved alcohol violations.

The Committee on Discipline imposed sanctions in seven incidents of academic misconduct and one of personal misconduct in 1999-2000. Committee chair Professor Graves said, "We are beginning to see a blip [increase] on plagiarism in 2000-01."

HARASSMENT

Professor Emeritus Samuel J. Keyser said the survey for 1999-2000 turned up 55 harassment incidents, including 29 for general mistreatment and 13 for sexual harassment. This was the lowest total since 1996, when 52 complaints were received. A year ago, the total was 70.

Shadowy travelers



Waxy floor and backlighting make for an interesting silhouette in the hallway between Buildings 8 and 16. Photo by Donna Coveney

Trout and Sachs chosen for Doherty Professorships

Bernhardt Trout, assistant professor in the Department of Chemical Engineering, and Julian Sachs, assistant professor in the Department of Earth, Atmospheric, and Planetary Sciences, have each been awarded a 2001 Doherty Professorship in Ocean Utilization from the MIT Sea Grant College Program. Every year, the program selects one or two new faculty members for a supplemental award of \$25,000 per year for two years.

Professor Trout's Doherty-funded research will focus on the formation and dissolution of hydrates—ice-like materials—in the ocean. CH₄ hydrates are practically ubiquitous in the ocean floor and could be used as an enormous source of clean-burning fuel. CO₂ hydrates could be used as a way to sequester and store carbon dioxide in the ocean. Dr. Trout will develop and apply theoretical and computational methods to obtain data about mechanisms and rates of formation and dissolution of hydrates, as well as use that data to predict how these materials will behave in the ocean under varying conditions.

Professor Sachs is a paleoclimatologist who uses innovative new organic geochemical techniques to decipher the complex climate changes that characterized the past 150,000 years. While oceanic currents are critical to climate control, uncertainty—particu-

larly about the sensitivity of the deep circulation to small climate changes—clouds climate forecasts and assessments of sequestration of carbon dioxide in the deep ocean. In his Doherty-funded research, Professor Sachs will analyze ocean bottom sediments to reconstruct past episodes of abrupt climate change and determine their cause, helping us to better understand the ocean's role in future climate change.

In 2000, the Doherty chair went to Assistant Professor Martin Polz of civil and environmental engineering to research the increasing and unexplained incidences of marine-related illnesses and harmful algal blooms, and Associate Professor Nicholas Makris of ocean engineering to study natural and man-made ambient noise in Massachusetts Bay to improve our understanding of the relative distribution of sounds arising from marine mammal sources versus those caused by shipping and wind and waves.

The Doherty Professorship, endowed by the Henry L. and Grace Doherty Charitable Foundation, encourages promising, nontenured professors to undertake marine-related research that will further innovative uses of the ocean's resources. The area of research may address any aspect of marine use and/or management, whether social, political, environmental or technological.



Sachs



Trout

Nobelist Clifford Shull is dead at 85

Professor Emeritus Clifford G. Shull, co-recipient of the 1994 Nobel Prize in physics, died on March 31 at Lawrence Memorial Hospital in Medford following a brief illness. He was 85 and lived in Lexington.

Professor Shull shared the Nobel Prize with Professor Bertram S. Brockhouse of McMaster University in Ontario.

"Clifford G. Shull has helped answer the question of where atoms 'are,' and Bertram N. Brockhouse the question of what atoms 'do,'" the Nobel citation said.

Professor Shull received the prize for his pioneering work in neutron scattering, a technique that reveals where atoms are within a material, like ricocheting bullets reveal where obstacles are in the dark.

When a beam of neutrons is directed at a given material, the neutrons bounce off or are scattered by atoms in the sample being investigated. The neutrons' directions change depending on the location of the atoms they hit, and a diffraction pattern of the atoms' positions can then be obtained.

Understanding where atoms are in a material and how they interact with one another is the key to understanding a material's properties.

"Then we can think of how we can



Shull

make better window glass, better semiconductors, better microphones. All of these things go back to understanding the basic science behind their operation," Professor Shull, then 79, said on the day of the Nobel announcement.

The Nobel citation noted that thousands of people now work in the field of neutron scattering, using the technology to study ceramic superconductors, the structure of viruses, surfaces of relevance to catalytic exhaust cleaning and more.

University of Toronto President and former MIT Dean of Science Robert J. Birgeneau said of Professor Shull, "He was one of the leading solid state physicists of the 20th century as well as an outstanding educator. Even after retirement he continued to oversee his famous neutron diffraction experiment at the MIT reactor. Cliff's death represents a great loss to science, to MIT and to me personally."

PHYSICS PIONEER

Professor Shull's pioneering work on neutron diffraction began about 50 years before he became a Nobel winner.

He started in 1946 at what is now Oak Ridge National Laboratory. At that time, he said, "Scientists at Oak Ridge were very anxious to find real honest-to-goodness scientific uses for the information and technology that had been developed during the war at Oak Ridge and at other places associated with the wartime Manhattan Project."

Professor Shull teamed up with the

late Ernest Wollan, and for the next nine years they explored ways of using the neutrons produced by nuclear reactors to probe the atomic structure of materials.

He said the most important problem he worked on at the time dealt with determining the positions of hydrogen atoms in materials.

"Hydrogen atoms are ubiquitous in all biological materials and in many other inorganic materials," Professor Shull once said, "but you couldn't see them with other techniques. With neutrons it turned out that that was completely different, and we were very pleased and happy to find that we could learn things about hydrogen-containing structures."

As he refined the scattering technique, Professor Shull studied the fundamental properties of the neutron itself. He also initiated the first neutron diffraction investigations of magnetic materials. This yielded information about the magnetic properties of materials at the atomic level, opening up an entirely new field of study.

"If there is a 'central clearing house for thermal neutron physics' or a 'father of neutron scattering' in the United States, it is Professor Shull," wrote Professor Anthony Nunes (PhD 1969), professor of physics at the University of Rhode Island, in a biographical article published in 1986. Professor Shull was Professor Nunes's thesis advisor at MIT.

In his 1986 article published in *Physica*, Professor Nunes said Professor Shull's "abilities as an experimental physicist are amplified and extended by his completely candid relations with coworkers" who "find him to be modest to a fault. He is very careful to 'give credit where credit is due,' usually citing originators of ideas even in casual conversation.

"I consider the intellectual stimulation, the unending optimism and the simple scientific fun of my student years with this man to be priceless," concluded Professor Nunes.

Professor Shull was the fourth member of the MIT physics faculty to receive the Nobel Prize in physics and the 15th present or former faculty member to receive a Nobel Prize. One staff member and 11 alumni also have won Nobels.

He came to MIT as a full professor in 1955 and retired in 1986.

Professor Shull's awards include the Buckley Prize, which he received from the American Physical Society in 1956, and election to the American Academy of Arts and Sciences (1956) and the National Academy of Sciences (1975). In 1993 he received the Royal Swedish Academy of Sciences' Gregori Aminoff prize for his "development and application of neutron diffraction methods for studies of atomic and magnetic structures of solids."

Born in Pittsburgh in 1915, Professor Shull received the BS from Carnegie Institute of Technology (now Carnegie Mellon University) in 1937. He entered Carnegie Tech to study aeronautical engineering, but after six months found himself drawn to physics. He received the PhD from New York University in 1941.

He was a teaching assistant at NYU from 1937-41, a research physicist with the Texas Company (now Texaco) in Beacon, NY, from 1941-46, and a research physicist at Oak Ridge from 1946-55.

His hobbies included stamp collecting, camping, hiking, coin collecting, model trains and golf, said his son, Robert D. Shull (SB 1968).

Professor Shull is survived by his wife of 60 years, Martha-Nuel Summer; three sons, John, Robert and William; and five grandchildren. One grandson, Craig M. Shull, received the SB in mechanical engineering from MIT in 1996.

A memorial service for Professor Shull will be held on Friday, April 6 from 1:30-3pm in the MIT Chapel, with a reception in the Physics Reading Room (26-152) from 3-4pm. Other arrangements are being made through the Douglass Funeral Home in Lexington.

Other obituaries

WILLIAM E. MAYTUM

William E. Maytum, 85, of Boston, a former custodian in Physical Plant, died on December 26. He retired in 1981 after working at MIT for 34 years. Information on survivors was unavailable.

JOHN E. WASIK

A Mass of Christian Burial was said in St. Margaret's Church in Dorchester on February 27 for John E. Wasik of Dorchester, who died on February 23 at age 72. A former machinist in the Laboratory for Nuclear Science, he retired in 1995 after 34 years at MIT.

Mr. Wasik is survived by his wife, Marilyn; two sons, Alan of Bridgewater and Kevin of E. Bridgewater; a daughter, Cheryl Ellis of Weymouth; nine grandchildren and one great-grandson. Memorial contributions may be made to St. Margaret's Church Restoration Fund, 800 Columbia Rd., Dorchester, MA 02125.

DOMINIC TINO

A funeral Mass was said in St. Rose's Church in Chelsea on March 10 for Dominic Tino of Everett, a former chef at the Faculty Club who died on March 6 at the age of 84. He began working at MIT in 1949 and retired in 1982.

Mr. Tino is survived by his wife, Josephine; two daughters, Linda Stratton of N. Reading and Celeste Dascoli of Andover; five grandchildren and one great-grandchild. Memorial donations may be made to the American Heart Association, 20 Speen St., Framingham, MA 01701.

ISAO OKAWA

Isao Okawa, chairman of Sega Corp. and founder and honorary chairman of its parent company CSK Corp. of Japan, died on March 16 of heart failure. He was 74.

In the fall of 1998, Okawa contributed \$27 million to MIT for the establishment of the Okawa Center for

Future Children, focused on children, learning and developing nations (MIT Tech Talk, November 25, 1998). An expansion of the Media Lab, the center will explore ways in which new digital technologies can provide fundamental changes in children's learning and education, and improve the lives of people in developing nations.



Okawa

Memorial services

CLIFFORD SHULL

A memorial service for Professor Emeritus Shull will be held on Friday, April 6 (see obituary on this page). The service will take place from 1:30-3pm in the MIT Chapel, with a reception in the Physics Reading Room (26-152) from 3-4pm.

DOROTHY BOWE

A reception is planned in remembrance of Dotty Bowe on Saturday, April 21 from 2-4 pm in the Brown living room of McCormick Hall. Ms. Bowe, a former associate director of Financial Aid who was instrumental in establishing the Women's Independent Living Group, AMITA and the Association of MIT Retirees, died on February 9 at the age of 71. All are invited.

ILONA KARMEL ZUCKER

The Program in Writing and Humanistic Studies is sponsoring a memorial event on Friday, April 6 in memory of retired senior lecturer Iлона Karmel Zucker, who died on November 30 at age 75. The event will be held at the Faculty Club with a reception/lunch from 11:30am-12:30pm and the memorial beginning at 12:30pm.

ALLAN HENRY

A memorial service for Professor Emeritus Allan Henry of nuclear engineering will be held on Tuesday, April 10 at 3:30pm in the MIT Chapel. A reception will follow at McCormick Hall. Professor Henry, a Boston resident, died on January 28 at age 76.

Awards & Honors

Chancellor **Lawrence Bacow** has been awarded a *laurea in ingegneria civile* honorary degree in civil and environmental engineering by the University of Bari's School of Engineering in Italy. It was the first honorary degree the University of Bari had given since 1970. Dr. Bacow is also the Lee and Geraldine Martin Professor of Environmental Studies at MIT.



Bacow

Assistant Professor of Chemistry **Catherine Drennan** has been awarded the Searle Scholars Program award to support her group's study of long-range communication in proteins, which have evolved complicated signaling and regulatory pathways to affect specific chemistry. The Searle program, established in 1980 to support research in medicine, chemistry and the biological sciences, is funded from the estates of Mr. and Mrs. John G. Searle. (Mr. Searle's grandfather founded the pharmaceutical firm G.D. Searle and Co.) About 15 grants per year go to researchers in the first or second year of their first tenure-track appointment at the assistant professor level.

Institute Professor and Nobel laureate **Phillip A. Sharp** received the Walker Prize from Boston's Museum of Science March 12. Established in 1864 by surgeon William Johnson Walker, the prize recognizes "meritorious published scientific investigation and discovery." Professor Sharp is director of the McGovern Institute for Brain Research.

The MIT Mars Team has been named one of five national finalists in the NASA Means Business student competition for its entry, "2020 Vision: An Educational Outreach." This year's challenge focused on involving NASA "customers" in the agency's newly announced 20-Year Mars Plan, which will send a series of robotic missions to the Red Planet over the next two decades. Ideas in MIT's entry include creating a space-centered scouting organization, publishing a book of Apollo-generation memories and developing a traveling Mars exhibit for schools. The team is already working on several local outreach initiatives, including helping Boy and Girl Scouts earn space-related merit badges, teaching a weekend class on Mars for high schoolers and coordinating a multi-university celebration of "Yuri's Night"—the April 12 anniversary of both the first manned space mission and the first US shuttle flight. The team has a web site at <http://web.mit.edu/mars/2020vision/>.

Two MIT graduate students, **Jonathan Weinstein** in economics and **Walter Lee** in computer science, won the North American Pairs Flight B bridge tournament at the 44th Spring North American Bridge Championships in Kansas City last month. They were fifth going into the final session. "We had a good start, but we slowed down about halfway through. I thought we had blown it in the next-to-last round, but we stayed calm and had an 80 percent last round. And we needed it," Mr. Lee said in an on-line bulletin about the contest. Mr. Weinstein also won a gold medal in the International Mathematical Olympiad in 1994.

Two seniors have been named to Verizon Academic All-America basketball teams. **Cristina Estrada**, an economics major, was selected for

the women's first team, while **Craig Heffernan** of electrical engineering and computer science was named to the men's third team (see "Centers get early-season spotlight," MIT Tech Talk, December 13, 2000). The program is co-sponsored by Verizon and the College Sports Information Directors of America.

Gordon L. Brownell, professor emeritus of nuclear engineering and honorary physicist in the radiology department at Massachusetts General Hospital (MGH), received the Bernard H. Falk Award at the National Electrical Manufacturers Association annual meeting. He was honored for his development of positron imaging and positron emission tomography (PET). He and colleagues at MIT and MGH developed the first positron imaging device for medical use in 1950 and the first PET scanner in 1970.

Assistant Professor **Thomas DeFrantz** of music and theater arts was the American representative at the Bienelle of Dance in Umea, Sweden from March 28-April 1.



DeFrantz

He was invited to give a talk about dance studies in the United States and a report on everything he saw at the festival. He said the trip was "part of a mini-tour" that included a visit to the Italian island of Sardinia to participate in the Congress on African-American Research, where he read from his manuscript on Alvin Ailey.

Two graduate students have each received \$1,000 research grants from Sigma Xi, the scientific research society. **Bart Bartlett** will work on spin-frustration effects on the antiferromagnetic coupling in Kagome lattice systems, supervised by Professor of Chemistry Daniel Nocera. **Balasundar Raju** of electrical engineering and computer science will research high-frequency ultrasonic characterization of normal human skin and skin cancer in vivo, supervised by Professor Mandayam Srinivasan of mechanical engineering and the Research Laboratory of Electronics.

Associate Professor **Frederic C. Schaffer** of political science is a 2000-01 Fulbright Scholar. He is researching "The Hidden Cost of Democratic Reform: Clean Elections and Voter Disengagement in the Philippines" at the University of the Philippines and Ateneo de Manila University. MIT is hosting 14 visiting Fulbright Scholars for various periods between August 2000 and January 2002.

Professor **Nam P. Suh**, head of the Department of Mechanical Engineering, has been selected by the Council of the Institution of Engineering Designers (IED) as the winner of the 2001 Hills Millennium Award, given annually to a foreign national who has made a major contribution to the professional areas of engineering design and/or product design.



Suh

The award, which is being presented for the first time this year, is made possible by a gift to the IED from Professor Peter Hills and his wife to mark the millennium and his service as IED president.



Eva Roos (left) and Susan Goldblatt of the Women's League sell daffodils in Lobby 10 to benefit the American Cancer Society. Photo by Donna Coveney

Daffodils net thousands to fight cancer

The fourth annual MIT Daffodil Days brought 31,000 bright yellow flowers to offices all over the Institute last week, helping the Women's League raise more than \$19,000 for cancer research, treatment and education.

Five of the 65 department coordinators each sold more than 100 bouquets: Jeanette Kelly of Facilities (208 bouquets), Alice Downing of the Sloan School (157), Marilyn Mercer of Information Systems (129), Rebecca Tyler of the President's Office (127) and Carol Manoli of the Controllers Office (109). In addition to department deliveries, volunteers from the Center for Can-

cer Research (CCR) sold flowers in the medical atrium and the Women's League sold flowers in Lobby 10. Jennifer Crays from the CCR coordinated sales in the medical lobby.

For the second year, Rui Borges of Mail Services donated his time to organize and help deliver the flowers to some 70 locations.

If you would like to coordinate daffodil sales in your department next year, contact Sis de Bordenave at the Women's League Office at x3-3656 or esdeb@mit.edu.

Team studies ecology of copper

Tina Voelker's heart may not belong to Seawannee, but her lab work has been tied to that river for the past couple of years. An assistant professor in the Department of Civil and Environmental Engineering (CEE), Dr. Voelker, along with CEE graduate student Megan Kogut, has been studying how copper binds up with humic substances—the tea-colored organic material found in soil and rivers and coastal waters. And because far-flung researchers need some standard substance, they get the stuff from the Georgia river.

Why the interest in copper and humic substances? Professor Voelker explained that "most of the pipes in

houses are copper, copper sulfate is used in reservoirs to kill algal blooms, and copper is a very prevalent metal in effluents."

While the metal is not toxic to humans, she says, "it is somewhat toxic to fish and very toxic to phytoplankton"—a fundamental link in the food chain. Natural humic substances and other copper-binding compounds may also greatly affect the toxicity and bioavailability of metals in rivers and coastal waters. When organic matter binds with metals, noted Professor Voelker, the metals often become less toxic. However, in environments such as groundwater, they may also become more mobile.

Professor Voelker's work is funded by the US Geological Survey through the Massachusetts Water Resources Research Center. Thus far her research has been in the lab, but she intends to continue it in the field.

"In the long term, we'd really like to see if we're having some effect on the ecology with all the copper in the water in these densely populated areas," she said.

With a bigger picture in mind, she's exploring how the mobility and bioavailability of metals may play a role in larger environmental contexts, from water treatment to global carbon cycling.

Andrea Cohen, MIT Sea Grant

Freed to give talk on tissue engineering

Dr. Lisa Freed will speak on "Engineering Functional Tissues" at the MIT Women's Forum/MIT Women's League "Women on the Edge of New Frontiers" lunchtime lecture on April 9. In its third year, the series features prominent women academics who explain their research to a non-

technical audience.

Dr. Freed is a principal research scientist in the Harvard-MIT Division of Health Sciences and Technology (HST). The goal of her research is to improve basic understanding of tissue development and to generate functional engineered tissues for scientific

research and clinical use. Over the past decade, she has worked towards engineering functional tissues that resemble native cartilage and cardiac tissue (i.e., cartilage that withstands compressive loading, cardiac muscle that propagates electrical signals) and developed novel biodegradable scaffolds and bio-reactor systems for these purposes.

Her related research aims to understand how gravity affects living organisms, and to develop new methods to prevent or treat the adverse effect of prolonged immobilization and spaceflight. As part of the NASA program in biological and physical sciences, she engineered tissues on earth and in space, the latter in a study aboard the Mir space station.

An MIT alumna (SB 1982, SM, PhD), Dr. Freed received the MD from Harvard Medical School and HST. She is a Fellow of the American Institute for Medical and Biological Engineering. She was a Fulbright Scholar in Belgrade, Yugoslavia in 1989 and won a Whitaker Health Sciences and Technology Fellowship, an American Heart Association Fellowship and an M.A. Cartland-Shackford Medical Fellowship.

The lectures in this series are free and are held in the Bush Room (10-105) from 1-2pm. Beverages and desserts are provided; bring your own lunch.

Construction update

SPORTS & FITNESS CENTER

Construction around concrete casting in the subbasement may disrupt pedestrian and vehicular traffic and cause noise and some utility shutdowns.

LOBBY 7

A major restoration to Lobby 7 has begun. Work planned for this spring and summer includes cleaning the dome and masonry, replacing lighting and opening the skylight.

STATA CENTER

Expect high-volume truck traffic for delivery of concrete and reinforced steel for the foundation.

SIMMONS HALL

Concrete placement may generate noise and affect vehicular traffic.

CHEMISTRY BUILDING

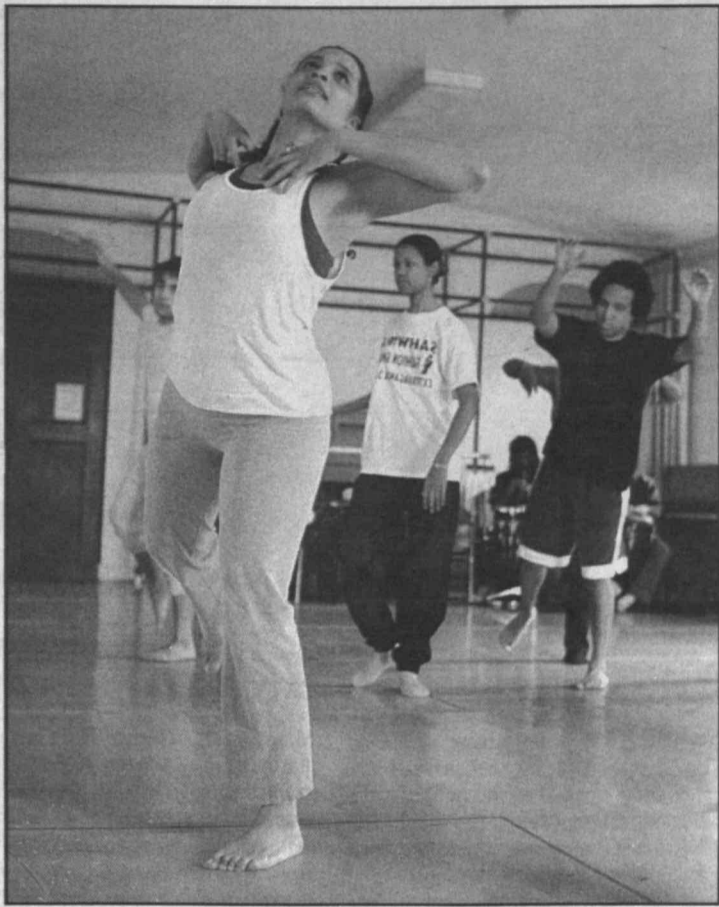
Construction of the labs on the west side of the building may cause a high noise level between 6am and 2pm.

70 PACIFIC ST.

Site utility installation and concrete foundation pouring may generate dust and noise and disrupt vehicular traffic.

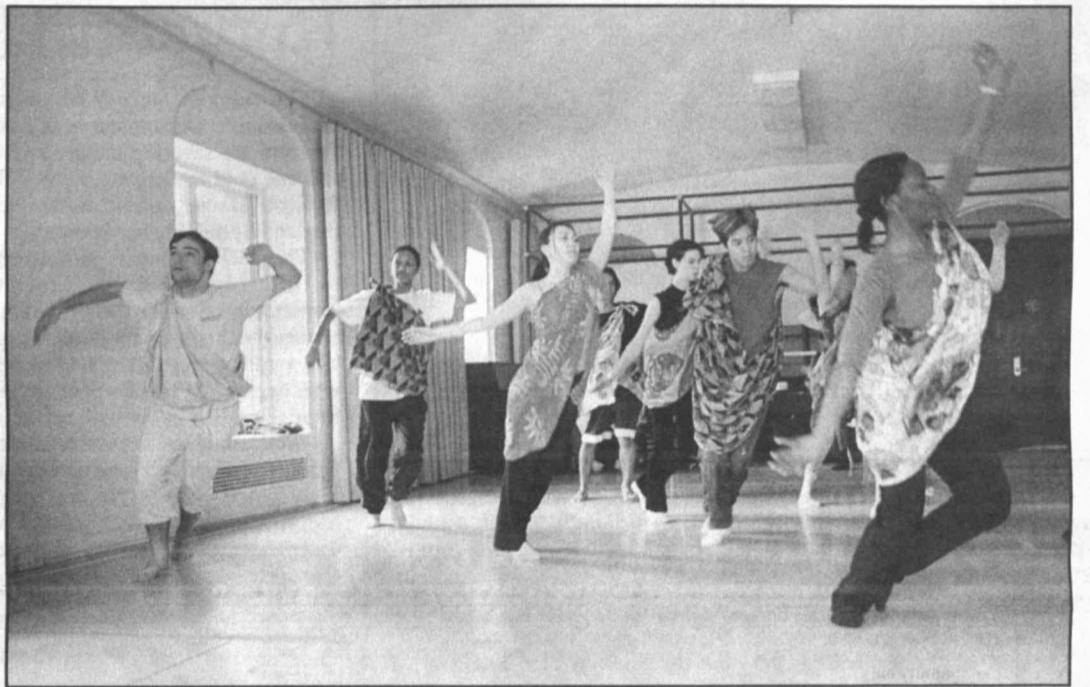
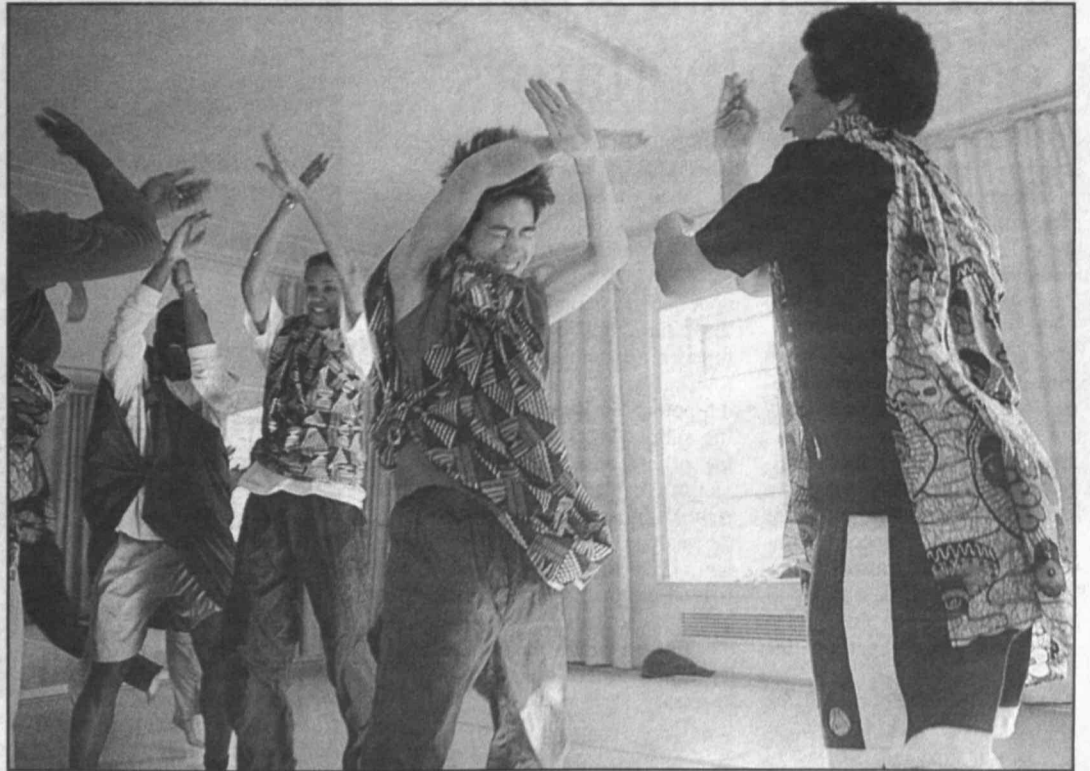
This information is provided by the Department of Facilities.

On your toes...



Students of all levels of experience are learning Afro-Brazilian Dance in a course offered by the Music and Theater Arts section taught by Lecturer Isuara Olivera.

Photos by Donna Coveney



Team of architects help design sustainable buildings in China

By Richard St. Clair
Center for Environmental Initiatives

Leon R. Glicksman, professor of architecture and mechanical engineering at MIT, is the leader of a four-year project funded by the Alliance for Global Sustainability (AGS) to assist Chinese architects and developers in designing more energy-efficient buildings.

Begun in 1998, the project emphasizes development of simple, generic solutions that are appropriate to the local area, are very cost-effective and will be accepted by the local people. Buildings being designed in this project could reduce summer energy consumption by as much as 50 percent in China.

Current estimates say that by 2015, the public and private sectors of China will generate more CO₂ emissions than the United States, primarily from energy consumption.

Buildings are projected to account for about one-third of total Chinese energy consumption. The Chinese are currently building about 10 million new residential units per year (the United States builds about 1 million), and many Chinese developers are interested in "sustainable" buildings—that is, buildings requiring lower energy consumption, fewer energy-intensive materials and nondestructive construction techniques.

"If you're really interested in reducing CO₂ around the world, doing more work in the developing world is going to have a much larger impact than all of the things people may do in the Western world," Professor Glicksman said.

In addition to Professor Glicksman, the research team at MIT includes Associate Professors Qingyang Chen, Leslie K. Norford and Andrew M. Scott and Assistant Professor John Fernandez, all of architecture.

The team is helping create large-scale demonstration residential buildings in China combining innovative design and technology. Several prototype designs of energy-efficient systems and buildings are being developed for Shenzhen, Beijing and Shanghai. Sponsored by the Beijing

city government in conjunction with a semiprivate developer, the larger of the two projects near Beijing is targeted to house 250,000 people.

The project, initiated with support from the Kann Rasmussen Venture Fund and the AGS, is a cooperative initiative involving Tsinghua University in Beijing, Tongji University in Shanghai, the University of Tokyo and the Swiss Federal Institutes of Technology, together with several Chinese developers. The latter two universities and MIT comprise the AGS partner institutions.

The groups have scheduled workshops for 2001 in Beijing and Shenzhen, where researchers will teach Chinese participants about available and relevant tools for sustainable buildings. The researchers are also developing a design manual for future developers to help the Chinese designers and builders become self-sufficient.

The researchers are aiming at not only the technical side of sustainability, such as energy efficiency and indoor air quality, but also sustainable design in the architectural sense, by developing a feeling of community with elements such as streetlight plans, shops and children's play areas.

The AGS is doing the conceptual design, while the detailed design is being done by the Tsinghua University team, which is familiar with the local building codes.

"It quickly became evident that what we wanted to do was good design—simple technology to start out with, like shading and ventilation—before embarking on more complicated features. This included finding a way to insulate the walls. Some buildings in Beijing have little if any insulation, even though it's very cold at times," said Professor Glicksman.

MANY INVOLVED

The project is multidisciplinary, involving architectural designers and technologists, engineers, faculty, researchers and students. "It's been a very good educational vehicle," he said. "We have conducted workshops where we've brought in engineering and technology students who will become professional architects and de-

signers. Now we're moving toward the implementation phase."

The researchers have spent much time in China, working with local people to come up with solutions. "We're working directly with developers who are actually building projects," said Professor Glicksman. "It's not a theoretical kind of exercise."

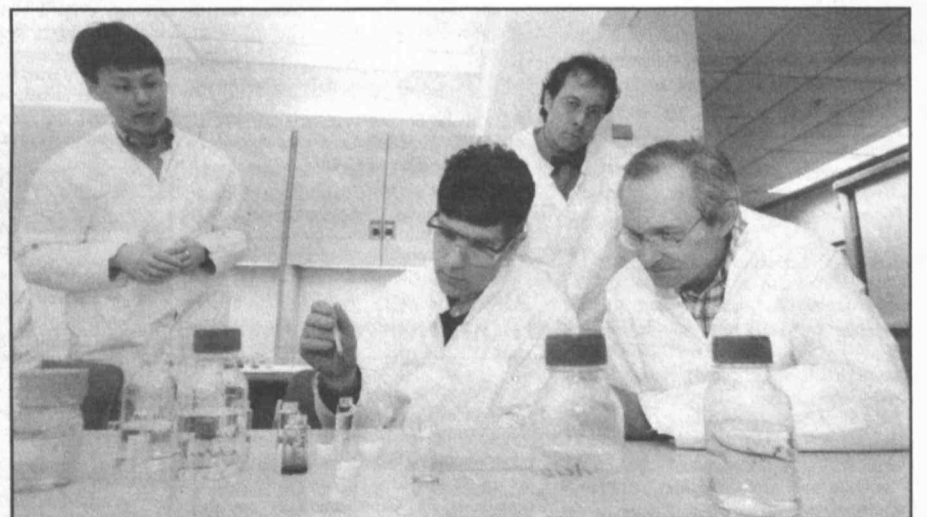
Other MIT projects in China have the same pragmatic philosophy, including a project on reducing emissions from coal-fired boilers in small- and medium-sized industry (Associate Professor Kenneth Oye of political science and Professor Emeritus János Beér of chemical engi-

neering), a coke-making project (Professor Karen Polenske of urban studies and planning), and an electric power systems project (research engineer Stephen Connors of the Energy Laboratory).

In September 2001, Chinese research collaborators will analyze the performance of the Shenzhen project. After construction is complete, MIT will do an assessment for any flaws in materials, construction or building operations.

For more information, see the MIT web site on sustainable urban housing in China at <<http://chinahousing.mit.edu/>> (a Chinese version will be available in June 2001), or contact the China Housing Project at <china_project@mit.edu>.

All bottled up



At a workshop on drug delivery during the Harvard/MIT Division of Health Sciences and Technology's "Experiencing the Frontiers of Biomedical Technology" symposium last month, graduate student David Wu (left) discusses criteria for selecting the appropriate route of drug administration as participants experiment with formulating and comparing various forms of controlled drug delivery. Photo by L. Barry Hetherington

Police vehicles soon to carry defibrillators

MIT's Campus Police will be equipped with up-to-date life-saving equipment by the end of April that will permit them to respond more quickly and efficiently to incidents of cardiopulmonary arrest, Campus Police Chief Anne P. Glavin announced last week.

"This adds one more tool for us to use in the delivery of emergency medical service to the MIT community," she said.

The department's 51 patrol officers and supervisors, all of whom are certified EMTs or first responders, are receiving five hours of special training in the use of the automatic external defibrillators (AEDs), which will be placed in the Campus Police ambulance and four marked patrol vehicles.

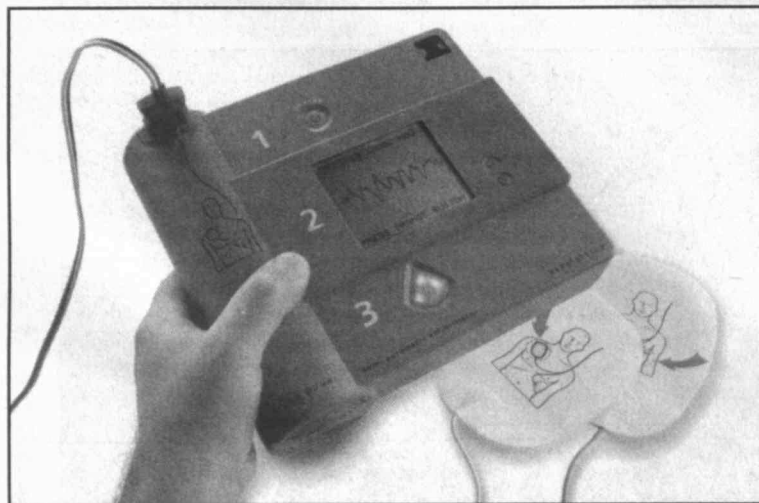
Currently, Campus Police call for an advanced life support ambulance

with an AED when responding to a person having a heart attack.

Since each minute lost reduces a patient's survival chances by 10 percent, the rapid response of police with an AED is invaluable. The machine continues to monitor the heart after the initial shock for a lapse into a life-threatening rhythm.

The 8-by-8.5 inch machine weighs 4.5 pounds. It is activated by following simple 1-2-3 device guides after the officer attaches pads under the victim's left arm and in front of the right shoulder. The machine analyzes the heart's rhythm and issues a "shock now" order with voice commands and written prompts. The officer pushes a button to activate the treatment. The machine continues to watch for a relapse and orders a second shock if necessary.

Robert J. Sales



MIT Campus Police vehicles will soon be equipped with the automatic external defibrillator shown above. The 8-by-8.5-inch machine weighs 4.5 pounds and is activated by the officers following simple 1-2-3 device guides after attaching the pads to the victim.

Classified Ads

Tech Talk ads are intended for personal and private transactions between members of the MIT community and are not available for commercial use. The Tech Talk staff reserves the right to edit ads and to reject those it deems inappropriate.

INSTRUCTIONS: Ads are limited to one (of about 30 words) per issue and may not be repeated in successive issues. Ads may be resubmitted after skipping a week. Ads/renewals are not accepted via telephone or fax. All must be accompanied by full name and extension (or proof of MIT affiliation).

- E-mail address (return address must be mit.edu): <ctads@mit.edu>
- Interdepartmental/walk-in address: Calendar Editor, Rm 11-400.

Please note that all Tech Talk ads are provided to the Internet on the date of publication, which makes them accessible world-wide.

All extensions listed below are campus numbers unless otherwise specified, i.e., Dorm, Lincoln, Draper, etc.

MIT-owned equipment may be disposed of through the Property Office.

Deadline is noon Friday before publication.

FOR SALE

VCR, \$70; computer/desk chair, \$55; 4-slice toaster, \$20; hairdryer, \$5; 100M zip disk, \$7. Contact x5-9757.

Carvin FX1244 12-ch mixer w/Anvil case, \$600; Carvin FX1644 16-ch mixer, \$600; 12-ch XLR Whirlwind 100 Snake, \$100. Jeff x3-856, 926-4661 or <bryant@cennr.mit.edu>.

China buffet hutch, oak, meas and pics avail, \$500 or bst; twin size bed, \$250 or bst; Mac Performer 6116CD, complete package w/printer, \$500 or bst. Contact <rmlynch@mit.edu>.

Boys 24" bike, well maint, \$35 firm. Jan Blair x8-2843 days.

SyQuest ezflyer 230mb removable cartridge ext disk drive, grt for backups, includes PC-formatted cartridge w/software and parallel cable, \$75. Todd <glickman@mit.edu> or x2-2457.

Amateur Radio Transceiver FT-100, w/mobile head cable YSK-100, Duplexer for 440/ 2MTR/

6MTR and auto antenna tuner FC-20, \$1,200. Contact 781-893-377 or <k1cei@gis.net>.

Aromatic seasoned cherry tree fireplace logs, small lot, \$50. Jack <jackgk@mit.edu> or x3-2808.

VEHICLES

1987 Nissan D21 pickup truck, 99k mi, auto w/liner and cap, runs gd, needs some work, have repair records, extra tire and spare parts, asking \$1,000 or bst. Deb x3-3879.

1987 Honda Accord LX, dark gray, getting new car, selling for \$750. Call x3-5115.

1990 Toyota Corolla, 100k+ mi, depend, clean, frisky, inherited nw car, selling reluctantly, valued \$2,800, asking \$2,400 or bst to gd home. Call 617-876-6257 or x3-4148.

1992 Ford F150 pickup truck 4x4 XLT, flare-side, exc cond, 80k mi, \$8,000 or bst. Mike x3-1500 or 617-666-5635.

1996 Oldsmobile Achieva, like nw, only 9k mi, V6, blue, perf body, pl, ps, pb, 2 airbags, anti-lock brake, 4-dr, \$8,000. Contact: 617-327-7605.

1997 Honda Accord DX Value Pkg, 4-dr, 44k mi, 4cyl, AT, a/c, AM/FM/cass, eucalyptus green pearl, \$12,400. Call x3-1844.

1998 Lexus ES300, like nw, white diamond exterior, gray leather interior, Nakamichi Audio, CD auto-changer, power everything, only 22k mi, \$25,600. Call x8-5320.

HOUSING

Cape Cod: Time-share unit in prem resort, comprehensive vacation-exchange program w/add getaways, \$4,300 for 1 wk, update for a week every yr, \$2,400. Call 617-666-6436.

Craigville Beach, Cape Cod: fully furnished 3BR, 2b, walk to beaches, July & Aug, \$800/wk. Contact <mcalamey@ll.mit.edu>.

Malden: 4 rooms on first floor, near T, \$875/mo. Contact x3-5969 or 617-371-6460.

Rhode Island: lovely, quiet beach house avail for July/Aug, secluded yard, 3BR, 1b, patio, open



Endicott House horticulturist Steve Wiswell (left) and Grounds Department head Andy Turcotte stand in the garden exhibit they created at the New England Spring Flower Show to exemplify the original rock garden from early 19th-century Endicott House. The exhibit won six awards and a gold medal. Photo by Donna Coveney

Endicott House puts on a show

Horticulturist Steve Wiswell and Grounds Department head Andy Turcotte are savoring the six awards and one gold medal won by the MIT Endicott House exhibit at the New England Spring Flower Show.

The celebration ends on April 23.

On that evening, the Massachusetts Horticultural Society (MHS) will announce the theme for the 2002 show at its awards banquet. That's when next year begins for the Endicott House team.

"You talk about it for a week, and then you put it to bed for a month, said Mr. Wiswell. "By June, the ideas coagulate. Then you start working on it." Plant materials are collected in September and construction begins in November.

The 2001 awards were presented on March 16, the day before the nine-day show opened to the public at the Bayside Expo Center. The theme *The Inspired Garden* was a perfect match for Endicott House.

Mr. Wiswell and Mr. Turcotte and their team developed an exhibit that exemplified the spirit of the estate's original rock garden, including rhododendrons, hosta and leopard's bane. "We dug up plants from the estate to recreate the flavor of the historic garden," Mr. Wiswell said.

The exhibit included a pond and a brook on one side and an azalea garden on the other. Photographs of Rockwell, the original rock garden, taken in the 1916 were included in the exhibit, courtesy of the MIT Museum. They named the exhibit *Rockwell Paradise, a Garden From the Past*.

Rockwell Paradise won the MHS Chairman's Award as the most meritorious exhibit in the show. It also won the MHS education award, the Emily Seaburgh Exhibitors Award for excellence in landscape design, the

Massachusetts Nursery and Landscape Association award for distinctive use of hardy plant material, the New England Nursery Association Award for distinctive use of deciduous plants, and the Superlative Award for rural garden or landscape excellence that reflects the character of rural America's gardens and landscape.

This was the fourth New England Spring Flower Show in which Endicott House participated. In previous years, it won bronze, silver and gold medals.

Robert J. Sales

It's a fact

Elmo/MIT, a five-and-a-half-foot bronze sculpture by Dimitri Hadzi commissioned in 1963, initiated an extensive public art collection at MIT that now includes outdoor installations of works by Henry Moore, Louise Nevelson, Alexander Calder and Pablo Picasso, among others.

Here & There

SCIENCE: THE "MIT" ISSUE

MIT featured prominently in the February 2 issue of *Science*. Research by Professor Gerald Fink and Todd Reynolds made the cover, and four of the 11 stories in the journal's News This Week section were about Institute research results or activities.

The cover photo by MIT's Felice Frankel, a research scientist in electrical engineering and computer science, showed a gauzy white "flower" that was actually a fungal growth. In the technical article inside, Drs. Fink and Reynolds described their discovery of a key gene that allows fungi to stick to plastic surfaces and form thin coatings called biofilms (see MIT Tech Talk, February 7).

The work, which lays the groundwork for preventing the formation of dangerous biofilms on medical implants, was also the focus of a second story that ran in the journal's news section. Dr. Fink is a professor of biology and director of the Whitehead Institute for Biomedical Research; Dr. Reynolds is a postdoctoral fellow in his lab.

"Sweet success" began the caption for a photo accompanying a second news story about a machine used by Assistant Professor Peter Seeberger of chemistry to create a wider range of complex sugars. The work "may dramatically ease the synthesis of these complex chains," wrote Robert Service.

Immediately following that story

was another about a meeting held at MIT on gender equity in science and engineering. Presidents, chancellors, provosts and 25 women professors of nine top research universities—including MIT—met for a full day to discuss the topic (see MIT Tech Talk, January 31). "Institutions of higher education have an obligation, both for themselves and for the nation, to fully develop and utilize all the creative talent available," the leaders said in a unanimous statement. "We recognize that barriers still exist" for women faculty.

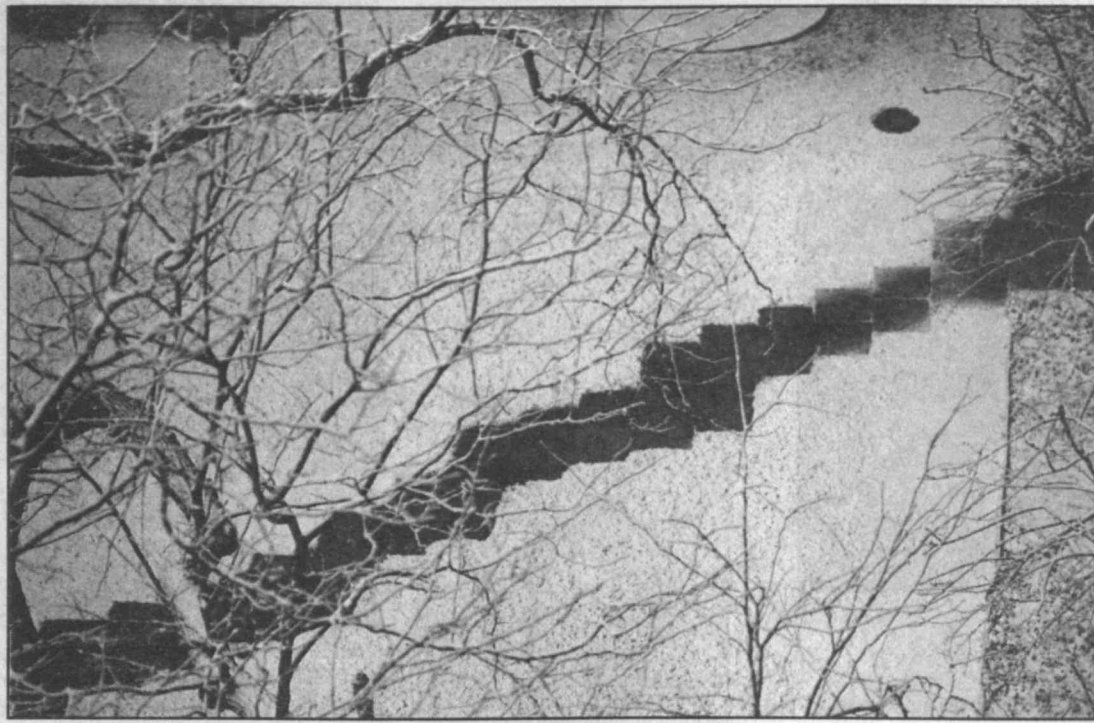
A fourth news story reported an advance in AIDS research by an MIT/Whitehead team led by then-Professor of Biology Peter Kim. Dr. Kim, now at Merck Research Laboratories, and colleagues designed a protein that blocks HIV entry into human cells (see MIT Tech Talk, January 24).

THE ULTIMATE 10...

Cog, MIT's humanoid robot, was featured in a one-hour episode of a documentary series on the Learning Channel that aired February 14. Each episode of *The Ultimate 10...*, said Associate Producer Susie Delava, "focuses on a certain topic and counts down what we think are the ultimate 10 examples of that topic." Cog appears in the episode on machines. Video of Cog was supplied by MIT Video Productions through the News Office.

Elizabeth Thomson

Crossword puzzle?



A spring dusting of snow coats the ground but leaves a pathway bare in the President's Courtyard, as seen from the News Office's new quarters on the fourth floor of Building 11. Photo by Donna Coveney

Genes for early sperm production found to reside on X chromosome

(continued from page 1)

due to low sperm production may be an X-linked disorder, passed on to male children through their mothers, much like color-blindness or hemophilia.

In this study, the Page lab researchers and their colleague, John McCarrey at Southwest Foundation for Biomedical Research in San Antonio, sought to study the genetic underpinnings of spermatogonia—stem cells in the testes that give rise to sperm. Spermatogonia are “the mother of all sperm cells,” but unlike other stem cells such as blood stem cells, which have been the subject of intense study, sperm stem cells have remained largely unexplored. So Jeremy Wang, a post-doctoral fellow in the Page lab, and his colleagues conducted a systematic search for genes that are active exclusively in sperm stem cells in mice.

The researchers found 25 genes, including 19 new ones, that were expressed exclusively in mouse sperm stem cells. They found that of these, only three were linked to the Y chromosome and 10 were linked to the X chromosome.

“This was a big surprise because if the genes had been distributed randomly in the genome, we would have

expected none, or at the most a couple, of these sperm-specific genes to be X-linked,” Professor Page said.

This finding is yet another chapter in the 300-million-year story of the X and the Y chromosomes, said Professor Page, whose research is unfolding the odyssey of the sex chromosomes that began their lives as autosomes (or non-sex chromosomes) but have since become specialized.

Aside from the intellectual surprise, this finding has enormous implications for future scientific investigation, he said.

“The X chromosome is one of the most intensely studied chromosomes, and the X-linked mode of inheritance is a textbook classic; it is one of the three modes of inheritance that we study in medical genetics,” he said.

In this mode of inheritance, a genetic defect on the X chromosome may cause a disease (for example, color blindness or hemophilia). The mother, who has a defective gene on one of her two X chromosomes, is protected against the disease because women have two copies of the X, and her normal X makes up for the defective one. Her sons have a 50 percent chance of inheriting the defective X and succumbing to the disease. Her daughters

have a 50 percent chance of inheriting the defective X and becoming carriers.

The finding that sperm-specific genes are found on the X chromosome suggests a new avenue for study, Professor Page said. One obvious possibility is that X chromosome plays a role in some forms of male infertility that results from low sperm counts. Thus far, researchers have combed the Y chromosome looking for the genetic underpinnings of low sperm counts. But in these cases, the defects on the Y may tell only part of the story. The researchers will have to do further studies to see if they can find the other part of the story in the X chromosome.

Finally, this study spurs researchers to ask if infertility can be inherited, just like color blindness and hemophilia. Previous research from the Page lab had suggested that the genetic defect underlying low sperm count can be inherited by sons from their fathers when infertile fathers use intracytoplasmic sperm injection (ICSI) to have children (MIT Tech Talk, June 12, 1996).

“Now it appears that we may face the possibility that the genetic defect underlying low sperm count can be inherited through mothers,” Professor Page said.

Don't clone humans, Jaenisch says

(continued from page 1)

onic development, at birth or soon after birth, with a variety of malformations. Many newborn clones are overweight and have an increased and dysfunctional placenta.

Those that survive the immediate perinatal period may die within days or weeks after birth with defects such as kidney or brain abnormalities, or with a defective immune system. Even apparently healthy adult clones may have subtle defects that cannot be recognized in the animal.

“Given the failure rate, it would be dangerous and irresponsible to attempt human cloning. The risks to the fetus and the developing child are unacceptable. If human cloning is attempted, those embryos that do not die early may live to become abnormal children and adults. Both are troubling outcomes,” said Professor Jaenisch.

He explained that the most likely cause of abnormal clone development is faulty reprogramming of the genome. This may lead to abnormal gene expression of any of the 30,000 genes residing in the animal. Faulty reprogramming does not lead to chromosomal or genetic alterations of the genome, so methods that are used in routine prenatal screening to detect chromosomal or genetic abnormalities in a fetus cannot detect these reprogramming errors. There are no methods available now or in the foreseeable future to assess whether the genome of a cloned embryo has been correctly reprogrammed.

“The experience with animal cloning allows us to pre-

dict with a high degree of confidence that few cloned humans will survive to birth, and of those, the majority will be abnormal,” Professor Jaenisch said.

The cloning controversy was stirred last month when an international group of fertility experts announced it would begin the world's first concerted effort to clone a human being. The team, including Kentucky fertility expert Panos Zavos and an Italian colleague, obstetrician Severino Antinori, met in Rome to work on their plan and declared that they would attempt to clone a human within a year.

Most cloning experts agree that it would be too dangerous to attempt human cloning.

Professor Jaenisch became a spokesperson in taking this message to the public. In interviews with several newspapers, including the Chicago Tribune, the Washington Post, the New York Times and the Boston Globe, as well as in TV interviews with CNN, ABC, CBS, WGBH and Fox, Professor Jaenisch clearly laid out the issues that made attempting human cloning irresponsible and dangerous.

“Every success in animal cloning has been accompanied by an enormous number of failures,” he said. “For every animal that has been cloned, there have been hundreds of others that have failed. They either died during embryonic development or soon after birth, most with fatal defects of the heart, lung, kidneys or the immune system.” Given this knowledge, how can we justify cloning humans, he asked.

US News rates MIT engineering school #1

(continued from page 1)

only examine the success of our economics graduates in academic research and teaching, government and business to understand why the profession continues to vote the way it does. My colleagues and I in the School of Humanities, Arts, and Social Sciences are enormously proud of our economics department.”

“Our strength is that we are a department rather than a collection of researchers. Interactions are key, and this is reflected in the quality of the research, the quality of the students we attract, and the jobs our students get when they graduate,” said Professor Olivier Blanchard, head of economics.

12 PROGRAMS ARE #1

In all, 12 MIT graduate programs or schools were ranked number one in the Schools of Engineering, Humanities and Management.

This year, PhD specialty programs were ranked, but not individual departments such as those in the School of Science that received rankings last year.

The Sloan School of Management was ranked fifth nationally in business school rankings, following Stanford, Harvard, Northwestern University's Kellogg School and the University of Pennsylvania's Wharton School.

Sloan's programs in management information systems, production/operat-

ions management and quantitative analysis were ranked #1 in the country. Its finance program came in fifth and its entrepreneurship program was #8.

The #1 engineering graduate programs in MIT's School of Engineering, as ranked by engineering school deans, are aerospace/aeronautical engineering, chemical engineering, electrical/electronic/communications engineering, materials engineering and mechanical engineering. MIT was #2 this year in computer engineering, down from #1 last year; #4 in bioengineering/biomedical and civil engineering; and #7 in environmental/environmental health.

In social sciences and humanities PhD specialty programs, MIT was #1 in microeconomics and in industrial organization. The Institute was #2 in public finance and #3 in macroeconomics and international economics.

MIT ranked ninth in the cognitive psychology PhD specialty, and the Department of Brain and Cognitive Science tied with Columbia, Princeton and the University of Minnesota at Twin Cities for 11th place in psychology graduate programs.

In graduate programs within the School of Humanities, Arts and Social Sciences, MIT was 11th in political science, tied with Columbia, the University of Rochester and the University of Wisconsin at Madison.

Walsin Lihwa, MIT to do \$3 million in optics research

Walsin Lihwa Corp., a leading cables and wire company in Taiwan, and MIT have signed an agreement to do collaborative research aimed at creating technologies and materials for the next generation of all-optical communications networks.

Under the terms of the agreement, Walsin Lihwa will have exclusive patent and technology licensing rights to inventions resulting from the research collaboration in exchange for its support of this five-year program. Walsin Lihwa's researchers also may serve as visiting scientists at MIT, working collaboratively with students, research staff and faculty.

“This research agreement between MIT and Walsin Lihwa will advance one of the most important areas of research today—the field of microphotonics, which has enormous implications for the telecommunications and computing industries,” said President Charles M. Vest. “We are very enthusiastic about the prospect of working with our colleagues at Walsin on this important frontier.”

The five-year sponsored research agreement provides \$3 million in the first year to develop integrated laser diodes and optical lightwave circuit devices for compact and low-cost DWDM (dense wavelength-division multiplexing) systems in all-optical communications networks.

“This agreement with MIT registers a significant milestone in Walsin Lihwa's transformation,” said Yu-Lon Chiao, chairman of Walsin Lihwa Corp. “With our solid foundation in the optical cables and wire industry, we leverage our strength in materials science to cooperate with MIT, one of the world's leading institutions in science and technology, to develop the future technology for all-optical communication. This is a giant step enabling us to lead in the field of broadband communication in the future.”

Mr. Chiao said the collabora-

tion exemplifies the fruitfulness of exchanges promoted by the Epoch Foundation between Taiwanese industries and MIT. Walsin Lihwa has participated in exchange projects with MIT through the Epoch Foundation in the past 10 years.

“Not only do we get innovative technology perspectives from MIT's School of Engineering; we're also profoundly inspired, during our transformation process, by the advanced business creation and management concepts from MIT's Sloan School of Management,” said Mr. Chiao. “We have turned ourselves from a local manufacturer to an enterprise that takes initiatives to develop our own technology with a global view.”

I-Lin Cheng, Walsin's president and chief technology officer, said, “We are enthusiastic about this promising collaboration. To step into R&D is a long-term commitment and a visionary action for Walsin. Besides the advancement into DWDM thin-film filter manufacturing and the establishment of the first MEMS [microelectromechanical systems] foundry in Taiwan, the partnership with MIT will keep us up with emerging technologies and help develop new technologies and products that lead the future.”

Walsin Lihwa Corp. has a tradition of drawing on the academic arena for knowledge and expertise, but in the past has formed long-term alliances primarily with domestic academic institutions. The partnership with MIT is the first direct Walsin Lihwa alliance with an internationally renowned research institution.

“We believe this new joint effort will help set a model for both industries and academic institutions to work together,” said Mr. Chiao. “And we hope our small step this time can lead to further development in the future for an even closer integration and cooperation between academic institutions and industry players.”

Arts at MIT

April Arts

4 Weds

Staff Literary Artists

Artist Behind the Desk Literary Event. Judson Wolfskill (assoc publicist, MIT Press) & John Verboss (sr office asst, Ctr for Tech, Policy, & Industrial Dev) read from their work. 12-1pm, Rm 14E-304.



5 Thurs

Art Lecture

"Revision, Revisionism & Rehabilitation: 1959/1999." Lecture by Francis Frascina, John Raven Prof of Visual Arts, Keele Univ, UK. 5:30pm Rm 3-133. 258-8438

6 Fri

Student Recital

Advanced Music Performance (AMP) Recital. Mea Cook (G), cello. 5pm, Killian Hall.

Campus Preview Weekend Concert

MIT Wind Ensemble, Chamber Chorus, Festival Jazz Ensemble, Percussion Ensemble, Chamber Orchestra, (Frederick Harris, William Cutter, Dante Anzolini, conductors), Jean Rife, horn soloist. Open forum—"Music at MIT" at 7pm; concert at 8pm, Kresge Aud.



7 Sat

New Songs by Faculty/Staff Composers

Works by William Cutter, Charles Shadle, Kyle Hoepner, Matthew Guerrieri & Richard St Clair, setting poems by faculty/staff poets John Hildebidle, Stephen Tapscott, Susan Spilecki & Elizabeth Connors. Performed by MIT voice students & faculty. 8pm, Killian Hall.

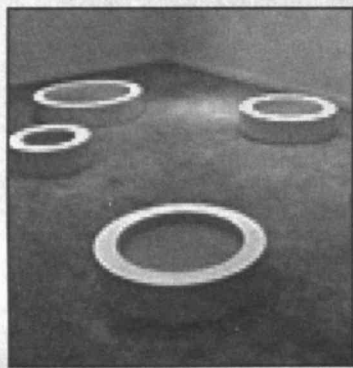
South Asian Cultural Show

Vidya: In Search of Knowledge. Admission free, but donations appreciated. Proceeds to Maitri, a confidential, nonprofit organization that helps South Asian women facing domestic violence, emotional abuse or family conflict. 7:30pm, Kresge Aud. Sourav Dey, 225-8918, sdey@mit.edu or Divya Agarwalla, 225-8617, divya123@mit.edu

8 Sun

List Shows Close

Inside Space: Experiments in Redefining Rooms & Circa 1999: Marco Breuer Solo Exhibition Hrs: Tues-Thurs & Weekends 12-6pm; Fri 12-8pm; closed holidays. List Visual Arts Ctr. 253-4680

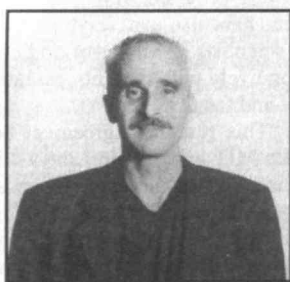


MITHAS Concert

Sumitra Guha, khyal. \$15; \$12—students & srs, MITHAS & New England Hindu Temple members; \$10—MIT students. 4pm, Wong Aud. 258-7971

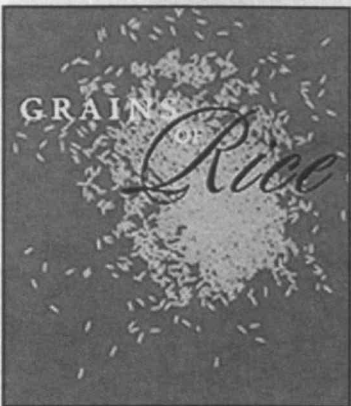


German/Spanish Poetry/Songs "fernlautmetz-cantero de sonidos lejanos: Living & Writing in German & Spanish." José F. A. Oliver reads & sings his poems in Spanish & German. 3:30-5pm, Killian Hall. 253-4771



Grains of Rice

Celebration of Asian Cultures. Performance by Great Leap, conveying the multicultural experience in America through music, theater, dance & workshops. \$8 pre-purchase (Lobby 10 the week prior to the event), \$10 at the door. Banquet—6pm, Walker Memorial. Richard Li, 225-7635, rice@mit.edu



10 Tues

"Space & the Architect"

14th Arthur H. Schein Memorial Lecture by Herman Hertzberger, architect, Amsterdam. 6:30pm, Rm 10-250. 253-7791

Lecture/Reading

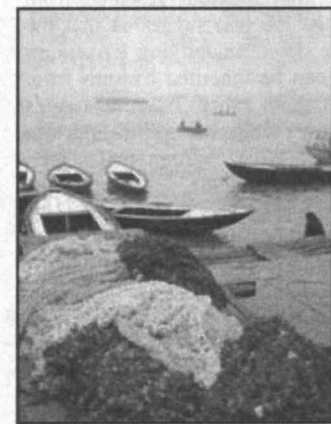
"Irony & Identity: The Invention of Paper Selves." André Aciman, author of *False Papers & Out of Egypt*. 7-9pm, Rm 2-105. 253-4771



11 Weds

Slide Show

"Lotuses for Osiris & Marigolds for Vishnu: A Photographic Portrait of Cultures from Niger, Nile To Ganges" presented by Susanne Gänsicke, Boston Museum of Fine Arts. 6:30pm, Rm 6-120. Email samudra@mit.edu



12 Thurs

Tea Time

World Cultures from a Woman's Perspective: Japan Chado: The Way of Tea. 12:30-2pm, Rm 10-340 (Emma Rogers Rm). Limited seating. 253-3656, wleague@mit.edu

poetry@mit

Bei Dao/Eliot Weinberger. Bei Dao, a leading poet writing in the Chinese language today, will read from *Unlock—Poems by Bei Dao*. Essayist/translator Eliot Weinberger will read from his work *Karmic Traces*. 7pm, Rm 6-120. 253-7894, poetry@mit.edu



Bei Dao

12-15 Thurs-Sun



Good Grief!

You're a Good Man, Charlie Brown. Musical Theatre Guild. \$9, \$8 MIT community, \$6 MIT/Wellesley students. 8pm (also 4pm on April 14), Kresge Little Theater. 253-6294 mtg-tickets@mit.edu

13 Fri

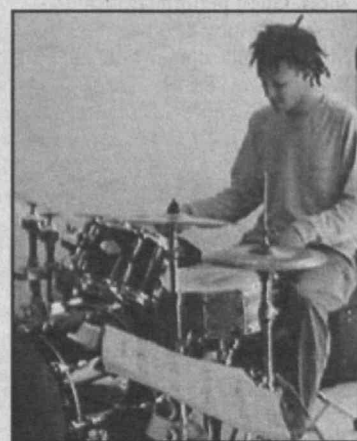
Artists by Night Closes

Artists by Night, Administrators by Day. Works by MIT support & administrative staff. Rotch Library of Architecture & Planning, Rm 7-238. M-Th 8:30am-11pm, F 8:30am-7pm, Sat 11-6pm, Sun 2-10pm. 253-7492 or abdesk@mit.edu



Student Recitals

Advanced Music Performance Concerts. Nate Fitzgerald '02, drum set. 5pm. Amanda Wang '02, violin. 6:30pm. Both in Killian Hall.



Nate Fitzgerald

Potluck Performance Art Party

AKA show+tell. Bring video, poetry, slides, anything to read, show, perform &/or consume. Sponsored by MIT Electronic Research Society. \$4 donation requested for selected charity; free for artistic/gustatory contributors. 9pm, Rm N52-115. 253-2060

17-20 Tues-Fri

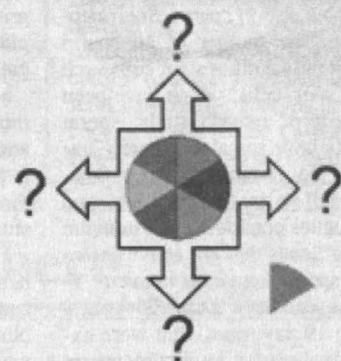
School Vacation Program

"Meet the Researchers." Visit *Robots & Beyond* & chat w/MIT students & researchers exploring the future of artificial intelligence. 1-2pm, MIT Museum. 253-4444

More School Vacation Programs

"Aqua Ducks & Sensational Sculptures." Work w/students from MIT's Media Lab. 1-3pm, MIT Museum. 253-4444

19-21 Thurs-Sat



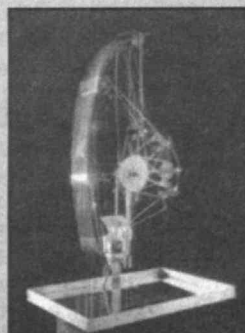
Trivial Pursuits

Student workshop production of new musical about friendship & a couch by Daniel Scribner & Seth Bisen-Hersh '01. 8pm, Kresge Reh Rm B. 225-6273, seth42@mit.edu

All Month

MIT Museum

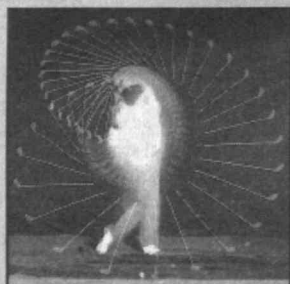
Robots & Beyond: Exploring Artificial Intelligence at MIT; Thinkapalooza; Gestural Engineering: The Sculpture of Arthur Ganson; Flashes of Inspiration: Life & Work of Prof Harold ("Doc") Edgerton.



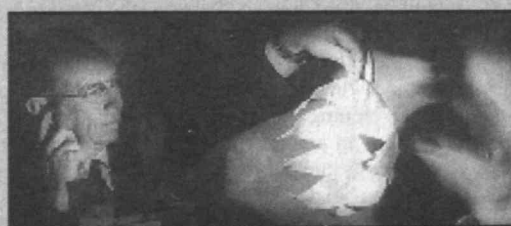
The Sculpture of Arthur Ganson

Strobe Alley

Never Stop Learning: The Life & Legacy of Harold Edgerton. Bldg 4, 4th fl corridor. 253-4629



Densmore Shute Bends the Shaft. 1938. © The Harold E. Edgerton 1992 Trust



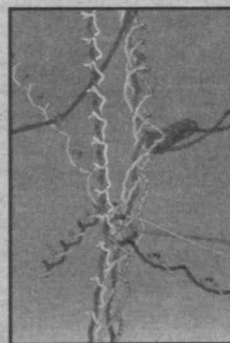
Self-Portrait with Balloon and Bullet, 1959 © The Harold E. Edgerton 1992 Trust

Institute Archives

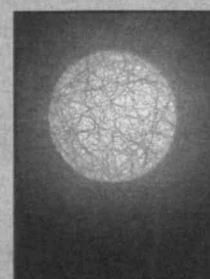
Object of the Month. *Artistry in Fashion: MIT Dames Fashion Show Poster, 1961*. Hallway exhibit case across from Rm 14N-118. 253-5136

Compton Gallery

Approaching Chaos: Visions from the Quantum Frontier. The art of Harvard physicist E.J. Heller, exploring classical & wave chaos. Compton Gallery (Rm 10-150). Through May 6. Weekdays 9am-5pm; Weekends 12-5pm. 253-4444



Approaching Chaos



All events are free unless prices are noted. All concerts: 253-9800 unless otherwise noted. MIT Arts Hotline: 253-ARTS MIT Arts Web: web.mit.edu/arts Month-at-a-Glance is produced by the MIT Office of the Arts (253-4003) and ARTSNET. All MIT phones are in area code 617.

20 Fri

"Fierce Forever"

Drag queen & drag king performances. Guest performers include Mizery, Destiny & others. \$8, \$5 MIT students. 8pm, Morss Hall, Walker Mem. Email gamit-admin@mit.edu

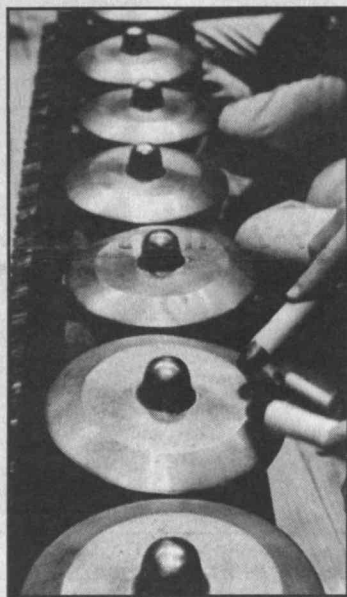
MIT Chamber Chorus

William Cutter, director. Madrigals of Monteverdi, Gesualdo; Irving Fine's *Alice in Wonderland Suite*; Janacek's *Three Songs*. 8pm, Kresge Aud.

21 Sat

Gamelan Galak Tika

Music & Dance of Bali. \$7, \$3 students, free w/MIT ID & children under 12. 2pm, Kresge Aud.



Gospel Concert

Spirit of Praise: MIT Gospel Choir w/guests Praise Dance & Wellesley Gospel Choir. 7pm, Lobdell Dining Hall. Email gospel-adm@mit.edu

Generation

Play written & directed by Chen-Hsiang Yeang. (G). 8pm, Kresge Little Theater. Chen-Hsiang Yeang, 577-8736, chyang@mit.edu or Chen-Pang Yeang, cpyeang@mit.edu

22 Sun



MITHAS Concert

M.S. Sheela, Carnatic vocal. \$15; \$12—students & seniors, MITHAS & New England Hindu Temple members; \$10—MIT students. 4pm, Wong Aud. 258-7971

Movements in Time

Amateur dance group at MIT. 3pm, Kresge Aud. \$5. Email movements-core@mit.edu



23 Mon

Staff Colloquium

All MIT faculty & arts staff invited to composer & Music Lecturer Elena Ruehr speak on her work at 12noon. Lunch will be served; reservations required by April 18. Laura Moses, 253-9821, laura@mit.edu.



Elena Ruehr



23 Mon

Student Violin

Advanced Music Performance concert by Rachel Levinson (G). 6pm, Killian Hall.

24 Tues

Architecture Lecture

"Interior/Exterior Visibilities." Elaine Sturtevant, artist, Paris. 6:30pm, Rm 10-250. 253-7791

25 Weds

Mehta/Lovens Duo

Rajesh Mehta '86 & Paul Lovens. Mehta is an experimental trumpeter, composer & instrument builder; Lovens is widely considered one of the most original percussionists of our time. 8pm, Killian Hall.



Rajesh Mehta

26 Thurs

"A Personal Story & A Trumpet Evolution"

Talk by Rajesh Mehta '86. 8pm, Killian Hall. 452-3205

26-29 Thurs-Sun

Bhoma

Dramashop production of play by Badal Sircar. Directed by Sudipto Chatterjee of Tufts U. \$8, \$6 students/srs. 8pm, also 3pm on April 29. Kresge Little Theater. 253-2908, ds_officers@mit.edu

26 Thurs

List Opening

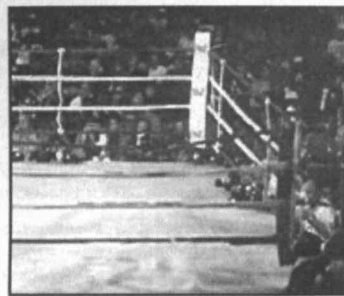
Reception from 5:30-7:30pm at the List Visual Arts Ctr (E15).

Isaac Julien *The Long Road to Mazatlan & Vagabondia*.

3-screen telling of a modern cowboy tale created in collaboration w/Venezuelan-born choreographer Javier De Frutos; score composed by Paul Gladstone Reid.

Paul Pfeiffer's *The Long Count (The Rumble in the Jungle)*,

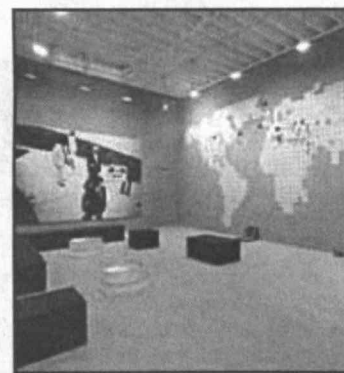
is the second of three works in which the artist has painstakingly removed Muhammad Ali from the boxer's most famous bouts.



Race In Digital Space, presented in conjunction w/a conference on race & technology hosted at MIT, features the work of over 30 artists using film, video, new media, & web techniques.

Johan Grimoprez's *Inflight*

is a spin-off of the airline magazines found on commercial flights.



Hours: Tues-Thurs & Weekends 12-6pm; Fri 12-8pm; closed holidays. 253-4680

27 Fri

Student Pianist

Advanced Music Performance concert by Ivan Middleton '01. 5pm, Killian Hall.

MIT Chamber Orchestra

Dante Anzolini, director. Shostakovich, Stravinsky & Respighi. 8pm, Killian Hall.

MIT International Fair.

Over 40 of MIT's cultural groups bring the world together in a day of dancing, food, music, fashion shows & more. 10am-6pm, Student Ctr Plaza & walkway from Mass Ave. Email icom@mit.edu



28 Sat

Affiliated Artist Concert

New Music by Matthew Guerrieri, composer & pianist. 3pm, Killian Hall. 625-1891

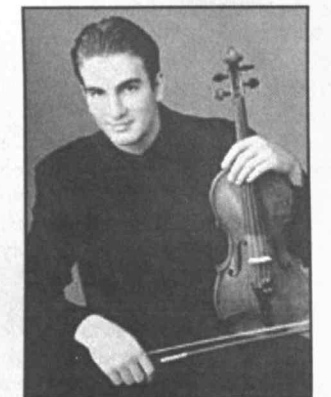
Mehta/Lovens Duo w/Aardvark

Trumpeter/composer/instrument builder Rajesh Mehta '86, percussionist Paul Lovens & the Aardvark Jazz Orchestra led by Lecturer Mark Harvey. 8pm, Kresge Aud.

29 Sun

Violin Concert

Stefan Milenkovich performs Brahms, Paganini, and Ravel. Organized by MIT Org of Serbian Students (MOST). Reception follows. Tickets: \$10, \$5 students, free for children under 12. Proceeds to charity. 8pm, Kresge Aud. Email most_sef@mit.edu



Stefan Milenkovich

All Month (cont.)

Dean's Gallery

Dreaming of Eternity: Landscapes, Trees & Ancient Places. Photographs by Sally Gregg. Toned gelatin silver prints made w/a Holga (plastic) camera. Through May 2. The Dean's Gallery, Sloan School of Management, Rm E52-466. Weekdays 9-5pm. 253-9455



Dreaming of Eternity

Rotch Visual Collections

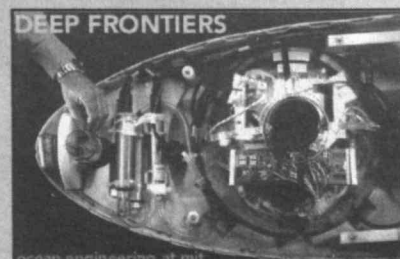
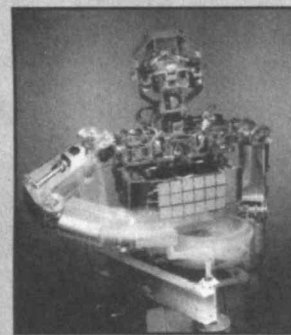
A Photographic Odyssey: Architecture & Space 2001. Photos by T. Luke Young. Rotch Visual Collections, Exhibit cases outside Rm 7-304. 253-7098



Deep Frontiers

Hart Nautical Gallery

Deep Frontiers: Ocean Engineering at MIT. Latest advances in underwater research. *Ship Models: The Evolution of Ship Design.* Hart Nautical Gallery, 55 Mass Ave. Daily 9-8pm. 253-5942



Robots & Beyond



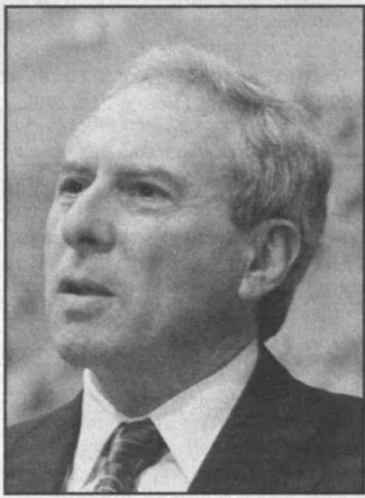
MIT Museum, 265 Mass Ave. Abbreviated hours due to construction: Tues-Sun 12-5pm. \$5; \$2 students/srs; \$1 children 5-18; free w/MIT ID. 253-4444

Daniel Goldin of NASA to deliver Commencement address

(continued from page 1)
port for space science and bringing change to NASA's organization and operations have been remarkable. He is an extraordinary leader who will have interesting and worthwhile messages for our graduates."

"Daniel Goldin is an excellent speaker selection for the first graduating class of the 21st century—one that will most surely bear witness to fantastic new achievements in space and aeronautics," said Erick Tseng, president of the Class of 2001. "This year's senior class displayed great interest in the Commencement speaker selection process and offered a wide variety of thoughtful suggestions. The class' response to Goldin has been very positive. It will be an honor to hear Goldin speak and I look forward to listening to him share his vision of the future and his goals for NASA at the turn of the millennium."

Soulaymane Kachani, president of the Graduate Student Council, said, "Mr. Goldin is a great speaker. He



Daniel Goldin
Photo by Bill Ingalls/NASA

made outstanding contributions to the nation's space program. Many graduate students expressed their delight to have such a great figure as a Commencement speaker. At the Graduate

Student Council, we are very pleased with the selection process of Commencement speakers. The mixture of students' input and Commencement committee members' feedback has worked very well. We look forward to continuing this collaborative effort between students and administrators to select the best speakers."

"Dan Goldin brought life sciences onto NASA's center stage. From the Astrobiology Institute and the National Space Biomedical Research Institute, which he initiated, to the course in biology for all NASA employees, he has changed the face of space research forever," said Apollo Program Professor of Astronautics Laurence R. Young, director of the National Space Biomedical Research Institute.

During Mr. Goldin's NASA tenure, the cost and time needed to develop spacecraft has been reduced dramatically while the number of missions launched each year has quadrupled. Safety standards and mission capabilities have improved significantly,

even with space shuttle costs reduced by 33 percent.

He started the Origins Program to understand the evolution of life on earth and determine if it exists elsewhere. He has been a strong supporter for increased exploration of Mars. Mr. Goldin was also in the forefront of the plan to install a "contact lens" on the Hubble Space Telescope, which resulted in important discoveries of the cosmos.

Last October, Mr. Goldin discussed the future of aerospace at the System Design and Management Lecture Series on Complex Systems. "MIT is at the leading edge and the students in this room will help lead that change," he told a packed Wong Auditorium.

A 1962 mechanical engineering graduate of City College of New York, Mr. Goldin began his career at NASA's Lewis Research Center in Cleveland, working on electric propulsion systems for human interplanetary travel. He was vice president and general manager of the TRW Space and Tech-

nology Group in California for 25 years before rejoining NASA as the administrator in March 1992. He became the agency's longest-serving director last month, surpassing James Fletcher, who served a total of eight years and 11 months during two terms in the 1970s and 1980s.

Mr. Goldin will be the 33rd person to deliver the MIT Commencement speech since 1951. From 1964-81, Presidents Julius A. Stratton, Howard W. Johnson, Jerome B. Wiesner and Paul E. Gray were the principal speakers.

Recent Commencement speakers have included Hewlett Packard President and CEO Carleton "Carly" S. Fiorina (2000), President William J. Clinton and AIDS researcher David Ho (1998), UN Secretary General Kofi Annan (1997) and Vice President Albert Gore in 1996. Providing a change of pace, MIT alumni Tom and Ray Magliozzi—better known as Click and Clack on their National Public Radio program "Car Talk," spoke in 1999.

MIT radio station marks 40 years of riding the airwaves

(continued from page 1)
ing show "Breakfast of Champions." She'll never forget her first on-air experience on "Niteowl," which features new DJs.

"Lights were blinking on the console, the Burke [which monitors the transmitter] was a mystery box, there seemed to be a gazillion buttons, the phone was ringing off the hook, and I forgot to bring in several of the CDs I had wanted to play," she said. "But amazingly, things gelled, my friends called me up to congratulate me, and my voice didn't crack, though it was a few octaves higher than usual."

MIT radio was established in 1946, broadcasting on campus as an AM station from the basement of the Ware dormitory (now part of Senior House) with the call letters WMIT. When the station applied for an FCC license five years later, the call letters were reluctantly changed to WTBS (Technology Broadcasting System) because a station in North Carolina already had the call letters WMIT.

WTBS went on the air as a 10-watt, student-run FM station on April 10, 1961. The broadcast schedule consisted of two or three hours each weekday morning and evening, with additional programs on weekends. The station shut down on weekday afternoons to allow the students to attend classes. Gradually, members of the community were invited to fill out the schedule.

In 1978, WTBS concluded a successful six-year legal battle to upgrade the signal to 200 watts and broadcast from the existing Eastgate tower and

antenna. But the legal expenses left the station broke, with no funds to complete the project and purchase a new transmitter.

At the same time, Ted Turner was hatching plans to create a cable superstation in Atlanta and wanted to call it WTBS (Turner Broadcasting System). Even though a New York Times offer (\$50) had been turned down in 1973, Mr. Turner contacted the MIT radio station with an offer to buy the call letters. A deal for \$50,000 was struck.

Since the purchase of call letters was prohibited by the FCC, the lawyers took advantage of the MIT station's nonprofit status: Mr. Turner would donate \$25,000 to the station under the condition that WTBS would apply for and receive new call letters. When the FCC granted the call letters to him, he would donate an additional \$25,000.

WTBS became WMBR (Walker Memorial Basement Radio) on May 24, 1979 and received the first payment. A short time later, Mr. Turner got the WTBS call sign and contributed another \$25,000. WMBR's 200-watt signal debuted on November 10, 1979.

The station, upgraded to 720 watts in 1995, broadcasts 365 days a year at 88.1 FM from Walker's basement. It is on the air 20-24 hours a day, seven days a week. With more than 70 shows, programming includes news and talk, hip-hop, punk rock, rhythm and blues, jazz and classical music. The longest-running program, "Downeast Ceilidh" (the second word, pronounced "KAY-lee," translates roughly to "jam ses-



Former WMBR general manager Joyce C. Yang, a graduate student in biology (left) and current general manager Christopher Avrigh, a senior in electrical engineering and computer science, work the boards in the radio station's studio.
Photo by Donna Coveney

sion" in Scottish Gaelic), has been hosted by Marcia Young Palmater since 1972.

"For 29 years, we've had the same name, the same theme music and the same night," said Ms. Palmater, a New Hampshire native who plays folk music from Canada's Atlantic Provinces on Thursdays from 8-10pm. "I've al-

ways loved the fiddle." Her boyfriend became her engineer and biggest fan shortly after the first broadcast. David Palmater, operations manager of WUMB, has been her husband for 27 years.

Ms. Palmater remembers when MIT's AM and FM stations broadcast simultaneously, with the commercial AM station airing advertisements while the public FM station did public service announcements. To break the monotony of the PSAs, the staff and announcers produced a series of commercials for fictitious products such as "Apple Gunkies." The AM station was never a commercial success. "We never had more than a few piddly little ads," said Ms. Palmater.

With the superior quality of the FM signal, the AM audience dwindled. At one point, the station offered \$5 to listeners who called within a short time period. "We never had a taker," recalled Ms. Palmater. "It was a real dinosaur." The AM station went off the air in 1974.

Other long-running programs include "Breakfast of Champions," which went on the air in 1983, six years after "The Late Riser's Club" made its debut. They are on the air back-to-back from 8am-noon Monday through Friday. Other popular programs include "Lost and Found," "The James Dean Death Car Experience," "Out of the Blues" and "Pipeline," which features live bands Tuesday evenings. The complete WMBR schedule is available at <http://wmb.mit.edu>.

The basement studios were renovated in 1999. In addition to a new broadcasting facility, performance space for live concerts and a production studio were built. The same year, WMBR received a Best in Boston award from Boston Magazine for its rock and roll programming.

"Radio makes no distinction between the person at the Newton golf club or the man walking down the street in Dorchester. It reaches everyone."

—Joyce C. Yang



In this photo from the 1975 Technique yearbook, an unidentified disc jockey plays records on what was then WTBS.