

Voting technology



On December 14, the presidents of MIT and the California Institute of Technology announced a collaborative project to develop an easy-to-use, reliable, affordable and secure US voting machine that will prevent a recurrence of the problems that threatened the 2000 presidential election. MIT President Charles Vest (seated) discusses voting technology with Caltech President David Baltimore (on video screen) in an interactive video news conference from their campuses in Cambridge and Pasadena, CA. The inset image on the videoscreen shows Dr. Vest and other MIT participants. The announcement has evoked many comments and suggestions from the public, as well as significant attention from the news media. See the special web site at <http://web.mit.edu/newsoffice/voting/>.

Photo by Donna Coveney

Cochran to be MLK speaker

■ By Robert J. Sales
News Office

Attorney and civil rights leader Johnnie L. Cochran Jr. will deliver the keynote address at MIT's 27th annual celebratory breakfast to honor the life and legacy of Dr. Martin Luther King Jr. on February 8 in Mors Hall at Walker Memorial. He will address the theme of this year's celebration, "Confronting the Gap: Building and Sustaining Inclusion."



Cochran

A brochure distributed by Mr. Cochran's law firm in the 1990s says in bold type on the first page that "each lawyer in the firm has literally adopted Dr. Martin Luther King Jr.'s maxim that 'injustice anywhere is a threat to justice everywhere.'"

The public is invited to the 7:30am breakfast, hosted by President Charles M. Vest and his wife, Rebecca M. Vest.

Seating is limited, with reservations required by Monday, Feb. 5. For information, see <http://web.mit.edu/mlking/www>.

Mr. Cochran is best known for representing high-profile clients Michael Jackson, Sean "Puffy" Combs, Lou Rawls, Geronimo Pratt, Jim Brown and O.J. Simpson, among others. He also represented Reginald Denny, a white truck driver assaulted by blacks during the disturbances in South Central Los Angeles following the Rodney King verdict in 1992. He currently represents the mother of the late Providence police officer Cornel Young Jr., shot to death by fellow officers in 1999.

Less known are his philanthropic activities, including the Johnnie L. Cochran Sr. scholarship at UCLA for African-American men. He also established the Johnnie L. Cochran Jr. Center for Early Learning at Second Baptist Church in Los Angeles, where he has been a member for more than 40 years. The Johnnie L. Cochran Jr. Art Fund to support African-American visual artists was created in 1997.

Mr. Cochran, a graduate of the University of California at Los Angeles and the Loyola Marymount University School of Law, went into private practice in 1966 after three years as a deputy city attorney in Los Angeles. He served as the third deputy assistant in the Los Angeles County District Attorney's Office from 1977-80.

(continued on page 12)

Silbey named dean of science

Robert J. Silbey, the Class of '42 Professor of Chemistry at MIT, has been named dean of the School of Science, effective immediately.

"Bob brings to this important position great judgment of the quality of science, a tremendous sense for the importance of the blending of education and research within MIT, and proven administrative experience," said Provost Robert A. Brown.

"I am looking forward to working with the president, provost and chancellor for the next few years to continue to foster the spirit of excellence set by the School of Science," Professor Silbey said.

Professor Silbey was appointed interim dean of science in February when former dean Robert J. Birge-neau resigned to become president of the University of Toronto.

"Bob Silbey is an outstanding fac-

ulty member, a world-class researcher and an experienced administrator," said President Charles M. Vest, who also described him as "ideally suited



Silbey

to provide leadership and continuity to the School of Science."

Internationally recognized for his contributions to theoretical chemistry, Professor Silbey has been a professor of chemistry at MIT for 34 years. In 1989 he was appointed the Class of '42 Professor of Chemistry.

Professor Silbey, co-chair of the Task Force on Student Life and Learning, is currently head of the Center for Materials Science and Engineer-

ing. He served as head of the Department of Chemistry from 1990-95.

Born in Brooklyn, NY, Professor Silbey received a bachelor of science degree from Brooklyn College in 1961 and a PhD from the University of Chicago in 1965 and served as a postdoctoral fellow at the University of Wisconsin in 1965-66.

Co-author of the textbook *Physical Chemistry*, Professor Silbey has produced more than 250 research publications.

In recognition of his teaching skills, he was named a Margaret MacVicar Faculty Fellow in 1996. He also has received the School of Science Teaching Award in 1986 and a Graduate Student Council Teaching Award in 1988.

He lives in Boston with his wife Susan.

Deborah Halber

Police Chief Glavin takes new post

■ By Janet Snover
Executive Vice President's Office

Anne P. Glavin, chief of the MIT Campus Police since 1987, has accepted a new senior-level position as director of public safety at the Institute, effective on or about March 30.

Chief Glavin will remain in her current position while MIT conducts a national search for her successor. Campus Police and the director of public safety will report to Stephen D. Immerman, director of enterprise services in the office

of the executive vice president.

In her new role, Ms. Glavin will remain a sworn law enforcement officer focusing on Institute-wide policies and projects related to the broad area of public safety. Included will be public safety issues related to major events coordination, critical incident and risk management, comprehensive campus disaster response planning, and interface with regional and local public law enforcement agencies, as well as campus-wide safety and security planning.

Commenting on Chief Glavin's many contributions in his memo

to Campus Police, Mr. Immerman wrote, "During Anne's 13 years as chief, the department has achieved substantial success in expanding its diversity, increasing its professionalism and reinforcing its primary role in service to the MIT community."

Chief Glavin believes the department enjoys very high approval at MIT because of officers' professional expertise and demonstrated abilities to meet the needs of the community. "We are well trained, practice our business according

(continued on page 12)

Postdoc killed during robbery in Mexico

A memorial service will be held at MIT on February 27 for post doctoral associate Constantine Giannitsis, who was stabbed to death and robbed of \$8 in cash, traveler's checks, credit cards and his passport while on vacation in Taxos, Mexico.

The Greek Embassy in Washington said Mexican police arrested and charged three teenagers—ages 15, 16 and 17—last Wednesday after surrounding their house. The Associated Press reported that a knife was also seized.

The embassy said Dr. Giannitsis, 29, was taking photographs in an alley in the historical section of the city when the youths confronted him at about 3:30pm on December 31. Dr. Giannitsis scuffled with the assailants and was stabbed in the chest, near his heart. He made his way out of the alley to the sidewalk, where he collapsed.

Husband and wife physicians from San Antonio, TX, sightseeing with a niece, a nephew and their three small children, discovered Dr. (continued on page 9)

Salt in Gaza Strip water could destroy agriculture in 20 years

■ By Denise Brehm
News Office

Lack of fresh drinking water poses a serious problem for the one million residents of the Gaza Strip, who live and grow food in an area one-tenth the size of Rhode Island. They draw water for drinking and agricultural irrigation from aquifers on the Mediterranean that are becoming saltier each year.

The United Nations Development Programme and United States Agency for International Development currently recommend that Gaza can main-

tain its freshwater supply by using only an amount less than or equal to that of its usable annual rainfall. But a study presented by MIT researchers at the December meeting of the American Geophysical Union shows that even if the residents stay within those quantity guidelines, the quality of the water will continue to deteriorate rapidly.

Because of saltwater intrusion from the sea into the aquifer, and recirculation and evaporation losses of pumped groundwater, the quality of the water is deteriorating faster than fresh rainwater can desalinate it. This means that Gaza residents must ac-

quire water from beyond their borders, which are closed at present; build a large desalination plant; or eliminate agriculture within the next two decades, said the two researchers, Assistant Professor Charles Harvey and Dr. Annette Huber-Lee of the Department of Civil and Environmental Engineering.

"We're not talking about a hundred years into the future," said Dr. Huber-Lee, lead author of the study. "I can show numbers that say it's a problem very soon. It's reaching a point where you have to (continued on page 10)

IN BRIEF

COPYTECH EVENT

CopyTech is hosting an open house on Wednesday, Jan. 17 from 2-4:30pm. Visitors can tour the main CopyTech Center in Rm 11-004, explore its programs, meet staff and enjoy refreshments.

Student Notices

* Open to public
** Open to MIT community only

INSTRUCTIONS: Listings for Student Notices should be submitted at <http://web.mit.edu/newsoffice/tt/calform.html>. If you have questions, please contact <tcalendar@mit.edu> or x3-2704.

January 10-28

ANNOUNCEMENTS

\$30,000 Lemelson-MIT Student Prize for Inventiveness—Deadline: January 10, 4pm.** Rm E60-324. The Lemelson-MIT Program is accepting applications for its annual \$30,000 Lemelson-MIT Student Prize for Inventiveness. All currently enrolled MIT seniors and graduate students are eligible to apply. More info: x3-3352, <invent@mit.edu> or <http://web.mit.edu/invent/www/stuprize.html>.

EECS VI-A Orientation Lecture—Wednesday, February 7, 3pm.** Edgerton Lecture Hall, Rm 34-101. All Course VI Sophomores & Juniors interested in applying for the EECS VI-A Internship Program with Industry and Government. More info: x3-4644, <lydia@eeecs.mit.edu>.

Energy, Technology, and International Affairs (ETIA) Research Grants—Feb. 8 deadline.** Available for advanced doctoral students working in collaboration with a faculty member on an international aspect of energy, environment and international affairs. Sponsored by the Center for International Studies. Contact William Keller, x3-9861 or <wkeller@mit.edu>.

EECS VI-A Student Open House—Wednesday, Feb. 14, 2:30-4pm.** Grier Room, 34-401. Meet current VI-A students. Get inside info on VI-A companies, learn about typical work assignments, thesis opportunities, salaries, housing, transportation, locale, etc. Sponsored by EECS VI-A Internship Program. More info: x3-4644, <lydia@eeecs.mit.edu>.

RELIGIOUS ACTIVITIES

The Chapel is open for private meditation 7am-11pm daily.

Baptist Campus Ministry—Weekly events:** Sunday nights at the RAC, 6pm, main dining rm, Bldg W11. Home-cooked meal (cost: by donation) followed by Bible study. Tuesday Vespers, 6-6:30pm, chapel. More info: x3-2328.

Baptist Student Fellowship*—Weekly meetings on Tuesdays, include dinner followed by Bible study. 5:30-7pm, Bldg W11, small dining room. Sponsored by Baptist Campus Ministry. More info: x3-2328.

Campus Crusade for Christ—Weekly meeting on Wednesdays, 7:45pm, PDR 1 & 2, 3rd fl Student Center.** More info: x5-6204 or <gnelson@mit.edu>.

Chi Alpha Christian Fellowship—Weekly organizational meeting, Tuesdays, 7:3-9pm, PDR 3 in Student Center.** Christian worship and an examination of the book of Revelation. Prayer and fasting each Thursday from 12-12:45pm in W11-063. More info: x3-2327, <cacf@mit.edu> <www.mit.edu/activities/xa/main/html>.

Christian Science Organization—Thursdays at 7pm.** More info: x3-8797 or <lnorford@mit.edu>.

Communitas-Life Together—Protestant worship, 11am Sunday.** Sponsored by American Baptist Church, United Church of Christ, United Methodist Church, Presbyterian Church. Chaplain John Wuestneck, x2-1780 or <chaplain@mit.edu>.

Graduate Christian Fellowship—Weekly meetings Fridays at 6pm.** Also weekly Bible studies, prayer and volleyball. More info: <http://web.mit.edu/mitgcf/> or <mit-gcf-info@mit.edu>.

Lincoln Laboratory Bible Study*—Mondays, 12-12:30pm, weekly Bible study in the Group 73 conference room, D-382. More info: Sharon Frigon at 981-7751 or <frigon@ll.mit.edu>.

Lutheran-Episcopal Ministry at MIT*—Wednesday worship 5:10pm, followed by either brown bag supper or social activity in the Bldg W11 dining room. Second Sunday of each month, LEM assists at Common Cathedral, a gathering of homeless people on the Boston Common, at 1pm. More info: x3-0108.

Meditation and Discourse on the Bhagavad Gita*—With MIT chaplain Swami Tyagananda, monk of the Ramakrishna Mission of India. Every Friday, 5:15pm, MIT Chapel. Sponsored by the MIT Vedanta Society. More info: 661-2011, <mehta@cvtel.com> or <http://www.cvtel.com>.

MIT Hillel—Tuesdays: 5:30pm beginning Hebrew; 6:30pm intermediate Hebrew. Wednesdays: noon Hebrew conversation table in Walker cafeteria; 7pm Haftarah class. Thursdays: noon Taste of Torah. Fridays: 6pm Egalitarian Chavurah services and Orthodox Minyan services; 7pm Shabbat dinner. Saturdays: 9am Orthodox Minyan services; 12:45pm Shabbat lunch.** More info x3-2982.

MIT Muslim Students Association*—Five daily prayers, Bldg W11; also Friday congregation 1:10-1:45pm, Rm W11-110. More info: x8-9285.

MIT Orthodox Christian Fellowship—Wednesdays at 5:30pm in Student Ctr DR 1 for dinner followed by Chapel Vespers.** John Kymissis x5-7649 or Costa Sapuntzakis x5-7683.

Protestant Eucharist/Holy Communion*—Wednesdays, 5:10pm in Building W11. Sponsored by the Lutheran-Episcopal Ministry at MIT. More info: x3-2325 or <lutheran@mit.edu>.

Taize Prayers*—Fridays, noon-12:30pm in W11, the Board Room. All invited. Sponsored by students from the Protestant Ministry at MIT, Tech Catholics and the Lutheran-Episcopal Ministry. Taize Prayers are a form of Christian meditation based on singing and silence.

Tech Catholic Community—Sunday Masses 9:30am, 1pm and 5pm. Masses Tuesday and Friday at 12:05pm in MIT chapel, when**

classes are in session. More info: x3-2981 or <catholic@mit.edu>.

United Christian Fellowship (UCF)—A member of Intervarsity Christian Fellowship. Large group meetings Fridays at 7:15pm, 3rd floor of Student Center.** Weekly dorm-based Bible studies on campus. More info: Sherry or Sara at 576-5157, <mitucf@mit.edu>, <http://web.mit.edu/ucf/>.

STUDENT JOBS

For job listings go to the Student Employment Office, Rm 11-120 or <http://web.mit.edu/seof/>. The MIT Student Employment Office functions much like the classified section of a local newspaper, and does not screen potential employers or employees.

VOLUNTEERS

The MIT Public Service Center (PSC) has compiled volunteer opportunities. Please contact the PSC for more information (Rm W20-547, x3-0742).

UROP

The UROP Office invites MIT and Wellesley students to join faculty members on research projects. For information on procedures, please contact the UROP Office, Rm 7-103 <urop@mit.edu> or x3-7306. Information and current listings available on-line at <http://web.mit.edu/urop/www/>.

Crimewatch

The following incidents were reported to the MIT Campus Police from November 28-December 10. This summary contains most incidents reported, but does not include incidents such as medical shuttles, ambulance transfers, false alarms and general service calls.

November 28: Bldg. 2: suspicious activity. *MacGregor House:* larceny of wallet, \$25. *Lobby 7:* report of homeless persons, gone upon arrival of CPs. *N10 Lot:* suspicious activity. *Bldg. 35:* former acquaintance bothering employee. *Student Ctr.:* report of suspicious person. *DuPont Gym:* gym bag stolen, \$190.

November 29: Amherst St.: check and inquiry. *Burton:* 1) suspicious activity; 2) suspicious person. *Student Ctr.:* assault and battery by persons known to each other. *Bldg. 68:* jewelry stolen, \$5,000. *Brookline, Zeta Beta Tau:* wallet stolen, \$20. *Mass. Ave. area of WILG:* suspicious person attempting to sell laptop computer. *DuPont Gym:* backpack stolen, containing palm pilot and wallet, \$485.

November 30: Bldg. E53: homeless person. *Westgate Lot:* 4 vehicles broken into with CD players, CD and a sleeping bag stolen. *Hayward Lot:* attendant being harassed by motorist. *Memorial Dr. and Wadsworth St.:* assist State Police with vehicle accident. *West Garage Annex Lot:* vehicle broken into, CD player stolen, \$500. *Rockwell:* cell phone stolen from gym bag: \$80.

December 1: Bldg. 13: suspicious persons. *Bldg. 8:* attempted larceny of CPU. *Bldg. E52:* mail stolen containing videos and CDs, \$140. *Bldg. NE20:* cell phone stolen, \$40; same only misplaced, not stolen. *Bldg. W59:* suspicious person. *Bldg. NE43:* laptop computer stolen, \$3,500. *Rear of NW61:* arrest of a male for possession of crack cocaine. *Westgate Lot:* car broken into and CD stereo stolen, \$400. *Bldg. NW62:* report of suspicious person, checks out okay.

December 2: Albany St.: assist Cambridge Police with vehicle accident. *Westgate Lot:* attempted larceny of vehicle. *Rockwell Cage:* pants with wallet stolen, \$250. *Bldg. 36:* suspicious person.

December 3: Boston, Sigma Phi Epsilon: report of fight, MIT Officers found no fight or disturbance.

December 4: Baker: suspicious person. *Bldg. 7:* drill stolen, \$200. *Rockwell Cage:* 1) wallet stolen, \$12 cash and credit cards; 2) wallet stolen, \$38 cash and credit cards; 3) backpack stolen containing calculator, unknown value; same later recovered in Cambridge. *Bldg. E19:* employee problem. *Rear of NW12:* check and inquiry of individual.

December 5: Vassar St.: assist Cambridge Police with tractor trailer operating erratically. *Bldg. E52:* suspicious activity.

December 6: Bldg. 56: boots and shampoo stolen, \$120. *Bldg. N10:* assist other police agency. *Bldg. 5:* check and inquiry of suspicious person. *Bldg. NW12 Lot:* suspicious activity.

December 7: Bldg. 66: 1) computer stolen, \$600; 2) credit card stolen.

December 8: East Garage: suspicious activity. *Bldg. 1:* larceny of clothing and palm pilot, later recovered. *Bldg. 56:* larceny of computer, \$2,500. *Bldg. 64:* suspicious activity. *Bldg. 56:* stolen keys, later recovered. *Bldg. 12:* larceny of computer. *Memorial Dr.:* assist State Police with vehicle accident. *Bldg. 50:* disorderly person. *Rockwell Cage:* persons refusing to leave area.

December 9: WILG: bicycle stolen, \$270. *Bldg. E23:* suspicious person. *Phi Delta Theta:* suspicious persons in alleyway. *Bldg. NW61:* homeless person, assisted to shelter.

December 10: Bldg. E56: malicious damage to vehicle. *Amherst Alley:* report of fight, nothing found. *Bldg. NW61:* homeless person.

Despite geek image, inventors respected by teens, survey finds

Traditionally stereotyped as brainy geeks with coke-bottle glasses, inventors have seldom won teen popularity contests. But according to the latest information gathered by the Lemelson-MIT Program, inventors' status is rising among teens.

The Lemelson-MIT Invention Index—an annual survey of Americans' perceptions about inventing and innovating—found that teens do recognize the value of inventors when survival is at stake. Using the hypothetical example of being stranded on a desert island, the study found that nearly half (46 percent) of all teens surveyed would choose the company of an inventor over that of a famous musician (19 percent), athlete (6 percent), actor (13 percent) or president of the United States (9 percent). This indicates that inventors, although not revered as celebrities, hold a vital place in the minds of many American teens.

Teens ranked the same groups very differently when asked which they'd prefer to meet. In line with prevailing stereotypes, the most popular professionals that teens want to meet are musicians (30 percent), athletes (23 percent) and actors (22 percent). Inventors ranked lowest at 8 percent.

The findings are not good news for the future of American invention. Teens still don't aspire to become inventors; they would rather assume more traditional professions—doctors, lawyers and teachers. The only careers ranking lower in the Lemelson-MIT study are politicians and journalists, revealing that much more needs to be done to foster interest in invention among American youth.

"In the knowledge-based economy of the 21st century, nothing is going to be more important than being able to invent the new and reinvent the old," said Professor Lester C. Thurow of economics, chairman of the Lemelson-MIT Awards Board. "In this environment, being an inventor has to be seen as a normal activity and not something reserved for geniuses. Bringing about this transformation in attitudes is what the Lemelson-MIT program is all about."

WHAT INSPIRES TEENS?

Although teens expressed only a lukewarm interest in inventing, the Invention Index highlights the reasons why teens would become inventors and provides a road map that can help educators better understand what inspires inventiveness in adolescents. Altruism is the primary motive behind why teens would invent—to help mankind (43 percent) and to improve or preserve the quality of life (34 percent). Surprisingly, money (27 percent) and fame (17 percent) rank lowest of five choices. Having fun (32 percent) ranked a close third.

Most American teens surveyed said "finding a cure for cancer" is the most important issue for the new President to tackle, followed by "eliminating hunger." Colonizing space can wait.

This year's study also compared the attitudes of American adults and teens. Unlike teens, adults not only recognize the importance of inventors in society, but also view inventors as role models worthy of attention. Whereas the popularity of inventors among teens suffers in comparison to musicians and athletes, it remains highest among adults, who would choose to meet an inventor before all other types of professionals cited in the study.

Another question revealed that despite the proliferation of computers and society's reliance on information technology, the car is the one invention that Americans say they cannot live without. Although the gap between cars and computers has narrowed over the past five years, these findings mirror those of 1996, when

the automobile topped personal computers by a whopping 63 percent over 8 percent. The lightbulb is second in both year's surveys.

ABOUT THE STUDY

The Lemelson-MIT Invention Index has explored American's perceptions about inventing and innovating since 1996. Previous topics were the importance of parents and teacher in fostering invention and innovation in today's youth (2000), the most profitable career areas for inventors (1999), areas of research and development supported by American taxpayers (1998), whether certain inventions make life easier or more complex (1997) and which inventions Americans could not live without (1996).

The 2001 Lemelson-MIT Invention Index Survey was conducted by Bruskin Research from a nationally representative sample of 1,010 adults and 500 teenagers. The interviews were conducted from November 17-21. For more information about the Lemelson-MIT Program, see <http://web.mit.edu/invent>.

Throwing it away?

Post it on the "reuse" e-mail list, where everything from old computers to kittens can be given away. For more information, send e-mail to: <reuse-request@mit.edu>

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At a 1997 party honoring his 80th birthday, Institute Professor Emeritus Herman Feshbach is greeted by human rights activist Yelena Bonner, who told guests of the party how Professor Feshbach had helped smuggle the work of her husband, Andrei Sakharov, out of the Soviet Union. Professor Feshbach "wasn't worried about the KGB—he only worried about his wife finding out," she said.

Photo by Donna Coveney

Renowned nuclear physicist Feshbach, Institute Professor emeritus, dies at 83

Institute Professor Emeritus Herman Feshbach of Cambridge, a renowned nuclear physicist and champion of equal opportunity at MIT and around the world, died December 22 of congestive heart failure at Youville Hospital in Cambridge. He was 83.

Professor Feshbach served on the faculty of the Department of Physics for more than 50 years and was department chairman for 10 years beginning in 1973. He also directed the Center for Theoretical Physics (which he helped create) from 1967-73. He won many awards, including the National Medal of Science in 1986.

Professor Feshbach worked to open communications between western and Soviet scientists during the height of the Cold War and championed the cause of "refuseniks" including physicist Andrei Sakharov. He first met Sakharov in the mid-1970s and wrote a piece in *Physics Today* about visiting him in Moscow after Sakharov's return from exile in Gorky in 1987. Professor Feshbach was also active in the antinuclear movement and helped found the Union of Concerned Scientists, serving as its first chairman.

A native of New York, NY, Professor Feshbach received the BS from the City College of New York in 1937 and then came to MIT for graduate study, subsequently remaining here for his entire career. He became an instructor in physics in 1941 and received the PhD in 1942. He was appointed to the faculty as an assistant professor in 1945, later becoming an associate professor in 1947 and full professor in 1955. Professor Feshbach was named an Institute Professor, MIT's highest faculty honor, in 1983. He retired in 1987.

Colleagues called Professor Feshbach one of the world's greatest theo-

retical nuclear physicists. He led the development of nuclear reaction theory and contributed significantly to the statistical description of nuclear states and reactions, as well as contributing to the understanding of the structure of nuclei, which was important for many applications including nuclear medicine and nuclear power. He co-authored two seminal textbooks, *Methods of Theoretical Physics* (1953) with Phillip M. Morse and *Theoretical Nuclear Physics* with Amos deShalit.

Professor Feshbach was also a vigorous advocate of scientific freedom and opportunity. "He was profoundly disturbed by the military application of nuclear physics and worked to rein in the darker side of scientific research," said Professor of Physics Robert L. Jaffe. He took part in a 1969 protest of military research at MIT, and in 1992, an ad hoc committee studying the "Military Impact on Campus Research" chaired by Professor Feshbach submitted a report saying that a "policy of openness" should govern research at MIT.

Professor Feshbach strove to increase the number of women and minority faculty members at MIT. He chaired the faculty's Equal Opportunity Committee, which made recommendations in 1991 for recruiting more women faculty members.

"He was an extremely smart, very friendly man, but he also had a toughness about him. He helped many of us start our careers, and was always straightforward and very thoughtful," Professor Marc A. Kastner, head of the physics department, told the Boston Globe.

As head of the physics department, "Herman was as dogged in his defense of fundamental physics as he

was kind in his mentoring of younger colleagues," said Professor Jaffe. "The corridors of Building 6 resonated to his laughter and his animated defense of principles of physics or politics for nearly 60 years."

The Department of Physics inaugurated the annual Herman Feshbach Lectures in 1984, honoring him for his distinguished career and service to the department. The Herman Feshbach Professorship was created in 1999 to support theoretical physicists.

Professor Feshbach was a member of the National Academy of Sciences since 1969 and headed the physics section of the American Association for the Advancement of Science in 1987. He was president of the American Physical Society from 1980-81 and of the American Academy of Arts and Sciences from 1982-86. Professor Feshbach served on several government and professional committees and was a consultant to the Brookhaven, Los Alamos and Argonne National Laboratories, as well as the Lawrence Berkeley Laboratory. He was also the longtime editor of the journal *Annals of Physics*.

Professor Feshbach leaves his wife, Sylvia (Harris); a daughter, Carolyn of Lexington; two sons, Theodore of Hopedale and Mark of Minneapolis; a sister, Florence Nadelman of Cranford, NJ; two brothers, Bernard of Palo Alto, CA and Sidney of Amherst; and two grandchildren.

A funeral was held on December 27 in Stanetsky Memorial Chapels in Brookline. A memorial service will be held at MIT at a time to be announced.

See page 9 for more obituaries.

Clinton establishes principles to guide research partnerships

By Kenneth D. Campbell
News Office

President Clinton, in a December 29 executive order, established 10 principles to guide the research partnership between universities and all agencies of the federal government.

It represents the first time that the basic goals and rationale of the partnership have been articulated to "provide the framework for the development and analysis of all future Federal policies, rules, and regulations for the federal government-university research partnership," the order said.

"More than any other nation in the world," said the President, "we rely on a partnership between our government and our public and private research universities to conduct research that improves our economy, health and national security, while also training our future science and technology workforce. It is vital that this partnership be equitable and effective to sustain US leadership across the frontiers of scientific knowledge."

The order was the culmination of studies that began in October 1995 with an initiative led by MIT President Charles Vest and University of Pennsylvania President Judith Rodin in their roles as members of the President's Council of Advisors on Science and Technology (PCAST).

The order directs the President's Office of Science and Technology Policy (OSTP) to "consult with all stakeholders and conduct a regular review of the state of the partnership and make recommendations to ensure its continued vitality," the White House statement said.

The guiding principles are widely accepted at this point by members of both political parties and by industry, said Arthur Bienenstock, OSTP associate director for science.

"American industry is really aware of the role of science and technology in the economy and the role of science and technology workforce in achieving industrial growth. I think any administration would be sensitive to those issues," said Dr. Bienenstock, who will soon return to his physics faculty position at Stanford.

GUIDELINES

The guidelines include four guiding principles and six operating principles. They are fully described in the April 1999 National Science and Technology Council report, "Renewing the Government-University Partnership," which resulted from the study and five open workshops on the issues.

The guiding principles are:

1. Research is an investment in the future, helping to assure the health,

security and quality of life of US citizens.

2. The integration of research and education is vital. "The intellectual development and scientific contributions of students who participate in federally sponsored research are among the most important benefits of publicly supported research."

3. Excellence is promoted when investments are guided by merit review, and "can accommodate endeavors that are high risk that have the potential for high payoff."

4. Research must be conducted with integrity; "the credibility of the collective enterprise relies on the integrity of each of its participants."

The six operating principles "that shall assist agencies, universities, individual researchers, and auditing and regulatory bodies in implementing the guiding principles" are:

1. Agency cost-sharing policies and practices must be transparent, "including explicit information regarding the amount of cost sharing expected."

2. Partners should respect the merit review process. "Excellence in science is promoted when all parties adhere to merit review as the basis for distributing federal funds for research projects and refrain from seeking federal funds through non-merit-based means."

3. Agencies and universities should manage research in a cost-effective manner. The goal "should be to make maximum resources available for the performance of research and education."

4. Accounting and accountability are not the same. The principal measure of accountability must be the research results and whether the work was consistent with the original scope of the proposed research.

5. The benefits of simplicity in policies and practices should be weighed against the costs; "one size doesn't necessarily fit all."

6. Change should be justified by need and the process made transparent. "Modifications in administrative, regulatory, auditing requirements, or in cost-sharing expectations, should be kept as infrequent as possible but consistent with the need to respond to changing circumstances."

Congressional Fellowship deadline nears

January 15 is the deadline for all application materials to be post-marked for both the American Institute of Physics and American Physical Society Congressional Science Fellowship programs.

These programs enable scientists with a PhD in physics or a closely related field—or outstanding non-PhD candidates with compensating research experience—to spend a year working for a congressional office or committee, learning how congressional decisions impact the science community and how a scientist can provide advice and expertise to Congress.

Many former Fellows have gone on to help craft administration science policy by serving in the White House Office of Science and Technology Policy, or in federal science and technology agencies. Others return to academia or industry, while some accept permanent staff positions on Capitol Hill.

For more information about the Congressional Science Fellowship program, see <<http://www.aip.org/enews/fyi/2000/fyi00.144.htm>>.

Institute solicits proposals to improve undergrad education

The Council on Educational Technology (CET), in collaboration with the Committee on the Undergraduate Program (CUP), has set a January 22 deadline for submission of preliminary proposals on projects that will enhance the educational experience of MIT students.

On December 13, Professor Hal Abelson, Provost Robert Brown and Dean Robert Redwine, co-chairs of CET, and Professor Robert Jaffe, chair of CUP, sent a letter to the community describing the Call for Preliminary Proposals.

Selected projects will receive funding through the d'Arbeloff Fund for Excellence in MIT Education and from Project iCampus, the MIT-Microsoft alliance for research in

educational technology. Any member of the MIT community may submit a proposal. Proposals from student groups are also welcome and will be reviewed as a special category.

Preliminary proposals will be reviewed by iCampus and the CET Grants Subcommittee. Applicants who pass the initial screening process will be invited to submit final proposals, which will be due in February. Awards will be announced in time for work on projects to begin in late spring or early summer.

In particular, the CET and the CUP are interested in ideas and initiatives in the following areas:

- Cooperative initiatives between

schools and departments

- Educational impact of wireless portable computing
- Educational initiatives that include alumni as key participants
- Improvements in advising and mentoring
- Increased flexibility for new learning experiences on and off campus
- Initiatives that improve the first year educational experience
- National and global resources for higher education.

The proposal web site describes CET's and CUP's goals in these areas, but the organizers stress that they welcome any preliminary proposal that has educational significance for MIT. Proposals for educational innovation are not required to

conform strictly to current Institute program requirements.

For more information, see the program's web site at <<http://mit.edu/ed-proposals>> or send e-mail to <ed-proposals@mit.edu>.

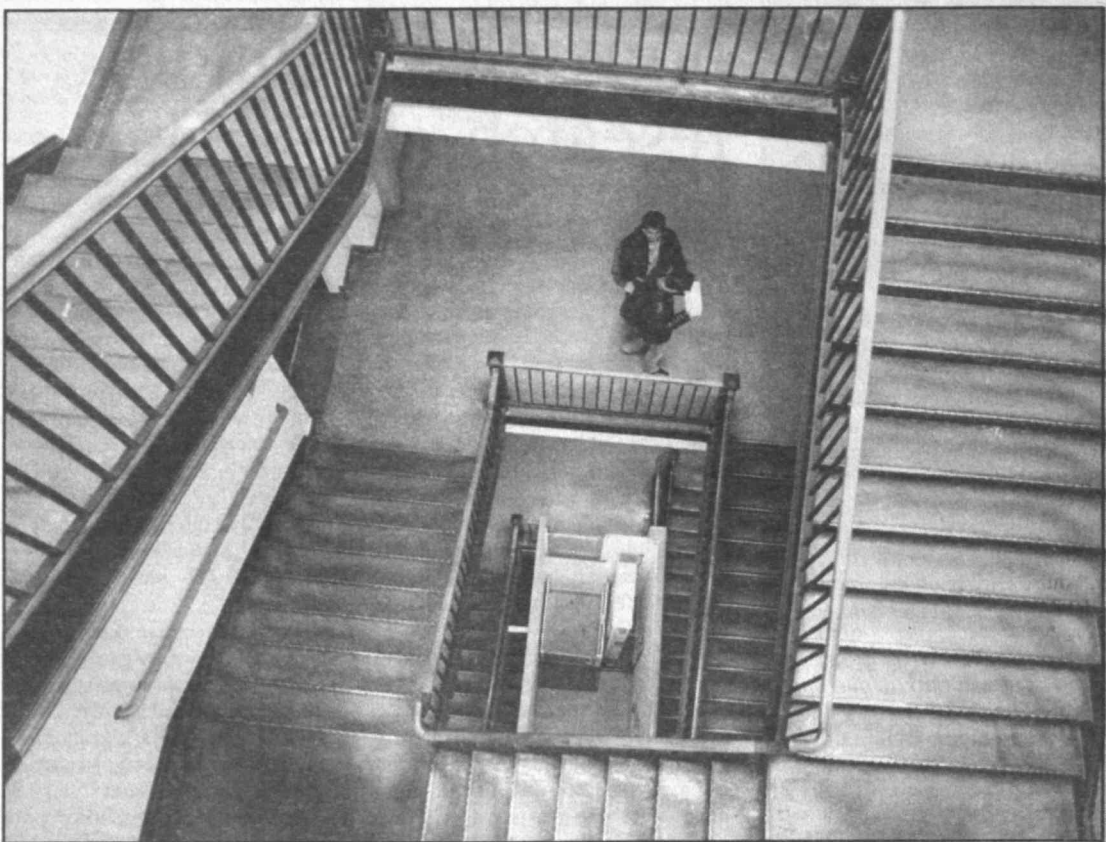
Denise Brehm

Looking for past articles?

All issues of Tech Talk published since 1990 are available on the web. Go to:

<http://web.mit.edu/newsoffice/tt>

Roundabout route



A view down the stairwell from the top floor of Building 1.

Photo by Laura Wulf

Libraries list hours for IAP and MLK Day

On Martin Luther King Jr. Day (Monday, Jan. 15), the following libraries will follow their regular schedules: Barker, Dewey, Humanities, Reserve Book Room, Rotch and Science. All other libraries will be closed.

The libraries' IAP hours, effective January 8 through February 5, are as follows.

- **Administrative offices**—Monday-Friday, 9am-5pm; Saturday-Sunday: closed.
- **Aero & Astro**—Monday-Friday: 9am-5pm; Saturday: 11am-5pm; Sunday: 1-5pm.
- **Barker**—Monday-Thursday, 8:30am-9pm; Friday, 8:30am-6pm; Saturday, 11am-6pm; Sunday, 1-9pm.
- **Computerized Literature Search**

Service—Monday-Friday, 10am-6pm; Saturday-Sunday, closed.

• **Dewey**—Monday-Thursday, 8:30am-9pm; Friday, 8:30am-6pm; Saturday, 11am-6pm; Sunday, 1-9pm.

• **Document Services**—Monday-Friday, 9am-5pm; Saturday-Sunday, closed.

• **Humanities**—Monday-Friday, 7am-midnight; Saturday, 8am-midnight; Sunday, 10am-midnight.

• **Institute Archives**—Open January 8-9, 16-17, 22-23, 29-30 and February 5, 11am-4:30pm; closed all other days.

• **Lewis Music**—Monday-Friday, 9am-6pm; Saturday-Sunday, 1-5pm.

• **Lindgren**—Monday-Friday, 9am-5pm; Saturday-Sunday, 1-5pm.

• **Reserve Book Room**—Monday-

Friday, 9am-5pm; Saturday-Sunday, 1-5pm.

• **RetroSpective Collection**—Monday-Friday, 9am-5pm; Saturday-Sunday, closed.

• **Rotch**—Monday-Thursday, 8:30am-9pm; Friday, 8:30am-6pm; Saturday, 11am-6pm; Sunday, 2-9pm.

• **Rotch Visual Collections**—Monday-Friday, 9am-5pm; Saturday-Sunday, closed.

• **Schering-Plough**—Monday-Friday, 9am-5pm; Saturday-Sunday, closed.

• **Science**—Monday-Friday, 7am-midnight; Saturday, 8am-midnight; Sunday, 10am-midnight.

Libraries' hours are also available on the web at <<http://libraries.mit.edu/hours.html>>.

SAP upgrade set; Procurement to be temporarily affected

By Janet Snover
Executive Vice President's Office

MIT will be upgrading to a new release of the Institute's SAP software over the final weekend of this month. The timing for the upgrade was approved at the December 20 meeting of the Administrative Systems and Policies Coordinating Council, and SAP users have been notified.

There are three remaining "delta" demonstrations to show users the differences between the new and current versions of SAP. These demonstrations are designed for people who do their work in the SAP GUI (graphical user interface). People who use SAP-web will not see any differences.

The one-hour, platform-specific demonstrations will each be given at 10am in Rm 1-190 on January 17 and 23 (Mac platform) and January 25 (PC platform).

It's important for the community to know that to complete the SAP upgrade, the entire production system (including SAPweb and ECAT, the electronic catalog) will be unavailable beginning at 10pm on Thursday evening, Jan. 25 through mid-morning on Monday, Jan. 29. This means that departments, labs and centers need to plan ahead to procure any supplies necessary for January 26-29.

Other important information about

the upgrade period:

- During the shutdown and upgrade, Procurement will be unable to create purchase orders from either paper or electronic requisitions. However, partner companies Office Depot, VWR and BOC Gases as well as MIT's internal providers will accept paper requisitions while the SAP system is unavailable.

- The VWR stockrooms on campus will be open as usual on January 26.

- Customers can order supplies using the VIP Credit Card during the upgrade. Standing blanket orders are another viable purchasing option.

- Walk-through checks cannot be processed by Accounts Payable or the Travel Office during the upgrade period.

- The Cashier's Office will be open on January 26, but only for necessary processing of cash and services, and temporary receipts will be issued for cash deposits. Staff who need the SAP deposit slips are asked to return after 3pm on Monday, Jan. 29.

- Although the credit card can be used, both the journal voucher and credit card verification processes will not be accessible during the upgrade.

- Reporting processes in SAP will be unavailable during the upgrade, but the Data Warehouse will have information that is current through the close of business on January 25.

Submission Guidelines for Tech Talk Calendar Listings and Notices

Seminars and Lectures

- Use the online TechCalendar at <http://tech-calendar.mit.edu>.

Community Calendar/Student Notices

- Fill out the web form at <http://web.mit.edu/newsoffice/tt/calform.html>

Deadline for ads, calendar items and notices is noon on the Friday before publication.

Please note that all Tech Talk calendar listings and other notices are uploaded to the News Office web site on the date of publication.

Institute Calendar

* Open to public
** Open to MIT community only

(For arts-related listings, see page 7.)

INSTRUCTIONS: Seminars & Lectures must be submitted to the online TechCalendar at <<http://tech-calendar.mit.edu>>. If you have questions, please contact <help@tech-calendar.mit.edu>.

Listings for Community Calendar should be submitted at <<http://web.mit.edu/newsoffice/tt/calform.html>>. If you have questions, please contact <tcalendar@mit.edu> or x3-2704.

Events must be MIT sponsored and take place on the MIT campus or at an MIT affiliate (Draper Labs, Lincoln Laboratory, etc.).

Next deadline for all types of listings is noon Friday, January 19, covering events from Wednesday, January 24 through Sunday, February 4.

January 10-28

SEMINARS & LECTURES

THURSDAY, JANUARY 11

The Three Big Bangs of BMW Product Development—Dr. Burkhard Goeschel, Board of Management, Development and Purchasing. Sponsored by CC++(the Car Research Group). 12-2pm, Bartos Theatre, E15 Lower Level. More info: x3-0518, <mp@media.mit.edu>.

TUESDAY, JANUARY 16

The Relation of the BOLD Signal to Neural Activity—Nikos Logothetis, Max-Planck Institute for Biological Cybernetics. McGovern Auditorium, Whitehead Institute, 4pm.

THURSDAY, JANUARY 18

Valuation: What's My Company Really Worth?—Joe Hadzima, Esq. '73. Sponsored by MIT Enterprise Forum, Inc. 7-9pm, Kresge Auditorium. More info: x3-0015, <plingard@mit.edu>, or <<http://web.mit.edu/entforum/www/SBS/valuation.htm>>.

MONDAY, JANUARY 22

Kawamura Fellowship Information Session—Carrie Jablonski. Sponsored by Academic Resource Center. 3-4:30pm, Rm 5-217. More info: x3-6771, <bloise@mit.edu>, or <<http://www.cotech.co.jp>>.

SUNDAY, JANUARY 28

F.A.S.T. Sunday (Family Adventures in Science and Technology) EAPS! Earth, Atmospheric, and Planetary Sciences. Sponsored by MIT Museum. 2-4pm, MIT Museum's Main Gallery, 265 Massachusetts Avenue, Bldg. N52-2nd fl. More info: x3-4422, <museum@mit.edu>, <<http://web.mit.edu/museum/programs/programs.html>>.

COMMUNITY CALENDAR

Supernatural Garden (Based on the book *Noah's Garden* by Sara Stein)—Tuesday, Jan. 19, 12-1pm, Emma Rogers Room, 10-340. Speaker: Robin Wilkerson. Sponsored by MIT's Gardener's Group.

Crewel Embroidery Exhibit—Tuesday, Jan. 23, 10am-3pm, 10-340 Emma Rogers Room. Priscilla Gray's Crewel Embroidery Class students will hold an exhibit of their work. Sponsored by MIT Women's League. More info: Sis de Bordenave <esdeb@mit.edu>.

English Conversation Classes Registration—Tuesday, Feb. 13, 9-11am, Bush Room, 10-105. Continuing beginner, intermediate, advanced classes offered at \$50/semester to

international women. Classes meet Tuesday and Thursday mornings from 9:15-11am. Babysitting available at \$110/child/semester. Sponsored by MIT Women's League. More info: x3-3656, <esdeb@mit.edu> or <<http://web.mit.edu/womensleague>>.

Spouses and Partners@MIT Group Join us for lunch in January. Call 3-1614 to reserve a place. Jan. 10: Malaysian. Jan. 17: Indian. Jan. 24: Chinese. Regular weekly meetings will resume in February. More info: 3-1614 or <<http://web.mit.edu/medical/spousesandpartners>>.

MITAC

The MIT Activities Office (MITAC) serves the cultural and recreational needs of the MIT community, including retirees. Two locations: Walker Memorial, Rm 50-005, 10:30am-4:30pm, Wednesday-Friday; and Lincoln Lab, Rm LL-B-210, noon-3pm, Thursday and Friday only. More info: x3-7990, <dtavit@mit.edu>, <<http://web.mit.edu/oscs/mitac>>. MITAC accepts cash, checks and MasterCard and Visa (\$20 minimum). MIT IDs must be presented.

CHANGE IN LINCOLN LAB MITAC HOURS: For January and February, MITAC at Linc. Lab (B-210) will be open on Fridays only from 12-5pm.

Joyful Noise Coffeehouse presents Jess Klein & Lori McKenna, Sat., Jan. 13, 8pm. First Baptist Church, Lexington, MA. \$10 (reg. \$12). Purchase by Jan. 12.

MITAC Dinner series presents Dim Sum at China Pearl, Sun., Jan. 14, 11:00am. Boston, MA. Purchase by Jan. 12.

Camping & RV Show, Jan. 20-28. Bayside Expo Center, Boston. \$4/adult (reg. \$7). Purchase by Jan. 26.

An Afternoon of Family Skating, Sun., Jan. 28,

2-5pm. Johnson Athletic Center, MIT. Free. Free hot chocolate provided also!

Radius Ensemble, Sat., Jan. 27, 8pm. Longy School of Music, Cambridge, MA. \$8 (reg. \$15).

Sarasa Chamber Ensemble: Mozart's Fortepiano, Sat., Jan. 27, 8pm. Friends' Meeting House, Cambridge, MA. \$10 (reg. \$14).

North American Home Show, Feb. 3-11. Bayside Expo Center, Boston. \$4/adult (reg. \$7). Purchase by Feb. 9.

From the Mississippi Delta, Sun., Feb. 4, 2pm. Merrimack Repertory Theatre, Lowell, MA. \$26 (reg. \$31.75). Purchase by Jan. 12.

Handel & Hayden Society presents Jazz Valentine, Sun., Feb. 11, 8pm. Symphony Hall, Boston. \$34/floor seating (reg. \$39). Purchase by Jan. 19.

West Side Story, Sun., Feb. 11, 2pm. Fiddlehead Theatre, Norwood. \$11 (reg. \$18). Purchase by Jan. 19.

Disney On Ice: Jungle Adventure, Feb. 18, 1pm. Fleet Center. \$21.50/loge (reg. \$24).

Penn & Teller, Sun., Feb. 18, 7pm. Shubert Theatre, Boston. \$46/orchestra/mezzanine (reg. \$49.50). Purchase by Jan. 19.

Dangerous Curves: Art of the Guitar, Mon., Feb. 19, 1:00pm, Museum of Fine Arts, Boston, MA. \$16/adult; \$6/child (6-12). Purchase by Jan. 25.

An Afternoon of World Music with the Boston Symphony Orchestra, Sun., Feb. 24, 2pm. Symphony Hall, Boston. Free. Tickets issued in pairs only, 2 tickets per person with an MIT ID/Linc. Lab badge. Tickets will be distributed on a first come, first served basis on Friday, Feb. 2, beginning at noon.

No Way to Treat a Lady, Sun., Feb. 25, 3pm. Lyric Stage, Boston. \$20 (reg. \$36). Purchase by Feb. 9.

Celtics vs. Seattle Supersonics, Mon., Feb. 26, 7pm. \$33/front balcony corner or \$44/front balcony center. Purchase by Jan. 26.

Celtics vs. Charlotte Hornets, Sun., March 4, 3pm. \$33/front balcony corner or \$44/front balcony center. Purchase by Feb. 2.

Bruins vs. Tampa Bay, Thurs., March 1, 7pm. Fleet Center, Boston. \$25.50 (reg. \$47). Purchase by Feb. 2.

Anne Murray, Thurs., March 8, 8pm. Lowell Memorial Auditorium, Lowell, MA. \$42/orchestra (reg. \$42.50). Purchase by Feb. 2.

Fangs for the Memories, Fri., March 9, 8pm. Hasty Pudding Theatre, Cambridge, MA. \$25 (reg. \$27). Purchase by Feb. 2.

Dame Edna, Sun., March 11, 2pm. Wilbur Theatre, Boston. \$60 (reg. \$65).

Kodo Drummers, Sun., March 11, 3pm. Symphony Hall, Boston. \$38/first balcony (reg. \$40). Purchase by Feb. 16.

Ski Weekend Getaway to the White Mountains, Sun.-Mon., March 11-12. Bretton Woods, NH. \$130/pp/dbl. occup. (incl. lodging for one night, dinner, breakfast, and 2 days' skiing at Bretton Woods or Cannon Mountain. You provide your own transportation). Purchase by Feb. 9.

Penn Dutch/Gettysburg Weekend, Thurs.-Sun., April 19-22, Lancaster, PA. \$395/pp/dbl. occup. Round-trip bus, 3 nights' hotel, 6 meals, visits to Wheatland, Farmer's Market and Kitchen Kettle Complex, Amish Farmlands, Gettysburg, Amish family-style feast; Hershey's Chocolate World and Founder's Hall. Purchase by Jan. 19.

MIT discovery could lead to new drug therapy for Alzheimer's

■ By Deborah Halber
News Office

Biologist Vernon M. Ingram has developed "decoy" compounds that can render harmless the toxic fibrils that grow in the brains of Alzheimer's patients.

Published recently in the *Journal of Alzheimer's Disease*, the work by Dr. Ingram, the John and Dorothy Wilson Professor of Biochemistry, presents another potential point of attack against Alzheimer's disease.

The discovery may lead to "a suitable therapeutic strategy early in the course of the disease, when the beta-amyloid fibrils begin to form," Professor Ingram said.

In patients with Alzheimer's disease, a common protein gone haywire produces an abnormal amount of beta-amyloid peptides in the brain. These aggregate into fibrils, or plaques, that cause a deadly influx of calcium into neurons when they come in contact with them.

Professor Ingram and a research team comprised of his long-time colleague, technical associate Barbara Blanchard, and a group of undergraduates created decoy peptides that combine with the amyloid peptide and prevent its calcium-raising toxicity.

INSIDIOUS RIBBONS

In Alzheimer's patients, plaques develop early in areas of the brain used for memory and other cognitive functions. The loss of memory and thinking ability characteristic of the disease is related to the dysfunction and eventual death of certain brain cells.

Fibrils of amyloid peptide molecules stack together to form long, ribbon-like peptide arrays that aggregate to form the characteristic Alzheimer's plaques. The plaques consist of insoluble deposits of beta-amyloid, a protein fragment snipped from a larger protein called amyloid precursor protein (APP). The formation of these pathological peptides is partially understood. It appears that only the aggregated fibrillar forms of the beta-amyloid peptide are toxic.

When these fibrils contact neurons, they open channels in the cell that allow large amounts of calcium to enter. Elderly brain cells are particularly vulnerable to this because they have a diminished ability to use the tactics that cells normally use to get rid of excess calcium.

Calcium helps cells do many things, including carry nerve signals. Neurons normally are very careful about the amount of calcium they allow in because they use minute changes in levels of internal calcium to interpret messages from other neurons. Too much calcium inside cells leads to cell death.

IDEAL DRUG CANDIDATES

Researchers are approaching the battle against Alzheimer's with a number of strategies. "Our approach is to try to find small peptides that will prevent the amyloid pep-

tide from being toxic, and render it harmless," Professor Ingram said.

To do this, the researchers selected from a combinatorial library a series of peptides with various interesting properties. Peptides are natural or synthetic compounds of two or more linked amino acids, the most basic building blocks of life.

Professor Ingram and his research team created 30 small peptides, each between five and eight amino acids long, and tested them with lab-cultured human nerve cells. Some had no effect. Eight of them counteracted the excessive, toxic influx of calcium, knocking it down to normal levels. "In the presence of the decoy peptide, the final product of the aggregate is not toxic," he said. The fibrils still form, but are harmless and do not affect internal calcium levels in the cells.

Because they are small and can be modified to cross the blood-brain barrier, "our decoy peptides are obvious candidates for drug development," Professor Ingram said.

Peptides are ideal drug candidates because they are highly specific—they work only with certain substances, like keys that fit only one lock. The peptides that he stud-

The discovery may lead to "a suitable therapeutic strategy early in the course of the disease, when the beta-amyloid fibrils begin to form."

—Prof. Vernon Ingram

ies also are resistant to degradation, meaning that they may survive a trip through the body's digestive system and make their way to their target in the brain.

"Experience with a number of difficult diseases teaches us that more than a single therapeutic strategy is often needed, because the dosage might be so high as to cause unacceptable side effects," he said.

These decoy peptides also may be effective in the treatment of another neurodegenerative condition: Huntington's disease. The mutant Huntington protein forms aggregates by a related process inside individual neurons. Professor Ingram plans to test the decoy method as a way to intercept the toxic aggregates of mutant proteins responsible for Huntington's disease.

This work is supported by Amgen Inc., the Kurt and Johanna Immerwahr Fund for Alzheimer's Research and MIT's Undergraduate Research Opportunities Program.

Book offers broader context for transportation

In his new book, Professor Joseph Sussman says the future of transportation lies in its evolution to the field of engineering systems, which puts complex technological systems and products in their broader contexts.

Introduction to Transportation Systems (Artech House) describes transportation in its social, political and economic contexts. Professor Sussman developed the material through lectures he gave in his "Introduction to Intelligent Transportation Systems" subject, which is required by all first-year graduate students in the Master of Science in Transportation program.

Early examples of this transition in transportation, he said, are the study

of urban transportation networks as complex adaptive systems, and expansion of the study of freight carriers to consider the full logistics supply chain.

Professor Sussman believes his approach to transportation systems has parallels in other engineering areas. "The future of several fields—including energy and environmental systems, manufacturing systems and others—depends on addressing them in the broader context of engineering systems.

"When I began work on this text in 1995," said Professor Sussman, the JR East Professor in the Department of Civil and Environmental Engineering and the Engineering Systems Di-

vision (ESD), "ESD was but a gleam in the collective eye of some MIT faculty. By the time I completed the book, ESD was a reality and it occurred to me that the book showed how a particular field—transportation—could be studied as an engineering system.

"My fondest wish is that colleagues at MIT and at other universities see this text as a useful model of how they might approach their fields within an engineering systems framework. Such approaches would give us a common basis for discussing our disparate fields and would allow us all to deepen our understanding of the importance of engineering systems."

Lois Slavin
Engineering Systems Division

Handbook is facilities management guide

William L. Porter, the Muriel and Norman Leventhal Professor of Architecture and Planning, is one of six editors of a comprehensive new handbook offering the best practices for commercial, industrial and institutional facilities engineering and management.

The 1,450-page book, *Facilities Engineering and Management Handbook: Commercial, Industrial and Institutional Buildings* (McGraw-Hill) includes a CD-ROM on facilities asset management worth \$500.

"The professions of facilities management and engineering are developing rapidly but are being pulled

in contradictory directions," Professor Porter said. "On the one hand, there's demand for greater competence in increasingly specialized subfields, and on the other hand, there's the need for broad-based thinking that integrates facilities into organizational and business strategy. This handbook should be a useful resource to the professional who must deal with both these pressures for change."

The handbook's process and systems approach is designed for everyday use as a complete desktop reference for facilities executives, managers, consultants, constructors, op-

erators, engineers and designers. Its lifecycle approach "helps you put all relevant issues in context—cost, durability, maintainability, operability, safety and more—throughout complex specialized facilities such as hospitals, laboratories, prisons, airports and industrial process plants as well as integrated complexes such as colleges, malls and government installations," said Paul R. Smith, editor in chief. More than 230 authors and reviewers contributed.

For more information, see the book's web site at <<http://members.aol.com/hlthcareee/index.html>>.

Sarah H. Wright

Borne aloft



This workman is getting a bird's-eye view of the Wright Brothers Wind Tunnel, with Building 33 in the background.
Photo by Donna Coveney

'Charming' IAP event to include fashion show

The Stratton School for Charm, formerly known as the MIT Charm School, will conduct its traditional annual session on Friday, Feb. 2, the final day of Independent Activities Period (IAP).

Among new events will be a fashion show with students and staff modeling business and casual attire for the workplace. The show, sponsored by the Office of Career Services and Pre-Professional Advising, begins at 4pm in the Stratton Student Center lobby. It is expected to become an annual affair.

The more than 30 classes in the curriculum include "Walking," "E-Mail Etiquette," "Table Manners," "Buttering Up Big Shots" and "How to Tie a Bowtie," all Charm School core courses.

Sessions are scheduled for noon-4pm throughout the Stratton Student Center. Students may take as many courses as they wish.

The traditional degrees will be presented. The CB (bachelor of charm) is awarded for completing six subjects, the CM for eight and the PhD for 12. No prerequisites, theses or dissertations are required.

The day will conclude with Com-

mencement ceremonies in the Student Center lobby, following the fashion show. Charm School Headmaster Larry G. Benedict, who is also the Dean for Student Life, will deliver the keynote address before presenting the degrees. Previous speakers have included Miss Manners, President Charles M. Vest and Chancellor Lawrence S. Bacow.

The School for Charm alma mater, sung to the tune of *Arise, All Ye of MIT*, will be sung by the Chorallaries at the ceremony.

This will be the eighth session of the School for Charm. The program, inaugurated in 1993 by Professor Travis R. Merritt of literature, brings together all sections of the MIT community, including students, staff, faculty and administrators in a lighthearted atmosphere. Professor Merritt has been the dean of Charm School since its inception.

For additional information, contact coordinators Assistant Dean Katherine G. O'Dair, <kodair@mit.edu>, x8-5487; Residential Program Administrator Tracy F. Purinton, <purinton@mit.edu>, x3-4158; or senior office assistant Leonard A. Wong, <lenwong@mit.edu>, x3-2696.

Here & There

■ Professor of Biology Peter S. Kim, known for his Whitehead Institute research on AIDS, has been named executive vice president for research and development at the Merck Research Laboratories, effective in February. Dr. Kim, 42, will be responsible for all of



Kim

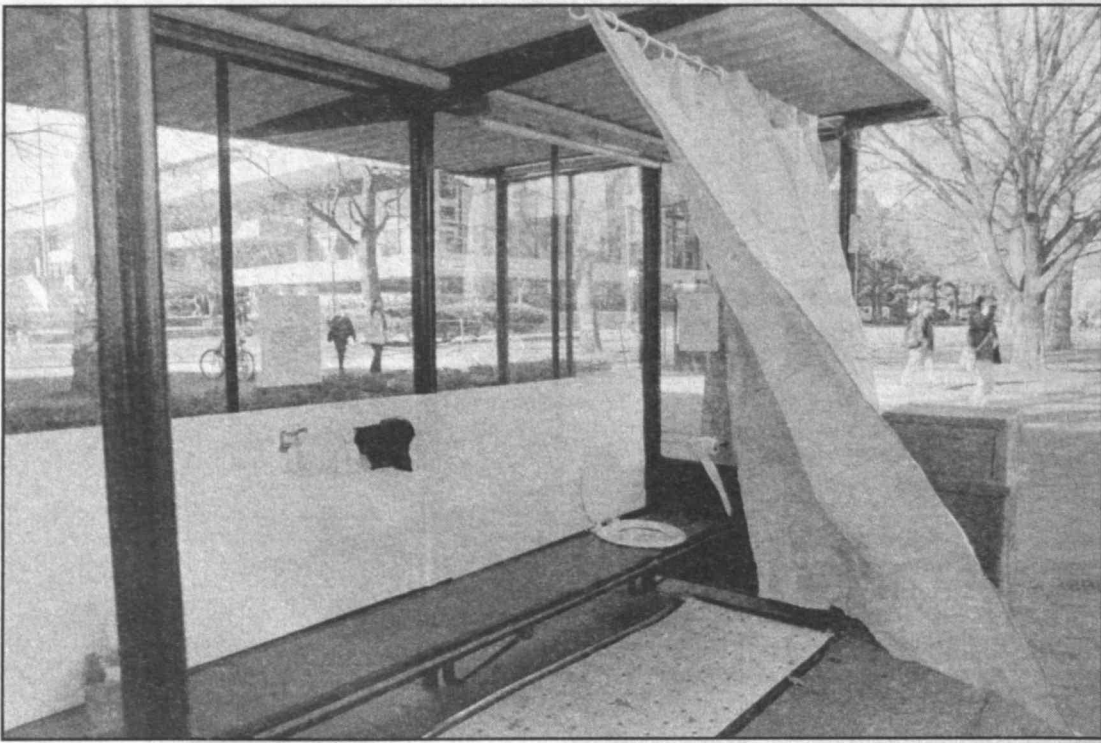
Merck's internal drug discovery and development activities.

Dr. Kim, associate head of the biology department, discovered how HIV fuses with human

cells and thereby invades them. "Peter Kim is an exceptional scientist and teacher," said Professor Gerald R. Fink, Whitehead director. "Since coming to the Whitehead Institute in 1985, Peter has become an international leader in structural biology and has made major contributions to the field of AIDS research. We wish him great success in his new position at Merck."

Phillip A. Sharp, Institute professor and director of the McGovern Institute at MIT, said Dr. Kim has been "a great educator both in teaching undergraduates biochemistry and training the next generation of professors. Colleagues at MIT will dearly miss his leadership and friendship."

Pit stop?



This "bathroom," complete with shower curtain, towels and toilet, appeared at the bus stop across from MIT's main entrance at 77 Massachusetts Ave. just before Christmas. Photo by Donna Coveney

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): <ttads@mit.edu>
- Interdepartmental/walk-in address: Calendar Editor, Rm 5-111.

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

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

Elliptix 300 Series cross trainer, 1 yr old, meter shows time, calories, and distance; better than paying for a gym every month, \$300. Jennifer x3-4824 or <holder@ligo.mit.edu>.

\$75 gift certificate for MaidPro home cleaning svc (you add \$5 for complete cleaning at \$80). Joan, x3-7900.

CCM Tacks hockey skates, sz 5, like new in orig box, \$75 cash. Jan Blair, Draper x8-2843 or 617-354-4653.

22" mountain bike, used 2x (belongs to my teen daughter); cost \$250; asking price \$50. Contact x3-0127 or 617-734-5350.

TV, \$100; desk and chair, \$80; futon sofa/bed, \$250; table and 4 chairs, \$150; perf cond. Price negotiable. Contact: <laurendi@yahoo.com>, x3-6551 or 973-9967.

New Holmes 4 gallon humidifier, \$25. Lenny MIT/LL, 781-861-8831.

Black Baldwin piano (spinnet) and a bench, well maint, just tuned, askg price \$1300. Contact 617-629-0048 or email <ssussman@mit.edu>.

Solid walnut desk, 5'x3', w/glass cover, 4 drawers on right side, 1 drawer plus filing drawer on left, pull out writing boards on both; glass cover for top. \$475. Contact: 781-449-7654.

PowerBuilder Software V.5.0 Enterprise Edition for Windows 95, still in shrink wrap, \$100. Chuck x3-8903, <cmunger@mit.edu>.

Skis & poles: x-c Skan 200cm, 3-pin bindings, Munari boots size 9.5, used 1x, \$95; downhill Dynastar 180cm, Tyrolia 280 bindings, exc cond, \$75. 666-3736 or <prsm@rcn.com>

Bedroom set of 1 bed, 2 bureaus, \$300; old but in very gd cond; also lamps and various other items (best offer). Thalia x3-5904.

Ladies' coat, sz 12, black wool, dressy coat w/brown mink collar, below knee length, like new, \$40. Rosalie 781-391-1307.

VEHICLES

1994 Mazda Protege, 4-dr, low mileage (26K), man transm, AM/FM/cass, exc cond. Sold w/warranty, asking \$5,000 or bst. Contact: 576-2484 or <ami_s@mit.edu>.

1995 Alfa Romeo 164LS, 4-dr, auto, AM/FM/CD/cass, 90K, sunroof, heated seats & mirrors, leather, exceptional cond, beautiful car, \$9500. Contact x8-6783 or <mbarnett@mit.edu>.

1995 Honda Del Sol, white, 2 seater, 61K miles, auto transm, a/c, cc, pw, removal top fits in trunk, 1 driver/owner, exc cond, \$8990. Linda, Draper x8-2239 or 781-749-0892.

1995 Oldsmobile Achieva, like new, only 9K miles, V6, blue, perf body, pl, ps, pb, 2 airbags, anti-lock brake, 4-dr, \$8100. Contact: 617-327-7605.

1997 Coachman Catalina 364 Travel Trailer, 36' w/slide out, fully equipped, 1 ownr, sleeps up to 9, mint cond, call for details, asking \$12,000. Tony x3-3922.

HOUSING

Belmont: fully-furn BR/study in private home, share bath, kitchen privileges, visiting scholars, non-smkrs, intl guests welcome, rates based on duration. Mrs. Wolf 484-6455.

Belmont Hill: quiet, comf, furn room in lovely house, off-st prkg, breakfast privileges, priv entrance & terrace, B&B also possible, rent based on duration. Contact 617-484-6833.

Cambridge: sabbatical house rental, 1 Feb - 31 July 2001, 10 rms, top of Avon Hill, 2 blocks to Porter Sq T. 4BR, LR, library, study, yd, off-st prkg, \$5500/mo. Contact: 492-3839.

Cambridge: completely furn, 1BR w/lrg closets & desk, LR w/sleep sofa, TV, eat-in ktchn, laundry, 10 min walk to Kendall, avail Jan 15, \$1500. Contact: <Johnnatale@aol.com>, 781-729-7725.

St. John, US Virgin Islands: rental of hilltop vacation house, 2BR, exc vws of bays & sea, privacy, simplicity, walk to priv beach, nr Natl Park & local village. Alfred 781-646-8618.

WANTED

Mature, resp person looking for long and/or short term housing position, refs provided. Contact <jfield@mit.edu>.

32-yr-old MIT prof F sks room on Red Line in Arlington, Somerville, or Cambridge; wd like to share with others in house or lrg apt; nice, neat, good attitude, <\$500/mo. Jean x3-8433.

Visiting Scholar and spouse seek 1BR apt 02/01/2001 - 01/31/2002, pref nr public transp to MIT, max \$1200/mo. Contact: <persio@fec.unicamp.br>.

Volunteer accompanist needed for 40 voice choir, evening rehearsals at MIT once a week for 2 concerts/year, experienced pianists call Jennifer, x3-1614 or <reck@med.mit.edu>.

Pt-time tutor wanted for HS student on So. Shore. Drafting engineering and pre-calc, either 2 days/wk (Tue/Thu) or 1 Saturday; on Red Line. Email <rmlych@mit.edu>.

1BR or 2BR house or apt needed to rent for 3-4 months while house under constr; pref NW metro area; 2 people, non-smkg, no pets, nd prkg for 2 cars. Prof J.H. Milgram x3-5943 or 781-646-8123.

ROOMMATES

Single neat M wanted to share spac 2BR apt. Hdwd fl, 15 min walk to Kendall, 5 min walk to Lechmere, st prkg, available now, \$495/mo+. Zhan Xiao, x8-0378 or 547-0723.

Technique helps with deciphering genome's master switches

By Seema Kumar
Whitehead Institute

Researchers at the Whitehead Institute and Corning Inc. have invented a powerful new microarray technique that can decipher the function of master switches in a cell by identifying the circuit, or the set of genes, they control across the entire genome.

The researchers show that the technique can correctly identify the circuits controlled by two known master switches in yeast. In addition, the technique allows researchers to unravel in a week what takes years to achieve by conventional methods.

"We are very excited by these results because they suggest that our technique can be used to create a "user's manual" for the cell's master controls, a booklet that matches the master switches to the circuits they control in the genome," said Professor of Biology and Whitehead member Richard Young, who led the study.

The technique, published in the December 22 issue of *Science*, also gives researchers new scientific muscle needed to piece together the master wiring diagram—the controls and the circuits—that operate the complicated machinery of life.

Creating such a diagram represents the next step toward using the information from the Human Genome Project. Although the Human Genome Project will soon provide researchers a catalog of all the genes that make up a human being, it will in many ways be analogous to having the complete parts list for a Boeing 777, say researchers. The information does not tell us anything about putting all the parts together, nor does it tell us how the cockpit controls function to make the plane fly.

"Our technique creates the documentation needed to put the parts together and identifies how the major controls are connected to these parts," said Professor Young. Such information will be fundamental to finding the genetic basis of diseases and for discovering better drugs.

CANCER APPLICATIONS

The technique also will help solve many unanswered questions in cancer research, he said. Malfunctioning of master switches has been shown to lead to cancer, but little is known about the nature of the circuitry they control.

The genome's master switches are DNA-binding proteins called gene activators. In humans, there are about 1,000 such activators controlling important functions in life, including cell growth and development. Some of the best known of these switches—the p53 protein, for example—are those that play a role in cancer. Others play a role during development, designating which cells become nerve or muscle cells, for instance.

Scientists know the identity of nearly 600 master switches and know

the function of at least 250 of those; their hope has been to find the set of all genes controlled by the master switches so they could crack open the genetic basis of health and disease.

However, finding all the genes—i.e., the circuitry—directly controlled by any given master switch has been a painstakingly long and tedious process, involving years of biochemical and molecular experiments. The new technique reported in *Science* provides a way to get the data in a global fashion and will allow researchers to do in a week what would have taken years to achieve.

"Our technique could conceivably be used in human cells to create a map matching up the master switches with the circuits they control," said Bing Ren, a postdoctoral associate in the Young lab.

Although DNA arrays are useful in determining a cell's expression profile (a snapshot of which genes are turned on and off in a cell), they represent an overall picture and capture the cell's state at a moment in time. One perturbation in the environment or a slight change in the tumor of which the cell is part could trigger a cascade of changes, all of which are captured in the snapshot. Such information is invaluable to researchers, but when it comes to identifying the one crucial master switch, finding it from DNA arrays can be like finding a needle in the haystack.

CROSS-LINKING METHODS

In this study, the Young lab scientists created a technique to overcome this problem. The technique involves first fixing DNA-binding proteins in living cells to their binding sites using chemical cross-linking methods and then breaking open the cells to create a molecular soup of DNA-protein complexes. Specific antibodies coupled with magnetic beads are then used to fish out DNA fragments cross-linked to proteins of interest. This provides researchers with a pure population of DNA-protein complexes. Unhooking the cross-linked DNA from the protein leaves them with DNA fragments that bind to proteins of interest. The researchers then label these fragments with fluorescent dye and hybridize them to a DNA array containing genomic DNA from yeast to reveal their identity.

"Our goal is to use this technique to find the circuits controlled by the 200 or so master switches in yeast and then develop analogous techniques in humans," said Professor Young.

This work was supported by Corning Inc., the National Institutes of Health, the Helen Hay Whitney Foundation, the National Cancer Institute of Canada, the National Science Foundation, the Howard Hughes Medical Institute, the European Molecular Biology Organization and the Human Frontier Science Foundation.

Increased discounts available for travel on two airlines

MIT's existing contracts with Continental Airlines and Northwest/KLM Airlines have been combined to further increase the discounts on Northwest/KLM, effective immediately through December 30, 2001.

The discount on the non-hub fares on Northwest/KLM has increased from 15 percent to 23 percent and now includes international flights. The Continental/Northwest alliance offers service to nearly 230 destinations within the United States. Continental

operates 175 flights per week to Europe, 168 flights per week to Latin/South America and 266 flights per week to Mexico. Northwest/KLM operates more than 180 flights per week to Europe with connections via AMS to the Middle East, Africa, India and cities throughout Europe. It also offers almost 100 flights per week to Asia.

For more details, see the MIT Travel web page at <<http://web.mit.edu/cao/www/travel.htm>>.

Submission Guidelines for Tech Talk Classified Ads

- Keep ad length to about 30 words.
- Ads may not be repeated in successive issues. Renewals must be resubmitted after skipping an issue. Ads/renewals are not accepted via telephone or fax.
- You must be a current member of the MIT community (student, staff, faculty, Draper, Lincoln Lab, etc.) or a retired staff or faculty member to place an ad. Include full name and phone extension (or proof of MIT affiliation).
- E-mail address (must be mailed from an mit.edu address):<ttads@mit.edu>
- Interdepartmental/walk-in address: Classified Ads, Room 5-111
- 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.

Deadline for ads, calendar items and notices is noon on the Friday before publication.

Please note that all Tech Talk ads and notices are uploaded to the News Office web site on the date of publication.

Dibner Institute to produce experimental historical web sites

■ By Sarah H. Wright
News Office

The Alfred P. Sloan Foundation and the Dibner Fund have jointly awarded a grant of \$2.7 million to a group of scholars led by principal investigator Jed Z. Buchwald, director of the Dibner Institute and the Bern Dibner Professor of the History of Science and Technology.

The grant, which will be administered by the Dibner Institute, is to produce five web sites that will exemplify methods for developing the history of recent science and technology on the web.

A major goal of the project will be to generate "new ways for historians to work with scientists in presenting and making permanently available accounts of how their fields developed," Professor Buchwald said. "The five new sites will stimulate historical participants to contribute reminiscences, thoughts, comments and source materials."

Babak Ashrafi, a producer of one of the new sites, is completing his second PhD under the supervision of Professor Buchwald. (His first PhD,

in physics, was from the Institute for Theoretical Physics in Stony Brook, NY in 1994.) Dr. Ashrafi described the overall Dibner/Sloan project as "an experiment in doing history of recent science and technology projects, which are large, highly specialized and generate huge amounts of archival materials in different media and formats."

"Also, historians who conventionally work alone on their topics face new problems because of the scale and technical specialization of recent science and technology. So we need teams of historians collaborating with the historical actors," said Dr. Ashrafi.

Each of the five web sites is directed by a principal scholar as well as one or two collaborators. The sites to be created by MIT faculty include "Human/Machine Interaction and the Apollo Guidance Computer," headed by David Mindell, the David and Frances Dibner Associate Professor of the History of Engineering and Manufacturing, and "Intractable Mathematics and the 'Standard Model,'" headed by Dr. Ashrafi.

Sites to be created by other schol-

ars include "Molecular Evolution and the Neutral Theory," "Materials Science" and "Bioinformatics and the Human Genome Project."

APOLLO GUIDANCE SYSTEM

Professor Mindell's site will explore the history of the Apollo Guidance Computer (AGC), the control system on the spacecraft that went to the moon and performed both automatic and manual control of the command module as well as the lunar lander. The AGC site will form a centerpiece for a larger archive of post-World War II electronics and computing technology in the United States linking the AGC to broader histories of electronics, computing, systems engineering, Cold War technology and American culture.

"We chose to study the AGC because it played a central role in such a significant event in American history and in the history of technology. As a real-time digital computer connected to an inertial guidance system with intense interaction with a human pilot, it epitomized the technology of the cybernetic age and thus also anticipated the current era

of human/machine interaction, real-time computer control and networked communications," Professor Mindell said.

"Also, the MIT connection is obviously of interest, as there is a generation of engineers and technologists whose memories should be captured and analyzed while they are still available," he noted.

In addition to text and conversation, the Human Machine Interaction site will feature visual data including, technical documents, drawings, photographs, publicity materials, films, 3-D graphics and "anything that gives the site viewer a rich sense of the design and use of the AGC," said Professor Mindell.

INTRACTABLE MATHEMATICS

Dr. Ashrafi's site, "Intractable Mathematics and the Standard Model," deals with the "standard model" theory of electro-weak interactions and how physicists, through that theory, developed ways to deal with the mathematical problems arising from the need to divide by zero or multiply by infinity to do relativistic quantum mechanics.

The site will examine how physicists addressed these issues beginning in the 1930s until, in the 1970s, a computational method for controlling infinities in a much wider range of theories was developed.

The materials science site is being developed by Professor Bensaude-Vincent of the Université de Paris X in France and Arne Hessenbruch, a postdoctoral research fellow at the Dibner Institute. It will focus on two

pilot projects: the development and application of the Scanning Tunneling Microscope (STM) from 1981 and the history of solid-state ionics since the 1970s. Together, the history of both topics should yield a backbone for writing the history of the larger field of materials science.

"I find our site fascinating because materials science and engineering is of great contemporary significance, and yet there simply is no history. We conduct interviews and have a dialogue with the scientists and engineers who have actually lived through what we write about. We link audiovisual materials, discussion groups and timelines so historical narratives open immediately to further comment and criticism. It's a completely new way of doing history," said Dr. Hessenbruch.

Professor Tim Lenoir of Stanford University will be in residence at the Dibner Institute this spring working on his site, "Bioinformatics and the Human Genome Project (HGP)." He plans to develop a timeline of key technical and scientific milestones to serve as a "first-cut" historical roadmap of the HGP. The roadmap will then be used to engage genome scientists in the process of producing their own history through web-forum dialogue.

The site created by Professor John Beatty of the University of Minnesota on "Molecular Evolution and the Neutral Theory" will document and discuss the history of molecular evolutionary studies, focusing on the computerization of the field.



An earth-shaking pile driver on the site of the new athletic center is viewed through a small hole in the fence covering near the Dupont walkway.
Photo by Donna Coveney

Campus construction update

MASSACHUSETTS AVENUE

● Starting this week, Revoli Construction Co., Inc., the city's contractor for the Massachusetts Avenue storm drain project from Main Street to Memorial Drive, will begin working at the main crosswalk in front of 77 Massachusetts Ave. The crosswalk will be temporarily relocated 100 feet up Massachusetts Ave towards Vassar Street. Handicapped access to the main building will be provided at the Amherst Street crosswalk only. Signs will direct pedestrian traffic. The relocation is expected to last approximately three to four weeks.

● Excavation of a fire protection main will close part of the sidewalk in front of Building 9 and affect the service road at W20. Work will take place in the evenings and on weekends.

DREYFUS/BUILDING 18

A total shutdown of Building 18 will occur from 3pm on Thursday, Jan. 11 until 8am on Friday, Jan. 12. Some noise is expected from the temporary mobile generator at the east side of the building.

STATA CENTER

The sidewalk and parking spaces on the south side of Vassar Street have been altered; a temporary pedestrian walkway is now located next to the site fence where cars currently park. About 12 parallel parking spaces have been temporarily removed.

SPORTS & FITNESS CENTER

For the next several weeks, major soil removal via the Kresge parking lot will generate a great deal of truck traffic.

LIFE SAFETY

Installation of a fire protection water pipe in Amherst Alley from Baker House to Burton-Conner may disrupt daytime vehicular traffic and cause noise, vibration and some dust.

ALBANY STREET GARAGE

As part of the utility expansion, the walkway between Buildings 42 and 44 at the railroad crossing connecting Vassar Street to the Albany Garage will be closed to pedestrian traffic through late January. While the walkway is closed, Facilities will sponsor a limited shuttle service to parking facilities along Albany Street through January 31; see <<http://web.mit.edu/parking/albanyshuttle.html>>.

SIMMONS HALL

Excavation of soil continues, causing dust and noise. Trucks removing the material may affect traffic on Vassar Street.

This information is provided by the Department of Facilities. For more information, see <<http://web.mit.edu/facilities/www/construction/>>.



Despite frigid temperatures and rock-hard ground, the basement of Simmons Hall has taken shape on Vassar Street.
Photo by Donna Coveney

MIT radar research used to treat breast cancer enters Phase II trials

■ By Elizabeth Thomson
News Office

An MIT researcher's work on radar technology to detect missiles will be applied in FDA-approved Phase II clinical trials for the treatment of breast cancer. A Phase I clinical trial was completed in July 2000.

In the Phase II trials, more than 100 women will receive focused microwave thermotherapy to heat breast cancer cells to about 115° F, killing them.

"This is an outpatient procedure. Patients treated in the Phase I trial went home with only one or two tiny Band-Aids," said Alan J. Fenn, senior staff member in the Air Defense Technology Division at Lincoln Laboratory. Dr. Fenn invented this new breast cancer treatment technique.

On December 11, Celsion Corp. of Columbia, MD, which exclusively licenses the technology from MIT and is developing the clinical system, announced that it had received FDA approval for two clinical studies using focused microwave thermotherapy for treating breast cancer.

"About 10 years ago, we were working on radar antijamming technology to detect missiles from spaceborne satellites," Dr. Fenn said. In the Strategic Defense Initiative, the main objective was to develop concepts and technology to quickly detect a missile launch, then destroy the missile over the enemy's territory as a deterrent. "As the Cold War was ending and we were asked to look for alternative applications, I discovered that this same focused microwave technology for missile detection could, in theory, be used to treat cancer cells."

It is well established that heat kills cancer cells, but "researchers were having trouble using it to treat cancer deep within the body without burning the skin," Dr. Fenn said.

In cancer treatment, the main objective is to detect and destroy the

cancerous tumor as quickly as possible before it can spread to vital organs. Techniques to detect tumors are fairly well developed, but treatment techniques such as surgery, chemotherapy and radiation have significant limitations and side effects and do not completely eliminate all the cancer cells.

The focused microwave radiation in the new technique avoids heating the skin, and "heats—and kills—cells containing high amounts of water deep in the breast," Dr. Fenn said. Breast cancer cells have a high water content—around 80 percent—while healthy breast tissue contains only about 20 to 60 percent water.

"Our goal is to destroy all visible and microscopic cancer cells and precancerous cells in the breast," he said. If this focused microwave thermotherapy can destroy these cells, breast surgery could be reduced or eliminated.

There is the potential to reduce or eliminate conventional radiation to the breast as well. Dr. Fenn noted, however, that if the cancer has spread to other parts of the body, the patient would still need chemotherapy and conventional radiation.

CLINICAL STUDIES

Ten patients were treated in the FDA-approved Phase I safety study completed in July, in which each patient received a single 20- to 40-minute microwave treatment.

The Phase I study was conducted by Dr. Robert Gardner of Columbia Hospital in West Palm Beach, FL, and Dr. Hernan Vargas of Harbor-UCLA Medical Center in Torrance, CA. The results of the study have been accepted for presentation at the Society of Surgical Oncology Annual Cancer Symposium in March in Washington, DC. "After seeing the results of the Phase I study, I look forward to beginning the Phase II studies with the ultimate objective of providing breast-conserving op-

tions to my patients," Dr. Gardner said.

The researchers verified that one to three weeks after a single limited-dose, heat-alone treatment, "advanced breast tumors typically had been reduced in size or destroyed by about 50 percent in eight out of the 10 patients," Dr. Fenn said.

The procedure used two needle probes to sense and measure parameters during treatment, in which the patient lies prone on a treatment table similar to that used in breast needle biopsies.

Side effects from thermotherapy were minimal. The only significant effect noted was a slight fever a few days following treatment.

Two Phase II clinical trials—planned for Columbia Hospital, UCLA Medical Center, Massachusetts General Hospital, Hammersmith Hospital in London and two other hospitals—will recruit patients who will be treated for advanced or early-stage breast cancer. The purpose of the Phase II clinical trials is to demonstrate the effectiveness of the treatment.

Patients with advanced breast cancer are sometimes treated with preoperative chemotherapy to reduce the tumor size, with the result that about 30 percent of the patients can be converted from mastectomy to breast conservation therapy (lumpectomy plus radiation) for an improved cosmetic result. However, viable tumor cells remain in the breast in about 75 percent of chemotherapy patients.

"With focused microwave thermotherapy, we want to demonstrate a significantly higher rate of conversion from mastectomy to breast conservation therapy as well as a more complete destruction of the cancer cells in the breast," Dr. Fenn said.

One Phase II trial involves approximately 90 patients with advanced breast cancer who want breast conservation therapy and currently are candidates for mastectomy. They will receive preoperative chemotherapy and three heat treatments, to attempt to reduce the breast tumor size prior to surgery. The control will be patients receiving only preoperative chemotherapy.

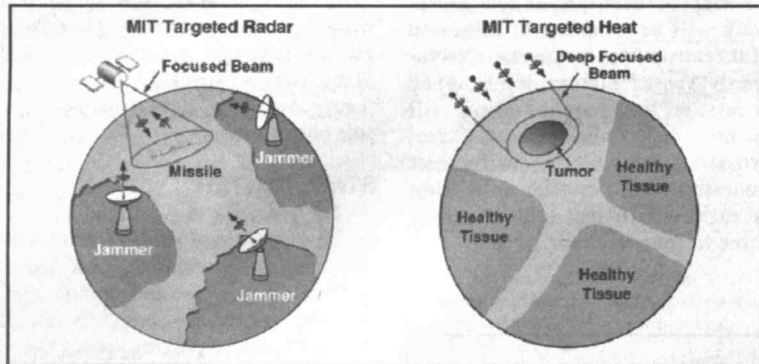
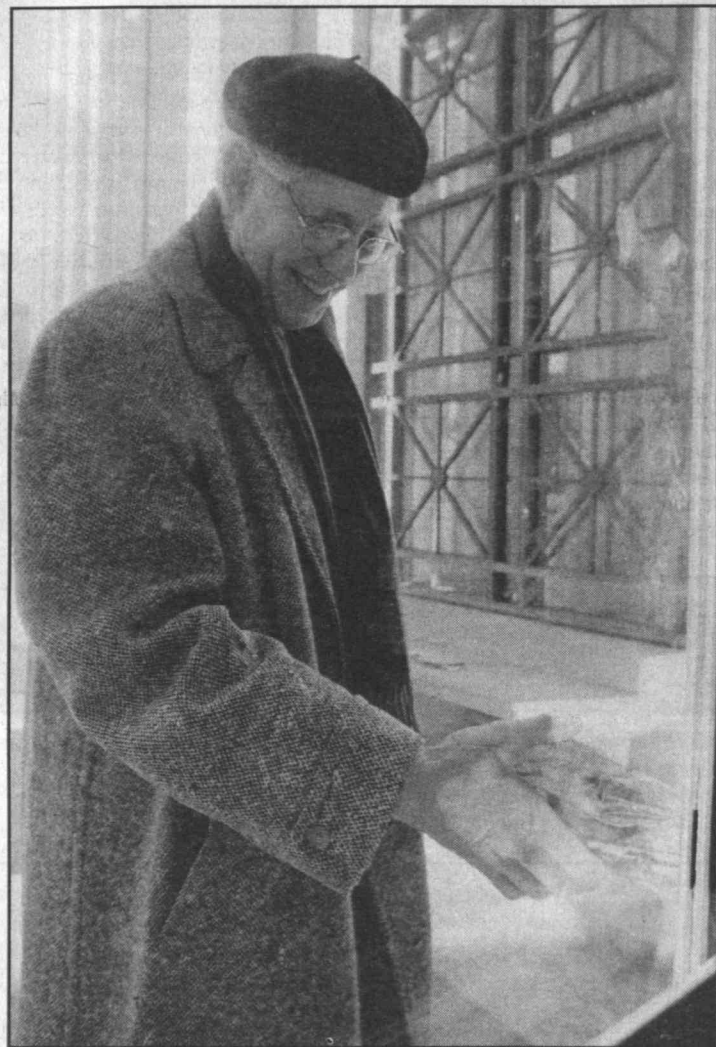
In a second Phase II trial, approximately 40 patients with early-stage breast cancer will receive one or two heat-alone treatments to attempt to completely destroy the breast tumor prior to breast conservation therapy. "This study is intended to demonstrate the potential use of thermotherapy to reduce breast surgery," Dr. Fenn said.

The original MIT Lincoln Laboratory research was funded by the Department of the Air Force. Dr. Fenn has received several United States and foreign patents assigned to MIT on the technology.

Let's shake on it



Some helpful soul replaced a missing doorknob on one of the doors at 77 Massachusetts Ave. with a gel-gloved hand earlier this month, offering a friendly shake to people entering there. Few were willing, but David H. Friedman, associate professor of architecture, gamely agreed to shake the glove.
Photos by Donna Coveney



To detect and destroy an enemy missile, microwave energy is targeted on the missile while simultaneously nullifying enemy jammers (left). To kill a cancerous tumor (right), microwave energy is focused on the tumor while simultaneously nullifying any energy that would overheat surrounding healthy tissue.

Supernova shock wave may regulate activity in galaxy center

Scientists from MIT and other institutions using NASA's Chandra X-ray Observatory have discovered an apparent supernova remnant in the center of our galaxy. They believe this remnant might help regulate the supermassive black hole at the center of our galaxy and that such relationships between supernova remnants and black holes might be common throughout the universe.

The scientists studied Sagittarius A East (Sgr A East), a shell-like structure nearly 25,000 light years from Earth in the constellation Sagittarius. Sgr A East surrounds the supermassive black hole known as Sagittarius A* (denoted with an asterisk because it is a point source that emits radio waves), which is offset by about six light years from the center of Sgr A East.

Using Chandra, scientists were able to separate Sgr A East from other complex structures for the first time in X-ray wavelengths. The properties

they discovered support the long-standing hypothesis that Sgr A East is a single supernova remnant that exploded about 10,000 years ago.

"With Chandra, we found a hot gas concentrated in the larger radio shell of Sgr A East," said Yoshitomo Maeda of Pennsylvania State University, who presented the research team's results at the 197th national meeting of the American Astronomical Society in San Diego on January 10. "The gas is highly enriched by heavy elements, with four times more calcium and iron than normal solar abundances, indicating Sgr A East is most likely a remnant of a supernova explosion."

After the explosion, scientists believe a shock wave heated gas to temperatures of 20 million degrees and that the gas and shock wave helped shape activity at our galactic center. Scientists believe two shocks, one moving inward and one outward, were formed and driven by the supernova

ejecta. The inward shock wave heated up the ejecta that was detected with X-rays by the Advanced CCD Imaging Spectrometer (ACIS) aboard Chandra. Scientists believe the outward shock wave moved the cooler, heavier ambient gas that comprises the intergalactic medium, compressing and plowing that gas past the black hole as the shock wave spread and feeding the black hole in the process.

"An important question to be raised here is what effect the plowed gas has on its environment," said Frederick Baganoff, an MIT research associate and lead scientist for Chandra's Galactic Center project. "It is possible that the plowed gas has passed over the supermassive black hole at some time in the recent past. During the passage, a lot of gas could have been captured by the black hole."

PULL OF A BLACK HOLE

When black holes pull matter into themselves, they are able to accelerate

those particles to almost the speed of light. Following principles similar to that of a hydroelectric power station, the matter accreting onto a black hole releases a great deal of energy, much of it in X-rays that can ionize the cooler ambient gas in the vicinity of the black hole.

"Actually, radio astronomers already found that the gas in a halo surrounding Sgr A East and the supermassive black hole is largely ionized," said Mark Morris of UCLA. "If the gas plowed by the supernova remnant was pushed past the black hole, the spectacular interaction would very possibly have occurred as recently as a few hundred years ago, and the resulting flash of energy would likely have irradiated and ionized the surrounding gas. This could explain why the ionization of the gas still survives."

In that manner, the activity of the black hole might be regulated by the supernova remnant. In a broader

sense, that activity might serve as a model for other black holes and other phenomena throughout the universe. Many scientists believe massive black holes thrive at the center of most galaxies.

CHANDRA OBSERVATORY

The Chandra observations were made September 21, 1999 using ACIS, a sophisticated version of the CCD detectors commonly used in digital cameras or video cameras, conceived and developed for NASA by Penn State and MIT. Along with Dr. Baganoff, other MIT researchers involved in this research are Mark Bautz, John Doty and George Ricker, all of the Center for Space Research. The research is funded by NASA.

The Chandra X-ray Observatory is the third of NASA's "great observatories," following the Hubble Space Telescope and the Compton Gamma-Ray Observatory.

Lily Kay, 53, life sciences historian

Dr. Lily E. Kay, a visiting scholar in the Program in Science, Technology, and Society (STS) and one of the outstanding historians of biology of her generation, died on December 18 of cancer.

Dr. Kay's work drew from multiple disciplines to understand science in its many social and cultural dimensions. Her most recent book, *Who Wrote the Book of Life?* (Stanford University Press, 1999), traced the efforts of biologists, biochemists and information scientists to explain the genome as an information system written in DNA code. Dr. Kay showed how the "code" is not really a code and thus why cryptanalytic techniques failed, and how the genetic "code" was eventually broken instead by biochemists who only reluctantly translated their work into the metaphor of code because that language had become the only way to get a hearing.

Her earlier book, *The Molecular Vision of Life: Caltech, the Rockefeller Foundation and the Rise of the New Biology*, has become a classic account. When it first appeared, it too was controversial but also received accolades from scientists such as Joshua Lederberg and Linus Pauling. Her views were always sharply argued, holding to account both extreme biological reductionism and legacies of eugenicist views in contemporary biology.

Born in Krakow, Poland in 1947 to concentration camp survivors, Dr. Kay moved with her parents to Israel and

then came to the United States in 1960. After she graduated from the University of Pittsburgh in 1969, she taught high school physics in Pittsburgh and was a research associate in biochemistry at the University of Pittsburgh from 1974-77. In 1977 she became a senior research assistant at the Salk Institute in La Jolla, CA, working on the molecular biology of viruses. She earned a PhD in the history of science from Johns Hopkins University in 1986.

After two years as a postdoctoral fellow at the American Philosophical Society in Philadelphia, she joined the history of science faculty at the University of Chicago, and in 1989 she began an eight-year stint on MIT's faculty in STS, which had just established a new PhD program. In recent years, she worked as an independent scholar, with guest appointments at Harvard University and the Max Planck Institute for the History of Science in Berlin.

When she died, Dr. Kay was working on a book on the MIT neuroscientist Warren S. McCulloch and the fields of research he helped spawn: serial computing, artificial intelligence and models of brain function.

A funeral was held on December 21 at the Levine Chapels in Brookline. Survivors include relatives Kurt and Paulette Olden of New York City, and three former husbands. Donations in her memory may be made to the American Cancer Society, 20 Speen St., Framingham, MA 01701.

EAPS postdoc is murdered in Mexico

(continued from page 1)

Giannitsis in the street, still alive but bleeding profusely, his lungs collapsed. Moises Bucay, a cardiologist, tended to Dr. Giannitsis at the scene. "You can't turn away when you see something like that," said his wife, Vivian, a dermatologist, who went through Dr. Giannitsis's wallet and discovered an MIT identification card, a Massachusetts ID that said he was a Greek citizen, and his health insurance card.

Moises Bucay rode to the hospital in an ambulance with Dr. Giannitsis, who was pronounced dead a short time later.

Dr. Giannitsis completed his thesis in the fall and was scheduled to receive his PhD in earth, atmospheric and planetary sciences (EAPS) on February 21. His father, Anastassios Giannitsis, is Greece's Minister of Labor and Social Affairs and a professor of economics at the University of Athens. He immediately went to Mexico when he learned of his son's death.

The embassy said Constantine Giannitsis and a friend were en route from Mexico City to Acapulco when they stopped to visit

Taxco, a picturesque resort area. The friends had parted during their sightseeing and Dr. Giannitsis was alone when he was attacked.

The MIT memorial for Dr. Giannitsis is scheduled for Tuesday, February 27 from 4-6pm at the MIT Chapel. Contact the International Students Office at x3-3795 for details.

"Constantine was a wonderfully kind and engaging individual, passionate about so many things," said Associate Dean for Graduate Students Danielle Guichard-Ashbrook, acting director of the ISO. "He would frequently stop by the International Office, just to chat casually with staff members about his many interests—filmmaking, politics, travel. I know that his academic endeavors here brought him much joy, but he loved participating in the social life of the community as well. Our deepest sympathies go to his family in Greece and to his many friends and colleagues here at MIT."

His friends and fellow graduate students remember Dr. Giannitsis as a scientist who combined keen physical insight and superior mathematical skills. He also had a wide variety of interests—movies, politics, sports, photography, cooking—and enjoyed the cosmopolitan lifestyle at MIT and in Boston.

Postdoctoral associate Jeff Scott of EAPS and Dr. Giannitsis came to MIT

at the same time. They shared an office for six and a half years and became good friends.

"Constantine was the rare combination of someone who worked extremely hard and was extremely bright," Dr. Scott recalled. "He helped me immensely during our early years, as his background in math and physics (and ability) was superior to mine, and he never got tired of answering my questions. He was confident and self-assured, but was also willing to laugh at himself. I think if he could see me writing such effusive praise for him, he would just roll his eyes, but I really haven't exaggerated. He will be sorely missed by all who knew him."

Gerard Roe and Nili Harnik also knew Dr. Giannitsis for more than six years. Both were graduate assistants with him under Professor Richard Lindzen, who was Dr. Giannitsis's thesis advisor. They said jointly: "It took a while for Constantine to get used to MIT and for MIT to get used to Constantine. Always in search of a good argument, he relished taking a strong opinion on almost any topic. But with a relaxed demeanor, and an engaging and generous sense of humor, he made and kept many good friends in the department. He loved the diversity of the department, and it seemed rare that he was not talking to foreign students in their native language.

"No words are ever adequate to sum up a life. But I think that for those who knew Constantine, he will live on in the memories of a hundred

different moments. We are fortunate to be enriched by his having touched our lives."

Dr. Giannitsis was a member of the Hellenic Students Association and sponsored a 1999 concert of Cuban music. He was a gifted photographer and an active participant in demonstrations protesting atrocities against the Serbian people in 1999.

"Unfortunately, we tend too often to forget how precious a human life is," said Aleksandar Kojic, president of the MIT Organization of Serbian Students from 1999-2000. "I remember Constantine as being a quiet, modest and humble person, possessing the age-old qualities almost forgotten in today's world. Yet in showing that actions speak louder than any words, he was always there to lend help and support in difficult times. He was indeed a hero and a true friend."

Dr. Giannitsis came to MIT in 1994 after he received his undergraduate degree from the University of Athens. He defended his thesis, "Non-Linear Saturation of Vertically Propagating Rossby Waves," on September 14. He planned to return to Greece in June to join the army to fulfill his military obligation. Dr. Giannitsis was born in West Berlin, Germany, on June 19, 1971, and raised in Kifissia, Greece.

In addition to his father, he is survived by his mother, Anna, and a younger brother, Andreas. His father, who arrived in Mexico on January 2, returned to Greece with his son's body last Thursday. A funeral service was held in Athens on Friday.

Other obituaries

ROBERT DONAHOE

Robert Donahoe, 74, of Stoneham, a former gardener in Facilities, died on November 10. He retired in 1991 after working at the Institute for 12 years. Survivors include his wife, Margaret.

GLADYS KOKTURK

A memorial service was held in the MIT Chapel on November 18 for Gladys Kokturk of West Newton, who died on October 19 at the age of 69. She retired as a section head in the Humanities Library in 1996 after 31 years at MIT.

Ms. Kokturk is survived by her husband, Alev; two daughters, June Gustakson of Marshfield and Jennifer Crimaldi of Yarmouth; a sister, Hilda Gomez of Miami; three nieces; two nephews and three grandchildren. Memorial donations may be sent to the Scleroderma Fund, 12 Kent Way, Suite 101, Byfield, MA 01922.

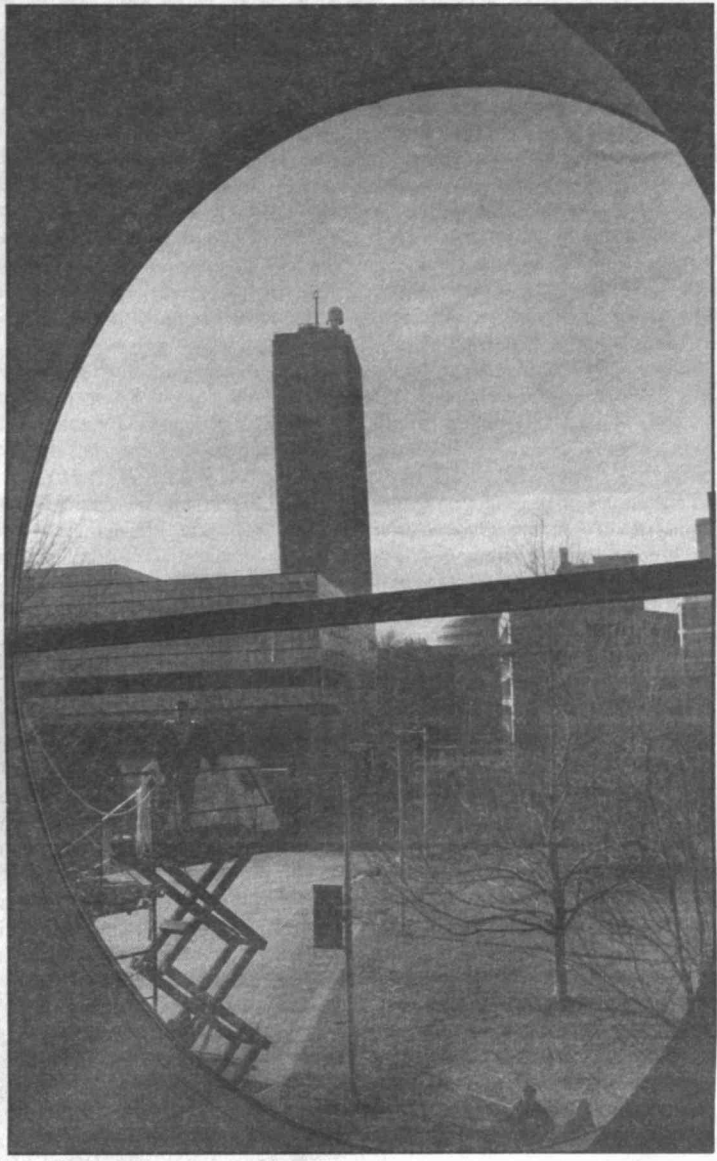
CAROL PHILLIPS

A funeral Mass was held in St. Peter's Church in Malden on November 30 for Carol Phillips of Malden, who died of cancer on November 26. She was 61.

Ms. Phillips had worked for MIT since 1987 in the Chemical Engineering Practice School and the Undergraduate Office in the Department of Chemical Engineering. In 1999 she won the James N. Murphy Award, which recognizes employees whose spirit and loyalty exemplify inspired and dedicated service, especially with regard to students.

Ms. Phillips is survived by two daughters, Donna Flaherty of Milton and Susan Whitney of Malden; a brother, James Gordon of Malden; and five grandchildren. Donations may be made in her name to the Chemical Engineering Practice School Fellowship Fund, c/o MIT Treasurers Office, Recording Secretary, 200 Main St., Suite 200, Cambridge, MA 02142.

Plaza porthole



Backed by a view of the Wiesner and Green Buildings, a worker attends to Whitaker College windows. Photo by Donna Coveney

League seeks coordinators for Daffodil Days fund drive

The Women's League is once again organizing the Daffodil Days campaign at MIT to raise money for the American Cancer Society, and coordinators are needed to oversee the February sign-up period.

This is the fourth year the Women's League has organized the event, in which MIT community members order bouquets of daffodils. It began with 16 departments in 1998 and rose to 53 last year, raising a total of \$16,040 for cancer research, treatment and education. The Institute-wide campaign has raised a total of \$32,573 in last three years.

As the Women's League further expands this project this year, it's looking for more volunteers to co-

ordinate sales in their departments. Anyone who wants to join the team of Daffodil Days coordinators should contact Sis de Bordenave in the Women's League Office at x3-3656 or <esdeb@mit.edu> as soon as possible. Orders are taken within departments during the month of February, and Women's League members will deliver the Daffodil bouquets during the last week of March.

It's a fact

The five yachts that defended America's Cup between 1893 and 1920 were all designed and built by Nathanael Herreshoff, a member of the MIT Class of 1870. He also designed and built the Navy's first torpedo boats.

Giving campaign extended through January

The Community Giving at MIT campaign will continue through the end of the month in hopes that a few more donations will help MIT reach this year's goal of \$350,000. Several Boston-area organizations have also donated raffle prizes, for which every Community Giving campaign donor is automatically eligible.

As of January 8, the campaign had received pledges of \$318,324, or 91 percent of its goal, from 1,045 community members, including 81 Leadership Givers contributing at least \$1,000 apiece. Of the pledge total, \$250,182 has been designated for the United Way of Massachusetts Bay (UWMB), \$64,787 for the MIT Community Service Fund and \$3,355 for other charity options. See the campaign web site

at <<http://web.mit.edu/community-giving/index2.html>> or call x3-7914 for more information.

Raffle prizes will be drawn at the end-of-campaign party for departmental solicitors at a date to be announced. Anyone who makes a pledge to the campaign is automatically entered.

Prizes include stays at the University Park Hotel at MIT, the Boston Marriott in Cambridge and the Holiday Inn Express in Cambridge; tickets to *Shear Madness* and a performance by the Boston Classical Orchestra; passes to the Children's Museum, the New England Sports Museum at the FleetCenter, the Museum of Science, and Water Country in Portsmouth, NH; and a limited-edition Boston Celtics poster.

Gaza Strip agriculture threatened, study says

(continued from page 1)

decide what you are willing to impose upon people, and without additional sources of water, you finally have to eliminate agriculture."

Agriculture is about 30 percent of Gaza's gross domestic product. While this percentage hasn't decreased in the past 20 years, the increasing salinity has affected the types of food grown, eliminating most citrus fruit—which is sensitive to saline—in favor of salt-tolerant vegetables and flowers.

SALT SOURCES

The aquifer acquires salt in several ways. One way is seawater intrusion, which occurs when water is overpumped from the aquifer, allowing seawater to seep in underground to fill the emptying reservoir. Another is from brackish upstream sources, and another way is from the evaporation of irrigation water and wells that recapture irrigation water, preventing it from flowing back into the Mediterranean. (As some of the water used to irrigate fields evaporates into the air, salt is left in the soil. That salt is then carried by irrigation water back into the aquifer, increasing the salinity of the aquifer with each cycle.)

"Families send kids out with two-liter Coke bottles to get water that is less salty for drinking. When they give you a cup of this water, you can certainly taste the salt, but it's drinkable," said Dr. Huber-Lee. "Still, the older people say to me, 'When I was younger, all this water was fresh.'"

OPTIMIZATION MODELS

Dr. Huber-Lee and Professor Harvey built optimization computer models to predict freshwater availability in the Gaza Strip by incorporating numerical modeling of groundwater flow and salt transport in the region with a quantitative economic model of the region's domestic and agricultural water use.

Assuming that the Gaza regional government followed international agencies' recommendations of using only the amount of water renewed by annual rainfall (10-20 inches), the population of the Gaza Strip still would run dangerously low on fresh water within a decade,

the researchers said.

"Our simulation models indicate that current water use in Gaza is unsustainable with the current population. The steady-state sustainable model shows an extreme solution: eliminating irrigated agriculture and reducing household water use," said the researchers.

The steady-state model, a type of model used more frequently by environmentalists than economists, calculates what actions can be taken that will be sustainable in the long run. The MIT model shows that the irrigation of crops would have to be stopped immediately and household water use curtailed to sustain water use into the future.

The researchers' "transient" model looked at how to use the water effectively from year to year. This type of model is the standard approach for evaluating the costs and benefits of water management plans over time, and it places a higher value on agricultural use of water today, regardless of what effect that has on the future.

"The 75-year transient model shows that irrigated agriculture can remain, but leaves the groundwater too saline for future generations to use," the researchers said in their paper.

"The solution is desalination or other new sources of freshwater, together with infrastructure to transport and treat water," said Drs. Huber-Lee and Harvey. They estimate that a desalination plant large enough to do the job—one that could process 50 million cubic meters per year—would cost at least \$100 million per year to build and have operational costs on the order of \$0.70 per cubic meter of water.

The researchers used data obtained from scientific literature and the Palestinian Ministry of Agriculture. The research was funded by grants from the Dutch Foreign Ministry and the US Environmental Protection Agency. Dr. Huber-Lee, who earned the SM at MIT in 1987, began working on the Gaza water project while doing her doctoral work at Harvard. She completed the project while working at MIT with Professor Harvey, who was on her doctoral committee.



Research scientist Chris E. Forest (seated), Professor Peter H. Stone and research scientist Andrei P. Sokolov (right) gather around a monitor displaying their climate model, which reduces the uncertainty of global climate change predictions. On the screen is a temperature record for the global mean surface temperature from 1900 to 1998.

Photo by Donna Coveney

Method helps reduce uncertainty of global climate prediction

■ By Deborah Halber
News Office

Three MIT researchers reported at the fall meeting of the American Geophysical Union (AGU) that they have come up with a way to quantify the world of global climate change prediction and reduce some of the uncertainties.

The MIT 2D Climate Model can tell where each of the major global climate change models falls in terms of probability with respect to observations, said research scientists Chris Forest and Andrei P. Sokolov and Professor Peter H. Stone, all of the Department of Earth, Atmospheric and Planetary Sciences.

The MIT model yields an objec-

tive measure of how well each model measured up to what really happened based on the most recent 100 years of recorded data. In fact, these results indicate that the uncertainty in the net cooling effect due to sulfate aerosols and other pollutants is significantly less than what will be presented in the Third Assessment Report of the Intergovernmental Panel on Climate Change.

The researchers presented their work in San Francisco during a December 17 AGU session on climate change detection and attribution. Their paper on the method being applied in the results presented at the meeting is slated to be published in the journal *Climate Dynamics*.

"Once you have the probabilities, you can talk about uncertainties of future global warming, dependent on emissions of greenhouse gases. The probability of different scenarios can be determined by what we have here," Dr. Forest said.

Climate change models calculate the potential future impact of changes in concentrations of greenhouse gases such as carbon dioxide, methane, chlorofluorocarbons and others. Some of these are produced by natural sources and some are tied to human activities. No one knows for sure what the future holds in terms of concentrations of these gases in the atmosphere. This variable, coupled with the Earth's chaotic weather system, adds up to a lot of uncertainty.

Running the 10 or so existing major climate models on supercomputers is slow and expensive, so researchers "tend to talk about just a handful of predictions" of future climate conditions for the planet, Dr. Forest said.

"The problem is that certain features of these models are uncertain. Our 2D model allows major uncertainties to be varied, so you can see how changing one parameter affects the probability of the outcome and test this value against the others," he said.

In addition, the 2D model, though sophisticated, is inexpensive to run.

FORCING A CHANGE

Radiative forcing is a change imposed upon the climate system by greenhouse gases, for instance, that modifies the system's radiative balance. Many climate models seek to quantify the ultimate change in Earth's temperature, rainfall and sea level from a specified change in radiative

forcing.

In addition to greenhouse gases, other variables affecting climate change are sulfate dioxide emissions, which are converted into sulfate aerosol particles that reflect sunlight back to space and change the amount of heat absorbed by the Earth; the rate of heat uptake by the oceans, which is not well known and has not figured prominently in assessments of existing models; and climate sensitivity, which is the likely temperature change on Earth if carbon dioxide concentration were to double in the atmosphere.

Each global climate change model and forcing scenario typically is tested against the observed climate change data to produce a "confidence interval," or likelihood that the model and scenario are correct. Some predictions were long assumed to have a certain confidence interval. But, Dr. Forest pointed out, "those calculations don't look at the results in terms of physical properties of the system. For instance, if you change the ocean parameter or the aerosol parameter, is the likelihood better or worse? They can't separate the effect of each parameter the way we've done it here."

Varying climate sensitivity, ocean heat uptake and strength of the aerosol forcing, the MIT researchers ran the 2D model for 1860 to 1995 and compared temperature change response to the recent observed record to see what changes in parameters were consistent with the observed record. They found that certain scenarios were far more unlikely than others.

For example, the likelihood is very low for the combination of a high climate sensitivity, weak aerosol forcing and slow rate of heat uptake. Alternatively, it also is not likely that the climate sensitivity is less than around 1° C for any combination of aerosol forcing or ocean heat uptake. For either of those combinations to be correct, the Earth should have either warmed more or not at all to date.

"These results demonstrate that if the model diagnostics, i.e., patterns of temperature change, are carefully chosen, they can reduce the uncertainty of physically important model parameters that affect climate change projections," the authors wrote.

This work is supported by the MIT Joint Program on the Science and Policy of Global Change and the National Oceanic and Atmospheric Administration.

Work aids S.F. airport fog forecasts

■ By Deborah Halber
News Office

Researchers at MIT's Lincoln Laboratory expect that their new method to predict the clearing times of San Francisco fog will reduce delays for air travelers.

At the fall meeting of the American Geophysical Union in San Francisco, Lincoln Laboratory researcher F. Wesley Wilson presented information about an automated forecast guidance system being developed by a research team that includes scientists from Pennsylvania State University, San Jose State University and the University of Quebec at Montreal.

The system involves four forecast algorithms that make use of existing weather data and data from the special sensors that MIT has installed at San Francisco and San Carlos airports for this project. The equipment includes SODARS (sonic detection and ranging instruments) to measure the height of the inversion base; pyranometers to measure the intensity of the solar radiation at the surface; and time series of winds, temperature and humidity.

Wilson, who heads Lincoln Lab's Marine Stratus Project sponsored by the Federal Aviation Administration (FAA), believes this ensemble forecast, which combines the individual forecasts through statistical and ex-

pert analysis to create a single, more accurate forecast, will make a significant difference for West Coast travelers.

"The goal is to give the human forecasters at the FAA's Central Weather Service Unit (CWSU) a sharp forecast they can work with," Wilson said. He emphasizes that this is "intended as an augmentation of the CWSU, not a replacement."

The Golden Gate city's ubiquitous

The goal is to say that the stratus will clear at a specific time and provide an indication of the confidence in the prediction's accuracy.

morning fog isn't romantic to San Francisco International Airport travelers, who are subject to twice as many summer fog-related delays than travelers at other airports.

There are, on average, 70 mornings each summer when low marine stratus

clouds cut peak arrivals from 55 per hour to 30 per hour. Compounding the problem are the airport's closely spaced, parallel runways, which force pilots to maintain visual separation during their final approach.

From May to October, moist air drawn off the ocean gets trapped over San Francisco Bay, where it cools and condenses at night and stays put until the sun gets hot enough to burn it off. Typically, the fog will burn off by 10:30am. Sometimes it's gone as early as 8am and sometimes it remains until 2pm or later. Dr. Wilson says the goal is to say that the stratus will clear at a specific time and provide an indication of the confidence in the prediction's accuracy.

The MIT team began giving information this past summer to human forecasters as an operational demonstration. They expect to have demonstrated the operational value of the system by the end of next summer.

The sooner controllers know when the fog is going to lift, the sooner they could get planes into the air and increase the rate at which planes are allowed to land. More accurate forecasts could translate to bringing the airport back to full capacity a full hour earlier than otherwise, which means adding 25 landing slots and saving \$200,000 in operational costs for the airlines, in addition to saving inconvenience to passengers.

Staff display artistic talents in exhibition at Rotch Library

■ By Lynn Heinemann
Office of the Arts

Perspective, focus and balance are admirable qualities in an employee. They also happen to be components of a work of art. The Artists Behind the Desk series celebrates the creative efforts of MIT employees with an exhibition titled *Artists by Night, Administrators by Day*, showing Jan. 16 -April 13 at the Rotch Library of Architecture and Planning (Rm 7-238).

A reception will be held on Thursday, Jan. 25

from 5:30-7:30pm for the exhibition of more than 40 photographs, works on paper, fabric and sculptures created by 20 members of MIT's support and administrative staff.

Unlike MIT's previous three Artists Behind the Desk exhibitions, this is not a juried show. Initially, an ad in MIT Tech Talk last fall asked staff who are artists to come to a meeting. "Eventually, through exposure and word of mouth, we ended up with the 20 artists who are exhibiting," said Mindy Baugham, administrative assistant in materials science and engineering who served as curator and artist coordinator. "I met with them all individually to discuss their work, and in a few cases, helped select which pieces would be shown."

In curating the show, Ms. Baugham wanted to highlight the two sides of the artists' lives: their connection to MIT as staff members as well as their lives as artists. "The emphasis of the exhibit is on the person behind the art as well as the art," she said. "By including their job descriptions and campus locations, I hoped first to identify the artists to the MIT community in their more recognizable role and then juxtapose that with the artist they may not know."

Ms. Baugham, who recently received an MA in museum studies, acknowledges that challenges are inherent in the duality of these artist's lives. Their day jobs, she says, are often highly structured and guided by rules, regulations and routines. "Art," she said, is "the antithesis to this."

EMBRACING CONTRADICTION

Lois Slavin, an MIT communications director and also a videographer, photographer and writer, welcomed the opportunity to juxtapose her artistic and professional selves in the exhibition. "Inclusiveness and integration of people and of ideas are themes that run throughout my art and my work here at MIT," she said. "To me... [this] means embracing the seeming contradictions within humans that force us to explore more deeply who we truly are and how we perceive and relate to each other," said Ms. Slavin.

Her four photos in the exhibition are part of a 50+ slide series shot in 1976 during a video project exploring the impact of the small-format video camera on the documen-

tary genre. Noting that the slide series shows female impersonators as they transform from male to female, she said that "the images explore the duality of masculine and feminine that exists within us all."

Ms. Slavin said that as communications director for MIT's Engineering Systems Division (ESD) and two programs within it, System Design and Management and Leaders for Manufacturing (LFM), it's her job to "find ways to visually and thematically carry the message about the cutting-edge, integrative work being done in these arenas."

She sees her artistic sideline as "an opportunity to balance my perspective... and find spiritual renewal. I'm fortunate to be able to practice my photography in my work at MIT," she said, noting that last summer she accompanied LFM students on an Outward Bound workshop to take digital photos of their team-building and leadership experience. These photos are displayed in the LFM office and study areas to "build a sense of community among students, faculty and staff, and to give our visitors a sense of how we train our future leaders," she said.

RADIANT ENVIRONMENTS

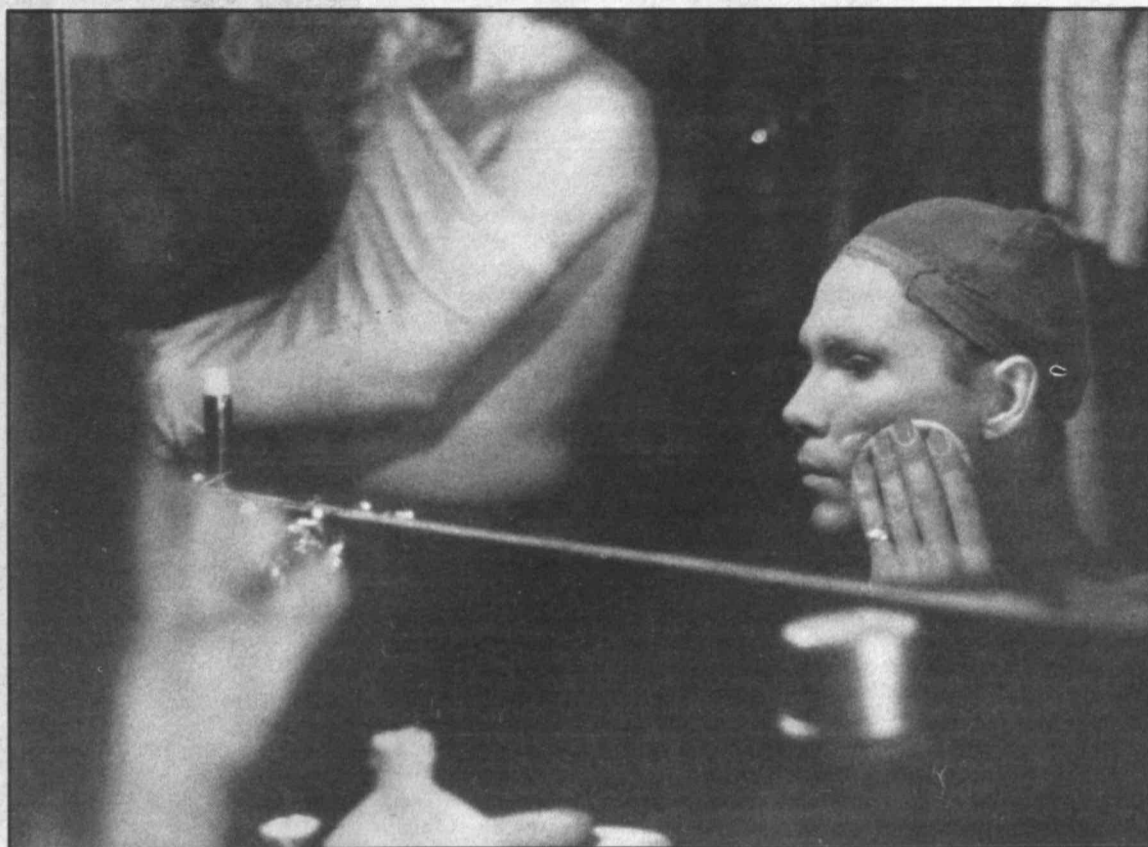
The exhibition also features the paintings of administrative secretary Marilyn Goodrich, who for the past 12 years has worked for Professor Ken Hale in the Department of Linguistics and Philosophy, assisting him on projects to preserve and reclaim indigenous languages.

"Professor Hale's dedication to Native American and aboriginal cultures... has been an important influence in my life," she said. "I've always loved languages, and in my artist books I want to create radiant environments for the power of the word."

Ms. Goodrich's paintings of water lilies, which use sumi ink and Japanese brushes, are inspired by the "powerful, rather abstract calligraphy paintings of the Zen masters rather than traditional Asian sumi ink paintings," she said. Ms. Goodrich, who has exhibited locally and in New York City for more than 20 years, differentiated her works from Monet's Impressionistic water lilies, saying hers are "executed with bold, vigorous gestures expressing the dancing movement I see in the flowers and the excitement they arouse in me."

In addition to stimulating her language and cultural interests, Ms. Goodrich said her position at MIT has provided the flexibility of a four-day week, which she says is "crucial in enabling me to be a productive professional artist."

The Artists Behind the Desk series, which began in 1987, is a standing committee of the Working Group on Support Staff Issues, showcasing the creative talent of support staff at MIT in the visual, literary and performing arts.



Untitled by Lois Slavin, one of a series of photographs of female impersonators.



Tulips, a black and white photograph by Mariann Gina Minghetti, senior office assistant in the Division of Bioengineering and Environmental Health.

Arts News

■ The unlikely technological pairing of film's earliest silent format with DVD has proven a boon for Senior Lecturer **Martin Marks** of the music and theater

arts section.

He composed the music and wrote the notes for 50 newly restored silent films included in the National Film Preservation Foundation's set

of four DVDs—"Treasures of American Film Archives"—which was called the "best set of the year" by Peter M. Nichols of the New York Times.

Institute Arts

* Open to public
** Open to MIT community only

For more arts-related information, call the 24-hour hotline at 253-ARTS or consult the web site at <<http://web.mit.edu/arts>>.

January 10-28

■ MUSIC

Arnold Dreyblatt Lectures*: Jan 9—Acoustics, Intonation and His Music*; Jan 23—The Memory Projects. Two public lectures with composer Arnold Dreyblatt, an instrument maker, acoustic theoretician and composer currently living in Berlin. 7pm, Endicott World Music (N52). x3-2826.

MIT Guild of Bell Ringers* Change ringing on hand bells. Beginners always welcome. Will also ring for occasions. Meets Mon-

days, 6:30pm, 2nd floor balcony of Lobby 7. Roberta Young, x3-3573 or <rey@mit.edu> or <<http://web.mit.edu/bellringers/www/>>.

■ EXHIBITS

List Visual Arts Center: Inside Space: Experiments in Redefining Rooms. Six installations by six international artists and/or teams, each starting with equal sized chambers that break apart the norms of architecture to interrogate the social and cultural implications of the standard-built world. **Circa 1999: Marco Breuer Solo Exhibition.** Breuer uses abusive measures to create art—attacking photographs with belt sanders, razor blades, red-hot coils and mold. Both shows on view Jan 27-April 8. Tues-Thurs and Weekends 12-6pm; Fri 12-8pm; closed holidays. x3-4680 or <<http://web.mit.edu/lvac/www>>.

MIT Museum* (N52): Robots and Beyond. Exploring Artificial Intelligence at MIT.

Ongoing: Gestural Engineering: The Sculpture of Arthur Ganson; Bill Hall of Hacks; Light Sculptures by MIT Parker; Flashes of Inspiration: The Work of Doc Edgerton; Thinkapalooza. Admission: \$5; \$2 students/seniors; \$1 children 5-18; free with MIT ID. 265 Mass Ave. Tues-Fri 10-5, Weekends 12-5. More info: x3-4444 or <<http://web.mit.edu/museum>>. **Cambridge Kids Free Day***—Jan 13-15. Children (or students of any age) who attend school in Cambridge get free admission to the Museum this weekend. Students must show appropriate ID or be accompanied by a parent w/ID showing Cambridge residency. MIT Museum, 12-5pm. x3-4444.

Compton Gallery*—A 50-Year Reflection: Humanities Arts, and Social Sciences at MIT. Celebrating the 50th anniversary of the School of Humanities, Arts, and Social Science. Through Jan 26. Rm 10-150. Weekdays 9-5pm. x3-4444, or <<http://web.mit.edu/museum/exhibitions/comptongallery.html>> or <<http://web.mit.edu/shss/www/>>.

The Dean's Gallery: Dora Hsiung: Fiber Constructions. Constructions that involve winding of English rug yarn. Through Jan 19. The Dean's Gallery, Sloan School of Management, E52-466. Weekdays 9-5pm. x3-9455 or <<http://mitsloan.mit.edu/deansgallery>>.

Institute Archives and Special Collections: Object of the Month—Jan. Balloon Prints from the Vail Collection. Hallway exhibit case across from Rm 14N-118. x3-5136 or <<http://libraries.mit.edu/archives/>>.

Rotch Visual Collections. A Photographic Odyssey: Architecture & Space 2001. Exhibition of photographs by T. Luke Young. Through May 31. Exhibit cases outside Rm 7-304. x3-7098.

Artists by Night, Administrators by Day. The people who keep the MIT machine humming show their more creative side through a variety of media including photography, works on paper, fabric, and sculpture. Sponsored

by Artists Behind the Desk, a task group of the Working Group on Support Staff Issues. **Opening Reception—Jan 25, 5:30-7:30pm.** Jan 16 through April 13. Rotch Library of Architecture & Planning, Rm 7-238. Hours until Feb 5: M-Th 8:30am-9pm, Sat 11am-6pm, Sun 2-9pm. Feb 6-April 13: M-Th 8:30am-11pm, F 8:30am-7pm, Sat 11am-6pm, Sun 2-10pm. x3-7492, <abdesk@mit.edu> or <<http://web.mit.edu/committees/wgssi/abd.html>>.

■ OTHER

Potluck Performance Art Party*—Jan 19. AKA show and tell. Bring video, poetry, slides, anything to read, show, perform and/or a consume, and you'll get in for free. \$4 donation requested for selected charity. Sponsored by MIT Electronic Research Society. 9pm, Rm N52-115 (enter via handicapped access ramp in rear of building). x3-2060.

Students commended for helping in rescue

Two Baker House residents have received Campus Police commendations for helping police rescue a woman trapped in her car in an acci-

dent on Memorial Drive.

Ricardo Dawkins, a senior in electrical engineering and computer science, and Andrew Single-

ton, a junior in biology, were honored for their actions by MIT Police Chief Anne P. Glavin in a ceremony at Campus Police headquar-

ters on December 15.

"The courage of these two students in pitching in and helping the officers save the driver's life was extraordinary," said Chief Glavin. "We know MIT students are special but these two students are gems."

Mr. Dawkins, who is from Jamaica, was on his way to class on November 8 when he saw police trying to extricate the woman trapped in her smoking car in front of Baker House (MIT Tech Talk, November 15, 2000).

"I decided then that a life was more important than my class and that I had better be a good Samaritan," said Mr. Dawkins, who has not told his family in the Bronx about the rescue yet. "I'm sure my parents would be proud of me."

Mr. Dawkins (who weighs 135 pounds) and Mr. Singleton helped several MIT officers and a state trooper lift the 1998 Toyota Camry while Campus Police Officer William C. Smith pulled the 59-year old woman to safety.

"I was really scared since smoke was coming from the car and the engine was still on," said Mr. Dawkins. "Thoughts of the car exploding came to my mind, but I decided that I had better help in any case."

In addition to Officer Smith, Campus Police Officers Clarence A. Henniger, Louis C. Rosa, Bennett Chin and Barbara A. Haven were involved in the rescue.



Campus Police Chief Anne P. Glavin presents senior Ricardo Dawkins with a citation recognizing his bravery in assisting state and campus police in pulling a woman out of a burning car on Memorial Drive.

Photo by Donna Coveney

Robert J. Sales

Glavin to be director of public safety

(continued from page 1)

to professional standards, are dedicated to community policing and understand our role at MIT," she said.

MIT Campus Police was among the first in Massachusetts to develop and implement a hate crime policy and to initiate a RAD (Rape Aggression Defense) program. In addition, the department was one of the earliest in the country to establish a bicycle patrol unit, which received a recognition award from the Massachusetts Association of College and University Public Safety Directors in 1992. The US Secret Service has acknowledged the MIT Campus Police threat management and workplace violence program as one of the better programs in campus law enforcement.

"Anne Glavin has done an outstanding job in leading Campus Police, and this new assignment will allow her to contribute at an even higher level to the Institute and to her profession," Mr. Immerman said.

Lunchtime seminar series planned for support staff

Support staff will find that taking professional development seminars is easier next term due to the efforts of the Task Group for Support Staff Professional Development (part of the Working Group on Support Staff Issues), which has arranged for a series of lunch-hour seminars to be held at convenient locations on the main campus.

Courses offered by the Office of Organization and Employee Development have been adapted to a series of one-hour noontime classes. The first series, "Career Assessment Workshops for Support Staff," is scheduled to begin on February 6 from noon-1pm. Seminars on negotiation skills, conflict resolution skills and the Myers-Briggs Type Indicator will be offered in the months ahead.

Additional information will be sent

to all support staff in January by e-mail and campus mail. Flyers with descriptions of each seminar series will be sent to staff via campus mail at least a month before each series begins. People will be asked to register in advance and commit to attending all sessions in a series.

The seminars are being offered through the support and assistance of the Human Resources Department, the Office of Organization and Employee Development, and the Ombuds Office.

For more information, contact task group co-chairs Phyllis King, administrative assistant in the Provost's Office, <psking@mit.edu>, or Anne Wasserman, assistant to the director in the Microsystems Technology Laboratories, <annew@mit.edu>, or send e-mail to the entire task group at <sspd@mit.edu>.

Attorney Johnnie Cochran to be MLK speaker at MIT

(continued from page 1)

In his first case after returning to private practice in 1981, he negotiated a record \$760,000 settlement for a jail death in California. In 1992, he obtained a \$9.4 million judgment from a Superior Court jury, the highest ever awarded in a Los Angeles police misconduct case.

Mr. Cochran has taught at the UCLA School of Law and the Loyola School of Law and lectured at the Harvard Law School. He has served on several philanthropic boards and received numerous awards from civic, legal and civil rights organizations, including the NAACP.

Mr. Cochran is as well known as many of his famous clients. He hosted Johnnie Cochran Tonight on Court TV and appeared in many other TV shows and movies. He also has been featured in numerous magazines, including Forbes and Smart Money. His autobiography, Journey to Justice, was a best-seller in 1996. He was cited by

the National Law Journal last year as one of the 100 most influential lawyers in the United States.

President Vest and Provost Robert A. Brown will also speak at the breakfast. Dr. Martin Luther King Jr. Leadership Awards will be presented to a faculty member or administrator, an alumnus or alumna, and a student or student group.

The celebration also includes arts and musical events. Thirty MIT and Wellesley students in the Dr. Martin Luther King Jr. IAP Design Seminar will construct an installation which reflects themes suggested by Mr. Cochran's accomplishments, as well as their thoughts on civil and human rights, justice, equality, race, racism and the principles of Dr. King. The installation may be viewed in Lobby 10 from February 7-11. On Friday, Feb. 9 at 5:30pm, a free performance of jazz and gospel music and dance will take place in Kresge Auditorium.

Awards & Honors

■ Director of Libraries **Ann J. Wolpert** was elected to a three-year term on the board of directors of the Association of Research Libraries (ARL). The ARL, composed of 120 leading North American research libraries, provides leadership in advocacy and educational efforts within the research and educational community in the areas of information and telecommunications policy, copyright and intellectual property, and also is active in advancing the development, preservation and accessibility of research collections.

■ Professor **Stephen J. Lippard**, who chairs the Department of Chemistry, has received an honorary degree from his alma mater, Haverford College, where he earned a bachelor's degree in 1962. His honorary doctorate in science recognizes his "pioneering research in inorganic and biological chemistry [leading] to a number of drug studies involving platinum anticancer drugs, combinatorial drug design and synthesis, and the development of reagents for studying neurochemical signaling."



Lippard

■ Music and theater arts lecturer **Elena Ruehr** was named composer-in-residence with the Boston Modern Orchestra Project (BMAP), a professional orchestra dedicated to music of the 20th century. In addition to composing a new work for the group to premiere next season, Dr. Ruehr will work with the orchestral board on the selection of repertoire and outreach and will

present preconcert lectures. She noted that for her first job with BMOP, to find an expert on film music for the fall concert, she searched no further than her own department, selecting MIT's own film music expert, senior lecturer **Martin Marks**.

■ At Techcon 2000, a technical conference hosted by the Semiconductor Research Corp. (SRC) in September, Professor **Rafael Reif**, associate department head of electrical engineering and computer science, was presented with the Aristotle Award. The honor recognized his abilities as teacher and mentor, as well as "his commitment to the educational experience of SRC students and the profound and continuing impact he has had on their professional careers," noting his leadership in building MIT's Microsystems Technology Laboratories and the Engineering Research Center's focus on environmental issues related to semiconductor manufacturing.

■ **Shigeru Miyagawa**, professor of linguistics and the Kochi-Manjiro



Miyagawa

Professor of Japanese Language and Culture, has won a major award in Japan, the Distinguished Award from Multimedia Grand Prix 2000, for the Internet version of his award-winning StarFestival Project. The prize is comparable to the Emmy Awards for multimedia and Internet products in Japan.

■ Drs. **Penny J. Beuning** and **Chong-hui Cheng** in the Department of Biology are among 18 recipients of three-year Runyon-Winchell postdoctoral fellowships bestowed by the Cancer Research Fund of the Damon Runyan-

Walter Winchell Foundation. Their MIT sponsors are Professor Graham C. Walker and Institute Professor Philip A. Sharp, respectively. The fellowships are given to young scientists researching cancer causes, mechanisms, therapies and prevention.

■ **Angus Huang**, a graduate student in electrical engineering and computer science, has been selected for the 2000-01 Verizon Academic All-America Football First Team for his athletic and academic achievements.

■ Five MIT students have been named Ron Brown Scholars by the Ron Brown Scholar Program. They are **Jordan Brewer** and **Francis St. Louis**, both seniors in electrical engineering and computer science (EECS); **Charly Jeune**, a sophomore in EECS; **Marc Knight**, a junior in EECS; and **Sean Nolan**, a sophomore in aeronautics and astronautics. The program provides \$10,000 a year for each year of college to African-American students who have demonstrated high academic achievement, strong leadership potential and a clear sense of social responsibility. Scholars attend at least one of the program's summer leadership conferences and are helped in seeking internships and mentors in their fields.

■ Freshman **Eun Lee** has been accepted to the Massachusetts Campus Compact (MACC) Leaders Program for 2000-01. MACC recognizes leaders in campus-based community service and gives them a chance to participate in MACC Leader Training, the State Leaders' Retreat, the Annual Youth Heroes Conference, and Alternative Winter and Spring Breaks. MACC Leaders are also eligible for the AmeriCorps Education Award.

Do you have news or information you'd like to share?

Contact the News Office at x3-2700 or send e-mail to <newsoffice@mit.edu>. Also see our web page at <http://web.mit.edu/newsoffice/www>