MIT TECH TALK

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Microchip stores, releases chemicals for many uses

■ By Elizabeth A. Thomson
News Office

Ask John Santini, Michael Cima and Robert Langer about potential applications for the microchip they reported in the January 28 issue of Nature, and settle back for an enthusiastic tour of a future that could include jewelry that emits different scents depending on your mood, and "pharmacies" that could be swallowed or implanted under the skin and programmed for the delivery of precise amounts of drugs at specific times.

The chip behind their excitement is the first of its kind: it can store and release different chemicals, on demand, from tiny reservoirs built into its silicon structure. Apply a small electrical voltage to a given reservoir, and the thin gold cap covering it dissolves, releasing the chemical inside.

"The Nature paper shows that this basic concept works," said Dr. Cima, the Sumitomo Electric Industries Professor of Ceramic Processing. "The next step is to do the engineering to make this into a real application."

The dime-sized prototype contains 34 reservoirs, each the size of a pinprick and capable of holding about 25 nanoliters of chemical in solid, liquid or gel form. "But there's room for over 1,000 reservoirs, potentially thousands more if you make [the reservoirs] smaller," said Dr. Langer, the Kenneth J. Germeshausen Professor of Chemical and Biomedical Engineering. "The reservoirs and microchips could both be made much larger or smaller, depending on the desired application," he added.

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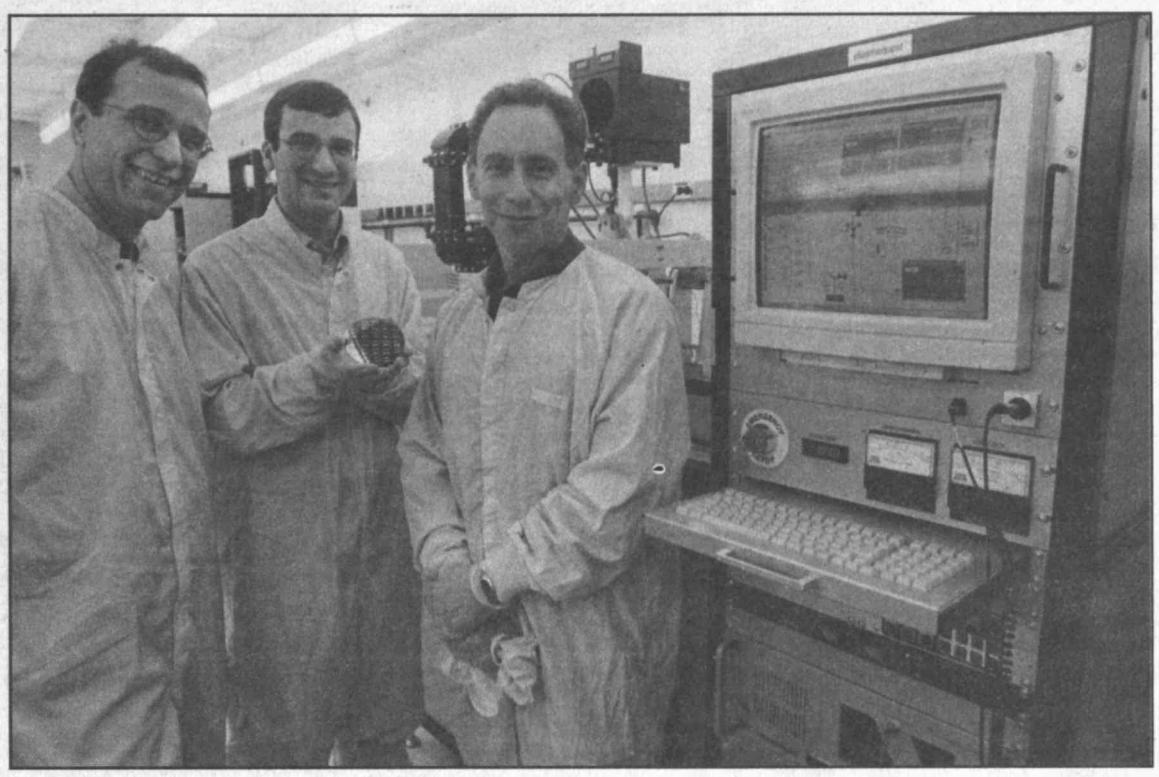

MIT researchers have developed a microchip that releases chemicals on demand. Left to right: Professor Michael Cima, graduate student John Santini and Professor Robert Langer stand in the Microsystems Technology Laboratory where the chip was fabricated. Mr. Santini holds a silicon wafer containing 21 of the dime-sized chips. **Photo by Donna Coveney**

In wake of budget threat, DOE vows to seek funds for Bates

■ By Kenneth D. Campbell
News Office

Secretary of Energy Bill Richardson has reassured MIT President Charles Vest that the Department of Energy will ask Congress to maintain funding for MIT's Bates Linear Accelerator in Middleton, despite provisions in President's Clinton's proposed budget to close down its operation as of September 30.

The President's budget for fiscal 2000 showed funding for basic research at Bates into the structure of the atomic nucleus would go from $10.8 million in fiscal 1999 to $2.5 million in fiscal 2000, which begins Oct. 1, 1999.

Martha Krebs, the director of the office of science for the Department of Energy, issued this statement yesterday:

"The administration's fiscal 2000 budget sent to Congress yesterday did not include continued funding for the operation of the Energy Department's Bates Laboratory at the Massachusetts Institute of Technology. The department will be developing a budget amendment to support continued operation of the facility and allow work to be completed on a new detector that will provide unique data on the structure of the atomic nucleus.

"I'm very pleased that Secretary Richardson made this important decision to maintain the Department's only university-based small accelerator. The work that can be done at Bates will lead to a better understanding of the fundamental nature of matter and is an important resource to help train the next generation of nuclear physicists and accelerator scientists. We will work with the Congress to find a way to continue this important teaching and learning center," Dr. Krebs said.

President Vest commented, "I spoke personally with Secretary Richardson on Monday. He assured me that the Department would act to restore funding for Bates during the congressional appropriations process. Today, the department publicly announced its intent to develop a budget amendment for this purpose.

"In any event, the President's budget submission is only the first step. In the coming months, MIT will cooperate with the administration to present to Congress a logical and compelling case for the current importance of the Bates Laboratory to the nation's nuclear physics program. It is especially important to complete the BLAST [Bates Large Acceptance Spectrometer Toroid] experiment. We expect

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Shuttle service changes

As a replacement for the Charles River Transportation Management Association's Landward and Riverside Shuttles, MIT and partners have started a new shuttle service that links Kendall Square with west campus and businesses at the end of Vassar Street.

The new shuttle began on a trial basis on Monday, Feb. 1. Continuation of the service will hinge on funding and ridership.

The Tech Shuttle operated by the CRTMA will offer more frequent trips and added stops compared to the old shuttle service, which began operating in August 1997 and stopped running last week when one of the corporate partners bowed out.

The new shuttle will run every 20 minutes rather than every 30 minutes. With a six-minute trip from the end of Vassar Street to Kendall Square three times an hour, the shuttle offers a convenient connection for lunch, running errands, shopping or getting to the Red Line. It also has a new stop at 84 Massachusetts Ave. outside the Stratton Student Center, as well as stops along Amherst Alley, so residents of Tang Hall and Westgate will no longer have to walk to the corner of Amesbury

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Residence system ideas presented

■ By Deborah Halber
News Office

Increasing the amount of time that upperclassmen spend mentoring freshmen and that faculty spend in the dorms were two of several recurring goals that turned up when 11 teams presented their proposals last Friday on how to redesign MIT's residence system. Maintaining students' ability to choose where and with whom they lived also was important to most of the presenters.

A first-of-its-kind IAP session called "A Community Shapes Its Future: Designing the New Residence System at MIT" ran from January 19-29. The teams, mostly made up of students, devoted dozens of daytime hours and even some all-nighters to the task of redesigning a system of living

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Turning on the charm

"Charmcellor" Lawrence Bacow (with the MIT beaver in the background) salutes Charm School graduates on January 27. See pages 6-7 for stories on this and other IAP events. **Photo by Laura Wulf**

Freedman to give second MacVicar Lecture on Friday

James O. Freedman, president emeritus of Dartmouth College, will discuss "Great Teachers, Great Teaching" in the second MacVicar Day Lecture at 3pm on Friday, Feb. 5 in Bartos Theater (Building E15).

The 1998-99 Fellows will be announced by Provost Robert A. Brown at a luncheon preceding the lecture. The luncheon is hosted by President and Mrs. Charles M. Vest at the President's House.

Freedman

Chancellor Lawrence S. Bacow will introduce Professor Freedman, who will speak for about 45 minutes. A panel discussion involving the MacVicar Fellows and undergraduate students will follow Professor Freedman's talk.

The fellowship program, created in 1991, honors Margaret MacVicar, former dean for undergraduate education, who died in 1991 at age 47. The purpose is to recognize and enhance outstanding contributions to undergraduate education at MIT. There are now 31 MacVicar Fellows.

Professor Freedman, a graduate of Harvard College, received the LLB from Yale Law School in 1962, after which he was law clerk to Judge Thurgood Marshall for the United States Court of Appeals for the Second Circuit. From 1963-64 Professor Freedman was an associate in the New York law firm of Paul, Weiss, Rifkind, Wharton and Garrison.

. From 1964-82 he was at the the University of Pennsylvania Law School, where he served as dean during his last three years. Professor Freedman was president of the University of Iowa from 1982-87 and president of Dartmouth College from 1987-98.

IN BRIEF

NO TECH TALK

There will be no Tech Talk on February 17 because of the President's Day holiday. The deadline for submitting classified ads and announcements for Tech Talk's February 10 issue, which will cover the period from February 10-28, is Friday, Feb. 5 at noon.

Student Notices

* Open to public
** Open to MIT community only

February 3-14

■ ANNOUNCEMENTS

Career Services and Preprofessional Advising Recruitment Presentations— Feb 3:** Goldman, Sachs, and Company/Information Technology, 7pm, Rm 4-153. Mass. Dept. of Education/Teacher Quality Enhancement, 7pm, Rm 4-149. **Feb 4:** Autodesk, Inc., 6pm, Rm 4-153. Consolidated Edison Company of New York, Inc., 6pm, Rm 8-105. Cummins Engine Company, 7pm, Rm 4-145. Netscape Communications Corporation, 7pm, Rm 4-149. **Feb 5:** Guidant Corporation, 5pm, Rm 4-145. **Feb 7:** Anubis Solutions, Inc., 2pm, Rm W20-306. Medtronic, Inc., 5:30pm, Rm 4-149. **Feb 8:** Capital One, 7:30pm, Rm 4-153. FactSet Research Systems, Inc., 7pm, Rm 8-105. Nuance Communications, 6pm, Rm 4-145. Siemens Medical Systems, 6pm, Rm 2-135. Siemens Westinghouse Power Corporation, 6:30pm, Rm 8-119. **Feb 9:** Adobe Systems, Inc., 8pm, Rm 4-149. Andersen Consulting, 7pm, Rm 4-163. Bose Corporation, 7:30pm, Rm 4-270. Fieldstone Private Capital Group, 7pm, Rm 4-159. Lockheed Martin Corporation, 7pm, Rm 34-101.

Campus housing—Friday, Feb. 26 deadline** to apply for on-campus summer and fall 1999-2000 vacancies in family and single graduate student apartments and dorms. Lottery on March 1. Apply in Rm E32-133. More info: x 3-5148.

EECS VI-A Orientation Lecture—Wednesday, Feb. 3**, 3pm, Rm 34-101. For course VI sophomores interested in applying for the VI-A Internship Program with Industry and Government. **Open house on Wednesday, Feb. 10**, 2:30-4pm, Grier Room (Rm 34-401). All student affair, informal. Meet current students, learn about companies, typical work assignments, thesis opportunities, salaries, housing, etc. Refreshments. More info: x3-64644 or <vi-a@eecs.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 at 6pm (cost: by donation), followed by Bible Study. Tuesday Vespers, 6-6:30pm, chapel. A quiet time for reflection. 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, 8pm, PDR 1 & 2, 3rd fl Student Center. Morning prayer, Tuesday and Thursday, 8:30am, Rm W11-080 (CFL). More info: x2-1781 or <bigbob@mit.edu>.

Christian Science Organization**—Thursdays at 7pm. Call x3-8797 or <lnorford @eagle.mit.edu> for further information.

Communitas-Life Together**—Protestant Worship Sunday at 11am. Sponsored by: American Baptist Church, United Church of Christ, United Methodist Church, Presbyterian Church (USA). 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*—Beginning Feb. 10. Wednesdays, noon-1pm, weekly Bible study in the Division 7 conference room, D-430. More info: Sharon Frigon at 981-7751 or <frigon@ll.mit.edu>.

Lutheran-Episcopal Ministry at MIT*—Regular Wednesday worship 5:10pm, followed by supper in the Bldg W11 dining room. On the 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 Swami Sarvagatananda, MIT Chaplain and Head, Ramakrishna Vedanta Society of Boston. Every Friday, 5:15-6:30pm, MIT Chapel. Sponsored by the MIT Vedanta Society. More info: 661-2011 or <mehta@cytel.com>.

MIT Hillel**—Tuesdays: 5:30pm Beginning Hebrew Class; 6:30pm Intermediate Hebrew Class. Wednesdays: 12:30pm Hebrew Conversation Table in Walker Cafeteria; 7pm Haftorah 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. 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 the Chapel. 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, coming from the Taize community in France, are a form of Christian meditation based on singing and silence.

Tech Catholic Community**—Sunday Masses 9:30am, 1pm and 5pm. Weekday Masses Tuesdays and Fridays 12:05pm when classes are in session. More info: x3-2981 or <catholic@mit.edu>.

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

■ STUDENT JOBS

For other job listings and more information about the following listings, go to the Student Employment Office, Rm 11-120 or <http://web.mit.edu/seo/>.

On Campus, Technical. Part-time student consultants to provide computer support and troubleshooting to users of the ATIC lab, and conduct demonstrations of adaptive software and hardware for visitors. Seek motivated, punctual, responsible students familiar with Windows 95 and NT on an operational level, some knowledge of UNIX, Athena and configuring dotfiles, and good tutoring skills. Kathleen Cahill at x3-5111.

Off campus, Non-Technical, Marketing. The W.H. Smith gift shops in the Hyatt Regency and Four Seasons hotels are looking for dependable, friendly workers to fill part-time and full-time positions. Opportunity for advancement. For position at the Hyatt in Cambridge, call Saada Ibrahim at 354-0969. For Four Seasons in Boston, call Siaza Ibrahim at 348-9340.

Off Campus, Technical, Engineering/Design. Artist seeks engineer for collaboration on kinetic sculpture. Must have knowledge of contemporary art and robotics and/or midi-controlled devices, interest in architecture, love of kinetic toys, ability to design modular components and sense of humor. Salary will begin as honorarium and possibly expand. Contact Stacy Pershall or send resume and letter to Atomic Media, 47 Seaverns Ave. #1L, Jamaica Plains, MA 02130 fax: 617-232-8039 phone: 522-2265.

The following positions are for students with Federal Work Study eligibility.

Community Service. Researchers will undertake library and on-line research that expands EcoLogic's database of information about community-based development and the conservation of threatened tropical ecosystems in Latin America. Information provided to computerized information exchange, the Network for New Ideas. Familiarity with Internet and Spanish preferred. Mail resume and letter to Luise Wills at P.O. Box 383405, Cambridge, MA 02238.

Community Service. Tutor children (Grades K- 5) in math and English. Play games, organize science activities, teach diligence, honesty, fairness and kindness through example. Chinese speaking can help. Contact Claudia Euler at Boston Children's Services at 482-6382.

Community Service. Top Secret Science is a science center in Woburn offering exciting and fun programs at our center and Boston schools. We seek dedicated people to join our team 5-20 hrs/wk. Must be outgoing, enjoy a great salary and have experience working with children. Access to a car is important. Contact Michael Bergen at 781-935-3336 <www.TopSecretScience.com>.

■ CABLE

For program information , contact Randy Winchester at x3-7431, Rm 9-050, <randy@mit.edu> or see the web site at <http://web.mit.edu/org/m/mitcable/www/home.html>.

25th MLK celebration tomorrow with Mfume as keynote speaker

The Hon. Kweisi Mfume, president and chief executive officer of the NAACP, will be the keynote speaker at MIT's 25th celebration of the life and legacy of Dr. Martin Luther King Jr. tomorrow.

Mr. Mfume, a former US congressman from Maryland, will speak at the annual celebratory breakfast at 7:45am at Morss Hall in Walker Memorial. The theme of the celebration is "Teaching and Learning: The Key to Full Inclusion." President Charles Vest will introduce Mr. Mfume.

Freshman Maribel Gomez and graduate student Randal Pinkett will offer brief recollections of Dr. King at the breakfast, hosted by President and Mrs. Vest.

Chancellor Lawrence Bacow will present the Dr. Martin Luther King Leadership Awards to Alexander Slocum, the Alex and Brit d'Arbeloff Professor of Mechanical Engineering; Boston public school math teacher Richard Williamson (SB 1985); and Adriana L. Holguin, a senior in mechanical engineering.

Provost Robert Brown will recognize the Dr. Martin Luther King Jr. Visiting Professors: Drs. Lloyd Demetrius of brain and cognitive sciences, Lynda Jordan of chemistry, Pamela McCauley-Bell of aeronautics and astronautics, Starling Hunter of the Sloan School and Arnold Stancell of chemical engineering.

The invocation will be given by MIT Rabbi Joshua Eli Plaut, whose father, also a rabbi, participated in the Freedom Rides with Dr. King in 1962. Betsy Draper, MIT's Southern Baptist chaplain, will offer the benediction. The mistress of ceremonies will be Shayna Smith, a senior in civil and environmental engineering. The MIT Gospel Choir will perform.

The celebration also includes an interactive exhibit in Lobby 7 designed by 15 undergraduates. The installation project, coordinated by senior Eto Otitigbe, is entitled "Reflections: A Tribute to all Individuals Who Have Supported the Struggle for Human Rights." An open discussion involving the designers will be held on Friday from noon-2pm in Rm 4-145.

In addition to the exhibit, a gospel quartet consisting of Semenya McCord, Wannetta Jackson, George W. Russell Jr. and Byron Gibbs will perform in Lobby 7 from 12-1pm tomorrow. The South Mass Choir, under the direction of Darryll Maston, will perform a musical tribute to Dr. King in Lobby 7 at 5pm.

The celebration concludes on Saturday with a daylong conference for women of color ages 15 and up entitled "Cyber Sisters and Virtual Visionaries." The conference, at the Tang Center (Building E51), is sponsored by the MIT Community Fellows Program. It will bring together young women of color and professionals who are actively involved in the design, production, distribution and use of information technology.

Robert J. Sales

27 students selected as Burchard Scholars in School of Humanities

Twenty-seven sophomores and juniors have been selected as Burchard Scholars in the School of Humanities and Social Science for 1999.

The awards, named after the School's first dean, John Ely Burchard, are given to students who demonstrate unusual abilities and academic excellence in the areas embraced by the School. According to Dean Philip S. Khoury, co-founder of the Burchard Program and chair of the selection committee, the students selected in the thirteenth year of competition for the awards "are from exciting and diverse backgrounds and are a remarkable group of gifted young scholars."

The Burchard Scholars and a rotating group of faculty will be invited to a series of dinners beginning in February, at which an MIT faculty member or visiting scholar will present work in progress, followed by a discussion. This will allow students and faculty members to mix and will give students an opportunity to engage in the kind of intellectual exchange that characterizes scholarship in the humanities, arts and social sciences. The emphasis throughout the program will be interdisciplinary.

In addition to Dean Khoury, the selection committee consisted of Professors Margery Resnick of foreign languages and literatures, John Hildebidle and Mary C. Fuller of literature, Daniel T. Kryder of political science and Lowell Lindgren of music and theater arts.

The Burchard Scholars are as follows.

Juniors: Jonna Anderson, urban studies and planning and writing and humanistic studies; Kelly Brogan, brain and cognitive sciences (BCS); Jasper Chen, philosophy and cognitive science; Jason Chicola, electrical engineering and computer science (EECS); Benjamin Chun, EECS and materials science and engineering; Sharmin Ghaznavi, BCS and biology; Eric Gunther, EECS; Madhulika Jain, computer science and biology; Risat Jannat, biology; Jason Krug, music; Berta Liao, political science and chemical engineering; Katherine Cherry Liu, urban studies and planning; David Matsa, economics and mathematics; Martin Mbaya, mechanical engineering; Xiaomin Mou, electrical engineering; Sripriya Natarajan, computer science and engineering; Janelle Prevost, computer science; Millie Roy, biology; Krzysztof Rybak, chemisty; Rachel Stanley, chemistry; Gaurav Tewari, EECS; Jonathan Woon, political science; and David Zych, EECS.

Sophomores: Marie Kosley, political science and chemistry; Richard Possemato, chemistry and biology; Andreas Sundquist, EECS and physics; and Jason Wasfy, chemical engineering and biology.

Nominations for science teaching prizes are sought

Nominations are open for the School of Science Teaching Prizes for Graduate Education and Undergraduate Education for 1998-99.

The undergraduate prize recognizes excellence in teaching undergraduate subjects. The selection committee wants to emphasize that nominations will be welcome for outstanding teaching not only in the subjects with large enrollments (usually those that satisfy the General Institute Requirements in science), but also in the upper-level science subjects in which enrollments are smaller.

For the graduate prize, preference will be given to nominees who teach mainstream subjects in which the fundamental principles of the relevant fields are presented. Such courses typically provide the basis for advanced education and research in the fields of interest and prepare students for professional careers.

Nominations for both awards may be made by faculty and students to any member of the selection committee by March 15. Each nomination should be accompanied by a letter in support of the nomination. Additional letters are welcome.

Members of the committee are Professors Monte Krieger, Rm 68-483, x3-6793 (chair); Mehran Kardar, Rm 12-108, x3-3259; and John Southard, Rm 54-1026, x3-3397.

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Can science writers get it right?

■ By Sarah H. Wright
News Office

The IAP session, "Will Science Journalists Ever Get It Right? Or, How to Cope with the News Media," was a spirited presentation by the Knight Science Fellows on how to improve relations between science reporters and researchers in the future.

A conversation between Knight Fellows and session participants exploring reportorial ethics and researchers' expectations of the media followed the presentation.

The January 28 session was moderated by Boyce Rensberger, director of the Knight Science Journalism Program at MIT. Among Mr. Rensberger's former positions in journalism is science editor of the Washington Post.

"What scientists and science writers do are interdependent parts of a shared responsibility to the general public. Most research is paid for by taxpayers, and they have a right to know what's being done with their money. But the general public doesn't read scientific journals and probably couldn't understand them. We can help scientists fulfill their obligation to the general public," he said.

A more subtle aspect of the relationship between scientists and the public lies in the interplay of curiosity on the one hand and creation of knowledge for its own sake on the other, Mr. Rensberger said.

"The public is extremely curious about science and technology, but not privileged to do research. They put up the money so you can do the research. Scientists are the agents of public curiosity," he said.

Science writers have two basic roles, he said. One is the "watchdog role, meaning we're supposed to alert the public about things that need attention, such as toxic waste. The other is the teacher role. We educate people who read our material."

Noting that several of the Knight Fellows had, like himself, been interested in science or in becoming scientists, Mr. Rensberger added that the educational function of science writing could also attract young people to careers in science.

Knight Fellow Robin Lloyd suggested that writers and researchers "get a little friendlier, learn about one another's worlds. My daily occupation is trying to get inside engineers' heads." She also noted that, as a wire service reporter completing between four and 10 news stories each day, she was not at all likely to have time to check facts or quotes with researchers.

"Share the glory, get a better story," said Kevin Coughlin, who covers technology for the Star-Ledger in Newark, NJ. "Give reporters access to researchers, grad students and people in your labs who are doing the grunt work. People working in the trenches often give better quotes."

Mr. Rensberger also advised researchers to "prepare for interviews in advance. Spend time to come up with metaphors— simple ways to describe your work. And you can ask, 'Did you understand what I said?' 'Do you need a diagram?'"

Knight Fellow Andrew Lawler covers federal science policy for Science magazine ("a very peculiar place," he noted). He advised researchers to "develop a relationship with a reporter who is covering your area. Help educate him or her so they'll trust you."

Bruce Schecter, who received the PhD in physics from MIT, is the author of two books: *The Path of No Resistance* about high-temperature superconductors and *My Brain is Open: The Mathematical Journeys of Paul Erdos* about an eccentric Hungarian mathematician.

He recalled that, as a child, he knew no scientists. It was science writers who "inspired me to come to college and to MIT. Science writing humanizes science. Some of my readers may be tomorrow's scientists," he said.

Mr. Schecter works closely with researchers. Thanks to the lengthy book-writing process, "I can afford to show chapters to my sources. The trade-off is, I ask [for] a lot of time, the most valuable thing you have, and the details I'm interested in may seem intrusive: tell me about your childhood; why did you become a scientist?"

ETHICS AND EXPECTATIONS

Participants had a freewheeling discussion of whether journalistic ethics require or forbid writers to allow scientists—or other sources—to review articles before they're published.

"Most science writers do show their stories to sources, asking them to check for factual errors [but] to refrain from editing," Mr. Rensberger said, adding that deadline pressures influenced such practices.

Venkatesh Hariharan, a Knight Fellow from Bombay who covers computers and information technology, said "we all want technical accuracy" but agreed with Mr. Lawler that a "nightmare scenario" of sources' vying for supremacy within a story can easily occur if several researchers are consulted on accuracy.

"I'm on the side of 'Never do it!'" said Mr. Lawler.

Knight Fellow Kerry Fehr-Snyder, technology reporter for the Arizona Republic in Phoenix, warned participants that, even with fact-checking, idiosyncrasies within news organizations mean the final length, the headline or photograph captions for an article won't always appear the way the reporter and the source may have wanted.

Secretary of the Interior Bruce Babbit speaks with Judy Pederson from the MIT Sea Grant Program before his address to the conference.
Photo by Laura Wulf

Babbit says prevention is best defense against marine bioinvasion

■ By Elizabeth Thomson
News Office

Ten years after the Exxon Valdez disaster, Alaska's Prince William Sound faces another serious threat: four new species of plankton that could alter the ecosystem and "prove to be infinitely more devastating than [the] oil spill," said Secretary of the Interior Bruce Babbitt last week in a talk at MIT.

Those plankton, which were released from ballast water brought by tankers from around the world, are a good example of the subject of Mr. Babbitt's talk: non-native species that are creating major economic and environmental problems in the sea.

At the First National Conference on Marine Bioinvasions, Mr. Babbitt outlined a counterattack against these intruders. He noted that within the next few weeks, President Clinton will issue an executive order addressing the problem.

"An executive order from the President saying 'get going' will, I think, have a major impact," he said.

That order will contain two broad initiatives, Mr. Babbitt said. First, it will require federal agencies to review their existing authorities to reduce the risk of bioinvaders. It will also create an interagency working group to draft a "truly comprehensive plan" for a coordinated response to the problem.

Mr. Babbitt emphasized that "the first, best and only line of defense against bioinvasion is to keep [these organisms] out in the first place… Not one marine bioinvasive species, after it has taken hold, has ever been eliminated or effectively contained…

"Our efforts must be focused primarily on prevention. And that, in turn, means effective regulation and enforcement."

Further research on control mechanisms is also necessary. "Research efforts right now are fragmented and directed at specific [organisms]," he said. "Somehow we've got to look across the scientific establishment [to] see if we can't find an organizing principle."

Mr. Babbitt also emphasized the importance of international cooperation toward solving the problem. "To have effective prevention controls, you ought to be working at both ends of the transportation pathways," he said.

The conference was hosted by the MIT Sea Grant College Program; Judith Pederson of MIT Sea Grant was conference chair. It was co-sponsored by the Oregon and Connecticut Sea Grant programs, the Massachusetts Environmental Trust, the National Oceanic and Atmospheric Administration, the US Fish and Wildlife Service, the US Coast Guard, Battelle and others.

Alumnus/astronaut Chang-Diaz describes missions, new propulsion system research

■ By John Tylko
Special to Tech Talk

NASA astronaut Franklin Chang-Diaz (ScD 1977), who has flown more space shuttle missions than any other MIT alumnus, discussed his work on a new propulsion system at a January 25 talk on campus.

Dr. Chang-Diaz, a veteran of six shuttle missions, was a mission specialist on last June's STS-91 mission which tested the Alpha Magnetic Spectrometer (AMS), an investigation led by Professor Samuel Ting, a Nobel laureate and researcher at MIT's Laboratory for Nuclear Science.

Dr. Chang-Diaz narrated a brief video overview of the flight, which also was the final Shuttle-Mir docking mission. During the mission, the ship's KU band antenna system failed to transmit data necessary for real-time calibration of the AMS experiment. He described the crew's in-flight maintenance procedure, which rerouted the AMS telemetry to the shuttle's S-band antenna system and allowed the AMS detector to be calibrated successfully from the ground.

Dr. Chang-Diaz then presented a summary of his research on plasma rocket engines and the VASIMR (variable specific impulse magnetic resonance) propulsion system. This engine uses plentiful hydrogen fuel and ion cyclotron resonance heating to create ionized plasma, which is controlled using a nozzle based on a magnetic field. The three-stage plasma rocket engine can achieve variable specific impulse and thrust at maximum power and can be used to achieve continuous acceleration.

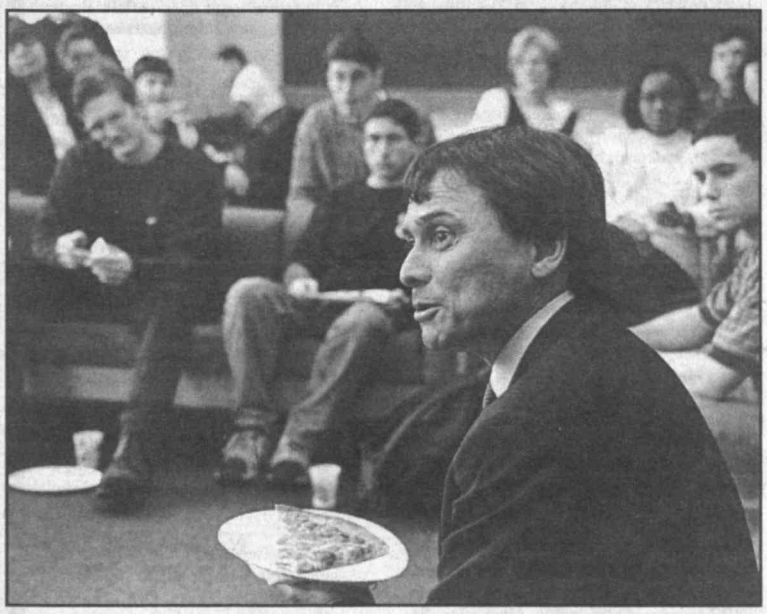
This technology could serve as the primary propulsion system for a manned mission to Mars in the next century, perhaps as early as 2018, Dr. Chang-Diaz said. Such a mission could deliver both an unmanned cargo ship and a crew lander to Mars utilizing a fast trajectory made possible by the propulsion technology, reducing the flight time from Earth to Mars to 93 days outbound and 89 days for the return. Chemical rocket systems based on today's technology would require mission times of at least 10 months in each direction.

He also presented a technology roadmap for the VASIMR concept which showed two technology paths, one based on ground testing at NASA's Advanced Space Propulsion Laboratory and the other based on a technology demonstration mission in space utilizing the Radiation Technology Demonstrator (RTD) spacecraft. This spacecraft would test an early version of the ionized plasma rocket engine utilizing helium fuel for flight safety reasons.

Dr. Chang-Diaz received a doctorate in applied plasma physics from MIT in 1977 and became a NASA astronaut in 1981. He has accumulated over 1,269 hours in space; his record of six missions is matched by only two other NASA astronauts, Story Musgrave and John Young.

His first space flight was STS 61-C in 1986 which was a satellite deployment mission. In 1989 he flew a mission which launched the Galileo spacecraft on its mission to Jupiter. He also flew two missions, one in 1992 and the other in 1996, which deployed the Tethered Satellite System. In 1994 he participated in STS-60, which was the first joint US/Russian space shuttle mission.

While maintaining active flight status in the astronaut program, Dr. Chang-Diaz continued his research in rocket propulsion based on magnetically confined high-temperature plasmas. From 1983-93, he was a visiting scientist at the MIT Plasma Fusion Center, where he led plasma propulsion research. In 1993, he became director of the Advanced Space Propulsion Laboratory at the NASA Johnson Space Center, where he continues his research on plasma rockets.



Astronaut Franklin Chang-Diaz speaks with students at an informal pizza lunch in the Physics Common Room. **Photo by Laura Wulf**

■ Awards & Honors

■ Three MIT faculty members—Professors **Justin E. Kerwin** of ocean engineering and **James M. Poterba** of economics, and Associate Professor **Nancy G. Kanwisher** of brain and cognitive sciences—are among 17 individuals recognized with awards from the the National Academy of Sciences in January. The awards will be presented on April 26 at a ceremony in Washington, DC during the Academy's 136th annual meeting.

Professor Kerwin won the Gibbs Brothers Medal, a $5,000 prize awarded every two years for outstanding contributions in the field of naval architecture and marine engineering. He was chosen "for his outstanding contributions in the field of naval architecture, including the development of computational methods used worldwide in propeller design."

Dr. Poterba, the Mitsui Professor of Economics and associate department head, won the NAS Award for Scientific Reviewing, a $5,000 prize for excellence in scientific reviewing within the past 10 years (the 1999 field is economics). He was chosen "for his influential and comprehensive review of factors determining the savings of individuals over their lifetimes and the private accumulation of wealth for retirement."

Dr. Kanwisher was co-winner of the Troland Research Award, a $35,000 sum given annually to each of two recipients, to be used to support their research within the broad spectrum of experimental psychology. She was recognized "for her innovative research on visual attention, awareness and imagery, including the characterization of a face perception module and discovery of a place encoding module."

■ **Jay W. Forrester,** professor emeritus and senior lecturer at the Sloan School, was recently awarded an honorary doctorate by the University of Seville in Spain. He was recognized for his work in founding and leading the field of system dynamics.

■ **Bryan Gaensler,** a postdoctoral fellow in astronomy, has been named the 1999 Young Australian of the Year. Dr. Gaensler, 25, graduated fromthe University of Sydney's Faculty of Science with high honors in 1994. Dr. Gaensler, who described himself to the Australian Broadcasting Corp. as spending his days in front of a computer and nights staring at the stars, also recently won the prestigious Hubble Fellowship, sponsored by NASA, for his research into how exploding stars are affected by the universe's magnetic fields.

Institute Calendar

Reminder

Remember to use the new online TechCalendar at <http://tech-calendar.mit.edu> to submit listings of upcoming seminars and lectures.

* Open to public
** Open to MIT community only

(For arts-related listings, see page 11.)

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

Listings for Community Calendar and Student Notices should be submitted using the web form at <http://web.mit.edu/newsoffice/tt/calform>. If you have questions, please contact <ttcalendar@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, Feb. 5, covering events from Wednesday, Feb. 10 through Sunday, Feb. 28.

February 3-14

■ SPECIAL INTEREST

MacVicar Day Lecture: Great Teachers, Great Teaching*—James O. Freedman, President Emeritus, Dartmouth College. Sponsored by MacVicar Fellows. 3pm, Friday, Feb. 5, Bartos Theatre, E15. Lecture and panel with MacVicar scholars and students, reception. All are welcome. More info: x3-3036 <rosalind@mit.edu> or <http://web.mit.edu/provost/macvicar>.

■ SEMINARS & LECTURES

(listings compiled by TechCalendar, courtesy of The Tech)

WEDNESDAY, FEBRUARY 3

The Israeli-Turkish Connection*—Dr. Efraim Inbar, Bar-Ilan University, Israel. Sponsored by Center for International Studies with Security Studies Program. Noon, Rm E38-615. MIT Security Studies Seminar Brown Bag Lunch. More info: Call Lynne Levine at x3-0133, <llevine@mit.edu>.

THURSDAY, FEBRUARY 4

Measurements of Omega and Lambda from 42 High-redshift Supernovae: Is The Universe Really Accelerating?*—Dr. Saul Perlmutter, Supernova Cosmology Project, Lawrence Berkeley National Lab. Physics Colloquium. 4:15pm, Rm 10-250. Refreshments in Rm 4-339 at 3:45pm. More info: x3-4801 <physhdq@mit.edu> <http://web.mit.edu/physics/www/Colloquium/current.html>.

FRIDAY, FEBRUARY 5

MacVicar Day Lecture: Great Teachers, Great Teaching*—James O. Freedman, President Emeritus, Dartmouth College. Sponsored by MacVicar Fellows. 3pm, Bartos Theatre, E15. See Special Interest above.

Houghton Lecture: Probing Tornadoes with Mobile Doppler Radars*—Prof. Howard Bluestein, Univ. of Oklahoma. EAPS Department Lecture Series. 4pm, Rm 54-915. Refreshments, 3:30 pm, Ida Green Lounge. More info: x3-3382 <bevkt@mit.edu> <http://www-eaps.mit.edu/dept_sem.html>.

TUESDAY, FEBRUARY 9

Late Babylonian Eclipse Records*—John Steele. Dibner Institute Lunchtime Colloquia. Noon, Rm E56-100. Call or email if you plan to attend, <dibner@mit.edu>, x3-6989.

The Thermodynamics of Polarized Systems in External Fields: A Generic Approach with Applications to Electromagnetic Systems*—Prof. Howard Brenner, MIT chemical eng. Energy Lab's Spring 10.978 Seminar Series. Noon-1:30pm, Rm E40-496. More info: x3-3401 <lmay@mit.edu>.

Circuit Implementation of a 600 MHz Superscalar RISC Microprocessor*—Kathryn Wilcox, Compaq Computer Corporation. MTL VLSI Seminar Series. 4pm, Rm 34-101. Refreshments at 3:30pm.

Tools for Robust Design*—Prof. Daniel Frey, MIT, aeronautics and astronautics dept. Sponsored by Gas Turbine Lab. 4:30pm, Rm 31-161. Refreshments at 4:15pm, More info: x3-2481 <dragonl@mit.edu>.

On Designing Migration Surveys: the World Bank Experience*—Robert E.B. Lucas, Boston Univ. Sponsored by Center for International Studies. 4:30pm, Rm E38-714. An Inter-University Seminar on International Migration. More info: x3-3121, <lauries@mit.edu>.

WEDNESDAY, FEBRUARY 10

Lecture on Careers: Manager, Researcher or Professor?*—Lloyd Baird, MIT. Professional Development Series. 3:30-5pm, Ashdown House, Hulsizer. More info: x3-2195, <wolff@mit.edu>, <http://www.mit.edu/activities/gsc>.

Economy, Ecology, and the Industrial Revolution: Europe in the East Asian Mirror*—Ken Pomeranz, Univ. of California, Irvine. Sahin Lecture Series, sponsored by History Office. 5-6:30pm, Rm 56-114. More info: x3-4965 <history-info@mit.edu> <http://web.mit.edu/history/www>.

THURSDAY, FEBRUARY 11

Microbiology of the Marine Sulfur Cycle: Molecular and Classical Approaches*—Dr. Andreas Teske, Woods Hole Oceanographic Institution. Sponsored by Earth, Atmospheric, and Planetary Sciences. 4pm, Rm 54-915. Refreshments at 3:30pm in the Ida Green Lounge. More info: x3-3382 <bevkt@mit.edu> <http://www-eaps.mit.edu/dept_sem.html>.

The Physics of Birdsong*—Partha Mitra, Bell Labs. Physics Colloquium. 4:15pm, Rm 10-250. Refreshments in Rm 4-339 at 3:45pm. More info: x3-4801 <physhdq@mit.edu> <http://web.mit.edu/physics/www/Colloquium/current.html>.

FRIDAY, FEBRUARY 12

Explaining the Flow of Elastic Liquids*—Prof. E.J. Hinch, Cambridge University, UK. ME Seminar Series. 3-4pm, Rm 3-270. Refreshments immediately after seminar in Miller Room (1-114). More info: x8-5807 <bhenson@mit.edu>.

The Earthquake Cycle: Paleogeodesy and Paleoseismology of the Sumatran Subduction Zone from Coral Microatolls*—Prof. Kerry Sieh, Caltech. EAPS Department Lecture Series. 4pm, Rm 54-915. Refreshments, 3:30pm, Ida Green Lounge. More info: x3-3382 <bevkt@mit.edu> <http://www-eaps.mit.edu/dept_sem.html>.

■ COMMUNITY CALENDAR

Working Group on Support Staff Issues*—Wednesday, Feb. 3, 11:45am-1:30pm. Agenda includes a presentation on Diversity in the Workplace by J.J. Jackson and updates from ongoing task groups. Contact Heather Mitchell at <mheather@mit.edu> or x3-9474. The Working Group is a volunteer organization of support staff and administrators working to improve the support staff environment at MIT.

MIT Libraries Book Sale—Thursday, Feb. 11.** Sponsored by MIT Libraries Gifts Office. 10am-3pm, Hayden Basement Cage, Building 14S. Engineering, fiction, physics, science, psychology/philosophy and foreign language titles at great prices. Proceeds support the MIT Libraries Preservation Fund. Free materials at every sale. More info: x3-5693 <gifts-lib@mit.edu> <http://macfadden.mit.edu:9500/colserv/gifts/booksale.html>.

English conversation classes registration—Feb. 9**, 9-11am, Bush Room (10-105). Registration for beginner/intermediate/and advanced English conversation classes. Sponsored by the MIT Women's League. $50 per student (includes books) and babysitting cost $100 per child. Classes meet Tuesday and Thursday from 9:15-11am. More info: x3-3656.

Wives Group— Feb. 3**: Welcome Meeting. **Feb. 10, 17, 24**: Civil rights and race relations - *The Long Walk Home*, film and discussion. A support network sponsored by MIT Medical for partners and spouses of students, staff and faculty. Meetings held every Wednesday from 3-5pm in W20-400. Childcare provided. More info: x3-1614 or <http://web.mit.edu/medical/wivesgroup>.

■ MITAC

The MIT Activities Office (MITAC) serves the cultural and recreational needs of the MIT community (including MIT's retirement community). Two locations: (1) Walker Memorial Rm 005, 9:30am-3:30pm, Wednesday-Friday (2) Room LLA-218, x6130, Lincoln Lab, 1:15-4pm, Thursday and Friday only. More info: x3-7990 or <julieh@mit.edu>. MITAC accepts only cash or a personal check made payable to MIT. ***MIT IDs must be presented.***

Boston Celtics Opening Game vs. Toronto (FleetCenter, Boston)—Fri., Feb. 5**, 8pm. Ticket: $23 (balc. seating).

Boston Celtics vs. New York (FleetCenter)—Fri., Feb. 26**, 8pm. Ticket: $23 (balc. seating).

N.E. Aquarium Animal Ambassador Program (N.E. Aquarium, Boston)—Sat., Feb. 27**, 2:30pm (includes admission into the aquarium). Ticket: $5.50.

Boston Celtics vs. Denver (FleetCenter, Boston)—Fri., Mar. 5**, 7pm. Ticket: $23 (balc. seating and includes a coupon for a free hot dog andsoda). On Sale 2/12.

Boston Ballet's "Balanchine" (Wang Center, Boston)—Sun., Mar. 21**, 2pm. Ticket: $35 (reg. $45). Purchase by 2/26. On Sale 2/11.

Six Flags Weekend (Jackson, NJ)—Sat., Apr. 17-Mon., Apr. 19**. Ticket: $209 pp double occupancy and $117 pp triple and quad occupancy.

Day Ski Trip to Loon Mountain (Lincoln, NH)—Sat., Mar. 6**. Downhill tickets: $55 adult, $48 teen (13-18), $41 child (6-12); Learn-to-Ski package plan (downhill or snowboarding) ticket: $65; and Cross Country ticket: $25. Purchase by 2/26.

Hammel to be featured in women's lecture series

On Monday, Feb. 8, Dr. Heidi B. Hammel will be the guest speaker at the second in a series of lectures focusing on the work of MIT "Women on the Edge of New Frontiers." The lectures are sponsored by the Women's Forum and the Women's League.

Dr. Hammel, who will speak and show slides on "Exploring the Giant Planets with the the Hubble Space Telescope," is a principal research scientist in the Department of Earth, Atmospheric and Planetary Sciences. She works primarily in the field of outer planets. Her latest research has focused on imaging of Neptune and Uranus with the Hubble Space Telescope.

Dr. Hammel has been awarded prizes both for her research (most recently, the 1996 Urey Prize of the American Astronomical Society Division for Planetary Sciences) and for her public outreach (including the 1996 National Spirit of American Women Award and the Exploratorium's 1998 Public Understanding of Science Award).

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

Ongoing Community Meetings

■ COMMUNITY

MIT Ballroom Dance Club*—For schedule, call x8-6554 or see <http://web.mit.edu/mitbdt/>.

The Furniture Exchange at MIT**—Used furniture needed in good condition, to be sold to MIT/Harvard students. Donations are tax-deductible and receipted; profits go to MIT scholarships. Call x3-4293 or see <http://web.mit.edu/medical/wivesgroup/resource.htm#anchor545694>.

GABLES (Gay, Bisexual, and Lesbian Employees and Supporters) at MIT**—Monthly lunch-time get togethers held on and off campus on the last business day of the month. Info line x2-1014. Staff lesbigay e-mail list sign-up: <gables-request@mit.edu>.

Graduate Student Council Grocery Shuttle*—The GSC offers a grocery shuttle from MIT to the University Park Star Market on Saturday mornings every half-hour from 8-11:30am from Eastgate. Free to all members of the MIT community. For schedule and stops, see <http://www.mit.edu/activities/gsc/Committees/HCA/Grocery/grocery.html>.

MIT Folkdance Club* —Sundays: International Dancing 7-11pm. Tuesdays: Advanced Balkan Dancing, regular teaching and requests, 7:30-11pm. Wednesdays: Israeli Dancing 7-11pm. MIT/Wellesley students free, $1 others. For location, see <http://www.mit.edu/activities/fdc/home.html>.

MIT Toastmasters**—An organization that helps people improve and practice their public speaking and presentation skills. Meets second and fourth Friday of each month, 12:05-1:30pm, Rm E19-220. For schedule, see <http://web.mit.edu/personnel/toastmasters/>.

Tech Squares*—MIT's Square and Round dance club, meets on Thursdays, with caller Ted Lizotte. For more info, see <http://www.mit.edu/activities/tech-squares/> or e-mail <squares@mit.edu>.

MIT Working Group on Support Staff Issues**—The MIT Working Group on Support Staff Issues is made up of staff and administrators working together to address issues of concern to support staff at MIT. The group organizes task groups which report findings to the membership for action and implementation. If you would like to attend one of the monthly meetings, contact Heather Mitchell at <mheather@mit.edu> or x3-9474.

■ FAMILY

Family Resource Center**—In addition to parenting workshops and programs, the Family Resource Center also offers support and training programs for child care providers, workshops at your request, a lending library, and individual consultations concerning parenting, schools, child care options, and work/family issues.See <http://web.mit.edu/personnel/www/frc/>, call x3-1592 or e-mail <frc@mit.edu>.

Family On-Line Services**—A computer workstation is available in the Family Resource Center reception area for those who would like to access child care databases and on-line parenting resources. Also, the FRC maintains a list of those members of the MIT community who would like to be on an e-mail list to receive news, program updates, etc. To be added to the subscriber list, e-mail <frc@ mit.edu> or call x3-1592.

Fathers Group**—Peer-led, informal discussions of the challenges and joys of fatherhood. No fee. Cosponsored by the Family Resource Center and the Health Education Resource Center. Open to MIT, Draper and Whitehead communities. Thursdays noon-1pm; call or e-mail for meeting place, x3-1316 or <mit-dads@mit.edu>.

Mothers Group**—Professionally led group, Wednesdays, 1-2pm, Rm E23-297. No fee or preregistration required. Co-sponsored by the Family Resource Center and the Health Education Resource Center. For schedule and information, call x3-1316.

Off-Campus Playgroups**—The MIT Wives Group, with the cosponsorship of the Family Resource Center, provides ongoing support for establishing and maintaining informal parent-child playgroups. Contact Wives Group, Rm E23-376, x3-1614.

Parents Forum**—Peer-led discussions for parents. No fee. Info: Chris Bates, x3-4084 or <cbates@mit.edu>.

Wives Group**—A support and self-help program sponsnored by MIT Medical for partners and spouses of students, staff and faculty. Meetings held every Wednesday from 3-5pm in W20-400. Childcare provided. Info: Jennifer, x3-1614.

■ HEALTH

Alcoholics Anonymous (AA)*—Meetings every Tues, 12-1pm; Thurs, 12-1p; Womens AA meets Mon 6-7pm., Rm E23-376. Info: Denise x3-4911.

Alcohol Support Group**—Meetings every Wednesday, 7:30-9am. Info: Denise, x3-4911.

Cancer Support Group**—Meets last Tuesday of the month, 12:15-2pm. For those with acute and chronic forms of cancer. Sponsored by the MIT Medical Dept. Info: Dawn Metcalf, x3-4911.

Co-Dependents Anonymous (CoDA)*—Thursdays, 6:30-8pm, Rm 66-168. Info:Alise, x3-4911.

Early Pregnancy, Prepared Childbirth and Childbirth Review**—Classes are offered to patients of the Medical Department's Obstetrics Service. Call x3-1316.

Falun Gong Classes*—Falun Gong is an ancient way of self-improvement in body and mind, an advanced Qigong system of the Buddhas' School. Good for all ages. Everyone is welcome. No fees or donations. Tuesdays, 6:30-7:30pm, Rm. 1-134. Contact Leonard at x3-0720 or see <http://falun.mit.edu>.

Health Education Resource Center**—Books, free video loan program and brochures on diet, exercise, wellness, childbirth, parenting, aging and much more. Rm E23-205; open weekdays 9-5pm. Call x3-1316.

Nursing Mothers Room**—A comfortable, private place to nurse babies or express milk. Cosponsored by the Family Resource Center and the Medical Dept. Located within the Women's Lounge in Rm 10-384 and Rm E19-6th floor, accessible 24 hrs/day. Make arrangements with Margery Wilson, Rm E23-407, x3-2466.

Nursing Mothers' Group**—First and third Wednesday of each month, 11am-noon, Rm E23-297. For pregnant and nursing women. Babies and toddlers welcome. No fee or registration. Sponsored by the Medical Dept. Info: x3-2466.

RSI Alert!**—RSI Alert! is a group of MIT employees and students dedicated to creating an awareness of Repetitive Strain Injury, educating to prevent RSI, and facilitating treatment and accommodations for those who have RSI. To receive notices about events and meetings, subscribe to our listserv mailing list by sending e-mail to <listserv@mitvma.mit.edu> with the following message: [SUBSCRIBE RSIALERT YourLastname YourFirstname]. Info: x8-9328.

Weight Watchers at Work**—Thursdays, 1-1:45pm, Rm 8-219. Cost: $120 for a 12-week session. Some health plans are eligible for reduced rates. More info: x3-4005 or <cohen@media.mit.edu>.

■ INTERNATIONAL

Guide for Foreign National Spouses Seeking Work**—Information on topics such as American resumes, job interviews, volunteer work, employment agencies, salary negotiation, visa issues and more. Reference binders may be used in Rm 12-170; ask for Beth Anderson.

Hebrew Lunch Table**—Come join us for an informal discussion in Hebrew every Wednesday. Students meet in the Walker Cafeteria at 12:30pm. Bring your lunch or buy it there. Speaking ability ranges and attendance need not be consistent. All are welcome. Info: Adam Bovilsky, <adambov@mit.edu> or 252-1521.

Hosts to International Students Program*—Offer assistance, encouragement and occasional hospitality to our students from around the world. Not a home-stay program. Faculty, staff and alumni/ae (singles, couples or families) are encouraged to participate. Kate Baty, x3-4862 or <baty@mit.edu>.

International Women's Discussion Group*—Meets Tuesdays beginning Oct. 28 from 12:30 to 2pm in Rm E23-347.Info: Dr. Grace Gibson, x3-2916.

Japanese Lunch Table*— Japanese and non-Japanese students meet every Wednesday at noon for language and cultural exchange. E38-7th floor. Bring your own lunch. Info: <japanprogram@mit.edu>.

MIT Japan Program**—Students: Go to Japan with the MIT Japan Program and do cutting-edge research in your field in a Japanese corporate, government or academic organization. All expenses paid. Info: x8-8208 or <japanprogram@mit.edu>.

MIT Job Support Group for international spouses. Meet people in the same situation you are. We can help you find information and prepare for your job search and interviews. Info: Jennifer, x3-1614.

MIT Language Conversation Exchange**—We find conversation partners for those interested in practicing a language with a native speaker. Info: x3-1614.

Stammtisch/German Table*—Join us for lunch auf deutsch, all are welcome. Every Monday at 1pm, MIT's Walker cafeteria. Info: <debi@mit.edu> or <sberka@mit.edu>.

■ Here & There

A hallway in the new University Park Hotel with framed photo of a man at the highest point of the Green Building. **Photo by Laura Wulf**

FAMOUS NAMES

The new University Park Hotel at MIT immerses visitors in Institute life present and past—it's located within walking distance of campus, and several meeting rooms and suites are named for notable figures in MIT history.

The **Norbert Wiener** Greatroom honors the eccentric father of cybernetics whose photos and mathematical notes fill an exhibit in MIT's Infinite Corridor. The **Jerome C. Hunsaker** Ballroom honors the aeronautics professor who designed the NC-4, the first plane to cross the Atlantic, and the **Lawrence B. Anderson** Roof Garden celebrates the memory of a force for modernism in MIT's Department of Architecture.

Other MIT notables whose memories are honored within the new hotel include **Florence Luscomb,** a 1909 architecture graduate; **Lan Jen Chu,** an MIT faculty member from 1947-73, and **Robert R. Taylor,** believed to be the first black graduate of MIT and a founder of Tuskegee University. The Presidential Suite on the hotel's eighth floor is named for MIT's founder, **William Barton Rogers,** and his wife, **Emma Savage Rogers.**

STRIKE UP THE BAND

Professor Emeritus **Samuel J. Keyser** sings in English and French on the new CD *The New Liberty Jazz Band Plays Whatever.*

Well, not exactly sings.

"I'm talking because I can't sing," Professor Keyser explained to Eric Jackson on WGBH radio's "Eric in the Evening" during an hour-long chat interspersed with selections from the disc on January 28.

The septet plays 16 songs written from 1900 through the 1950s in the Dixieland/ragtime style in which they were originally performed. The songs were extremely popular in their day but have been long since forgotten.

Professor Keyser provides his rendition of *The Breeze,* written by a trio of composers named MacDonald, Goodwin and Hanley in 1919 and included in the repertoire of many barber shop quartets of the day. He also recites the 16th-century French poem *A une Damoyselle malade* by Clement Marot to the tune of *I Remember When,* popularized by the legendary New Orleans soprano saxophone pioneer Sidney Bechet in the 1950s.

Other songs on the CD include *Riverboat Shuffle,* written by Hoagy Carmichael for his cornetist friend Bix Beiderbecke; *Irish Blackbottom,* a Louis Armstrong showpiece written by Perry Venable; and *Eccentric* by J. Russell Robinson, best known as the composer of *Margie.*

Professor Keyser, who also plays trombone in the band, told Mr. Jackson that the CD derives its title from its sole original song, written by cornetist Bobby MacInnis. One band member suggested that he name it *Igor's Lunch,* Professor Keyser said, while another nominated *Rasputin's Stomp.* The composer said, "Whatever."

The song was no longer untitled. Nor was the CD.

Anyone interested in purchasing the CD may call Professor Keyser at x3-1917. He delivers.

TO HOMER AND BEYOND

The Cambridge Tab (December 22, 1998) interviewed **Janet Murray,** senior research scientist at the Center for Advanced Educational Services and author of *Hamlet on the Holodeck: The Future of Narrative in Cyberspace* (MIT Press), to honor her book's publication in paperback.

Hamlet on the Holodeck, voted one of Library Journal's two "Best Computer Books of 1997," was described in the Tab as "an accessible read that doesn't dumb down its subject."

"We have got a storytelling technology that is able to capture more of the world than Homer's lyre," said Professor Murray, referring to new interactive and multimedia narrative software to which many have reacted with apprehension. "My reaction is, 'Hooray!'" she said.

GOODBYE, GEEKS

In an essay in the January 13 issue of the New York Times, **Paul Krugman,** the Ford International Professor of Economics, ascribed the success of a new book, *Information Rules: A Strategic Guide to the Network Economy* by Carl Shapiro and Hal Varian, to the co-authors' "hardheaded, even Machiavellian" views.

"To make money from information, they suggest, you have to find clever, in some cases dastardly ways to outmaneuver your competition and exploit your customers," wrote Professor Krugman (who is also the subject of a reprinted interview on page 9).

"The Information Age has lost its innocence… say goodbye to the geeks in their garages, and say hello to the new railroad barons—and by the way, see you in court."

HELLO, HAL

The Age of Spiritual Machines: When Computers Exceed Human Intelligence by Ray Kurzweil (Viking) and *When Things Start to Think* by **Neil Gershenfeld** (Holt) were reviewed at length in the New York Times Book Review (January 3) by Colin McGinn.

The books "provide a vivid window on the state of the art in artificial intelligence research and offer provocative speculations on where we might be heading as the information age advances.

Gershenfeld

"The Age of Spiritual Machines… is detailed, thoughtful, clearly explained and attractively written. [It] ranges widely over such juicy topics as entropy, chaos, the big bang, quantum theory, DNA computers, neural nets, genetic algorithms—the whole world of information technology past, present and future. This is a book for computer enthusiasts, science fiction writers in search of cutting-edge themes and anyone who wonders where human technology is going next.

"Gershenfeld's breezily chatty book [has] much discussion of his many achievements in harnessing computer technology to more physical concerns: electronic books, smart shoes, wearable computers, technologically enhanced cellos."

Dr. Gershenfeld is associate professor of media arts and sciences at the Media Lab. Ray Kurzweil (SB 1970) is founder, chairman and CEO of Kurzweil Music Systems Inc. in Waltham.

SUCH A DEAL

Microrockets smaller than matchbooks could follow the worthy example of ants, launching payloads many times their own weight, according to **Jack L. Kerrebrock,** professor of aeronautics and astronautics.

In an explanatory interview published by the Sunday Times of London on December 27, 1998, Professor Kerrebrock said, "We are simply working on the same principle that lets ants carry heavy objects, which basically allows small things to produce a lot of power."

Fueled by a mix of liquid oxygen and ethanol, each tiny rocket will produce about three pounds of thrust. This gives the rocket a thrust-to-weight ratio of more than 10,000. The space shuttle's main engine has a ratio of 70, the Times article noted.

The NASA-funded microrocket project will also lead to rockets that are "extremely cheap to produce," said Professor Kerrebrock. "Once we enter mass production, the price could drop to $10."

MIT ANCESTOR

In "Fading into White," an article in the February/March issue of American Heritage magazine, Jillian Sim, who was brought up to consider herself white, tells the poignant and sometimes suspenseful story of her quest to locate and honor her African American ancestors—some who "passed" as white, others who didn't. Among those who did not was her great-grand-uncle, **Frederick John Hemmings,** one of the first African Americans to graduate from MIT. Mr. Hemmings, who received his degree in 1897, lived in Roxbury and worked as a chemist at the Boston Navy Yard. His MIT senior class photograph accompanied the article.

Hemmings

Obituaries

MICHAEL BLAHO JR.

A funeral Mass was held on January 6 at St. Joseph's Church in Wakefield for Michael Blaho Jr., 75, of Wakefield, a former project technician at the Francis Bitter Magnet Laboratory, who died on January 3. He joined MIT in 1951 and retired in 1989.

Mr. Blaho is survived by his wife, Doris; four daughters, Maureen, Karen, Joyce and Irene; a son, Neil; and a granddaughter. Donations in his memory may be made to the Memorial and Honor Program at St. Jude Children's and Research Hospital, 501 St. Jude Place, Memphis, TN 38105.

FREDERICK D. CARTER

Word has been received of the September 10, 1998 death of Frederick D. Carter, 86, of Cambridge, a former custodian in Physical Plant. He joined MIT in 1969 and retired in 1978. Survivors include three sons, Henry, Robert and Joseph; a daughter, R. Joy King; several grandchildren and great-grandchildren; and one great-great-grandchild.

PAUL C. CROWLEY

A funeral Mass was held on December 16 at St. Mary's Church in Cambridge for Paul C. Crowley, 82, of Somerville, a former custodian in Physical Plant, who died on December 13. He retired in 1981 after working at MIT for seven years.

Mr. Crowley is survived by a son, Paul Jr. of Melrose; seven brothers, Ronald, Donald, Philip, John, Richard and Jerry Rogers and Kenneth Crowley; three sisters, Bernice Kaminski, Mary Cleary and Mildred Crowley; and three grandchildren. He was buried in Puritan Lawn Memorial Park in Peabody.

DANIEL M. DEVINE

Daniel M. Devine, 39, of Hingham, a Lincoln Laboratory administrative staff member, died on January 3. He began working at Lincoln Lab in August 1997. He is survived by his mother, Katherine Devine, and a brother, Robert.

JOHN J. FITZGERALD

A funeral Mass was held in St. Mary's Church in Melrose on January 26 for John J. Fitzgerald, 91, of Melrose, a former mail worker in Physical Plant, who died on January 22. He retired in 1973 after 11 years at MIT.

Mr. Fitzgerald is survived by his wife, Mary; two sons, John of Burlington and James of Burlington; a daughter, Catherine Fitzgerald of Melrose; a brother, Dermot of Ireland; a sister, Catherine Clifford of Ireland; eight grandchildren and three great-grandchildren. He was buried in Oak Grove Cemetery in Medford.

ALICE M. GRIFFIN

A funeral was held at the Folsom Funeral Home in Roslindale on January 14 for Alice M. Griffin, 75, of Braintree, a former senior technical artist in Graphic Arts, who died on January 10. She joined MIT in 1948 and retired in 1982.

Ms. Griffin is survived by two sisters, Ruth Anderson of Needham and Phyllis Burke of N. Quincy. She was buried in Forest Hills Cemetery in Jamaica Plain. Donations in her memory may be made to the American Cancer Society, 30 Speen St., Framingham, MA 01701.

JULIA E. JOHNSON

A funeral Mass was held at Our Lady of the Presentation Church in Brighton on January 30 for Julia E. Johnson, 98, of Cambridge, who died on January 24. She was a retired senior office assistant in the Comptroller's Accounting Office who worked at MIT from 1939-67.

She is survived by two stepdaughters, Ruth Randolph of Needham and Mary Grunland of Lexington; a stepson, William Johnson of Pennsylvania; and a sister, Helen Dewire of Lexington. She was buried in Holyhood Cemetery.

CALVIN C. PATTEN

A funeral was held on January 4 at the Robinson Funeral Home in Melrose for Calvin C. Patten, 70, of Malden, a former senior technical artist at Lincoln Laboratory, who died on December 31. He retired in 1993 after working at MIT for 32 years.

Mr. Patten is survived by his wife, Mildred; a son, Calvin W. of Malden; a sister, Minerva Russell of Kissimee, FL; and a grandson. Donations in his memory may be made to the North Shore Assembly of God, c/o Royal Rangers, 77 Kennedy Dr., Malden, MA 02148.

CHARLES J. RECORD

A funeral Mass was held in Mary Immaculate of Lourdes Church in Newton Upper Falls on December 17 for Charles J. Record, 84, of Newton Upper Falls, who died on December 13. He was a former technical assistant in the Department of Biology who began working at MIT in 1945 and retired in 1977.

Mr. Record is survived by a daughter, Verna M. Brown of South Paris, ME. He was buried in St. Mary's Cemetery in Needham. Memorial donations may be made to the American Heart Association, 20 Speen St., Framingham, MA 01701.

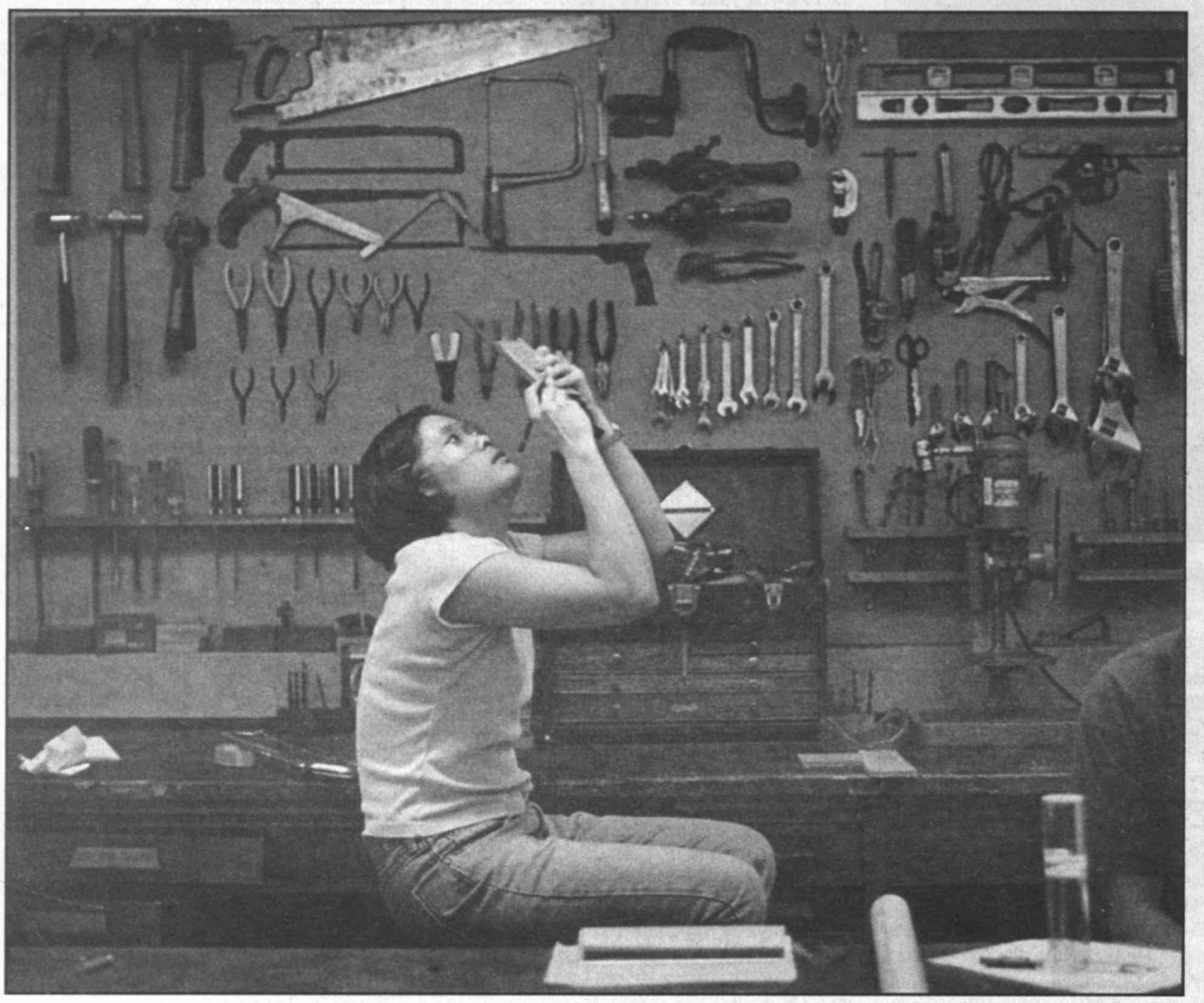
GRACE W. ROWE

Grace W. Rowe, 78, of Winchester, a former senior technical artist at the Laboratory for Nuclear Science, died on January 24. She began working at MIT in 1965 and retired in 1983. Names of survivors were unavailable.

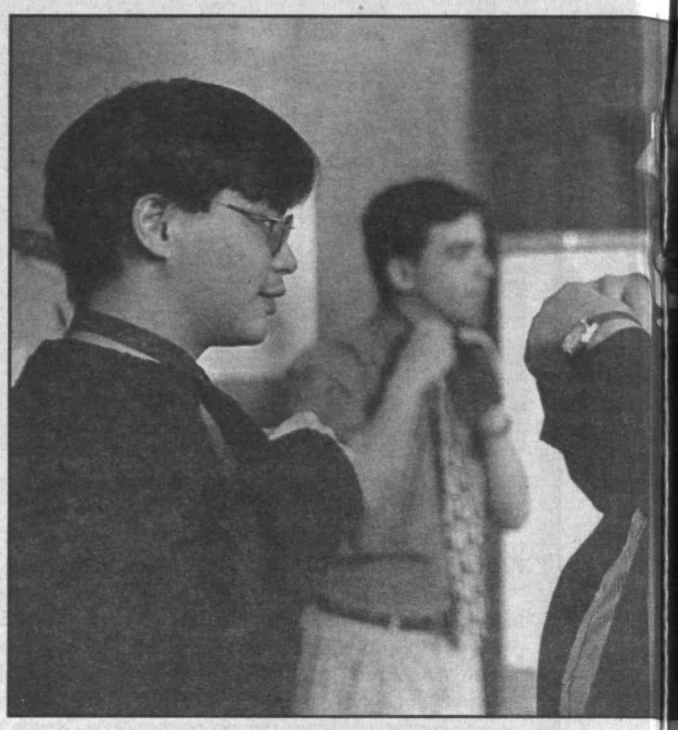
ELIZABETH G. WHITNEY

Word has been received of the November 20, 1998 death of Elizabeth G. Whitney, 87, of Somerville, a former senior clerk at MIT Press. She retired in 1977 after working at the Institute for 13 years. Survivors include two daughters, Katherine Inglee of Wilmington, DE, and Mary Elizabeth Whitney of Meadville, PA; and two grandchildren.

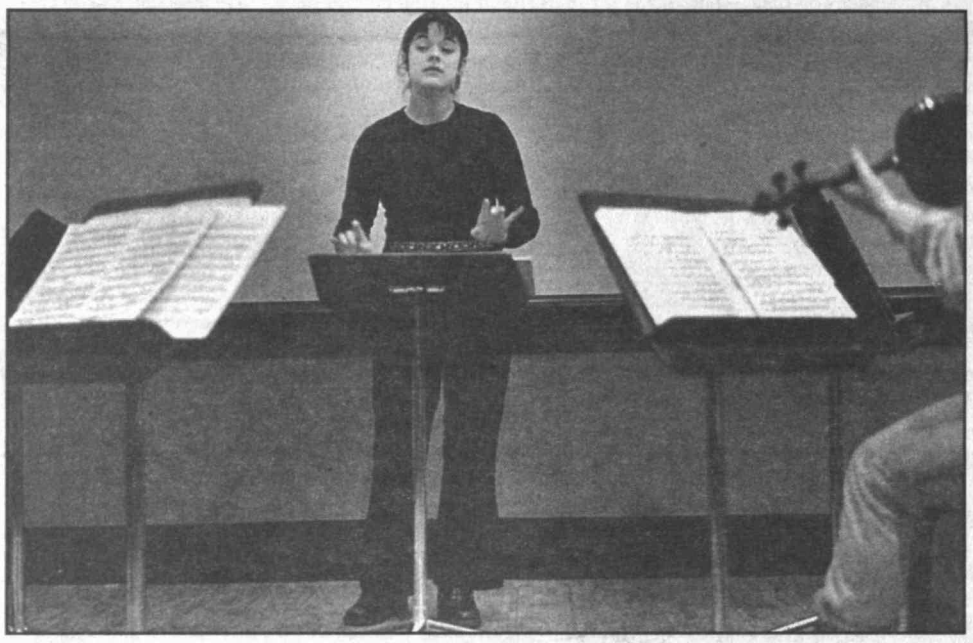
IAP Notebook



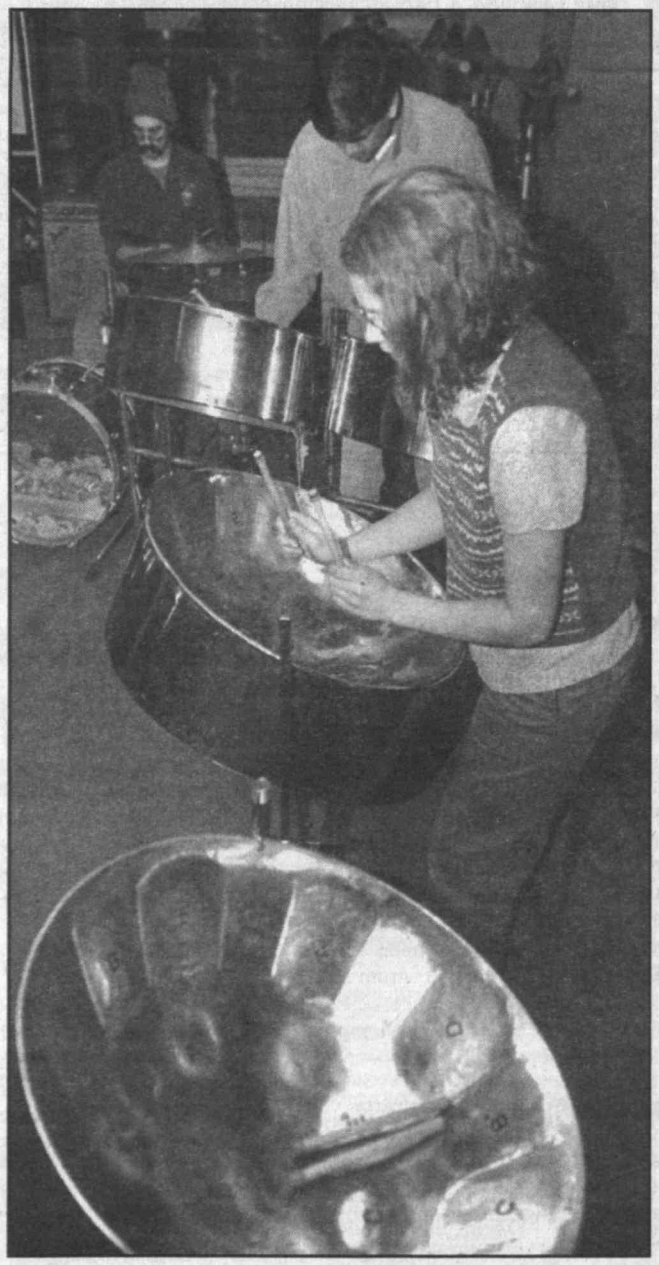
Sabina Ma, a senior in mechanical engineering, at work in "Make a Motor."



William Hecht, executive vice president of the Alumni/ae Asso ion (right), ins a graduate student in mechanical engineering, on the fine point tying a bow ti School."



Molly Forr, a sophomore in architecture, tries her hand at "Becoming a Musical Semiconductor."



Django Carranza (rear) and students Manu Sridharan, a sophomore in electrical engineering and computer science, and Jenni Szlosek, a sophomore in earth, atmospheric and planetary sciences, give a performance on "Steel Pans (Drums) of Trinidad and Tobago."

Advice from the 'charmcellor'

Forget sunscreen—"don't forget your raincoat." That was the advice Chancellor Lawrence Bacow offered to 216 graduates at the Charm School commencement in Lobby 10 last Thursday.

Chancellor Bacow, promoted to "charmcellor" for the occasion, told the students his raincoat was a strategic lifesaver when he used it to cover an unfortunately located rip in his trousers at a luncheon meeting with a potential MIT supporter at the Harvard Club. The lesson, he said, is that "poise, charm and a firm handshake are important, but don't forget your raincoat."

Wearing a Harvard robe, a Viking helmet and carrying a plastic mace, Charmcellor Bacow said he was fulfilling a lifelong dream with his appearance—"not wearing this crazy hat… but delivering an MIT Commencement speech."

After completing an intense one-day curriculum that included schmoozing, body language, manners, how to tell a joke, flirting and dating, "what more do you need other than an MIT education to conquer the world?" he asked his student audience.

Honorary degrees were awarded to Associate Dean Alberta Lipson and Rosanne Swire of the Office of Academic Services. In addition to awarding bachelor's, master's and PhD "degrees," the Charm School Police issued more than 200 citations for fashion violations. About 50 students received complimentary citations for making positive fashion statements, according to Charm School Police Chief Ted Johnson of the Campus Activities Complex.

Charmcellor Bacow shared the commencement platform with Dean of Charm Travis Merritt, the MIT beaver (Anne McLeod, a junior in civil and environmental engineering), and the Charm School student coordinator, Rita Lin, a junior in chemical engineering. Monica Huggins, Katherine O'Dair and Heather Trickett of Residential Life and Student Life Programs were the Charm School coordinators.

Robert J. Sales

IAP Notebook

...ae Association (right), instructs Kan Ota, ...he point tying a bow tie during "Charm

A participant in the January 29 "Bridge Tournament" plays a card.

Photos by Laura Wulf

Joining forces for leadership

The Leaders for Manufacturing program (LFM) at the Sloan School for Management and ROTC co-sponsored a two-day IAP seminar last week on leadership—a key ingredient in success for both the military and industry. Eighteen undergraduates participated in the seminar, most of them from the Sloan School and the School of Engineering.

The military-civilian effort was organized by ROTC officers and the LFM over five months at the suggestion of LFM Professor Emeritus Robert McKersie, who was the keynote speaker last Friday, the final day of the event. Professor McKersie chairs the ROTC Oversight Committee.

"Our goal was exposure," said Col. John Kuconis, director of the Air Force ROTC. "We want to be part of the mainstream of the Institute." Representatives of all three ROTC units participated in planning the seminar while Capt. Tony Cho of the Army participated. Speakers included William Hanson of LFM and Professor Maureen Scully of the Sloan School.

A principal LFM organizer was James A. Wolters II, who attended the Naval Academy and served as a Naval flight officer for 10 years before becoming an LFM Fellow in the fall. In his eyes, both civilian and military leadership involve motivational skills that "build esprit de corps."

"You've got to make people feel like they have a stake in the organization, that their ideas count," he said. "People want leadership. They want someone to stand up."

Besides Mr. Wolters, LFM graduate students who participated in the seminar were Brian Urkiel, Brian Wolkenberg, Meghan McArdle, Chip Zaenglein and Dan Wheeler.

Robert J. Sales

Field work fun in the sun

(The following account of IAP course 12.314, Field Oceanography, was written by Moana Minton, a sophomore in earth, atmospheric and planetary sciences. The trip from January 11-22 was led by Associate Professor Maureen Raymo of EAPS. Professors Ron Prinn of EAPS and Rafael Bras, head of civil and environmental engineering, as well as the Caribbean Marine Research Center, also provided funding to support the expedition.)

When we finally arrived at the dock of the Caribbean Marine Research Center on Lee Stocking Island, in the outer archipelago of the Bahamas, we were exhausted. We had arrived at Logan Airport at 4:30am to tumble onto a plane to Miami; we then crowded onto a bus to a propeller plane to Great Exuma, and then onto another bus and finally to a motor boat which carried us across the Great Bahama Bank to our destination.

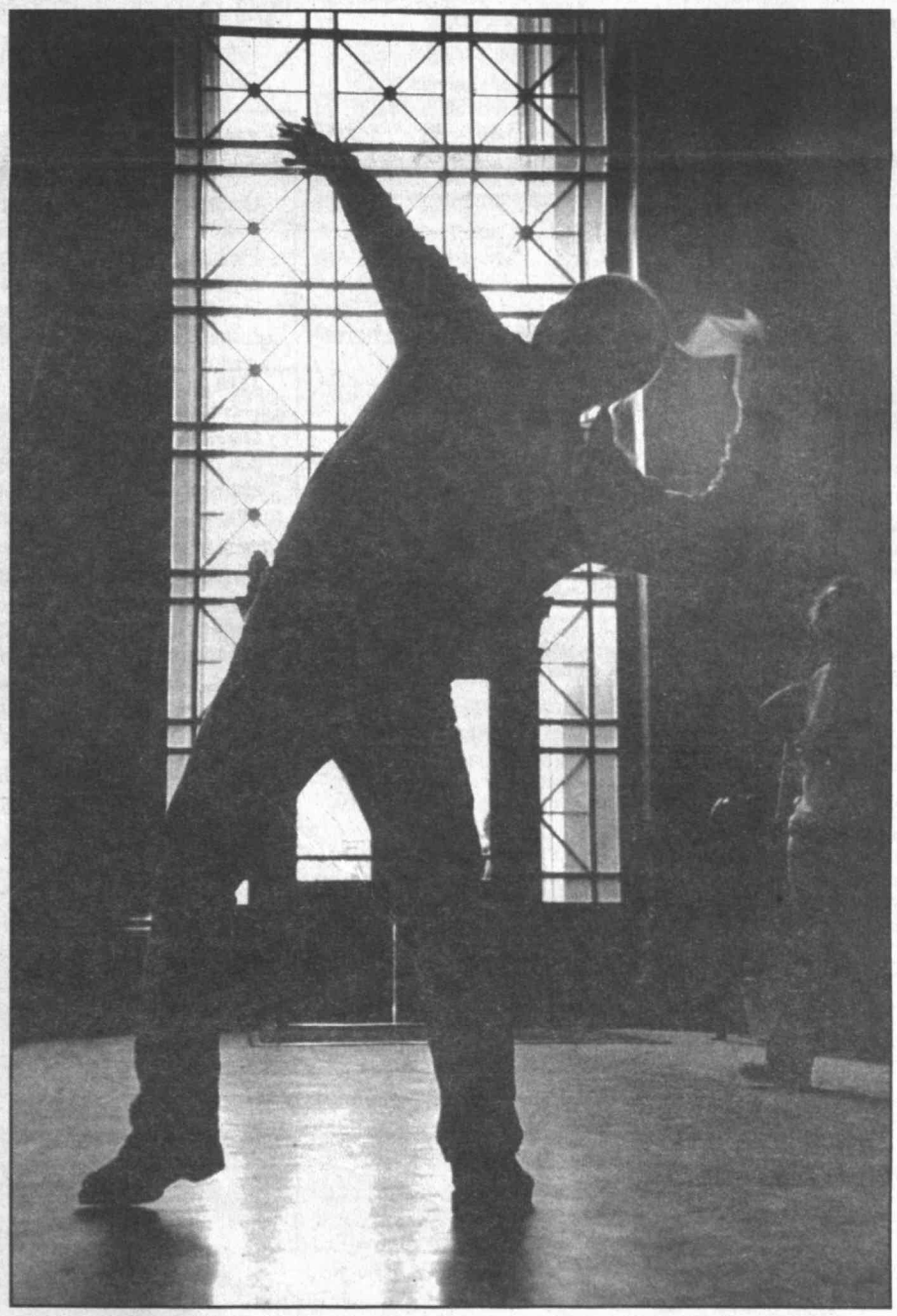
The island was small, inhabited only by the Center employees. There was only one vehicle, and it was a golf cart. The residents obtained all their water through desalinization. There were no lights at night, no radios (save in the kitchen), and when the one television was on, it was to watch the Weather Channel. These people (approximately 30 including our group) were here to do science and learn from other scientists, up at dawn for breakfast and outside until the sun went down. This was real. They were dissecting the planet.

It was amazing to me that we were there, too—a bunch of students without a real understanding of what we were doing. Myself, especially—one who intended to leave MIT for the greater world of writing and literature. One scientist's T-shirt read it right, though, and made me laugh: "If We Knew What It Was We Were Doing, It Wouldn't Be Called Research!"

The next day I snorkeled over corals that, even coming from Hawaii, I had never seen or imagined. Looking at brain corals six feet in diameter, and elkhorn coral that reached 20 feet up through the water and branched dozens of feet across, I understood clearly how entire civilizations could depend on these tiny animals. The bright bodies of hundreds of fish hid in their branches and swarmed around us in groups.

Every night, we received an impromptu lecture from one of the researchers—either on the worldwide bleaching of corals that occurs when the oceans warm (and their fractional recovery rate), or the depleted conch population in Florida that, despite 14 years of protection, has not rebounded. The delicacy of popula-

(continued on page 10)



Stefan Marti, a Media Lab graduate student, launches his entry in the "14th Annual Paper Airplane Contest" in Lobby 7 last Friday.

Alcohol guidelines updated in policy guide

The section of "MIT Policies and Procedures: A Guide for Faculty and Staff Members" which concerns alcohol has been updated on the web.

The updated Section 9.3.2 of Policies and Procedures, which was recently reaffirmed by the Academic Council, does not reflect a change in policy. It does bring together in one place the alcohol policy as previously expressed in Policies and Procedures and the guidelines that have been in place for the last year with respect to using Institute funds for purchasing alcohol and to the events registration process. The document should make the policy and procedures clearer.

Section 9.3.2 can be found on the web at <http://web.mit.edu/policies/9.3.html> and is reprinted below.

"MIT observes all laws and regulations governing the sale, purchase, and serving of alcoholic beverages by all members of its community and expects that these laws will be adhered to at all events associated with the Institute. This includes activities on the MIT campus, in MIT independent living groups, and at off-campus functions sponsored and supported by MIT or any of its affiliated groups.

"The Institute does not intend through its guidelines or policies to restrict the responsible use of alcohol by members of the MIT community who are at or above the legal drinking age. Efforts to observe existing laws and regulations in an environment in which the majority of the undergraduate student body is not of drinking age will, however, almost certainly impose some constraints on those who are of age.

"No alcoholic beverages may be served or consumed in any work area of the Institute at any time, except in Institute dining areas or at official Institute functions when expressly authorized by a member of the Academic Council.

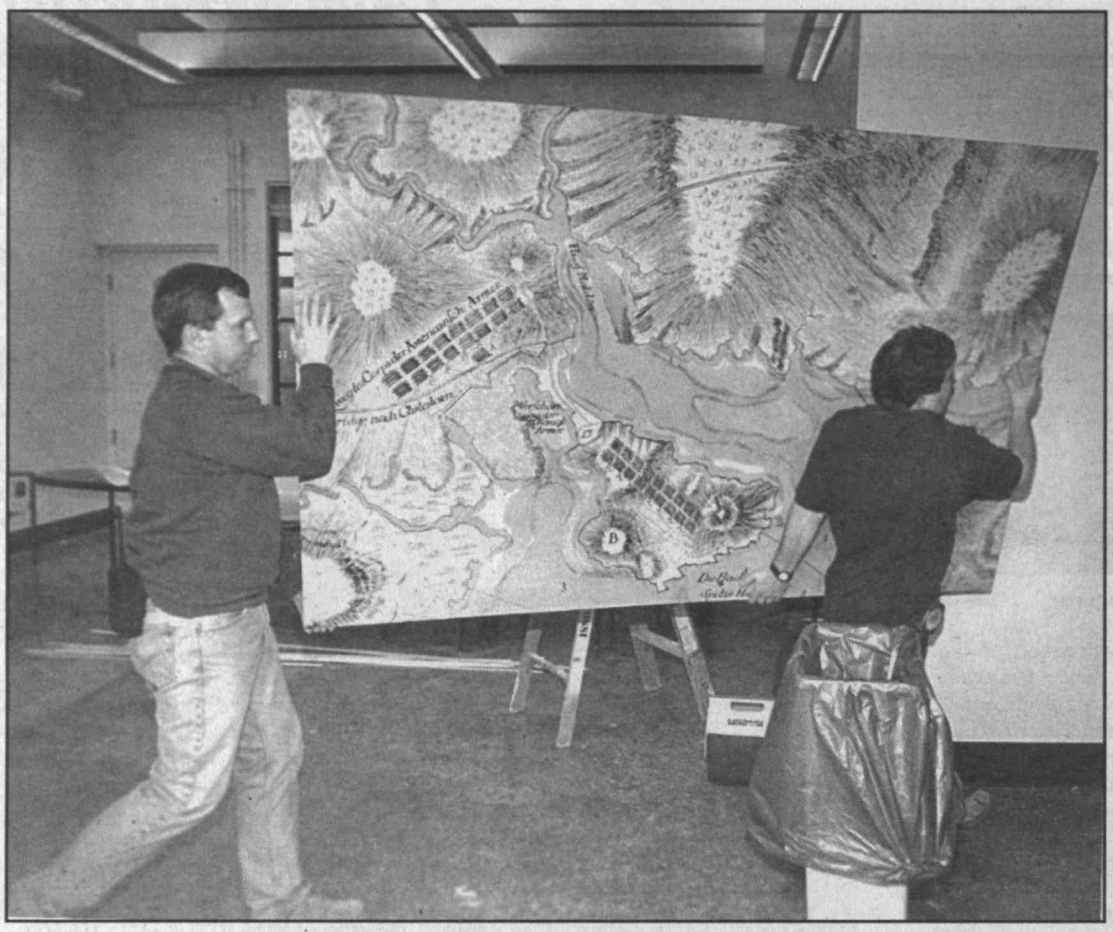
"Institute funds may not be used by student-run organizations to purchase alcohol. This includes both graduate and undergraduate groups and residence halls. As a result, 'house taxes' and student activities funds may not be used to purchase alcohol; however, they may be used to hire bonded bartenders and/or party monitors.

"MIT departments, including academic departments, laboratories and centers, and administrative units, may not use Institute funds to purchase alcohol for events where persons under the age of 21 are present. This prohibition may be waived with the approval of the relevant dean, vice president, or other member of the Academic Council, based on a determination that the requirements for serving alcohol at events are understood and will be observed.

"All nonstudent-sponsored events where alcohol is served must be registered through the Conference Services Office, after being authorized by a member of the Academic Council. All student-sponsored events where alcohol is served must be registered through the Residential Life and Student Life Programs Office, after being authorized by the appropriate dean in the Office of the Dean of Students and Undergraduate Education.

"Violations of this policy may be grounds for serious disciplinary action, up to and including discharge."

Map murals



Bill Maddox (left) and Bill Warnock of Kennedy and Rossi Construction carry an enlarged map of late eighteenth-century Boston to its home on the wall of newly renovated space in the School of Architecture and Planning (a computer area on the fourth floor beneath the Great Dome). The wall mural is one of two that were reproduced from original antique maps owned by Norman B. Leventhal (SB 1938 in building engineering and construction). Some of his maps were displayed last summer in the Compton Gallery.
Photo by Laura Wulf

It's a fact

In 1866 MIT's tuition was $100 for first-year students, $125 for second-year students and $150 for upperclassmen.

More retirement sessions scheduled

Following is the February schedule for campus information sessions on changes to the MIT Retirement Plan.

Topic	Date/TIme	Location
Understanding Your MIT Retirement Plans —A discussion of both the MIT Supplemental 401(k) Plan and the Basic Retirement Plan. This includes an overview of the new 401(k) contribution limits, investment options and recent changes to the plans.	• February 10 at 11am • February 17 at 1pm	• Student Center, Twenty Chimneys • Killian Hall (Rm 14W-111)
TDA or 401(k) —Should you stop contributing to your TDA and increase your 401(k) contributions? This presentation will outline issues to consider and help you understand the differences among the 401(k), TDAs and other retirement savings plans.	• February 10 at 1pm	• Student Center, Twenty Chimneys
Tax-Advantaged Investing —Designed for employees making the maximum contributions to the MIT 401(k) Plan and the TDA/403(b) program and have additional money to invest. An overview of investments designed to minimize the effect of income taxes on returns.	• February 10 at noon • February 24 at 1pm	• Student Center, Twenty Chimneys • Killian Hall (Rm 14W-111)
Understanding Your 401(k) Investment Options —A discussion of the Variable Fund, Fixed Fund and the Money Market Fund, focusing on investment guidelines and returns.	• February 17 at 11am	• Killian Hall (Rm 14W-111)
Your Annual MIT Retirement Plan Statement of Benefits —A discussion of reading the 1998 annual statement (to be mailed in late February), reviewing assumptions used in preparing retirement income estimates and discussing the one-time market value adjustment.	• February 24 at noon	• Killian Hall (Rm 14W-111)
Decisions, Decisions, Decisions —A presentation designed to help you decide how to take advantage of the changes in the MIT Retirement Plans.	• February 17 at noon • February 24 at 11am	Both in Killian Hall (Rm 14W-111)

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 world-wide.

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

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

Deadline is noon Friday before publication.

■ FOR SALE

Small desk w/drawers both sides, $55; 4 Captain's chairs, $35/ea; black Boston rocker, $45; rowing machine, $20; x-c skis & boots, downhill boots & skis, poles, bst offer. Call 617-332-8251.

Global Village external modem, Mac compatible, upgraded to 33K, software, $50; Canon fax/phone, hardly used, $75. Suzan, <schin@mit.edu> or x3-9634.

Irish knit cardigan, beautiful, new, never worn, handknit, sz large, natural color, $165. Joan x3-4287, <jcq@space.mit.edu>.

Special order, brand new, never used (too large for area) rattan arm chair, wheat color background, blue/rose flower print, $325. Pat, Draper x8-3513.

Polaroid Super Shooter Plus with timer & carrying case; SX70 sonar One Step w/accessories, model E-10 w/microscope tube. Mark, 781-259-9386.

M's topcoat, sz 42 reg, navy blue w/lining plus zip-out pile lining, yr-rd water-repellent coat, like new, $35. Rosalie 617-776-3748.

M's Olin 190 w/Tyrolia bindings, poles, $25; Nordica boots sz 9, Salomon sz 8, $10/ea; x-c Karahu 210, poles, boots sz 10, $25; L's x-c Karahu 190, poles, boots, sz 8.5, $40. Call 781-769- 4882.

■ VEHICLES

1990 Chevrolet GT Beretta, grt cond, 59K, 2-dr coupe, maroon, $4000 or bst. Call 617-436-9986 x15 (days).

1991 Nissan Sentra Xe sedan, 2-dr, 4-cyl, 1.6 liter, 5-sp manual, 103K, AM/FM/cass, nw tune-up, timing blt recently completed, book value $4500, perf cond, askg $3700 or bst. Call 781-279-8534.

1994 Honda Civic CX htchbk, manual transm, Aztec green, exc cond, 63K, AM/FM/cass, a/c, 1 ownr, $8600. Email: <Laurenza@mit.edu>.

1996 Volvo 850 wagon, rare 5-sp, black, htd seats, pw, 1 ownr, dealer serviced, superclean, 35K miles, $20,500. Contact x3-5472 or <pierce@shore.net>.

■ HOUSING

Paris, 11th: lrg furn traditional 3 room (+ kitchen) apt in gd bldg w/elev & concierge, avail acad yr 99-00 for $1500/mo incl ht. Contact: <rlindzen@mit.edu> or 617-332-4342.

Somerville: 2BR+, Som-Camb line, nr Harvard/Inman Sq, completely renov, w/d, yd, prkg, $1200/mo. Call 623-1377; <ahmed@LL.mit.edu>.

Somerville: 1st floor apt, 10 min walk to Porter & Davis Sq, 4 rms, 1BR, 1b, hdwd flrs, $700. Call 617-666-0534 or x3-5427.

West Medford: 3-rm apt on bus line, off-st prkg, no pets, no smkg, incl elec and fridge, $650. Call 781-483-3032.

■ CHILDCARE

Technology Children's Center at Eastgate currently has 2 openings for full day (8-5:45) child care — one for 5 days/wk, the other 3 days/wk. Contact: <olslocum@mit.edu> or x3-5907.

Do you have news or information you'd like to share with the MIT community or outside readers?

The MIT News Office staff can work with you to produce Tech Talk stories and press releases on such things as:

- **Research advances (upcoming papers, clinical trials, etc.)**
- **New programs**
- **Noteworthy events or milestones**

Contact the News Office at **x3-2700** or **<newsoffice@mit.edu>**. Also see our web page with links to our various publications at **<http://web.mit.edu/newsoffice/www/>.**

Sharp tongue, maverick mind characterize Paul Krugman

(The following article by Orna Feldman originally appeared in the fall 1998 issue of Soundings, the newsletter of the School of Humanities and Social Science. Ms. Feldman is editor of Soundings.)

Paul Krugman, the Ford International Professor of Economics, is the winner of the 1991 John Bates Clark Medal, awarded every two years to an American economist under 40 who has made significant contributions to economic knowledge. Lauded for the originality and elegance of his theoretical thinking—particularly on the "new trade theory" he helped found—he is known equally well for his controversial stances that debunk policymakers' thinking on many hot-button economic issues. Cited by Newsweek as Nobel-bound, Krugman is the author of 16 books—most recently, *The Accidental Theorist*—and a regular contributor to Fortune magazine and Slate, an on-line magazine.


Krugman

Soundings: **You're known for skewering the cherished economic ideas of powerful policymakers. A while back, for example, you called the notion of international competition a "dangerous obsession." Where, in your opinion, should policymakers be focusing their attention?**

Krugman: I think the really big problems here are mostly problems of distribution, of inequality between the well-off and the badly off, and the social problems that go with that.

Let's talk about this disparity of income. Why are the rich getting richer and the poor getting poorer?

The short answer is, we don't know. But there are two popular stories. One is a right-wing popular story which says it's not happening and that it's all politically motivated. Much of what I've written has been an attempt to debunk the well-financed attempts to declare that there is no issue of income inequality.

You mean by laying out the facts?

Yes. But the problem is how you look at the facts. One of the great myths of American life is social mobility. Our belief in Horatio Alger stories is really a lot larger than the reality. The fact is that most people who are in the upper tiers of the income distribution were born there and most people who are in the bottom were born there. But there's almost a disinformation campaign to claim this isn't true.

And what's the other popular story?

Well, the myth on the left is that it's all the fault of imports, that it's the global economy that's done it. And looking at the numbers makes it clear that this is not the main story. It's probably some combination of technological change and more complicated factors that have caused the inequality.

In what way is technological change the culprit?

The kinds of technological change we've had in the last 20-25 years have been very strongly biased toward highly skilled people. Loosely speaking, you take something that used to require two engineers and 48 blue-collar workers to produce, and now you can produce it with four engineers and 10 blue-collar workers. So it's not just that you can produce something with fewer workers—which is a good thing because you get to produce more stuff—but that the workers needed are much more highly educated and skilled. There has been a devaluing of ordinary labor.

The other thing, which is a little more subtle, is that technologies put a huge premium on a small number of people perceived as being the best at something. This is the "winner take all" or "superstar" aspect of technology. You have a handful of people making enormous sums of money on the one hand, and on the other, a decline in the demand for people who are only good, as opposed to famous. You see this in the superstar lawyer who can handle many cases simultaneously, with a staff of supporting people, and in the academic world with the increased ability to disseminate information over the Internet.

While it's true that anybody can post a paper on the Internet, what actually happens is that the half dozen or so established names get read and responded to. And there is no way for someone who isn't already in the magic circle to really get into that discussion. It has the effect of creating a handful of academic superstars who reap a disproportionate share of the glory. It's happening throughout our society—a relatively small number of people become enormously wealthy and a relatively large number of people are left behind.

Are they left behind in the middle class, or are they slipping further down?

The changes in income in the US are what I call fractal—that is, there's increased inequality among astonishingly narrow groups of people. So engineers are doing better than janitors, but there's increased inequality among engineers. And the bottom tenth of our population is clearly slipping backwards. The main point for me is a question of social cohesion—a sense that the bulk of Americans are living in the same universe. Social cohesion has been steadily eroding for 20 years now.

Why does that concern you?

I think it affects the way our society functions. It's hard for people to feel part of a community when there are vast inequalities within that community. It's something that makes a lot of people feel that they've been left behind, even if in absolute terms their living standard has risen over their lifetime, and I also think it has political consequences. When I was growing up, the idea that the way you became a senator or even a president was to be a very rich man who spent a lot of money on your own campaign just didn't have currency. Now it does. Compared with the kinds of economic crises that are happening elsewhere in the world, the US is doing pretty well. But I still find what's happening to our society pretty disturbing, though I think you can do some things carefully to redress the balance.

What economic policies would flow from that?

I'm a big believer in taxes and transfers. In the US, we like to complain about how over-taxed we are, but we actually have the lowest tax burden, as a share of income, in the advanced world. And you can make a lot of difference at the bottom with a relatively small amount of money. We have a program, the Earned Income Tax Credit, which, like any program, has its problems, but it makes a huge difference to millions of hard-working but low-paid people. Basically, it tops up the wages of people with low earnings. I'd like to see a lot more along those lines.

And conversely, would you tax the rich at higher levels?

Yes. We really need ameliorative social policies.

Much has been written about the impact on the US of the fall of the Asian economies and the economic debacle in Russia. What concerns you most about this?

The thing that most bothers me about Asia is, if this can happen to them, who's to say it can't happen to us? In the case of Japan, you have an advanced, modern economy with no foreign debt and a stable government and all that, which can still get caught in a slump that it doesn't seem to know how to get out of. In the case of the rest of Asia, you have economies that are a little more backward and a little more primitive that do have foreign debts. But still, the way they went almost instantly from an economic boom to the worst slump since the 1930s has got to be a cautionary tale. It suggests there's a lot more risks out there in the world economy than anyone suspected.

So what should we be doing?

First of all, we should be working extremely hard to understand what's happening. And I've actually been a bit dismayed that a lot of the economic commentary in the United States about Asia, and about Japan in particular, has had this kind of moralistic, triumphalist tone: "Well, we do it right and they did it wrong, and that's why this can't happen to us." It was just a few years ago that everyone talked about how superior the Asian economic systems were.

But I'm obsessed with Japan right now. And the reason is—to see something that really looks like a Depression-style economic crisis developing in Japan is a little bit like seeing the Black Death return. This is not supposed to happen in modern times. So I think it's terribly urgent to understand their problem, and well enough so that we understand how to avoid getting into it ourselves. But I find strikingly few serious attempts to analyze the situation.

"The fact is that most people who are in the upper tiers of the income distribution were born there and most people who are in the bottom were born there. But there's almost a disinformation campaign to claim this isn't true."

—Paul Krugman

I want to segue to your work in the media. You've been lauded for the simplicity of your prose that nevertheless manages to explain complex phenomena. But many professionals say that the simplicity doesn't do justice to the complexity. How would you respond?

Well, for one thing, I decided a few years back that if people who knew the complexities didn't write for the broader audience, then the broader audience was going to be the captive of people who didn't understand the complexities. And you know, there's a lot of bad economics out there. A lot of things that are wrong—either on the facts or on the logic or both—can sound very good to someone who isn't used to thinking about it systematically. You need to have somebody explaining that these things are wrong. Otherwise, they get into the public perception.

I mean, suppose you were a serious research psychologist and you saw Deepak Chopra made head of the National Institute of Mental Health. You'd feel pretty bad about that, right? That's been taking place in economics. And beyond that, why not? I enjoy writing. I like to think I'm a pretty good writer. Maybe a John Updike I'm not, but I think I can write as well as most of the people who do write on economics. And I happen to know my stuff, too. So why shouldn't I be trying to communicate it?

What is your opinion of economic journalism in general?

What's amazing is how thin it is. If you look at the people who actually know enough to make knowledgeable commentary on economics in the US press, it's probably a dozen or so, total. Several people at the [New York] Times, Peter Passell and Sylvia Nasar, are pretty good, and Lou Uchitelle works hard on it. Generally speaking, the writers for the Economist know what they're doing. But the stuff that they put out on economics in general-interest, intellectual magazines, say the New Yorker or the Atlantic Monthly, has been just awful.

What's wrong with it?

Both magazines have consistently favored people who don't know what they're talking about. The Atlantic at one point was very dedicated to the view that Japan was succeeding and the US was failing because the US was free-trade and Japan was not. The evidence that was being offered and the logic were just wrong. Or take Business Week; I subscribe to Business Week largely because in every issue I can count on there being something that I can make fun of.

If you had a chance to be a policymaker—to be in a position of power—would you take it?

That's a tough question. I would worry about whether or not I have the personality for it. There are two things that are difficult about it. One of them is you have to have the ability to organize other people to do work, and I'm just not a manager. The other is that you do have to suffer fools gladly and be able to negotiate your way through things.

In some ways, the task of being a policymaker, at least in your public role, is almost the opposite of your task as an outsider making commentary, which is to get people's attention and to force them to think differently. Most of the time, the objective of someone who's inside is to avoid saying anything that catches people's interest, to say something more or less true and relevant, but which doesn't set off alarm bells.

You said you spent an eye-opening year at the White House [in the Council of Economic Affairs in 1982-83]. What were your eyes opened to?

If you spend all of your life in academics, you tend to imagine both that academic research has more influence than it does and that the level of discussion in the real world is higher than it is. And if you spend some time in Washington, you realize that it's really a very primitive level of discussion most of the time. The difference between a real and a nominal interest rate—that was one that I saw in some Cabinet-level meetings. You could see that the then-Secretary of the Treasury just didn't understand that difference. So it changes your view about what kinds of economic analysis are actually useful.

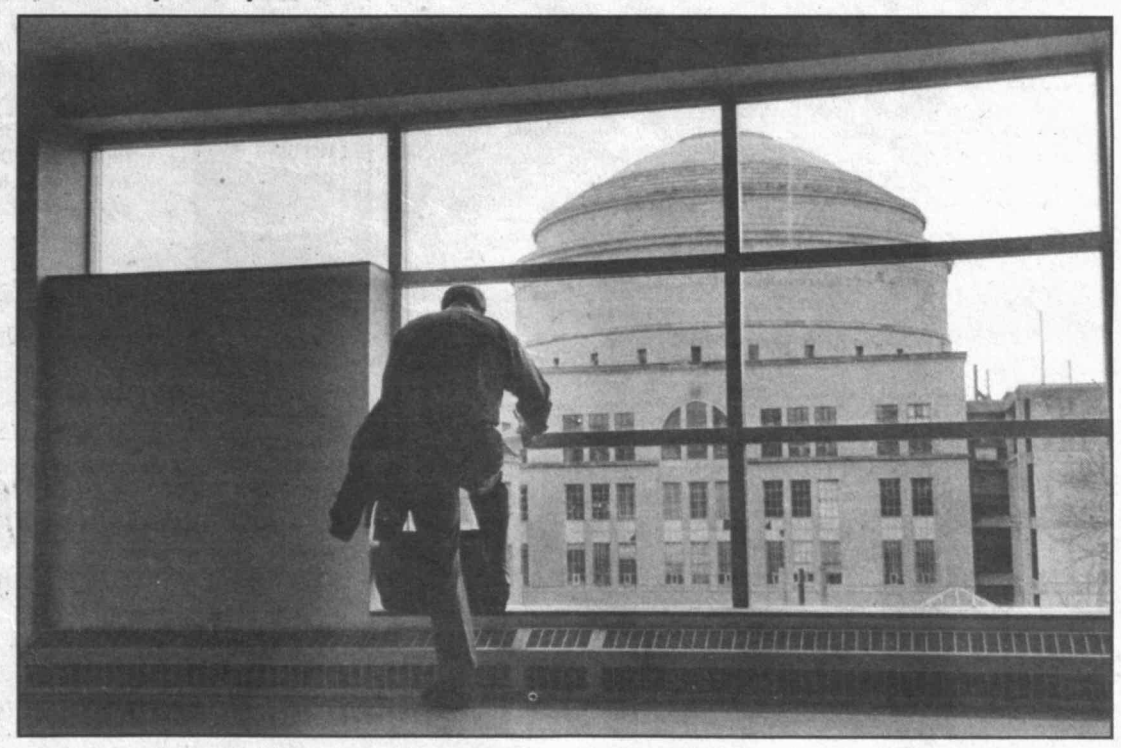
You were a graduate student at MIT, and after a stint teaching at Yale, you returned to MIT. Then you left in 1994 for a professorship at Stanford University, but returned again two years later. What do you like about MIT?

Well, I've spent more of my life at MIT than anywhere else, so this is home. But there are a couple of things that are really special about the MIT economics department. One is the environment—it's the best place to be in touch with cutting-edge ideas in economics. This is a place where stuff is happening. And also, at many universities, the senior faculty are no-shows—they don't do a lot of teaching. Even though people here are frantically busy, everyone does their share of teaching. It keeps people around and interacting.

How would you describe the ambience of the department?

The faculty in this department are as good as any in the world, and they're all around. There are unplanned conversations in the hallways and open doors, and people poke their heads in other people's offices. The collegiality here—it's the best. And also, there's an MIT style of economics, which is relatively more issue-oriented and less formalistic. It's building models of issues suggested by real-world experience, as opposed to proving theorems about fundamental stuff. And I very much operate in this MIT tradition.

Put in perspective



A view of the dome from the walkway between Buildings 8 and 16. **Photo by Laura Wulf**

DOE says it will seek to restore funding for Bates center

(continued from page 1)

that scientists throughout the country who utilize Bates will join us in making this case."

"The country has made a huge investment in Bates for the very best of scientific reasons," Dean of Science Robert J. Birgeneau said. "The facility is operating magnificently, it has outstanding leadership and a superb staff, and it is poised to do pathbreaking fundamental physics with BLAST over the next five years. The United States must not squander this unique scientific opportunity."

Professor Robert Redwine, director of the Laboratory of Nuclear Science, said, "The Bates facility has a distinguished record of first-class research and education of young scientists. With recent major upgrades, Bates remains on the cutting edge of research in nuclear science."

"The focus of nuclear physics research at Bates is three unique detector systems," explained Professor Richard Milner, director of the laboratory. "The SAMPLE detectors study the magnetism of protons; the Out-of-Plane Spectrometer (OOPS) studies the proton's shape; and for the future, BLAST will study the spin of nuclei."

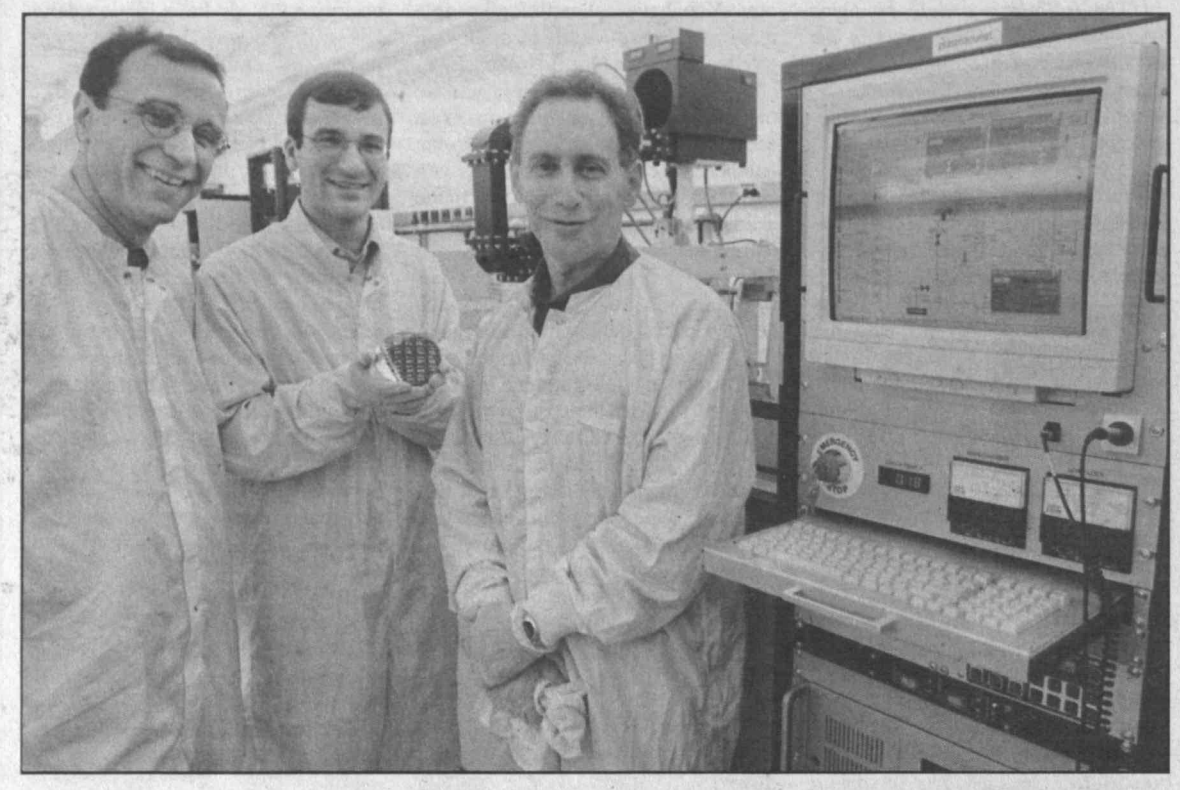
MAGNETISM'S MYSTERY

"An understanding of the origins of magnetism is one of the outstanding problems in physical science, of both basic and practical importance," Dr. Milner said. "Microscopically, magnetism is due to the spins of elementary particles like electrons and nuclei. In spite of decades of work and much sophisticated research, the basic physics of magnetism in nuclei is still totally mysterious.

"The Bates Large Acceptance Spectrometer Toroid (BLAST) is a detector which will shed new light on magnetism in nuclei. It is under construction by an international collaboration to exploit the high-intensity, stored, polarized beam in the MIT-Bates South Hall Ring. Nuclear physicists from 12 institutions in four countries are constructing a unique facility to study the spin structure of nuclei using BLAST and state-of-the-art polarized target technology.

"Construction of the magnetic toroid is almost complete and will be installed in the Ring in summer 1999. The complete BLAST spectrometer is scheduled for completion in 2001. A three-year program of first rate physics measurements utilizing BLAST will follow this."

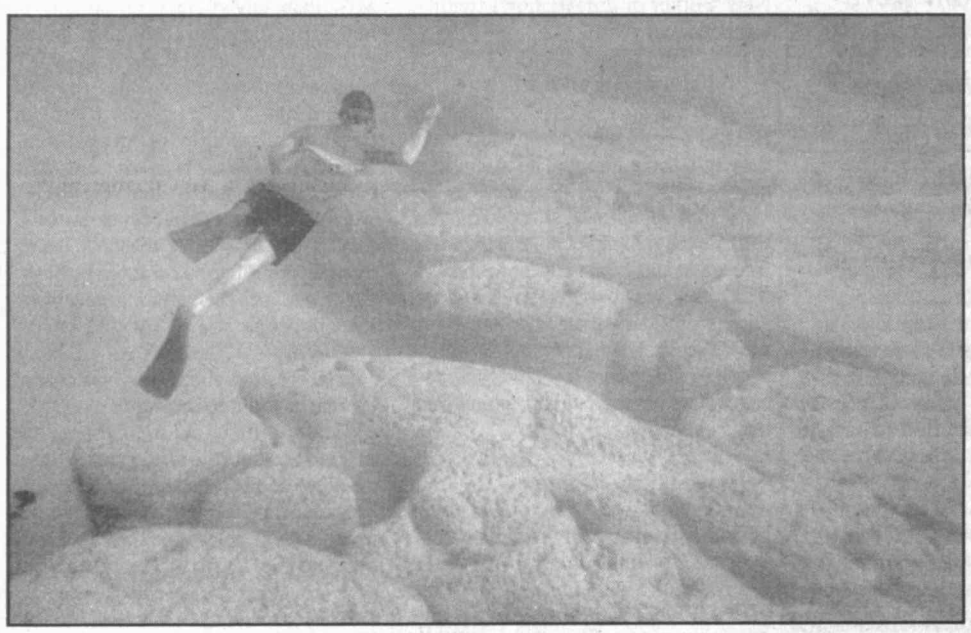
The federal government has invested about $50 million in the past four years into the Department of Energy facility. The accelerator is operated by MIT's Laboratory for Nuclear Science, which claims three Nobel Prizes among its faculty and has trained 120 PhDs at Bates in the past quarter-century. Ten graduate students are currently doing doctorate work in nuclear physics there. The facility employs 85 people.



A state-of-the-art detector, the Bates Large Acceptance Spectrometer Toroid (BLAST), late last year. It is being built by an internal collaboration of approximately 50 physicists. **Photo by Donna Coveney**

Last November, the Bates center achieved a major milestone en route to a new frontier in measuring the most basic elements of matter. Using a high-intensity beam of electrons stored in the 600-foot South Hall Ring, physicists created a continuous intense electron beam with a current that is 1,000 times greater than what is normally available. (See MIT Tech Talk, Nov. 25, 1998).

Students learn geology in the field during IAP course



Tony Stumpo, a junior in civil and environmental engineering, snorkels over stomatolites or "living fossils," which are found only in two places on Earth today.

(continued from page 7)

tions was very clear.

Everything we did gave us insight and perspective—from seeing and touching the stromatolites ("rocks that grow") I had learned about as a kid, to walking along ancient Pleistocene reefs exposed since the last ice age, to realizing that not only are there stromatolites in Nevada but that once the Rockies used to look like the Bahamas.

We were able to tear up huge algal mats that were strong enough to hold us up, and using the algae-coated footprints of last year's team, determine how long the pond had existed under present conditions. In our core samples we found storm deposits and could count back the years to recent hurricanes.

On the third day, I stood far from land on the crest of a migrating dune which had surfaced at low tide and buried my feet in oolites (small grains of carbonate) as round and perfect as pearls of yeast. I could watch them underwater, forming, collecting aragonite needles as they bounced along the bottom. It was heaven.

We spent time in a lab examining the results of plankton tows we did in the open ocean east of the shallow bank. We saw living foraminifera—single-celled marine plankton—as well as the tiny organisms whose shells appeared in the sediments we collected everywhere we went. By the fourth day, all of us could accurately identify different sediments based on their contents. We were beginning to understand sedimentology, and beginning to know for ourselves the art in seeing the smallest things, and their vast differences.

In a week of field oceanography on Lee Stocking Island, though, I think it became clear to most of us that the most important thing we gained was the acquaintance of a handful of scientists who work in the tiny network of oceanographic and geological research. The interdependence of all their work and the accessibility of it (all of us were invited to return as volunteers) hit us very hard.

For myself, I was reassured of the huge importance of their work—and renewed in the drive to pursue it myself. It took being outside, in the middle of nowhere for a week, for me to rediscover the love of science I had slowly been losing in a year and a half of closed-door MIT life. This week of field work might just last me two and a half years more.

On the morning we were leaving, I signed a form in the office acknowledging that it cost the world $540 for me to be there that week—not including my airfare, just for my water and the food I ate and the bed I slept in. I realized why only 10 of us could come, and why Maureen, my professor, was so excited when I decided to write this. Finding support for field work is difficult, especially for that involving undergraduates. I have only one response to that: It made all the difference.

It's a snap

Michelle Shook,a graduate student in mechanical engineering, at work in the Cube in the basement of the Wiesner Building. She's using Legos (which fill the boxes on the shelves around her) to build things that will help elementary school students she works with to understand basic principles of mechanics.

Photo by Laura Wulf

Day care openings

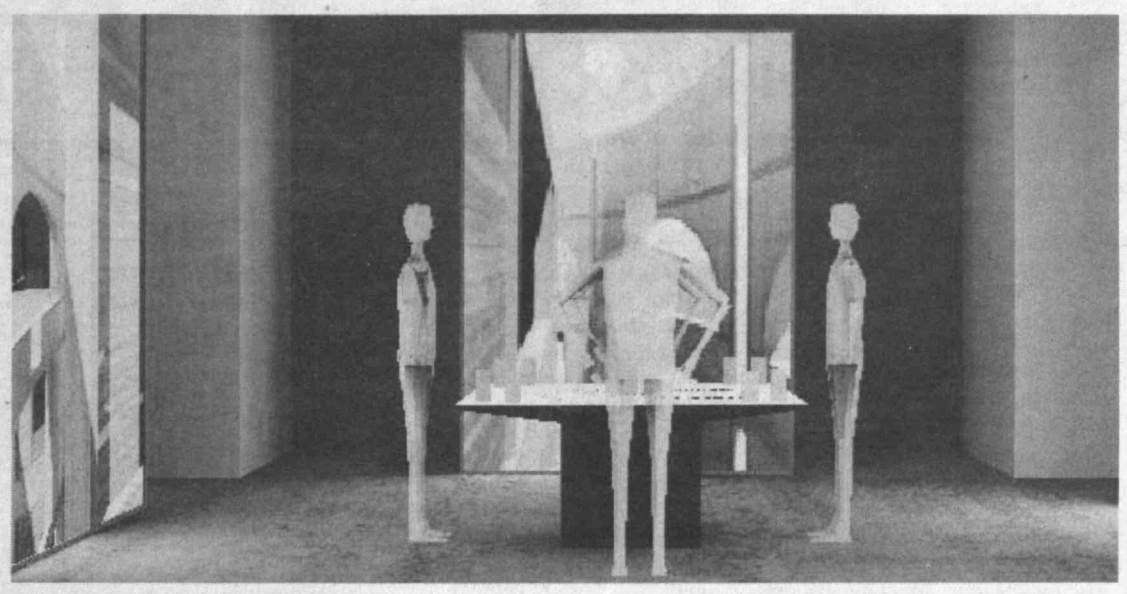
The Technology Children's Center (TCC) at Eastgate has two openings for full-day (8am-5:45pm) child care—one for five days a week and the other for three days a week. TCC at Westgate has three openings for full-day child care five days a week and two openings for Tuesday/Thursday full-day child care.

Children between the ages of two years, nine months and five years old are eligible for these programs. For more information or to arrange a tour, contact Olga Slocum at <olslocum@mit.edu> or x3-5907.

It's a fact

The random access magnetic core memory, used for many years in high-speed digital computers, was developed by Jay W. Forrester, an MIT electrical engineer, in 1954.

Arts at MIT



Unbuilt Ruins: Digital Interpretations of Eight Projects by Louis I. Kahn.

February

3-4 Weds/Thurs

Toon Try-Outs
Pop a cappella group from MIT/Wellesley College seeks vocalists. Time/place TBA. email jonlee@mit.edu

Be aYeoman

MIT Gilbert & Sullivan Players auditions for *Yeomen of the Guard*. Prepare song in English; bring two copies. 7-10pm, Student Ctr Rm 491. savoyards-request@mit.edu for info.

4 Thurs

Tech Squares
No partner necessary. Refreshments served. 8pm, Student Ctr 2nd flr. 253-7000 or email squares@mit.edu

Chapel Concert
Leonora Quartet. Brahms' Quartet in Bb, Op. 67; Haydn's Quartet, Op. 20, No. 4 in D Major. 12noon, Chapel.

Exhibit Opens
Katherine Muench: Cerny Hlava / Black Head Series. Images of identifiable archetypes: heads, funnels, animals, words & numbers, inspired by the echoes of history experienced in Prague & Vienna. Opening Reception-5-7pm. The Dean's Gallery, Sloan School of Mgt, E52-466. Weekdays 9-5pm. 253-9455

4-6 Thurs/Sat

The Good Person of Sezuan
Dramashop production of new translation by Tony Kushner of Brecht's play, directed by Kim Mancuso. $7, $6 MIT students & sr citizens. 8pm, Kresge Little Theater. 253-2908 or email ds_officers@mit.edu

5 Fri

The Magic Flute
Mozart's opera narrated by Prof Arthur Steinberg. $5. 7:30pm, Kresge Aud. Marshall Hughes, 253-8045

5-7 Fri/Sun

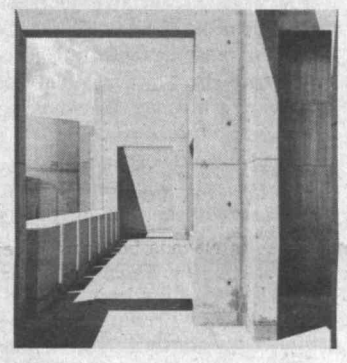
She Loves Me
Musical Theatre Guild production of show by Joe Masteroff (book), Jerry Bock (music) & Sheldon Harnick (lyrics). $9; $8 MIT faculty & staff, sr citizens, other students; $6 MIT/Wellesley students. 8pm (except 2pm-Sun, Feb 7), Sala de Puerto Rico. 253-6294 or email mtg-tickets@mit.edu

6 Sat

Faculty Concert
Sr Lecturer George Ruckert, sarod; Monir Hossain, tabla. $15, $12-MITHAS & NEHT members & students, free-MIT students. 8pm, Wong Aud (Tang Ctr). 258-7971

8 Mon

Compton Opening
Unbuilt Ruins: Digital Interpretations of Eight Projects by Louis I. Kahn. Computer simulations & exhibition by Kent Larson, Dept of Architecture research scientist. Compton Gallery (Rm 10-150). Weekdays 9-5. 253-7791



11 Thurs

Chapel Concert
Andrew Halberstadt, organ & Brian Kay, sackbut. Buxtehude, Bach & Frescobaldi. 12noon, Chapel.

authors@mit

Prof Edward Baron Turk discusses Jeanette MacDonald, subject of his new book *Hollywood Diva*. With film clips. 5:30pm, Humanities Library (14S 2nd flr). 253-5249 or authors@mit.edu

11-13 Thurs/Sat

***Good Person of Sezuan* Closes**
See 4-6 Thurs/Sat above.

***She Loves Me* Ends**
See 5-7 Fri/Sun above.

18 Thurs

Sax in Chapel
Andrew Cook, saxophone. 12noon, Chapel.

Through 19 Fri

Photo Exhibit
Photographs of the Sierra Nevada by Matthew Hollingworth (G, EECS). Wiesner Student Art Gallery (2nd flr Student Ctr). 253-3913

19 Fri

Arts Colloquium
MIT faculty invited to hear Michael Ouellette, sr lecturer in theater, speak on his work. Lunch served; reservations required. Contact Laura Moses (253-9821 or laura@mit.edu) by Tues, Feb. 16.

SP@MIT
Simultaneous Performances of Sonic Processing, Synchronized Poses, Swing Partners & Super Powers. The MIT Dance Mix Coalition allies w/Dance Troupe, the MIT Anime Club & the MIT Ballroom Dance Team for a one-of-a-kind nonstop multimedia phenomenon. Bring your dancing shoes. Doors open at 9pm, Sala de Puerto Rico. Philip Tan, 225-6339 or email mitdmc-officers@mit.edu

Potluck Performance Art
Bring video, poetry, slides, anything to read, show or perform for free admission; $4 donation requested for selected charity. 9pm, Rm N52-115. 253-2060

20 Sat

MIT Concert Band
John Corley, conductor. 8pm, Kresge Aud.

22 Mon

Student Art Exhibit
Impressions of Colombia. Color photographs & musings by Richard Fletcher (G), taken from two recent visits to Colombia, S.A. Wiesner Student Art Gallery. 253-3913

23 Tues

Architecture Lecture
"Louis I. Kahn: Unbuilt Ruins," by Kent Larson, research scientist, MIT. Presented in conjunction w/Compton Gallery exhibit. 6:30pm, Rm 10-250. 253-7791

25 Thurs

Danzi Trio in Chapel
Douglas Worthen, flute; Elizabeth Abbate, violin; Joan Esch, cello. Trios by Danzi, Pleyel & Haydn on period instruments. 12noon, Chapel.

Last Day to Join
Women's Chorale—open to MIT/Harvard women who can read music. 7:45pm, Emma Rogers Rm (10-340). Jennifer, 253-1614

26 Fri

Avalon String Quartet
Haydn's String Quartet Op. 76, No. 1; Schuller's String Quartet No. 3 (1986); Beethoven's String Quartet, Op. 130. 8pm, Kresge Aud.

27 Sat

Bala Music & Dance
Lakshmi, Bharat Natyam dance; T. Viswanathan, flute; D. Knight, mridangam. $15, $12-MITHAS & NEHT members & students, $10-MIT students. 8pm, Kresge Little Theater. 258-7971

Midnight Bad Taste
Chorallaries of MIT reprogram PC-brainwashed minds w/skits & songs never found on local TV. 11:59pm, Rm 10-250. 536-4481

All Month

List Visual Arts Ctr
Alfredo Jaar: Lament of the Images presents 3 photography-based installation works derived from the artist's experiences in 1994 Rwanda, recording the testimonies of the survivors of a genocide that claimed one million lives.

William Kentridge: Weighing . . . and Wanting an installation of charcoal & gouache drawings & a film transferred to laser disk based on his drawings, which use broad allegorical terms to deal w/the situation in Kentridge's homeland, South Africa.

Kiki Smith: Recent Photographic Work, reflects the artist's burgeoning interest in the natural world.

The List Ctr is open Tues through Thurs & weekends from 12-6pm; Fridays from 12-8pm; closed holidays. Meet the curatorial staff for informal discussions on Weds from 12:30-1:30pm. 253-4680

Ongoing Events

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

MIT Museum
Flashes of Inspiration. The life & work of Prof Harold ("Doc") Edgerton (1903-1991), whose work w/stroboscopic light redefined photography.

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

Gestural Engineering: The Sculpture of Arthur Ganson; Lightforest: The Holographic Rainforest; Holography: Artists & Inventors; The MIT Hall of Hacks; Light Sculptures by Bill Parker; Math in 3D: Geometric Sculptures by Morton G. Bradley, Jr.; MathSpace.

MIT Museum, 265 Mass Ave. Tues-Fri 10-5, Sat-Sun 12-5. Admission $3; $1 students, srs & children 12 & under; free for members of the MIT community w/ID. 253-4444

Hart Nautical Gallery
Ships for Victory: American Shipbuilding's Finest Hour & Ship Models: The Evolution of Ship Design. 55 Mass Ave. Daily 9-8. 253-5942

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

New MIT microchip can deliver chemicals on demand

(continued from page 1)

The prototype chip testing apparatus also contains 34 wires connecting the circuitry of each reservoir to an external power source. The researchers say that it should be possible, however, to make a device that's completely self-contained. This would involve fitting the chip with a small battery and a microprocessor. The chip could then be either preprogrammed for the release of chemicals, triggered by remote control or activated by an on-chip biosensor.

The chip could also be cheap. "We're making them right now in a research lab for about $20 each," Professor Cima said. "With process optimization and larger batches, I could easily see making them for a few dollars each, or even less."

BACK TO THE FUTURE

Back to the future and potential applications. "What about diagnostics?" said Mr. Santini, a graduate student in chemical engineering. He noted that many diagnostic tests today involve adding precise amounts of chemicals in a precise order to fluids like blood and saliva. As a result, samples must be sent to a lab, where it can take hours to days for results.

However, a microchip preprogrammed to release the proper chemicals at the right times and in the right order could be fitted to the end of a probe, swirled in a vial of fluid at the bedside, and deliver the results as the patient waits.

"And what about jewelry that releases different scents based on your mood?" said Professor Cima. In this case, a biosensor on the chip would convey information about, say, the salinity of your skin to the microprocessor, which would activate certain reservoirs. Similarly, "a microchip in TVs could possibly someday release different scents keyed to an advertisement or scene," said Professor Langer. In this case the chip would be triggered by remote control via a signal sent over the airwaves.

Other applications lie in drug delivery. Most implants and patches currently on the market deliver drugs continuously over time; the new chip would "allow you to control not only the amount of drug released, but also the exact time of delivery," Mr. Santini said.

For example, some infertility treatments require wearing a small pump that delivers pulses of certain hormones every 90 minutes for weeks at a time via a catheter inserted through the skin. Those hormones could potentially be incorporated into a chip that is implanted under the skin and programmed to release the contents of specific reservoirs at specific times.

"The applications, I think, are unlimited," Professor Langer said. "The question is, which are the best ones?"

HOW IT WORKS

In the new chip, a reservoir is opened by applying a small electrical voltage between the reservoir's gold cap (the anode) and another gold structure (the cathode), which causes a current to flow between the two. The cathode remains intact during this process, but the anode dissolves due to an electrochemical reaction between it and the salt solution in which it's bathed. (Mr. Santini notes that the team has ideas for future versions of the chip that won't have to be in solution.) With the anode cap out of the way, the chemical inside is liberated.

The researchers have demonstrated this for multiple chemicals in separate reservoirs. In other words, they applied a small voltage between a reservoir containing chemical A and a cathode and observed that chemical's release, then at a later time did the same for a reservoir containing chemical B with the same results. They did this for several different reservoirs filled with one or the other chemical over a period of several hours. This shows "that multiple compounds can be released independently from a single microchip device," the trio writes in Nature.

Talking about the development of the chip, which took five years, Mr. Santini said "there was never a sudden 'voila.' Rather, it was a steady progression. We encountered numerous challenges along the way, such as material selection, reservoir filling and structural design issues, but we were able to develop solutions for each of these. We had a feeling it would eventually work, but it took a while to realize [a functioning chip]."

THE INSPIRATION

Professor Langer got the idea for the new device while watching a documentary on mass-producing microchips. "I thought, 'that would be neat to apply [microchips] to chemical or drug delivery," said Dr. Langer, who is well-known for his work on polymers and implants for drug delivery. "I immediately thought of Michael [Cima], and told one of my students to call him ASAP about it." (Professor Cima is an expert on forming technologies such as those used to form the microchip.)

Professor Cima, in turn, thought the project might be a good one for a student in the Materials Processing Center's Summer Scholars Program, which currently invites 10 outstanding undergraduate students from universities around the country to participate in ongoing materials research at MIT.

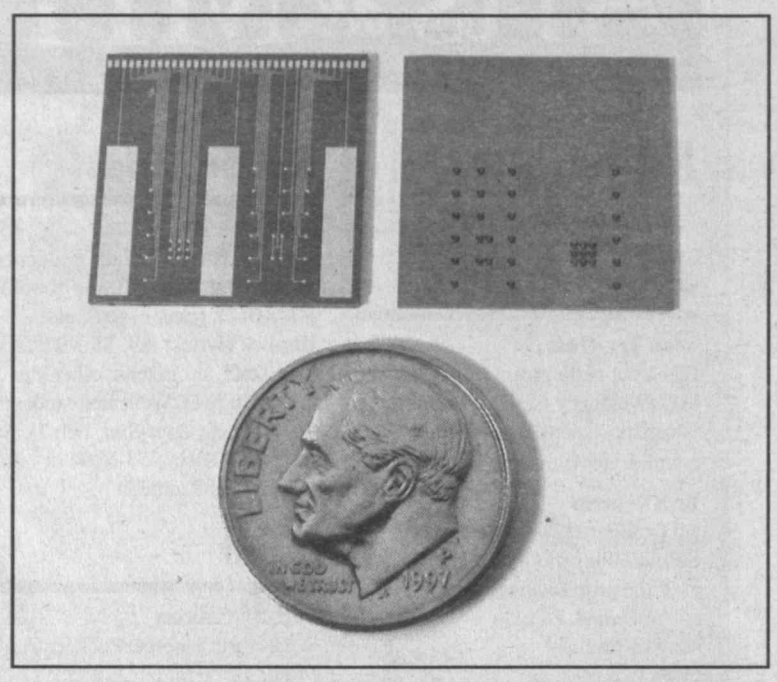
Enter Mr. Santini, who was one of four Summer Scholars in 1993. "All of us in the program went around to 16 professors in two days to hear presentations from each on their research and the projects we could work on," said Mr. Santini, then a junior at the University of Michigan. "Michael's description of the microchip idea made an impression. I thought, 'Hey—this is interesting.'"

But when the summer was over, the project was not. So Mr. Santini came back to MIT a year later as a graduate student, with the microchip the focus of his doctoral thesis. "Summer Scholars projects are supposed to take five to six weeks to complete. Little did [the administrators know] that mine would take five years!" chuckled Professor Cima, who pointed out, however, that most Summer Scholars don't end up with a paper in Nature and a patent.

Santini, Cima, Langer, and Achim M. Göpferich, an MIT visiting scientist during the early stages of the project now at the Lehrstuhl für Pharma-zeutische Technologie Universität Erlangen-Nürnberg, were granted a broad United States patent covering the microchip technology on August 25, 1998. There are currently two patents pending; a US patent on the fabrication of the microchips (Santini, Cima and Langer), and a foreign patent covering all aspects of the microchip technology (Santini, Cima, Langer and Göpferich).

With a prototype chip in hand, what's next? "We want to do the engineering to make this into a real application," Professor Cima said. "Also, we want to better characterize the gold dissolution process. We're filling in the details right now."

The new microchip was constructed at the Microsystems Technology Laboratory. The work was funded in part by the National Science Foundation.



Front (upper left) and back view (upper right) of a new microchip for the controlled release of chemicals, with a dime to show scale. The dots between the three large bars (cathodes) on the front are the caps (anodes) covering the reservoirs that hold chemicals. The back view shows the larger openings for each reservoir through which chemicals are deposited; these openings are sealed by a waterproof material after the reservoirs are filled. **Photo by Paul Horwitz, Atlantic Photo Service, Inc.**

Residence ideas aired

(continued from page 1)

and learning at MIT.

William J. Hecht (SB 1961), Alumni/ae Association executive vice president and chair of the Residence System Steering Committee appointed by Chancellor Lawrence Bacow, pointed out that the current system was never really designed, but rather evolved to its present state over the past 40 years.

Up to six people from the team that comes up with the winning redesign of MIT's residence system will win a trip to England. The second-place team will win a trip to California. Mr. Hecht said that steering committee will choose a winner by March 1. The committee will generate a proposal for Chancellor Bacow by September 1.

"We would like to present the chancellor a proposal and have him just say yes," Mr. Hecht said. Outstanding designs will serve as the foundation for community discussion throughout the spring semester and the final proposal may incorporate ideas from several of the 11 teams, he said.

Mr. Hecht and other organizers of the two-week IAP session sought to elicit from the community a new approach to how first-year students select housing, how rush for dorms and fraternities, sororities and independent living groups (FSILGs) is timed, and how faculty and students interact overall, among other issues.

The Beaver Dream Team, whose members made their presentation in matching white shirts and khaki pants, said that fostering a sense of belonging and class unity were among their goals. Their proposal suggested that first-year residences should have 75 percent freshmen and 25 percent upperclassmen and graduate-student mentors.

The team called the Optimizers proposed expanding pre-Orientation programming to include wilderness trips to Vermont, Maine or New Hampshire. They suggested that freshmen clusters with resident advisors would help freshmen integrate into the community, and faculty lunches at the dorms and faculty-led trips would increase faculty members' informal interactions with students.

Another team proposed a "Greek-free" orientation, which would allow students to "focus on educational priorities." This team also suggested that the new dorm, planned for completion by 2001, house all four classes, not just freshmen, and include a "ballroom-style" student activity space that would attract students from all over campus.

A maximum of six of the first-prize winners will get a chance to visit the model Cambridge University residence system in England and second-prize winners can choose to visit Stanford or Caltech.

The Residence System Steering Committee consists of Mr. Hecht and students Jennifer Berk, a sophomore in electrical engineering and computer science; Elisha Hopson, a junior in civil and environmental engineering; Eric Liu, a junior in mechanical engineering, and Abigail Pelcyger, a sophomore in chemical engineering; four faculty and staff representatives: Professors Paul Gray (SB 1954), Karen Gleason (SB 1982) and Anne McCants, and Dean Andrew Eisenmann (SB 1970); and alumni/ae members Erin Hester (SB 1982) and Steven Stuntz (SB 1967).

DISSENTING VOICES

The fear that FSILGs will become "social clubs" instead of an integral part of the residence community was one of the forces behind a demonstration for freshman housing choice held in Lobby 7 on Monday, Feb. 1 (Registration Day).

Chris Rezek, a senior in linguistics and philosophy and a member of the Undergraduate Association Executive Committee, which organized the demonstration, said he opposes the decision to require all freshmen to live on campus because "the trust and respect that MIT has shown its students for the past 125 years sets it apart from peer institutions that have restricted freshmen to a single dormitory or have assigned them randomly to on-campus housing."

This was the second such demonstration; the first was on last semester's Registration Day (September 8, 1998).

Microchip media frenzy

The new MIT microchip for releasing chemicals on demand has generated a storm of top news coverage.

Over the last week, the News Office has received some 60 calls about the chip from media including the New York Times and the largest newspaper in Greece (Eleftherotypia). ABC News was especially intrigued, airing separate stories on three different programs: the January 27 national nightly news with Peter Jennings, the January 27 local nightly news (WCVB-TV Channel 5, ABC's Boston affiliate) and Good Morning America the next day.

"The microchip is unique. There are potentially lots of uses in consumer products and drug-delivery systems," Professor Mark Saltzman of Cornell University told the Christian Science Monitor.

The microchip was introduced to the world via an article by its inventors in last week's issue of the journal Nature.

Elizabeth A. Thomson

New shuttle service offers more stops

(continued from page 1)

and Vassar to board the shuttle.

Tech Shuttle will stop at the corner of Hayward and Amherst Streets to serve the Sloan School. The schedule can get riders to Kendall Square at 8:15am in plenty of time for 8:30am classes.

CRTMA quickly started the new service under time and funding constraints and may need some time to iron out the bugs, but the organization welcomes comments. Contact Jim Gascoigne of CRTMA at <coin1@mit.edu>.

The schedule for the Tech Shuttle is given at right. Service runs Monday through Friday starting at 7:15am and ending at 7:15pm in Kendall Square.

The shuttle arrives back at Kendall Square a moment before its next departure. Vehicles are operated by Paul Revere Transportation are white with blue trim. Look for the maroon Tech Shuttle window and header signs.

This schedule is also online at <http://web.mit.edu/planning/shuttle/drftsched.htm>.

Stop	Location	Minutes past the hour		
A Kendall Sq./MBTA	Main St., Boston-bound side	:15	:35	:55
B Hayward at Amherst	corner	*	*	*
C Building 39	rear of building	*	*	*
D 84 Mass Ave	MBTA bus stop	:22	:42	:02
E Burton House	corner of Fowler and Amherst	*	*	*
F Tang/Westgate	Amherst across from sculpture	:25	:45	:05
G Professional Learning Ctr.	Audrey St. at Vassar	*	*	*
H 600-620 Memorial	600 Memorial Dr.	*	*	*
I Vassar/Amesbury	corner	:28	:48	:08
J Vassar/Mass Ave	MBTA bus stop across from ATM	*	*	*
C Building 39	rear of building	*	*	*
A Kendall Sq./MBTA	arrives a moment before next departure			

** The shuttle will make all stops on every trip. For stops without a designated time (asterisks), add one minute to the time of the previous stop.*