

Student Advisory Committee makes recommendations

Two teams win top prize

in MIT \$50K contest

By Denise Brehm News Office

C alling for a radical transformation of MIT culture, the Student Advisory Committee to the Presidential Task Force on Student Life and Learning is advocating the adoption of an educational triad that places equal emphasis on research, academics and community so that "the development of the whole student becomes the highest priority across all areas at MIT," according to its recently completed final report.

The Student Advisory Committee's report is the result of nearly two years of open forums, meetings with individuals and student groups, and work with the Task Force on Student Life and Learning, which was established

The MIT \$50K Entrepreneurship Competition judges—dead-

locked over the high quality of stu-

dent business plans-named two

winners of the coveted \$30,000 top

prize at the final awards ceremony

tion and Direct Hit-two Internet-

Volunteer Community Connec-

in September 1996 at the request of President Charles Vest. The Student Advisory Committee (SAC) was appointed shortly thereafter to advise the Task Force.

The SAC, which currently has about a dozen members (a total of 19 students have served since its inception), is in the process of holding meetings to discuss the recommendations in its report with individuals in the senior administration, including President Vest, Provost Joel Moses, the deans and the faculty chair. Committee members hope that the Task Force will adopt some of the recommendations in its own report to the president.

The SAC report calls for a far greater level of faculty and staff participation in the student community, with both (continued on page 6)

based ventures-each received

\$30,000 after an anonymous donor

fattened the fund with an additional

\$20,000. The donation transformed

the usual \$50,000 prize into \$70,000,

marking the first time in the

competition's history that two teams

each received a grand prize. A third

(continued on page 6)



Professor Toyoichi Tanaka demonstrates how a gel can quickly swell and contract in response to different stimuli at a talk he gave during the ILF Research Directors Conference. Photo by Donna Coveney

Event highlights variety of research

By Elizabeth A. Thomson News Office

S ome 500 research directors from understand first-hand the oft-used analogy that getting an education from MIT is like taking a drink from a firehose.

For two days last week at the Indus-

trial Liaison Program's 1998 Research Directors Conference, participants listened to research highlights from all five of MIT's schools and several laboratories. In addition, five concurrent sessions Wednesday afternoon presented 20 projects in more detail.

This year's conference marked the ILP's 50th anniversary. Karl F. Koster, acting director of the MIT Office of Corporate Relations, noted that when the ILP was formed in 1948, it had six member companies. Now it has 200 from around the world.

SLOAN SCHOOL

One theme echoed by several speakers was the importance of research collaborations between MIT's schools. "This is one of MIT's real advantages," said Thomas J. Allen, deputy dean for the Sloan School of Management and the Howard W. Johnson Professor of *(continued on page 8)*

Institute gears up for Commencement

By Robert J. Sales News Office

last Thursday.

The Commencement Committee, planning for a record crowd, has announced the full program for MIT's 132nd Commencement on Friday, June 5, at which President William J. Clinton will address some 2,250 seniors and graduate students and more than 9,000 relatives and guests.

Professor Joel Moses will be presiding at his final Commencement as provost and Alex d'Arbeloff at his first as chair of the MIT Corporation. Provost Moses will step down

on August 1 and return to research and teaching.

President Clinton, the first sitting president to speak at MIT, will deliver only two other Commencement speeches this year, at the Naval Academy on May 22 and Portland State University in Oregon on June 13.

Other speakers at this year's Commencement will include Geoffrey J. Coram, president of the Graduate Student Council, and Salman A. Khan, president of the Class of 1998. The invocation will be given by Swami Sarvagatunanda of the Ramakrishna Vedanta Society.

(continued on page 6)

Report on dangerous drinking to be discussed tomorrow

The co-chairs of the Working Group on Binge Drinking—Professor Phillip Sharp, head of the Department of Biology, and Dr. Mark Goldstein, chief of Pediatric and Student Health Services—will hold a community meeting Thursday at 1pm in the Student Center Mezzanine Lounge to discuss the report's recom-

mendations for continuing actions to curb dangerous drinking among MIT students. Copies of the report will be available at the meeting.

President Charles Vest and the Academic Council received and discussed the report with Dr. Sharp and Dr. Goldstein at the Academic Council meeting on Tuesday.

IN BRIEF

• Vote on the proposal to establish a Master's of Science in Comparative Media Studies, by

Expo explanation



Vinardeep Kaur, 13, of the Fitzgerald School explains her project, The Eclipse, to aeronautics and astronautics freshman Dana Forti at the sixth annual MIT/Cambridge Science Expo held in the Johnson Athletics Center last week. See story on page 5. Photo by Donna Coveney Dickson, who is retiring after four decades at MIT, the Institute will host an all-MIT barbecue from 3-6pm on Friday, June 12 at the barbecue pits outside the Johnson Athletics Center. All are welcome.

enior Vice President William

AWARDS TODAY

DICKSON FAREWELL

The Awards Convocation will be held today at 3:30pm in Rm 10-250. A reception will follow the ceremony in the President's Courtyard (outside the Bush Room), or in the Bush Room itself in case of rain.

FACULTY MEETING

A regular faculty meeting will be held on Wednesday, May 20 at 3:15pm in Rm 10-250. Agenda items will include:

• Vote on the report of the Committee on Nominations, by Professor Hax

• Vote on the motion to implement a housekeeping change to Rules and Regulations of the Faculty, by Professor Bailyn

• Vote on the proposal to establish an MIT/ WHOI Joint Masters of Engineering Program in Ocean Engineering, by Professor Vandiver

Professor Jenkins

• Election of members of the Faculty Ex Officiis, by Professor Bailyn

• In recognition of retiring faculty members, by Professor Bailyn

• Report of the Killian Committee, by Professor Bras

• Report on the proposal to establish a Division of Bioengineering and Environmental Health, by Dean Brown

• Report on the move of the Division of Toxicology to the School of Engineering, by Professor Canizares

• Report of the ROTC Implementation Team, by Professor Clay

• Report from the Commencement Committee, by Professor Schlecht

NO TECH TALK

There will be no issue of MIT Tech Talk on May 27 because of the Memorial Day holiday. The deadline for submitting classified ads and announcements for the May 20 issue, which will cover the period from May 20-June 7, is Friday, May 15 at noon.



- * Open to public ** Open to MIT community only

May 13-24

ANNOUNCEMENTS

- Degree candidates with federal and/or MITadministered loans must have an exit interview before graduation. Send e-mail to <ewolcott@mit.edu>to schedule an appointment.
- MIT Community Summer Softball organizational meetings. See listing under Community Calendar.
- Visual Arts Exchange Program application deadline is May 22. See listing in Arts Calendar

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 meet-ings 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>.
- Tech Catholic Community**-Weekday Mass Tues & Thurs 5:05pm, Friday 12:05pm, Saturday 5pm, Sunday 9:30am & 5pm. Call x3-2981
- Graduate Christian Fellowship**-Weekly meetings in Student Ctr, PDR 1&2, Fridays at 5:30pm. Also weekly Bible studies and Responsible Technology discussion group. Andrew Crabtree 868-0488 <crabtree@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>.
- MIT Hillel**-Tuesdays: 5:30pm Beginning Hebrew Class; 6:30pm Intermediate Hebrew Class. Wednesdays: 12noon 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.

- 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 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.

STUDENT JOBS

For other job listings and more information about the following listings, go to the Student Employment Office, Rm 5-119 or <http:// web.mit.edu/seo/>.

- On-Campus, Non-Technical, Summer: Looking for an energetic student to help run the Student Employment Office: manage federal community service program, process invoices, post jobs to filemaker database, update job boards, "E19 run", and more. Required: exc. oral and written skills, attention to detail, work with different databases, service oriented. Must work through RO and into reg. day, about 35 hrs/wk. \$7.75/hr. Contact Jane Smith, Rm 5-119 or x8-5614.
- Off-Campus, Summer, Personal Care: Mature, congenial female student needed to live in our Newton home to check in on wonderful, witty 89 year "young" woman on weekends. Need someone to stay over Friday and Saturday nights in large home overlooking golf course starting immediately and throughout the summer when we are away. Need be there from 10:30pm until 8am each day, but welcome to stay entire weekend. Bedroom, bath and meals provided as well as \$50 stipend each weekend. No housekeeping chores. Car a plus but not essential. Contact Janet Sermon in Rm 10-140 or x3-8242.
- Off-Campus, Non-Technical, Manual Labor: Woman in Cambridge needs someone to cut bushes in her driveway. Will pay generously for reliable person. Call Janet Strazzullo at (617) 497-0011.

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

Six living groups form new council

S ix MIT independent living groups (ILGs)—Epsilon Theta, Fenway House, pika, MIT Student House, the Xi Chapter of Tau Epsilon Phi, and the Women's Independent Living Group-have formed the MIT Living Group Council (LGC). The LGC is intended to enable member houses to discuss common concerns and to be more active participants in Institute affairs.

At its second meeting on May 3, the LGC elected Epsilon Theta's Grant Gould, a junior in electrical engineering and computer science, as speaker pro tempore; freshman Jennifer Berk of WILG as secretary; and Sarah McDougal, a sophomore in civil and environmental engineering and a Fenway House resident, as treasurer. Elections for moderator and a permanent speaker are still pending.

Historically, LGC member houses have been less active in the Interfraternity Council (IFC), which is the umbrella organization for all fraternities, sororities and independent living groups (FSILGs) at MIT. As a group of houses with concerns different from traditional fraternities, the voices of these living groups are often lost in the 39-member IFC, LGC members say.

By joining together, and in cooperation with the IFC Executive Committee, the members of the LGC hope to play a larger role within the IFC and within the greater MIT community. This involvement will include action on such issues as graduate resident tutors, orientation and rush, alcohol policy and medical transportation. The organization will also allow member houses to exchange ideas on issues pertaining to cooperative living.

The LGC's role within the IFC is intended to parallel that of the PanHellenic Council, which represents MIT's five national sororities. The name "Living Group Council" (as opposed to "Independent Living Group Council") was deliberately chosen to avoid excluding any groups which may elect to join the organization in the future.

The impetus behind the Council's creation was the idea that a formal organization was necessary to ensure the continued activity of the "ilg-talk" movement. After the alcohol-related incidents of last fall, the ilg-talk mailing list was used as a forum for concerned individuals to coordinate activism on various issues. Many list participants (including students, alumni/ae and faculty) were affiliated with the six ILGs which have since joined the LGC. In cooperation with leaders of the IFC, various faculty members and key administrators, the group played a prominent role in the effort to reform policies on alcohol, housing and orientation.

MAY 13, 1998

Members of ilg-talk lobbied on behalf of reform efforts and facilitated an intense exchange of information and ideas among students, alumni/ae, faculty, staff and administrators. The group distributed an informative mailing to all faculty, which attempted to dispel popular myths about MIT's housing system, and presented its proposal to reform Residence/Orientation (R/O) Week. Many of the group's ideas were incorporated into official recommendations and policies, including the "three strikes" alcohol enforcement policy and a comprehensive R/O reform plan.

With diminishing media attention on MIT, and the completion of many aspects of the reform effort, ILG residents who had participated in the ilg-talk movement realized that a more permanent, formal organization would facilitate continuing activism. However, the LGC-an association of houses, as opposed to individuals-is also intended to address concerns unrelated to recent controversies, especially everyday issues specific to nontraditional houses

The LGC will be approaching the IFC and the MIT administration, seeking to establish new channels of communication and opportunities for cooperation. The organization's charter is available on the web at <http:// web.mit.edu/jcberk/lgc/www/charter.html>.

Obituaries

JAMES J. ADAMS

James J. Adams, 74, of Cocoa, FL, a former custodian with Physical Plant, died on April 24. He was hired in 1971 and retired in 1989. Names of survivors were unavailable.

SALVATORE LAURICELLA

A funeral mass was held May 5 in St. Mary of the Assumption Church in Revere for Salvatore Lauricella, 77, of Revere, a former manager in Food Services who died on May 1. He was the first winner of the James N. Murphy Award in 1968, a former director of the MIT Employees' Federal Credit Union and an honorary MIT alumnus. Mr. Lauricella retired in 1985 after 34 years at MIT.

He is survived by his wife, Virginia (who retired from her job as financial administrator at the Research Labora-

Community Service: As a part of America

Reads Summer Program, ReadBoston seeks

enthusiastic summer camp counselors to assist classroom teachers with literacy in-

struction for 7-8 year old students. Must have desire to work in intense and fun read-ing environment. July 6-August 7, 8am-

1pm, Monday-Friday, \$9.50/hr. Call Melanie

Community Service: Administrative assistant

and curriculum writer needed for Peace

Games, a program which places college vol-

unteers in Boston-area schools to teach year-long violence prevention curriculum based

on cooperative games. Full-time summer

jobs with competitive salary. Come to the Student Employment Office (Rm 5-119) for

Community Service: Assistant to executive di-

rector. Duties: produce and distribute

Persche at 653-4710 ext. 197.

tory of Electronics in 1996); three daughters, Debi Aubee of Franklin, Joni Lauricella of Woodland Hills, CA and Doreen Howell of Marblehead; two sisters, Josephine Panzini of Revere and Frances Tringale of East Boston; and two grandsons.

Mr. Lauricella was buried in Woodlawn Cemetery in Everett. Memorial donations may be made to the MIT Medical Department Infirmary, 25 Carleton St., Cambridge, MA 02139.

DANIEL L. MCCALL

A service was held in the Kirby-Rapino Memorial Home in East Boston on May 1 for Daniel L. McCall, 87, of East Boston, a former custodian with Physical Plant who died on April 28. He retired in 1976 after working at MIT for eight years.

Mr. McCall is survived by his

fundraising appeals, research into new program areas, curriculum development, program evaluation, database creation and maintenance, and direct service (4-5 hours/week). Two volunteer management and market-ing specialist positions. Responsibilities include volunteer recruitment and intake, volunteer training, increasing parental involvement, communicating with media, special events planning, newsletter develop ment and direct service (4-5 hours/week).

Positions run from August 1998 through July 1999. The benefits include a \$9,432 stipend, \$4,725 educational grant upon successful completion of the program, and health insurance. Stop by the PSC or contact MAGIC/ME Boston, Inc., at (617)423-6633 or <magicme1@ma.ultranet.com> for more information

CABLE

wife, Anna; two daughters, Diana Melanson and Regina Falzone, both of East Boston; a sister, Stella Buckley of Medford; two grandchildren and one great-grandson.

WILLIAM K. WRIGHT

William K. Wright, 85, of Concord, NH, a former guard at Lincoln Laboratory, died on April 13. He was hired in 1956 and retired in 1969. Survivors include a son, David of Mystic, CT; and a sister, Phyllis Branigan of Ft. Lauderdale, FL.

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News Office World Wide Web URL:

Crimewatch

The following summary contains most of the incidents reported to Campus Police from April 30-May 6, 1998. It does not include medical shuttles, ambulance transfers, false alarms and general service calls.

- April 30: Bldg. 56: microwave oven stolen, unknown value. Bldg. NW22: bomber leather jacket stolen, \$400; Student Center game room: backpack stolen, \$150.
- May 1: Mass. Ave.: an off duty MIT officer witnessed an individual exit his vehicle after being involved in a slight motor vehicle accident, and assault the operator of the other vehicle. The male was placed under arrest for assault and battery. Bldg. 8: 1) stereo equipment stolen, unknown value; 2) laptop stolen, \$4,000; 3) laptop stolen, \$3,000. Alumni Pool: wallet stolen, \$6 cash. Bldg. 20: file cabinet reported stolen, later found. Windsor lot: vehicle stolen elsewhere dropped off here. Student Center: wallet stolen, \$100 cash. Bldg. 4: wallet stolen, \$20 cash.

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- May 2: Mass. Ave.: MIT Officers assist MBTA Police with removing an individual from a bus for an assault on another passenger.
- May 3: Bldg. 4. Athena Cluster: camera stolen, \$300. 500 Memorial Drive: Campus Police received a complaint of noise. Officers observed a small but loud gathering. This was an unregistered event, no citable offenses observed, no citations were issu
- May 4: 33 Mass. Ave. bike rack: bike secured with cable stolen, \$240. Walker: computer stolen, \$2,120. Bldg. E51: suspicious activity. Alumni Pool: wallet stolen, \$4 cash. New House: bike secured to itself by a cable was stolen from the lobby, \$150.
- May 5: Bldg. E17: 1) computer keyboard stolen, unknown value; 2) typewriter reported stolen, later found. Bldg. 12: thermos stolen, \$25. Walker: malicious damage to a door. Senior House: Cambridge Fire and MIT Officers discovered burnt pasta set off smoke detector. duPont: illegal use of credit cards, person believes cards taken when he left wallet at duPont, victim never lost possession of cards but charges were made against his account in Lynn, MA.
- May 6: 33 Mass. Ave. bike rack: bike secured with "U" lock, \$390. Bldg. 16: suspicious activity

Money and credit cards aren't the only things of value in your wallet. Social Security numbers allow scam artist/thieves to do just about anything. 1) Reduce the number of credit cards that you actively use to a bare minimum and carry only one or two in your wallet. Call the companies to cancel accounts that you don't use-since cutting up the card doesn't mean the card doesn't exist. 2) Shred all documents that carry your account numbers before you throw them away. 3) Get a copy of your credit report once a year. 4) When renewing your Massachusetts driver's license, have your Social Security number changed to a number issued by the state. (Usually referred to as an "S" number.) If your wallet is stolen, report the larceny to the police.

monthly newsletter, organize and conduct volunteer recruitment, maintain contact with Tutoring Plus constituents through mailings and phone calls, schedule interviews and appointments, check volunteer references during screening process, database entry, filing, correspondence, light office cleaning. Contact Diego Sanchez at 548-7670.

VOLUNTEERS

information

The MIT Public Service Center (Room W20-311, x3-0742) has compiled the following volunteer opportunities

Year-long volunteer positions through AmeriCorps VISTA National Service Program. AmeriCorps VISTA will enhance MAGIC/ME Boston's capacity to deliver high quality intergenerational programming focused on literacy. Major programs run out of Magic/Me include MMB Clubs which create long-term relationships between adolescents and elders in seniors residences and Leaps in Literacy, a national demonstation project mobilizing senior citizens to serve as Reading Coaches for K-3 students. Two fundraising and program development positions. Responsibilities include grant writing and research of funding proposals,

For more information, call Randy Winchester at x3-7431, Rm 9-050 or <randy@mit.edu> or <http://web.mit.edu/org/m/mitcable/www/ ome.html>

Continuously Running Programs-Channel 10: Physics 8.02 TV Help Sessions. Assignments will be discussed by Professor Walter Lewin. Program starts every hour on the

hour. Channel 11: NASA Television. See schedule at <http://www.hq.nasa.gov/ ntv.html>. Channel 12: Today at MIT - a listing of MIT events. To submit your event, send e-mail to <tv-messages@mit.edu>. Channel 13: International Channel provided by the MIT Language Learning and Resource Center. See schedule at <http:// www.i-channel.com>.

May 14: Channel 8: 10am-12:00pm-Live from Digital Equipment Corp.: "Windows NT 5.0...Will It Be An Enterprise System?" Jed Lawrence, CompuWorks. 3:30-5pm-Live coverage of the Laboratory for Computer Science Distinguished Lecturer Series: "Digital Lights, Cameras and Materials" Patrick Hanrahan, Stanford. 5:30pm-2am-Laboratory for Computer Science Distinguished Lecturer Series (prerecorded).

http://web.mit.edu/ ww1 Office of the Arts URL: http://web.mit.edu/arts

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Printed on **Recycled Pape**

Middle East scholar Slyomovics named to new women's studies chair

S usan Slyomovics, a noted scholar of the Middle East, has joined the anthropology program in the School of Humanities and Social Science (SHSS) as the first holder of the Genevieve McMillan-Reba Stewart Chair in the Study of Women in the Developing World.

Dr. Slyomovics, previously a professor at Brown University, has published widely in gender studies, performance studies and



Slyomovics

sity of California Press, 1988). Another book, The Object of Memory: Arab and Jew Narrate the Palestinian Village (University of Pennsylvania Press) will appear in June. She is presently editing a volume of essays entitled Gender and Transformation in the Middle East and is conducting research on the anthropology and literature of political prisoners in North Africa.

Egyptian

"I have a great opportunity to make

what I care about a part of the humanities and social science project at MIT," said Professor Slyomovics. "I look forward to teaching gender studies in the Middle East and North Africa and to bringing feminist scholars on the Middle East here to participate.'

In 1998-99, she will teach courses in storytelling; photography and truth (with the Comparative Media Studies program); and the anthropology of the Middle East. She will spend part of this summer in the Middle East, including a return visit to the Palestinian village where she did her field work for The Object of Memory. Professor Slyomovics is sharing royalties from the book with the people she wrote about.

Originally from Montreal, Professor Slyomovics received the BA in philosophy from Barnard College in 1970, the MA in philosophy and Judaic studies from the Jewish Theological Seminary in 1977, and the PhD in Near Eastern studies and folklore from the University of California at Berkeley in 1985. She has also studied at Hebrew University in Jerusalem and the American University in Cairo. She is the recipient of numerous fellowships and awards including a Guggenheim Foundation Grant in 1995-96.

"Susan Slyomovics has an extraordinary scholarly range that spans North Africa and the Middle East and a significant international reputation," said Philip S. Khoury, SHSS dean and a professor of Middle Eastern history. "She is a truly interdisciplinary humanist with deep interests in comparative literature, performance studies, anthropology and gender studies. She brings new distinction to women's studies and Middle Eastern studies at MIT."

The McMillan-Stewart chair is the first of its kind in the United States devoted to the study of women in the Middle East and North Africa. Women's issues are of special interest to Genevieve McMillan, a Cambridge intellectual, businesswoman, art patron, and philanthropist who established the chair. She named the chair in honor of her friend, Reba Stewart, a young American painter who died while practicing her art in Africa.

Genevieve McMillan has a profound understanding of the problems facing women in the developing world and the importance of focusing rigorous scholarly attention on women in the Middle East and North Africa," Dean Khoury said. Her gift to MIT includes resources to establish a new lecture series on women in the developing world at the Graduate Consortium of Women's Studies at Radcliffe College, of which MIT is a founding member. That series is to begin under the direction of Professor Slyomovics.

Dibner Institute appoints Fellows for 1998-99

The Dibner Institute to the bold of Science and Technology has appointed thirteen resident, one visiting and seven postdoctoral Fellows for 1998-99. They come from several nations and pursue many different aspects of the history of science and technology

The following are the names and planned research projects of the new Dibner Institute Resident Fellows:

Xiang Chen, Department of Philosophy, California Lutheran University. "Instruments as Material Paradigms: Experimental Apparatus in the Optical Revolution."

Kelly DeVries, associate professor, Department of History, Loyola College. "Devils from Hell: Gunpowder Weaponry During the Hundred Years War.

Moritz Epple, assistant professor for the history of mathematics and exact sciences, University of Mainz, Germany. His Dibner research will continue his work on the emergence of topology.

Training team seeks focus group participants

The Training Policies and Administration (TPA) team, an offshoot of the Human Resource Practices Development (HRPD) group, is seeking par-

Juliet Floyd, associate professor of philosophy, Boston University. She plans to complete a book on the historical and philosophical significance of Ludwig Wittgenstein's discussions of mathematics and logic.

Alan Franklin, professor of physics, University of Colorado. "Death by a Thousand Cuts: Selectivity and the Production of Experimental Results."

Kostas Gavroglu, professor in the Department of History and Philosophy of Science, University of Athens. At the Dibner Institute he plans to work on two projects: the final stages of a book on the history of quantum chemistry, and research for a project entitled "The Sciences in the European Periphery During the Enlightenment."

Alexander Jones, professor in the Department of Classics and IHPST at the University of Toronto. At the Dibner Institute he will explore Ptolemy's Geography, the only book on cartography to have survived from classical antiquity

Andrew Pickering, professor in the Department of Sociology at the University of Illinois at Urbana-Champaign. He will work on a book titled History of Cybernetics.

Nicolas Rasmussen, University of New South Wales, Australia. He will study American plant physiologists in the 1920s-1940s and their links to the biotechnology industry

Leonard S. Reich, professor of science, technology and society and administrative science at Colby College. He will work on a book about transportation in American history titled On Wheels, Wings and Waves.

She has taught at the Universities of Copenhagen and Aarhus in Denmark and is the author of articles on the history of ancient astronomy. While at the Dibner Institute, she will work on interpreting Babylonian lunar text TU 11.

The Dibner Institute has made the following postdoctoral fellowship appointments:

Arne Hessenbruch, a visiting lecturer at the University of Pennsylvania. His project is a book, Reception of the Theory of Radioactive Disintegration.

Christophe Lecuyer recently completed his dissertation at Stanford University. His Dibner project is "From the Lab to the Fab: Physics Research, Manufacturing Practice, and Ion Implantation at High Voltage Engineering Corporation and Fairchild Semiconductor, 1962-1978."

Reviel Netz, research fellow and affiliated lecturer, Cambridge University. He expects to write a brief volume, An Introduction to Cognitive History

Richard Sorrenson, assistant professor at Indiana University. He will continue work on his manuscript, Visible Technicians: The Pursuit of Natural Philosophy by Mathematical and Optical Instrument Makers in 18th-Century England.

Klaus Staubermann completed his dissertation at Cambridge University. He will analyze the debate between two leading astrophotometrists, G. Müller in Potsdam and E. Pickering at Harvard College Observatory.



Architectural graduate student Eunice Lin catches some rays as the camera catches an interesting convergence of lines.

Photo by Donna Coveney

1998-99 Knight Science Journalism Fellows named

ewspaper, magazine and film journalists from the United States, Europe and Asia have been selected as Knight Science Journalism Fellows for 1998-99 at MIT. The journalists come from California, Arizona, Wisconsin, New Jersey and Washington, DC, as well as from Germany and India. They arrive at the Institute September 1.

The Fellows will spend nine months at the Institute in group and individual study of recent developments in technology and science, under the leadership of Boyce Rensberger, who succeeds Victor McElheny as director of the Knight Fellowships on July 1. The program is part of the Program on Science, Technology, and Society in the School of Humanities and Social Science. Principal sponsor of the program is the John S. and James L. Knight Foundation of Miami.

The new group, the 16th since the program's founding, brings the total of Fellows to 162 from the United States and 15 foreign countries-73 women and 89 men. Of the total, 46 have been citizens of other nations. An additional four have been US citizens working abroad. The largest group

Robin Lloyd, 35, science writer for the Pasadena Star-News, California. Holder of a PhD in sociology from the University of California at Santa Barbara, she frequently covers science news at California Institute of Technology and the Jet Propulsion Laboratory.

Daniel Pendick, 35, freelance writer, Milwaukee, WI. He is a former associate editor and currently a contributing editor to Earth magazine, and a frequent contributor to the New Scientist.

Bruce Shechter, 43, freelance writer, Altadena, CA. Holder of a 1978 PhD in physics from MIT, he recently completed a biography of the mathematician Paul Erdos, entitled My Brain is Open.

Claudia Wassmann, 38, television science journalist, Sueddeutscher Rundfunk, residing in Heidelberg, Germany. Holder of a doctorate in medicine from Heinrich Heine University in Duesseldorf, she recently completed a documentary on schizophrenia.

Choosing the Fellows was a selection committee consisting of Mr. Rensberger, Mr. McElheny, Professor of Biology Nancy Hopkins, 1986-87 Knight Fellow Robert Buderi, and 1991-92 Knight Fellow Shawna Vogel.

ticipants for focus groups to provide input on the first draft of its recommendations for staff training and development.

The focus groups will be held from noon-1pm on the following dates:

Tuesday, May 19-Support staff Wednesday, May 20-Administrative staff, non-supervisory

Tuesday, May 26-Administrative



staff, supervisory Wednesday, May 27—Support staff Locations will be announced. Anyone interested in participating should contact Samantha Conti

at x3-7685 or <sconti@mit.edu> by Monday, May 18.

The TPA team thanks all staff who responded to their recent survey of staff training and development needs.

For further information, see the HRPD web site, which includes frequently asked questions, at <http:// web.mit.edu/reeng/www/hrpd>.

Katherine Rinne, associate fellow, Institute for Advanced Technology in the Humanities at the University of Virginia. She will continue to develop a CD-ROM prototype entitled "Aquae Urbis Romae: the Waters of the City of Rome," an interdisciplinary study of hydrology, topography and urban form that explores the city's 2,800-year water history

Friedrich Steinle, research fellow, Max-Planck Institute for the History of Science, Berlin. He plans to continue work on a book titled The Formative Period of Electromagnetism 1820-ca. 1833.

Nicolas Wey-Gomez, assistant professor of Hispanic studies at MIT. "The Old Science in the New World: Scholastic Science and Moral Philosophy in the Spanish Colonial Americas.

Appointed as a Dibner Institute Visiting Fellow is Lis Brack-Bernsen.

John Michael Steele will investigate the lunar and planetary records contained in the "Astronomical Diaries" kept by Babylonian astronomers from mid-eighth century BC to the beginning of the Christian era. He also plans to study East Asian, European and Babylonian records of meteors.

Benno van Dalen, Alexander von Humboldt Foundation Fellow, Institut für Geschichte der Naturwissenschaften, Frankfurt, Germany. He will work on a manuscript tentatively titled The Activities of Muslim Astronomers in China During the Mongolian Yuan Dynasty (1260-1368).

The Dibner Institute has also reappointed Noah Efron, Tal Golan, David McGee and James Voelkel to a second year as postdoctoral fellows and announced that fellowship awards have been made to 11 PhD candidates enrolled in programs at three Dibner Institute consortium-member institutions: host institution MIT, Boston University and Harvard University.

of Knight Fellows has come from newspapers.

The new Fellows are:

Kevin Coughlin, technology reporter for The Star-Ledger in Newark, NJ, a Newhouse newspaper. He supplements his coverage of electronic technologies with cable television reports.

Kerry Fehr-Snyder, 34, technology reporter for The Arizona Republic in Phoenix, a Pulliam newspaper. She recently covered the Iridium communications satellite project and writes a weekly column called "Digital Desert."

Venkatesh Hariharan, 29, freelance electronics reporter, Bombay, India. A former executive editor of Express Computer, he contributes to Upside magazine in California.

Andrew Lawler, 36, science policy reporter for Science magazine in Washington, DC, the weekly journal of the American Association for the Advancement of Science. He covers the White House, Congress and federal agencies.

Mr. Rensberger is a former reporter for the Detroit Free Press and The New York Times, head writer for the 3-2-1 Contact! program of Children's Television Workshop, senior editor of Science 80 magazine, science editor of The Washington Post and first editor of Horizon, the paper's monthly learning section on science, mathematics and history. He is co-director of the Science Writing Fellowships at the Marine Biological Laboratory in Woods Hole and author of Life Itself, published in 1997 by Oxford University Press.

Mr. McElheny, a former reporter at The Charlotte Observer, Science magazine, The Boston Globe and The New York Times, is retiring to devote full time to writing. Insisting on the Impossible, his biography of Edwin Land, inventor of instant photography, will be published this fall by Perseus Books.

Students compete to design a perpetual-motion machine

By Elizabeth A. Thomson News Office

A perpetual motion machine, or one that moves forever with no source of energy from the outside, is considered impossible by organizations including the American and British patent offices (the latter will not accept patent applications on this subject; the US requires a working model).

So what could be a better problem for MIT undergraduates to tackle?

Two students have won honorable mentions in MIT's first Perpetual Motion Competition. Carl C. Dietrich, a junior in aeronautics and astronautics, and David A. Shear, a sophomore in mechanical engineering, each received \$250 for their written proposals describing machines they believe fit the criteria. They will receive their prizes at a reception May 14.

Six undergraduates entered the competition. None succeeded in winning the \$500 first prize by stumping the judges—students in a class taught by Dr. Yuri B. Chernyak within the Concourse Program directed by Professor Robert M. Rose. However, the entries from Mr. Dietrich and Mr. Shear were so well done that the judges agreed they merited some acknowledgment and split the money between them. Mr. Dietrich submitted his entry, which presented three machine designs, "on the premise that this design competition is not some form of elaborate April Fool's Day joke." (The deadline for entries was April 1.) He went on to describe a water wheel that turns perpetually based on tidal motion, a second water wheel that employs solar energy to do the same, and a generator flying in space that uses "the flux of ions emanating from the sun" to move about.

Mr. Shear described a continuously spinning top that works via magnets inside the top and under the concave dish the top spins in. Although the judges eventually debunked this submission, too, "the model kept us busy for some time," they wrote in a letter to Mr. Shear.

Why are two MIT instructors "espousing such a major crackpot idea?" said Dr. Chernyak, a NASA senior fellow at MIT. Answer: it's a great teaching vehicle. "There's some very serious physics behind the humor," he said. "You have to understand the physics of the world to understand why a perpetual motion machine will or won't work... The ability to find errors in some fine presentations is a vitally important feature of a scientist."

Dr. Chernyak teaches Problems in Electricity and Magnetism, a Concourse Program enrichment course for students in their second term of



In Carl Dietrich's design for a perpetual motion machine (one of three he submitted), the upper reservoir fills at high tide and the water slowly empties into the lower reservoir, continuously turning a water wheel. Once the tide falls below the level of the lower reservoir, the water drains back into the ocean through a one-way valve. Diagram courtesy Carl Dietrich

physics. "The problems presented are meant to stretch their minds, and give them a better intuitive feel for physics," said Professor Rose, of the Department of Materials Science and Engineering.

In past semesters, some of those problems led to the students' unintentionally inventing their own perpetual motion machines, some of which seemed to create energy where there was none before. The appearance of such seemingly simple solutions to global energy and environmental problems led to spirited arguments, analysis, and, according to Professor Rose, "a much deeper understanding of freshman physics... Then it occurred to us that we should extend this challenge to the MIT community at large," and so the Perpetual Motion Competition was born.

Haystack workshop introduces new VLBI system, Mark IV

By Deborah Halber News Office

M ore than 100 engineers from 18 countries took part in a workshop at the MIT Haystack Observatory in Westford from May 10-13 for operators of the global network of VLBI (very long baseline interferometer) stations.

The workshop provided technical training in all operational aspects of VLBI, including handson sessions, lectures, demonstrations and seminars. Included in the presentations was an introduction to Haystack's latest and most sensitive VLBI system, the Mark IV, which is expected to be up and running at observatories around the world by late next year.

The workshop—popularly known as the chiefs' meeting because it offers technical training to staff members who are, or hope to become, one of the

chief operators at their station—is sponsored by NASA and by the European VLBI Network. The workshop was organized by the Haystack Observatory geodetic VLBI staff and the NASA Goddard Space Flight Center VLBI group.

"We are now completing the next generation of VLBI equipment, called Mark IV, which is being deployed worldwide. This is an opportunity to train engineers at various radiotelescope stations in the operations, the new equipment and procedures in general," said Joseph E. Salah, director of Haystack.

VLBI uses simultaneously operating radio telescopes around the world to monitor radio signals from distant sources, typically quasars in galaxies billions of light years away. The data are sampled and time-tagged according to atomic clocks operating at each site, and recorded on magnetic tapes.

The tapes are shipped to a VLBI correlator, such

as the Mark III at Haystack, and processed with custom-designed hardware and controlling software that matches the pattern of radio waves from the distant radio sources. The hardware compensates for the different positions of the telescopes on the surface of the Earth and for the Doppler shift of the radio waves due to the Earth's rotation.

From this processing, the difference in time of arrival at the stations of the signals from the quasars is determined to a precision of a few picoseconds (light travels one millimeter in three picoseconds). Measuring these time differences from at least three sources makes it possible to calculate the distances between the receiving telescopes to a typical precision of better than one centimeter.

These distances are used to determine many geophysical properties, such as the velocities of the plates covering the Earth's surface and the changes in the Earth's rotation rate caused by El Niño. The correlator data are also of astrophysical interest because they can be used to make extremely highresolution images of the extragalactic objects that are the source of the radio emission.

"The Mark IV VLBI system is an evolutionary improvement over the Mark III," said Arthur Niell, senior research scientist at Haystack. "With the Mark IV, the tapes from up to 32 telescopes can be fully correlated at one time, while the Mark III is limited to only four stations.

"The Mark IV also will allow correlation at much higher rates—up to 2 billion samples per second per station, compared to 250 million for the Mark III—providing a much more sensitive system and higher accuracy."

The Mark IV prototype is ready, and the complete correlator should be active by late 1999. Most recording-equipment upgrades at the telescopes should be completed by then, Dr. Niell said.

Calendar

* Open to public ** Open to MIT community only

(For arts-related listings, see page 7)

Tech Talk Calendar and Student Notices are on-line at <http://web.mit.edu/newsoffice/tt/ listings>.

Next deadline for listings: Noon Friday, May 15. Covers events from Wednesday, May 20 through Sunday, June 7. Listings for the Institute Calendar and Student Notices should be submitted using the web form at <http:// web.mit.edu/newsoffice/tt/calform>. Questions can be e-mailed to <ttcalendar @mit.edu> or call x3-2704. Early submissions encouraged.

May 13-24

SPECIAL INTEREST

of Low-angle Normal Faulting and Footwall Exhumation*—Prof. Jane Selverstone, Univ of New Mexico. Sponsored by Department of Earth, Athmospheric, and Planetary Sciences. 4pm, Rm 54-915. Refreshments at 3:30pm, Ida Green Lounge. More info: x3-3382 or <http://wwweaps.mit.edu/dept_sem.html>.

Fluid Inclusion Constraints on the Mechanics

THURSDAY, MAY 14

- Digital Lights, Cameras, Materials...*— Patrick Hanrahan, Stanford Univ. Sponsored by MIT Lab for Computer Science. 3:30pm, Rm 34-101. Refreshments at 3:15pm. More info: x3-0145, <bary@ hq.lcs.mit.edu>or<htp://www.lcs.mit.edu/ web_project/dls97.html>.
- Closed Crack Detection using a Novel Fiber Optic Sensing Technique*--Niell Elvin, Dept. of Civil and Environmental Engi-

Computation of Unsteady Nonlinear Flows in Cascades Using a Harmonic-Balance Technique*—Prof. Kenneth C. Hall, Duke Univ. FDRL Seminar, Dept. of Aeronautics & Astronautics. Noon, Rm 33-206. More info: <jeans@mit.edu> <http://raphael/ seminars.html>.

Startups and Letdowns: Reflections of a Professor in Venture Land**—Raymond F. Baddour, Lamott duPont Professor of Chemical Engineering, Emeritus, MIT. Warren K. Lewis Lectureship in Chemical Engineering. 3pm, Rm 66-110, Gilliland Auditorium. More info: x8-7031 <arline@mit.edu> <attp://web.mit.edu/ cheme/www/Titlepage.html>.

Key Issues for the Applications of High Temperature Superconductors*—Prof. David C. Larbalestier, Univ. of Wisconsin. Sponsored by Plasma Science and Fusion Center. 4pm, Rm NW17-218. More info:

THURSDAY, MAY 21

- Eddy-Induced Variability in Mode Water Formation*—Wilco Hazeleger, KNMI, The Netherlands. Physical Oceanography Sack Lunch Seminar. 12:10-1pm, Rm 54-1615. More info: http://puddle.mit.edu/ -ganacho/sack.html>.
- Dynamics In Driven Granular Media : How Sand Melts And Flows*—Narayanan Menon, U. Mass. Amherst. Sponsored by Div. of Mechanics & Materials, ME Dept. 4-5 pm, Rm 5-234. Refreshments prior to talk. More info: x3-9379, <1_m@mit.edu><http:// /lohtse.mit.edu/~maha/seminar.html>.

FRIDAY, MAY 22

Aurora: An Infrastructure for Dynamic Work Sessions*—Prof. Christos N. Nikolaou, Computer Science Dept., Univ. of Crete, MIT Women's League**—Informal Needlework Group: May 20. 10:30am-1:30pm, Rm 10-340 (Emma Rogers Room).

MIT Community Summer Softball: Umpire Sign-up, Wednesday, May 13, 5:30pm, Student Center, 3rd Floor, PDR1; Umpire Clinic, Thursday, May 21, 5:30pm, Rm 1-190. More Info: Mark Throop 508-877-9263 or Maryann Smela x3-6207. New Teams and Umps welcome!

MITAC

The MIT Activities Office (MITAC) serves the cultural and recreational needs of the MIT community (including MIT's retirement community). Two locations: (1) Room 20A-023, 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.

The Awards Convocation will be held May 13 (today) at 3:30pm in Rm 10-250. A reception will follow the ceremony in the. President's Courtyard (outside the Bush Room), or in the Bush Room itself in case of rain. All members of the MIT Community are invited.

SEMINARS & LECTURES

WEDNESDAY, MAY 13

But Is It Socialization? International Institutional Effects on Chinese Arms Control Policy*—Alasatair Iain Johnston, Harvard Univ. Sponsored by Security Studies Program. Noon-1:30pm, Rm E38-615. Bag lunch, refreshments provided. More info: x3-0133, <llevine@mit.edu>.

Bioinformatics in Gene and Drug Recovery*— Dr. David Searls, Smith Kline Beecham. Problems and Methods in Bioinformatics Seminar, sponsored by Metabolic Engineering Lab & Lab for Intelligent Systems Process Eng. 4pm, Rm 56-114. More info: x3-4583 or <gregstep@mit.edu>. **Dept. of Crvit and Environmental Engineering.** Sponsored by Engineering & Environmental Mechanics Group. 4pm, Rm 1-350. More info: x3-7186, <obuyuk@ mit.edu>.

Modeling Crystal Plasticity: Is There Life Beyond Finite Elements?*---Vasily Bulatov, ME Dept. Sponsored by Div. of Mechanics & Materials, ME Dept. 4-5pm, Rm 5-234. Refreshments prior to talk. More info: x3-9379, <1_m@mit.edu> <http:// lohtse.mit.edu/-maha/seminar.html>.

Benzo[a]pyrene-Mediated Induction of CYP1A1 by a Unique Protein with Two Functions[#]—Prof. Edward Bresnick, UMass. Medical Center. The Robert S. Harris Lecture, sponsored by the Division of Toxicology. 4:15 pm, Rm 6-120. Refreshments at 4pm. More info: x3-6792 <toxop@mit.edu>.

FRIDAY, MAY 15

US & International Science & Technology Policy: A Symposium in Honor of Eugene B. Skolnikoff**. Sponsored by the Department of Political Science. 9:00am-5:30pm, Killian Hall, Rm 14W-111. More info: cpekreut2@mit.edu>. <rivenberg@psfc.mit.edu> or <http:// www.pfc.mit.edu/cgi/calendars/psfc>.

What Can the Marine Os Isotope Record Tell Us About the Geologic History of Chemical Weathering?*—Dr. Greg Ravizza, WHOI. Sponsored by Earth, Atmospheric, and Planetary Sciences. 4-5pm, Rm 54-915. Refreshments at 3:30pm, Ida Green Lounge. More info: x3-3382, <bevkt@mit.edu>, <http://www-eaps.mit.edu/dept_sem.html>.

TUESDAY, MAY 19

Using Polymer Science to Influence Cell Biology*—Molly S. Shoichet, Univ. of Toronto. Sponsored by Department of Materials Science and Engineering as part of the Perspectives in Biomedical Materials Science and Engineering Series 3pm, Rm 8-314 (John Chipman Room). More info: x8-0537 or <burkett@mit.edu>.

WEDNESDAY, MAY 20

Global Silica Dynamics in an Ocean General Circulation Model*—Anand Gnanadesikan, Princeton Univ. Physical Oceanography Sack Lunch Seminar. 12:10-1pm, Rm 54-915. More info: http://puddle.mit.edu/-ganacho/sack.html Greece. MIT Design Laboratory Seminar. 11am-noon, Rm 5-314. More info: x3-8372 <gunst@mit.edu>.

Ripples, Twisters and Avalanches in Plasma Phase Space*—Prof. B. Breizmann, U. of Texas at Austin. Sponsored by Plasma Science and Fusion Center Seminar Series. 4 pm, Rm NW17-218. More info: x3-8101 <rivenberg@psfc.mit.edu>.

COMMUNITY CALENDAR

- Hi-Tech Swapfest, Sunday May 17. Sponsored by Sponsored by W1MX, the MIT Electronics Research Society, W1XM/R and the Harvard Wireless Club. 9am-2pm, Albany & Main St. Buy, sell, swap electronics, computers, radio parts, etc. Buyers \$4 (\$1 off with MIT ID), sellers \$10/space. More info: x8-3754.
- Wives Group**—May 13: Trip to Mount Auburn Cemetery. Meet at MIT Coopin Kendall Square at 2:45pm. May 20: Wives Group Barbecue at the Barbecue pits between Johnson Athletics Center (W34) and Briggs Field House (W23) from 3-6pm. Spouses and children welcome. Bring chairs and a dish to share. Info: Jennifer x3-1614.

- Six Flags Adventure Theme Park (NJ)**— Early bird one day, two park passes good thru June 14, 1998. Tickets: \$22 (reg. \$40).
- Tanglewood and the Boston Symphony (Tanglewood, Lenox)**—Sun., Aug. 9 thru Mon., Aug. 10. Tickets: \$219 pp double occupancy. Purchase by 6/16.
- Nova Scotia Weekend Getaway (Canada)**--Fri., Oct. 9 thru Sun., Oct. 11. Tickets: \$199 pp double occupancy. Purchase by 8/21.
- Trapp Family Lodge Weekend (Stowe, VT)**-Sun., Nov. 8 thru Wed., Nov. 11. Tickets: \$215 pp double for two nights (Sun. and Mon. evening) and \$315 pp double for three nights (Sun., Mon., and Tues. evening).
- Museum Passes**—Children's Museum, \$4 (reg \$6-7). Museum of Science, \$4 (reg \$5.50-\$7.50). NE Aquarium, \$5.50 (reg. \$5.50 and \$11).
- Discount Movie Tickets**—Sony Theatres \$5. Showcase Cinemas \$5.50. General Cinemas: adults \$5.50, children \$3.25. Kendall Square Cinema \$6.50.

AUV seeks clues to global climate change in Labrador Sea

By Andrea Cohen **MIT Sea Grant**

ost New Englanders booking a M winter cruise opt for tropical destinations like the Caribbean. But this February, Jim Bellingham and his traveling companions headed north instead, to the icy, gale-whipped reaches of the Labrador Sea.

The principal research engineer with MIT Sea Grant's Autonomous Underwater Vehicles (AUV) Laboratory chose the Labrador Sea precisely for its violent seasonal offering-and the clues they offer toward a clearer understanding of global climate change.

Along with regions in Antarctica and the Mediterranean, the Labrador Sea is the site of deep ocean convection, or the mixing of near-surface water into the ocean's depths. During the summer months, a warm cap of water (5°C or 6°C) forms on the surface. In winter, cold Arctic winds chill that relatively salty surface water, making it heavier and causing it to mix with warmer waters below. As winter progresses, that mixed layer of water extends deeper toward the ocean floor.

This vertical mixing of the Labrador Sea-a critical part of the thermohaline cycle-delivers cold water to the deep ocean as part of a larger circulation process transferring heat from warm tropical climes northward. As such, the currents are known to play a critical role in regulating climate throughout the world. In fact, many scientists believe that changes in the

B roken glass and any materials other than cans, plastic and glass

tion of whether anything dangerous

was on the slide were of concern.

"The Biosafety Office had to track

nifer Combs

thermohaline cycle caused a little historical weather event a few years back known as the Ice Age.

Unfortunately, observing the processes by which deep waters are formed is difficult. As a result, many questions remain unanswered about this phenomenon-which, in turn, leaves gaps in models that predict global climate events

Up until recently, researchers had to rely on traditional oceanographic tools that generally allowed them to study various processes with vertical measurements. In that method, Dr. Bellingham said, "you lower something down and then you pick it up. What you get is a sense of how things change as a function of depth."

However, what researchers don't get is a sense of horizontal variability. Through a five-year project called the Autonomous Ocean Sampling Network (AOSN), researchers from MIT Sea Grant are using durable, low-cost, easily maneuverable AUVs to navigate and collect data about deep ocean convection over large areas and under harsh conditions. Supported by MIT Sea Grant with major funding from the Office of Naval Research, AOSN is a collaborative effort involving scientists from the Woods Hole Oceanographic Institution (WHOI), the University of Washington, and Chapel Hill, NC-based Electronic Data Consultants (EDC)

In the latest portion of this project, Dr. Bellingham and colleagues left Woods Hole in late January aboard the research vessel R/V Knorr-the same

down the slides and send them out

for testing," Ms. Combs said. "An



Crew members and researchers aboard the R/VKnorr in the Labrador Sea deploy the mooring system for the Odyssey IIB. Photo courtesy MIT Sea Grant

ship that discovered the Titanic off of the Grand Banks in 1985. Working between major winter storms and 30foot seas, the researchers successfully deployed their elaborate mooring system, complete with a docking station where the AUV could recharge itself and download data.

The goal of the mission was to leave the AUV and the mooring at sea to collect data while the researchers returned home. From the warmth of their offices, researchers would communicate with the vehicle via a two-way satellite link. The idea, said Dr. Bellingham, is that scientists will be able to "configure surveys responding to specific convection episodes, allowing a real-time reactive presence in a remote, hostile environment."

From hurricanes to deep-ocean convection, most of the ocean's high-energy events are episodic in nature. With several AUVs roving an area and sending data back to shore, scientists would be poised to respond to such events. One application might be to monitor an open-ocean aquaculture site for cold currents of water that can stream in and kill fish. A network of AUVs could also provide information useful for fisheries management, for military purposes, and for studying pollution transport.

During their time at sea, the research team ran numerous successful missions with its latest version of MIT Sea Grant's AUV, Odyssey IIB. "We were measuring simple things such as temperature and salinity, but doing a very accurate job of it," Dr. Bellingham said.

The WHOI team members included

Hanumant Singh, Dana Yoerger and Martin Bowen, who worked on the AUV's docking system; Keith von der Heydt, who concentrated on satellite and radio communications; John Kemp, an expert in putting complex moorings into place; and Mark Johnson, who focused on acoustic communications. Mike Feezor (EDC), Albert Bradley (WHOI) and James Bales (MIT Sea Grant) worked on battery charging and power and data transfer; Robert Grieve (MIT Sea Grant) handled vehicle operations; and Brad Moran (MIT Sea Grant) handled vehicle software.

MISSION LANDMARKS

The team chalked up a number of firsts, especially in the realm of communications. Position and scientific measurements were transmitted acoustically by the AUV to the dock, which recorded the data and relayed them by radio to the ship, where scientists monitored the mission's progress. Back on shore, satellite transmissions from the mooring in the Labrador Sea appeared as e-mail on colleagues' computers. Satellites relayed e-mail from scientists back to the mooring.

During the mission, the AUV demonstrated the first successful homing on a deep (500-meter) dock. In addition, vehicle measurements of the spatial variability and dynamics of the mixed layer highlighted a much more active process than is imaged from shipboard sensors.

From an operational perspective, the growing maturity of the systems was evident as well, with more than 20 vehicle missions run from the Knorr in winds up to 35 knots. Despite this progress, the system was not ready to be left behind in the Labrador Sea unattended. As a result, the researchers decided to pull up the mooring and bring the AUV home with them-a tough decision, says Bellingham, because it was "one of the first times I wanted to come back with fewer vehicles.'

Back from the Labrador Sea, the team continues to work on docking. With growing confidence in their techniques, they plan more scientific operations with AUVs for the future, including joint operations with the Harvard-led Littoral Ocean Observation and Predictions System Project in Massachusetts Bay. Even as these systems are perfected, the team is creating systems for the next generation of vehicles. A Bellingham-led project for monitoring the Arctic Ocean with longrange AUVs is being kicked off this month at MIT.

Bellingham noted that there is "no one silver bullet for making measurements in the ocean." Instead, he described a developing arsenal that includes many AUVs with different energy, payload, propulsion and endurance systems. What the various systems share is the ability to operate for extended periods without a person nearby

"Our need for getting data from the ocean is rising exponentially for all kinds of monitoring reasons, while the dollars that are going into those systems are plummeting," he said. As a result, the wave of the future will, by necessity, include more and more of these types of economical and robust systems.

Shuttle driver spots lone toddler on late-night stroll

By Denise Brehm **News Office**

He doesn't usually stop for pas-sengers on Magazine Street, but when Safe Ride driver Jim McNeely spotted the stocking-footed toddler walking alone in the dark, he pulled the van over without hesitating.

"I saw this little kid walking along

didn't know where he lived," said Ms. Sever. "So I squatted down on the porch next to him and just started talking. I had a really tough time understanding him because he's so young and didn't enunciate very well. It took quite a while to figure out his name," she said.

"Apparently the porch he was on really was where he lived. But we didn't know that," said Ms. Sever, who said she often relies on Safe Ride for transportation home after working late on campus

Kids display science projects—and see MIT's

The spin rates of the Turbo Bumble- two groups. One group toured MIT ratory for Electromagnetic and Elec-

incident like this can have some sebottles must not be placed in recycling containers marked for that purrious physical, emotional and legal pose, said recycling coordinator Jenconsequences. Sharp objects including broken Her warning was issued after an glass, window panes, mirrors, slides and laboratory materials should not be dropped into recycling containers, Ms. Combs emphasized. They are

employee of Jet-a-Way, the company that picks up the recycling material from campus, required six stitches for a cut he received from a intended only for glass bottles, metal cans and #1 and #2 plastic (a number broken microscope slide which was placed in a recycling container. is stamped inside a recycling logo on Both the cut itself and the questhe bottom of plastic containers).

Don't recycle broken glass

Anyone with questions about recycling may contact Ms. Combs, at <recycling@mit.edu> or x3-7671.

the sidewalk. All he had on was a little shirt, socks and a diaper. His body language, his facial expression-everything said to me that he was in trouble," said Mr. McNeely, a retired social worker and guidance counselor who drives one of MIT's shuttle vans. "When I pulled up next to him, it scared him. He went up the stairs of a house and started pulling on the door."

It was 3:45am and Mr. McNeely was making his last trip of the night through Cambridgeport, just as the toddler was making his own solitary trip home in the damp chill on Friday, May 8. The child had apparently traveled about 10 blocks from his father's house to his mother's, when Mr. McNeely saw him and notified his Safe Ride supervisor and the police.

Safe Ride passenger Laura Sever, a senior in electrical engineering, got out of the van to comfort the little boy and keep him from running away.

'What I wanted to say was, 'It's okay, we'll take you home.' But we

Another Safe Ride driver, Zach Roscoe, heard the call and came to help, wrapping his jacket around the little boy. MIT Campus Police and Cambridge Police officers arrived shortly afterward.

Mr. McNeely said the Cambridge police had been looking for the toddler after receiving a call from someone who reported seeing the child in a nearby park. Police officers took the child to Cambridge Hospital, where he was reunited with his family later that morn-

The child's grandfather told the Boston Globe: "My grandson stayed over my son's house, and my grandson, he wanted to come home. Everyone was sleeping, so he got up and he came home. You know, opened the door and started walking home. I'm surprised that he knew his way home."

bee and other vo-vos and the effect of different light sources on radish seedlings were among the science projects brought to MIT last Tuesday by some 200 seventh- and eighth-grade students from the Cambridge public schools.

The children were joined by about 200 MIT student volunteers who talked to them about their projects and led them on tours of MIT laboratories for the sixth annual MIT/Cambridge Science Expo. The non-competitive Expo included T-shirts for all and culminated with a Battle of the Robots presented by MIT students.

"We want to encourage the students to pursue science, and show them how interesting it can be and how much fun they can have," said freshman Anita L. Chaudhuri. Ms. Chaudhuri was cocoordinator of the event with Ashok C. Chander, a sophomore in biology.

After the students set up their projects-which were displayed on posters with titles like "Flower Power" and "It's Alive"-they divided into

labs to view the "cool stuff" going on there; the other stayed with their projects to discuss them with MIT student Science Evaluators.

The latter exercise could not have been quick work: most projects came complete with working hypotheses, a list of materials used, experimental results, and sometimes photos, graphs, and bibliographies. The two groups eventually switched so everyone could tour labs and meet with MIT evaluators.

This year the students toured the MIT Museum, the Artificial Intelligence Laboratory, the wind tunnel, the cyclotron building and the Edgerton Center. They could also drop by a number of demonstrations in the Johnson Athletics Center, including one on magnets by Mr. Magnet (a.k.a. Paul Thomas of the Plasma Science and Fusion Center) and one on MITee Mouse, a robot that traverses a maze. (The robot was run by David Otten, a principal research engineer in the Labotronic Systems.)

"Oh wow! It cut those corners like it was Knight Rider or something,' said one student watching the MITee Mouse demo.

At the closing ceremony, the students were addressed by Cambridge Mayor Frank Duehay; Bobbie D'Allessandro, superintendent of Cambridge schools; and MIT's Paul Parravano, assistant for community relations in the President's Office.

The first Science Expo was organized by the Educational Studies Program in the spring of 1993. Since then it has been run annually by the Public Service Center and its staff of MIT students following essentially the same schedule and goals. The Expo has been steadily increasing in size each year as the event is increasingly recognized within the Cambridge schools and around MIT. For more information, see the web site at <http://web.mit.edu/ pscenter/www/expo.html>

Elizabeth Thomson

Teams compete in Sloan Challenge

By Rukmin Ramsuchit Sloan Communications

B y successfully launching a new product in four hours, the student/ corporate team Victory By Design won the inaugural MIT Sloan Challenge last Friday.

In the unconventional business skills competition and fund-raiser, 20 teams vied against each other to provide innovative solutions to unexpected business crises, such as a newly detected "bug" in the portable noise reduction machine about to be launched.

The Victory By Design team included an MIT alumnus, Allen Frechter (SB '83, SM); a corporate sponsor representative, Kevin Johnson of The Design Continuum; a Harvard Business School student, Bhavin Shah; and Uen-Li Chia, a Sloan MBA student.

All profits from corporate sponsorships will benefit Jobs For Youth-Boston, Inc., Boston's largest nonprofit workforce development training center for underskilled, underemployed youth and adults.

"We've initiated this event to continue building bridges between MIT, Sloan and the community at large," said Paul Cheng, a Sloan MBA student and the competition's lead student organizer. "Being at MIT, everyone knows we understand technology and its applications. The purpose of this event is to demonstrate teamwork and relationship-building."

Each team represented a fictitious company being chauffeured around Boston and Cambridge in an attempt to launch a new product. Teams were armed with Nokia 9000i Communicators (digital palmtop computers that allowed teams to get e-mail, check voicemail, fax memos and search the Internet), Bell Atlantic PCS phones and Polaroid digital cameras while driving around town and meeting with business partners, customers and suppliers.

"Students take the project from conception through execution," said Assistant Professor Nader Tavassoli, director of Sloan's new product and venture development track. "It uses the skills we try to instill in the students: leadership, teamwork, pragmatic business sensibilities. The MIT Sloan Challenge benefits Jobs For Youth tomorrow's workers. With the integrated teams of corporate members, students and faculty from across the Institute, it breaks down the barriers of a traditional business school."

At an awards ceremony held at Walker Memorial, the four members of the winning team received Nokia 9000i Communicators. The second- and third-place winners, Diverse Advantage and Price Waterhouse EMC, won Polaroid Digital Cameras and Illuminite Reflective Fleece Jackets.

Two teams are top winners in \$50K contest

(continued from page 1) company, CarSoft, earned the runnerup slot with a \$10,000 prize.

In another unprecedented move, Direct Hit donated its \$30,000 winnings to the other finalists after announcing it had received a commitment for \$1.3 million in funding. Making the event even richer, contest alumni/ae Krisztina Holly, John Barrus and Mike Cassidy, whose company Stylus Innovations won the grand prize in the 1991 \$10K Competition, returned their original \$10,000 award to encourage student entrepreneurship. Artisoft acquired Stylus Innovations in 1996 for \$13 million.

The two grand prize winners at the ninth annual MIT event included a nonprofit and a for-profit venture. Volunteer Community Connection is an Internet-based clearinghouse that matches volunteers and nonprofit organizations. Direct Hit provides software that improves the performance of existing Internet search engines.

CarSoft, the runner-up, designs and

produces automotive diagnostic tools that connect to home computers. Other finalists included Akamai Technologies, which develops ways to speed content distribution through the Internet; SiliconTest, which designs probe cards for semiconductor chip testing; and WeddingBell.com, which registers wedding gifts via the Internet.

The six finalists were chosen from 84 entrants and 30 semifinalists. Judges selected six finalists based on the quality of their business plans. Each finalist presented its plan to the final awards audience of more than 500, including venture capitalists and business leaders. The event reached a global audience through a live Internet broadcast.

Entrepreneurial luminaries led the ceremonies. Bill Porter (Sloan SM '67), chairman and founder of E*Trade, delivered the keynote address. Judges included Mitch Kapor, founder of Lotus Development Corp.; J. William Poduska, Sr., founder of Prime Computer and Apollo Computer; and David Morgenthaler, founder of Morgenthaler Ventures.

Student entrepreneurs must actually launch their companies to receive the prize money. In addition to the six finalists, 12 other teams plan to transform their plans into corporations. Several teams have conditional commitments for venture financing in hand.

The MIT \$50K Entrepreneurship Competition is the world leader among university-based business plan competitions, recently described by Inc. Magazine as the business plan competition that is "more equal than all the others." In its nine-year history, the contest has facilitated the birth of more than 30 companies with more than \$180 million dollars in aggregate market value and created some 500 jobs.

Successful start-ups from past competitions include Firefly Network (acquired by Microsoft), Lexicus (acquired by Motorola), SensAble Technologies, Webline Communications, Stylus Innovation, Silicon Spice, and Flash Communications (acquired by Microsoft).

MIT gears up for June 5 Commencement exercises

(continued from page 1) Dr. David Ho, scientific director and chief executive officer of the Aaron Diamond AIDS Research Center in New York, also will speak. When White House representatives contacted MIT last month to schedule the President's speech, Dr. Ho said he would be honored "to share the podium with President Clinton." Dr. Ho accepted an invitation to speak in February. In order to accommodate two speakers, President Charles Vest will forgo his traditional charge to the graduates.

"We are honored and delighted that President Clinton has selected MIT as the place to deliver a major address to people who will be leaders of the 21st century," said President Vest. "The future will be shaped in large measure by advances in science and technology, and MIT is the home of many of the people making these advances. We look forward to the President's address and his vision."

The Commencement speaker in 1997 was United Nations Secretary General Kofi Annan; in 1996, the speaker was Vice President Albert Gore Jr.

For the awarding of more than 2,700 degrees (a number of graduates get more than one), Dr. Vest will present diplomas to the bachelor of science degree recipients and those receiving both bachelor of science and master of science degrees, while Provost Joel Moses will give out the doctoral, engineering and other master's degrees. The two lines of students will approach the stage simultaneously as their names are announced in an alternating pattern.

Those receiving their doctoral degrees also will attend a special hooding ceremony on the day before

Commencement (Thursday, June 4) in Rockwell Cage. At that ceremony, department heads or their representatives will assist the school deans in hooding the degree recipients. Receptions will be held for the graduates and their guests.

Following Friday's Commencement program, President and Mrs. Rebecca Vest will hold a reception for graduates and their guests at several locations in or near McDermott Court.

A second important event awaits some of the graduates, relatives and guests on Commencement day. At 6pm on Friday, a commissioning ceremony will be held for 25 graduating cadets and midshipmen in MIT's Army, Air Force and Navy Reserve Officers Training Corps (ROTC) units under the masts of the historic frigate USS Constitution at the Charlestown Navy Yard Historical Park. The speaker will be Rear Admiral John B. Padgett III, commander of Submarine Group Two in Groton, CT.

Commencement tickets May 26

Commencement tickets will be distributed beginning Tuesday, May 26, the Commencement Committee has announced. The previously announced distribution date of May 18 had to be changed because details on security remain pending.

Tickets will be distributed to degree recipients—four tickets per graduate—in the Information Center (Rm 7-121) from 9am-5pm on May 26-29 and from 9am-6pm on June 1-4. The hours and location of ticket distribution on Commencement Day will be announced later.

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

the Internet on the date of publication, which Mag I

- Mac stuff: laserprinter/personal Laserwriter 320(Postscript), addtl new toner (\$65 value); Iomega zip driver w/11 disks (100 MB each); Mac Classic II. Exc. cond., \$595 for all. <jiongru@mit.edu>
- Sony Discman CD player, barely used, pd \$120, askg \$60. Call x3-2024, <anzer@mit.edu>.
- Black frame futon w/Q matt, \$170; microwave, \$70; black wood.coffee table, \$40, everything 1.5 yrs old & exc cond; Evenflo baby carseat, new, nvr used, \$45. Call x7-5637 or <janique@mit.edu>.
- Piano, Baldwin spinet, exc cond, can fit in apt, \$1950; comb shelves/desk/drawers, 1 piece, 6' tall, 30" wide, 15" deep, \$60; bookcase, same size, \$30. Ann x3-9410, <annr@mit.edu>.
- This Old House tour tickets, four avail for May 30 at 6:30pm, will sell for \$19/ea or all four for \$70. Sharon x3-7188, <scayley@mit.edu>.
- Mas I C w/12 PAM & othernat card 14" color

- a/c, off-stprkg, availearly-mid June, 1 yr lease, no smkg/pets, \$1200/mo. 781-275-4417.
- Cambridge: furn rms for rent in single home, nr 1 Kendall Sq, convenient to MIT, subway, restaurants, \$250/wk, \$800/mo, \$65/night + utils. J. Blair, Draper x8-2843 or 617-576-5125.
- Davis Square: Irg sunny furn studio apt, prkg, laundry, deck, no smoke or pets, all utils incl, 1 block to Red Line T, avail June 15 or Sept 1, \$900/mo. 617-625-8847 or <mcciaglo@mit.edu>.
- New Haven, CT: Colonial rent/sale, starting 7/1 or 8/ 1, 3BR, 2.5b, LR, family rm, study, full bsmt & cellar, 1 car gar, nr Yale Bowl, dead-end st, quiet nbhd, Magnet Sch. Call 617-558-3690.
- South End: sublet 1BR, W. Canton St, nr T stop, priv roof deck, carpets, Irg BR, fully furn, a/c, \$1000 for 8/1-8/31, less if can housesit plants, pets. Alex

Student Advisory Committee recommends many changes

(continued from page 1)

monetary and administrative support for that involvement. For example, the SAC puts forth a scenario in which a faculty member could receive a temporary appointment of fixed duration as a "departmental community chair," which would come with a grant for teaching and participating in the student community.

It also calls for the increased presence of graduate students and faculty members in the undergraduate student community through the establishment of mixed graduate and undergraduate student housing as well as special living quarters for faculty within student residential halls, in addition to the current housemasters.

In addition, the report recommends changes to MIT's basic curriculum, advocating the adoption of both an undergraduate humanities core which would provide education in both communications and ethics, and a minor program for doctoral candidates. The SAC urges a new system of governance for MIT that incorporates opportunities for student participation as a means of "learning by doing," and the framework for better interaction and integration among students from different departments, research, political, living and interest groups. The basis of the committee's recommendations is an educational triad, a concept of education that places equal emphasis on research, academics and community.

ployers and society in general. The leaders of tomorrow will be technically proficient, but they will also work well with others, adapt quickly to organizational and technological change, and understand the needs of the communities in which they work and live," said the report.

To achieve its goal of preparing the student for all aspects of life, the SAC called for the adoption of a Student Development Program, which would create:

 A "clearly articulated set of competencies that all students should learn and develop" during their years at MIT both inside and outside the classroom;
An appropriate way of assessing that development;

• A comprehensive list of curricular, co-curricular and off-campus means for students to develop these competencies;

• Rewards for the teachers and learners who participate;

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

Discount coupon on Northwest Airlines valued at \$100, will sell for \$75. Terry (781) 395-6930 or <terryh@ai.mit.edu>.

HP 560C color ink jet printer with extra ink cartridges \$175. Call x3-2720 or <srudolph@mit.edu>.

Evenflo swing/cradle set, Graco exersaucer, porta crib. Launa x3-7271.

Beaut 19" deep reddish-brown Bianchi "Limited" just tuned up for riding season, top-flight components, extras, exc cond, must see, \$350. Call x3-0758 or <sandra @mit.edu> Mac LC w/12 RAM & ethernet card, 14" color monitor, HP printer & software, great for student, \$200 or bst. Call 781-769-4882.

ANIMALS

Good home sought for 2 healthy, 8 yr old neutered cats with up-to-date shots. E-mail <ljgibson@mit.edu> or call 522-5966.

VEHICLES

1986 white Pontiac 4 cyl Fiero, 120K, exc int & ext cond, nds transmission work, \$500 or bst. Call 781-860-0036 after 6pm.

1987 Nissan Sentra, 2-dr, 5-sp, AM/FM, 83K, orig ownr, meticulously maint, no rust, etc, \$1700. Kevin x3-0177, <kcunning@mit.edu>.

1990 Honda Civic LX, 4-dr, 5-sp, gd cond, 88K, new brks, gd trs, \$4500 or bst. Call 781-933-8141.

HOUSING

Bedford: spacious 2BR 1-level duplex apt, quiet walkto-center nbrhd, priv patio, hdwd fl, w/d hook-up, 617-236-4475 or <nachman@wi.mit.edu>.

Truro: 2BR newly renov hse nr best beaches, nicely furn, cable, deck overlooks wooded yard, \$700/wk July & Aug. Call 617-661-6698 or 508-487-9106 wknds.

White Mountains, NH: Waterville Estates, 3BR, 2b, on site tennis, 3 htd pools, hot tub, pond, biking, hiking, grt vw, sorry no pets, non-smkg unit, summer \$490/wk, Call Chuck, Draper x8-2957.

WANTED

For her sabbatical yr, Israeli prof sks 1BR apt starting Aug 98, poss exch w/2BR apt in Haifa, Israel. Ph/ fx+972-4-833-1824; <gabig@tx.technion.ac.il> or <carmon@mit.edu>.

I need camping gear (just a used tent and 2 sleeping bags will do fine). I can't pay much! Betsy x3-5668,
bets@mit.edu>.

Housing wanted July 1 or later for 1 yr, 1BR apt or housesitting, non-smkrs, v resp grad student couple. E-mail <hein@psyche.mit.edu> or call 302-366-0689. "If MIT graduates are expected to be the leaders that make important contributions to society in the 21st century, an MIT education must better prepare students for life," the April 22 report stated.

"Students who have a narrow set of skills and are unable to adapt quickly to change are no longer desirable by em• Participation by all members of the MIT community, particularly faculty and staff;

• A person and place to own and administer the Student Development Program.

The SAC is chaired by Luis Ortiz, a graduate student in materials science and engineering who also serves as one of three student members of the Task Force, along with Jeremy Sher, a junior in mathematics, and Iddo Gilon, a senior in computer science.

The 14-member Task Force, which has a total of 11 faculty members plus the three students, is co-chaired by Professor Robert Silbey of chemistry and Professor R. John Hansman of aeronautics and astronautics. Anyone who would like a copy of the Student Advisory Committee's report should contact Anthony Ives at x3-6399 or <ajives@mit.edu>.

Janney and Baryshnikov create electrocardio-choreography

When Mikhail Baryshnikov performs "HeartBeat:mb" this week as part of the White Oak Dance Project, he won't be dancing to classical ballet music by Tchaikovsky or Copland. Instead, he'll be accompanied by sounds generated by his own body through a device created by interactive architecture artist and composer Chris Janney, who received the SM in visual studies from MIT's Center for Advanced Visual Studies (CAVS) in 1978,

Mr. Janney first conceived "HeartBeat" in 1981 when he was a research fellow at the CAVS. The

work was premiered by Sara Rudner of the Twyla Tharp Dance Company at Boston's Institute of Contemporary Art in 1983.

Arts at MIT

The bioengineering device, developed by Transkinetics, Inc., captures the electrical impulses to the heart and surrounding muscles via wireless telemetry. Placed on the performer's chest and amplified through filters and a sound system designed by Mr. Janney, the machine provides a percussive track layered over music based on jazz scat and Indian tabla rhythms and Mr. Janney's recitation of medical texts.

"The pace of the thump-thumpthump both elicits his movement and reacts to it," wrote Newsweek in January. "Baryshnikov is practically translucent here: we see the still unsurpassed elegance of his classical technique, but we see it shaping moves that emanate directly from his personality, his very blood and breath."

Mr. Janney has been working on



Ghadames, a small Libyan village in the Sahara Desert, provides a fascinating example of vernacular earth architecture. An exhibition about this historic village, Ghadames: The City of Shades, can be seen at the Rotch Visual Collections, Rm 7-304, through May 20.

interactive architectural sound and light installations since 1989. He is best known locally for his "Soundstair" in Boston's Museum of Science, a project similar to one he created while at MIT, in which musical sounds are triggered by a person's movements up and down a flight of stairs. Mr. Janney is a professor in the School of Architecture at Cooper Union College in New York City, where he teaches Sound as a Visual Medium.

> Last week, Lynn Heinemann of the Office of the Arts asked him about the Heart-Beat project.

LH: What prompted the creation of "HeartBeat"?

CJ: When I developed the piece, my father had recently died of a heart attack (in 1979) and the Jarvik-7 artificial heart had been invented (in 1983). These coincidental events made me ponder the juxtoposition of the heart as both a sophisticated pump and as the seat of the soul, as we've read in literature and poetry. The medical-text section of the score is about the heart's function as an almost totally cold, anesthetic machine. The other end of the spectrum is the score's inclusion of the music of Barber and the whispered track singing jazz scat phrases. The heart is really a machine that gives life, just as rhythm is the foundation of life.

How did Baryshnikov become aware of the "HeartBeat" project?

About two years ago, Misha [Baryshnikov] asked Sara Rudner to create something for his company. Sara and I thought that while it would be nice to create something for Baryshnikov's company, it would be even better for him to do "HeartBeat" as a solo. He premiered the piece in Paris and New York City and is performing in Boston as the first stop in a ten-city US tour.

Was there a lot of change in the choreography from Ms. Rudner's version to Mr. Baryshnikov's?

As a structured improvisation, it's completely different. The exploration of structured improvisation is a whole new thing for Misha. I'm the creator and composer and the choreographic direction is by Sara, but the actual improvisational movement is by Misha.

So that is why the title includes the initials ":mb"?

I've done it in many different ways over the last 20 years, so I've always called it "HeartBeat" and then added something that's more of an identification than a metaphor.

Does the musical accompaniment also vary?

I originally wrote the piece for three singers, performing jazz scat and tabla rhythms over the rhythm of the heart, which of course speeds up and slows down, causing the singers to follow the



Mikhail Baryshnikov (left) and Christopher Janney take a bow in Paris.

rhythm of the performer's heartbeat. Since Misha travels with a string quartet and a concert pianist, I scored it into a sampler keyboard, which looks like a piano but can create any sound you want. I recorded my voice reciting the various numbers and medical phrases and then the keyboardist plays it in time to Misha's heartbeat. In this particular variation, the string quartet plays Samuel Barber's Adagio for Strings as the third section. Because it's just for strings with no percussion, the heartbeat and the strings co-exist quite well.

As an improvisation, how do the musicians know when the piece is over?

It's like jazz. There are sections and subsections, but Misha decides how long he wants to stay in one section or how fast he wants to move in a particular section. It's left up to the moment. The musicians watch Misha for their cues.

How many variations of "HeartBeat" have there been?

Too many to count, and not just in dance. I've often lectured while wearing the "HeartBeat," to hear my heart as I talk about my projects. I've done pieces with poets who read over the sound of their heartbeat. On May 5 in New York City, the jazz sax player Stan Strickland played over the sound of his heartbeat with two singers and myself doing the voice parts.

I even put the "HeartBeat" device on my son during his christening when he was one year old. Stan played a flute piece, in the church, over my son's heartbeat. My son is the only one I can think of who was not consciously a performer, aware of what was going on. It was a very beautiful piece.

Do you record these events?

I don't record much. The whole idea of structured improvisation is about being present in the moment. It's very hard to get a sense of this piece from a recording or even from a video tape. The theater's large sound system provides a lot of rich low end which feels like a blanket of sound just wrapping around you. It's very hard to recreate that in video or audio, so I don't try Photo by Terrell Lamb

much. I just urge people to come see the real thing.

"Heartbeat:mb" plays Thursday-Sunday, May 14-17 at Boston's Shubert Theater. Tickets are available through Telecharge at (800- 447-7400).

Arts News

The New York Times praised the List Visual Arts Center's "ambitious and carefully wrought" Mirror Images: Women, Surrealism and Self-Representation, in a lengthy review which concludes, "Bigger and splashier exhibitions devoted to this subject will surely be coming along, but they will all probably in some way take off from this one." The show is on view through June 28.

Junior Eto Otitigbe has been named the 1997-98 Cordover Scholar in the Arts. The award, given to someone who has financial need and is active in the arts, was established in 1996-97 by Ronald H. Cordover, who graduated from MIT in 1964 with a degree in electrical engineering. Mr. Otitigbe won third prize in the first annual Harold and Arlene Schnitzer Prize in the Visual Arts in 1996, received the 1997 List Foundation Fellowship in the Arts, inaugurated an annual poetry slam for students from the area, helped bring the Last Poets to MIT, initiated field trips to Bostonarea artistic and cultural events of special interest to the black community, and won the 1998 Dr. Martin Luther King Student Leadership Award. "Could any of us ask for a better model of how the arts inform the lives of the students at MIT?" asked Associate Provost for the Arts Alan Brody.

Open City, a new Boston theater company, had MIT connections even before its first show opened-Myles Crowley, administrative assistant in the News Office, and Thomas R. Consi, research engineer in ocean engineering, are two of its seven founders. Since last fall, the MIT connections have grown: Sarah Cohen, a sophomore in biology and Shakespeare Ensemble member, volunteered with setting up the theater's space. Kristin "Nummi" Nummerdor (SB '94) designed the company's brochure, and EECS graduate student Eddie Kohler, a Dramashop member, created posters. Michael Kreutz, administrative assistant in economics, lent his talents to Open City's first show as musical director and accompanist, and Charlotte Peed, a senior secretary in architecture, appears as Kitty in the theater's current production of Six Degrees of Separation, the tragicomedy by John Guare, running May 13-June 13 at the Paramount Penthouse, 58 Berkeley St., Boston.



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

* Open to public ** Open to MIT community only

May 13-24

MUSIC

Concert of Student Compositions*—May 13. Original music written by students taking 21M304 (Advanced Music Writing). 3:30pm, Killian Hall. x3-2826.

MIT Sinfonietta*—May 14. Vivaldi's Concerto for four violins in b minor, Dvorak's Serenade for String Orchestra & Mozart's Piano Concerto No. 9, featuring faculty member Marek Zebrowski, & Sinfonietta members Max Chen '99, Sandy Choi '99, Jo Marie Sison '01 & Danny Yu '98. 8pm, Kresge Aud. x5-9647 or <strings@mit.edu>.

MIT Gospel Choir Spring Concert*-May

16. Bryan Spriggs, director. With solo gospel artist Wanetta Shepard and the Alpha and Omega Steppers of New Covenant Christian Center 7:30pm, Lobdell Dining Hall (Stratton Student Center 2nd floor, 84 Mass Ave). See <http://web.mit.edu/adwinthe/ www/portfolio/index10.html>.

Live Jazz at Muddy Charles Pub*—Wednesdays. The Pat Battstone Quartet. 8:30-10:30pm, Rm 50-110. x3-4012.

MIT Guild of Bell Ringers*—Mondays, 6:30pm, 2nd floor balcony of Lobby 7. x3-3573. Info: Jeremy Lueck, <jlueck@ mit.edu>.

FILM/VIDEO

- 4th Annual Media Spectacle*—May 14. MITmade Media Spectacle. Films/videos/ hypertext produced by MIT & Wellesley affiliates. 7pm, Rm 3-133. Chris Pomiecko x3-3599 or <cpomieko@mit.edu>.
- "Mirror Images: Artist Documentaries"*-May 17. Ana Mendieta: Fuego del Tierra (Kate Horsfield, Nereyda Garcia-Ferraz, Branda Miller, 1988). Other documentary TBA. Presented in conjunction with Mirror Images... at the List Ctr (see below). 2pm, Bartos Theater. x3-4400.
- **EXHIBITS**

List Visual Arts Center (E15)*: Mirror Images: Women, Surrealism and Self-Representation. Self-representations by three generations of women Surrealist or Surrealistinfluenced artists from 1928-1996. Show runs through June 28. Hours: Tues-Thurs & weekends noon-6pm; Fri 12-8pm; closed holidays. x3-4680.

MIT Museum* (N52): Piranesi in Perspective: Designing the Icons of an Age. Examination of Giovanni Battista Piranesi's (1720-1778) career as an etcher, archaeologist & as a promoter of Rome extraordinaire. Through June 14. Ongoing Exhibits. Gestural Engineering: The Sculpture of Arthur Ganson; LightForest: The Holographic Rainforest; Holography: Artists and Inventors; MIT Hall of Hacks; Light Sculptures by Bill Parker; Math-in-3D: Geometric Sculptures by Morton C. Bradley, Jr.; MathSpace. 265 Mass Ave. Tues-Fri 10-5, Weekends 12-5. x3-4444.

Wolk Gallery: Reflections: Drawings and Projects by Wellington Reiter. Companion exhibition to Piranesi in Perspective . Through July 7. Rm 7-338 x8-9106.

Hart Nautical Gallery—Ships for Victory: American Shipbuilding's Finest Hour. Shipbuilding production during World War II. Ship Models: The Evolution of Ship Design. Ongoing. Daily 9am-8pm. x3-5942.

- Wiesner Student Art Gallery—Schnitzer Prize Winners' Exhibition. Featuring the three student winners of the 1998 Schnitzer Prize in the Visual Arts: Eto Ottigbe '98, Kevin Simmons '98, Kim Eng '99. Opening Reception—May 14, 3-5pm. May 12 through June 14. Wiesner Student Art Gallery (2nd floor, Stratton Student Ctr), x3-7019.
- The Dean's Gallery—A.E. Ryan: Dangerous Cooks & Falling Arches. Carefully crafted wall constructions made from transformed, discarded decorative woods & metals, fabrics & ephemera, to acrylic paints & gels. Through June 20. Rm E52-466. Weekdays 9am-5pm, x3-9455 or <http://web.mit.edu/ deans-gallery/www/>.
- Compton Gallery—MIT Master of Architecture Theses 1997/1998. Drawings and models by recent graduates show a range of architectural thought and process, and a diversity of projects and scale. Through May 22. Compton Gallery (Rm 10-150). Weekdays 9-5. x3-7791.
- Rotch Visual Collections—Ghadames: The City of Shades. Exhibition on a small historic town in the Sahara Desert. Through May 20. Rm 7-304 x3-2955.

Women's Studies. Permanent exhibition of archival photographs documenting the role of women at MIT over the decades. Rm 14E-316. x3-8844.

Doc Edgerton Strobe Alley. Photographs, instruments and memorabilia and hands-on experiments. Bldg 4, 4th floor. x3-4629.

OTHER

Visual Arts Exchange Program Application Deadline for Fall 1998***—May 22. Crossregistration for five students at Mass College of Art and five to the School of the Museum of Fine Arts for selected classes in painting and drawing. Info/applications: Renée Caso <vàmmie@mit.edu> or Linda Woolford <woolford@mit.edu>.

"Flock Mentality" Slide Presentation*—May 22. Stephen McHale, graduate student in architecture, discusses his public art project in which pink flamingo lawn ornaments migrated into Boston. 5pm, Rm 3-133. 661-6771, x8-9264 or <stevemac@mit.edu>.

Applications for Wiesner Student Art Gallery** All students welcome to apply to put up an exhibit. x3-7019.

Newest knowledge on growth and death of cells presented

By Deborah Halber News Office

By delving into the innermost work-ings of cells, four MIT researchers who spoke at the technology track on life sciences and bioengineering at the ILP Research Directors Conference are delivering useful substances to cells to control disease, making progress on understanding how and why cells age, seeing living cartilage in the body to monitor the progression and treatment of degenerative disease, and uncovering the secret of cancer cells' mindboggling ability to reproduce themselves forever.

CONFERRING IMMORTALITY

Robert A. Weinberg, the Ludwig Professor for Cancer Research and the American Cancer Society Professor of Biology, de-

cer cells-unlike normal cellsneed no influx of growth factors to multiply indefinitely in a petri dish. They make their own growth factors, which they release out-

scribed how can-

Weinberg

side the cell and which in turn stimulate the cell to produce more growth factor.

There must be at least two changes to a cell to transform it from a normal cell to a cancer cell, said Professor Weinberg, a founding member of the Whitehead Institute for Biomedical Research. It must develop the ability to

produce its own growth factor, and it must learn to resist the inhibitory signals from neighboring cells that keep normal cells from proliferating out of control.

The third insidious characteristic of cancer cells is that they do not have the generational clock" of normal cells that stop them from growing after a certain number of generations. While normal cells seem programmed to stop multiplying after 50 or 60 generations, cancer cells, with enough space and nutrients, will simply grow forever. This raised the question of how normal cells "know" how many times they had doubled in the past.

The answer seems to lie within the ends of chromosomes, called telomeres. These tips, made up of specific gene sequences, protect the chromosomes from damage like plastic tips protect the ends of shoelaces, Professor Weinberg explained.

When cells replicate, they fail to copy the entire telomere sequence, so with each reproduction, the telomeres grow a little shorter. This leads to cell death. Scientists speculate that this innate ability of cells to bring about their own demise is a protective mechanism that keeps premalignant cell populations from turning cancerous.

However, about one cell in a million solves the problem of telomere collapse by generating an enzyme called telomerase. Cancer cells are the only cells that produce this enzyme, effectively creating their own means to immortality.

Professor Weinberg's recent efforts to "immortalize" normal cells by giving them the ability to make telomerase

led to cells that grew for a far longer time than normal cells, but they did not proliferate indefinitely. "We believe we may learn how to immortalize these cells," he said, leading to a better understanding of the genetic basis of human cancer.

'SEEING' INSIDE LIVING TISSUE

Martha L. Gray, the J.W. Kieckhefer Associate Professor of Electrical Engineering and co-director of the Harvard-MIT Division of Health Science and

Technology, described her team's progress on watching cartilage degradation and repair. To Professor Gray and others trying to "see" the 1 to 2mm of sponge-like tissue called cartilage that encases our

bones, an X-ray is

Gray

of little help. Cartilage damage might show up as a decreased space between two bones, but that's not much to go on when you're trying to diagnose and treat a case of arthritis so severe that the tissue has been eroded to nothing.

With magnetic resonance imaging (MRI), however, one can see cartilage and look for the absence or disruption of tissue. Taking that a step further, Professor Gray has come up with a way to measure the concentration of ions within the fluid of affected tissue. The ions indicate the presence or absence of proteoglycans-brush-shaped molecules that give cartilage some of its bone-protective qualities.

By using MRI data to quantify the concentration of ions, researchers have found a way to "see" living cartilage, detect any changes before the tissue is badly disrupted, monitor disease progression and choose appropriate therapeutic strategies.

AGING CELLS

"What is it like to be an old cell?" asked Professor of Biology Leonard P. Guarente, who addressed the molecular cause of aging. He is especially interested in old yeast. While most of us can't tell young yeast from old yeast, researchers can do so by watching the cells divide. They divide by budding, with a daughter cell of new material breaking off from the mother cell, which gets older with every division. The mother cell can divide 20 times before it stops.

By watching yeast divide, Professor Guarente has found that there are changes in the nucleolus-a section of the nucleus-of cells that are aging. He has found that in the nucleolus of older cells, some of the cell's genetic material, a circular piece of ribosomal DNA, pinches off from a chromosome and accumulates in the cell, causing it to enlarge.

These "circles" of material happen with aging and at the same time cause aging, he said. The circles double with every cell division, growing exponentially, producing more and more ribosomal proteins that poison the cell and eventually kill it.

They solve a short-term problem for the cell-trying to repair damage to rDNA-while establishing its mortality. One of the next steps is to determine if the same process happens in human cells that, like yeast, undergo asymmetrical cell division. These kinds of cells are found in the skin, kidney and liver as well as the blood.

AN ENGINEERING APPROACH

Douglas A. Lauffenberger, the Joseph R. Mares Professor of Chemical Engineering and director of the Center for Biomedical Engineering, said an engineering approach to manipulating cell function can provide a more effective way to deliver useful substances to cells.

Once a useful substance like a growth factor or a protein binds with a cell, many dynamics can occur, he said. Researchers in biomedical engineering consider the interaction of all the components of the cell, like the many components of an engineering system. "If you can control one step, you can do as much or more at a systemic level," he said.

Gels featured in talk on sensors and detectors

S pecially designed gels that shrink or swell in response to factors like temperature and pH, and "molecular wires" to detect various chemicals were the subjects of two talks at the Sensors, Actuators and Detectors session of the Industrial Liaison Program's Research Directors Conference last week.

Gels are jello-like materials made of cross-linked networks of polymers that contain a fluid. In response to different environmental factors they can be made to contract or swell-processes that correspond to the folding and unfolding of the polymer.

They can also be designed to detect and capture specific molecules. In the latter case, "the gel absorbs the target molecule when collapsed, and releases it when swollen," said Toyoichi Tanaka, the Otto and Jane Morningstar Professor of Physics. "We have made such a 'target recovery' system."

Professor Timothy M. Swager of chemistry described an approach to creating ultra-sensitive detectors for chemicals such as TNT. Traditional chemosensors, or individual molecular devices that can detect chemicals, are useful, but only to a point. "If you want to go to very, very low concentrations of the chemical of interest, it becomes much more difficult," he said.

His solution? "Hard-wire" individual chemosensor molecules together into a "molecular wire." This results in a much more sensitive device due to the "additive

Conference highlights many research projects

(continued from page 1)

Management. The Program on the Pharmaceutical Industry, for example, brings together researchers from the schools of management, engineering, science, and humanities and social science.

One project in that program involves looking at ways of making the clinical testing process more efficient. Currently that process "makes up the majority of costs in drug development," said Professor Allen. He also described research aimed at discovering what effect various medications (such as those for allergies) have on worker productivity. The work is based on productivity data and health records for about 3,000 insurance workers.

Professor Allen also emphasized the importance of industrial collaborations to MIT research. "If you were to attend a meeting of MIT's Lean Aerospace Initiative, you'd see people in industry making research presentations alongside MIT students and faculty. The goal is to increase the bidirectional technology transfer," he said.

SCHOOL OF ENGINEERING

Imagine highlighting, in 25 minutes, the research and educational initiatives for a school with eight departments and some 20 laboratories, programs and centers. John B. Vander Sande, associate dean of the School of Engineering and a professor in the Department of Materials Science and Engineering, was faced with that challenge. Among his comments: the School is listening to industry feedback about its students. For example, he noted that industry "tells us MIT students are brilliant, but don't know how to work in teams. They also aren't always the best communicators, either orally or in writing." The School is instituting curriculum changes to address such issues.

Swinging over to research, Professor Vander Sande described projects including the development of molecularly engineered films of materials only one atomic layer thick. That work is led by Professor Paul Laibinis of chemical engineering.

ARCHITECTURE/PLANNING

A slide of a weathering Buddha was key to Professor Bernard J. Frieden's description of one research project in the School of Architecture and Planning. The image was actually a computer simulation by Julie Dorsey, associate professor of design and computational and building technology, showing how a new statue would weather with time. Such simulations, which can also be applied to building facades and other architectural features, could be a useful tool to architects who want to know, in advance, what their creations will look like in the future.

Dr. Frieden, associate dean of the school and Ford Professor of Urban Development, also described studies of how cities use publicity to advance themselves and particular projects. That work, by Professor Lawrence Vale of urban studies and planning, will be the focus of a faculty seminar this fall. Professor Frieden concluded with a project he himself is working on: issues surrounding the closing of military bases and their conversion to airports and other private-sector facilities. "It is not yet clear whether the bases ought to be considered a bonus from the end of the Cold War or the 'yard sale at the end of history'-unwanted property, available only to buyers willing to make their way through a maze of bureaucratic obstacles," he said.

media technology.

Professor Khoury also described an award-winning project for learning languages in which interactive multimedia stories "totally immerse a student in the language and culture" of the main character. For example, in "A la rencontre de Philippe," the first of the series, students help Philippe navigate around Paris.

"The student is no longer just sitting in the language lab passively ab-sorbing French," Professor Khoury said. The researchers have also developed programs for German, Japanese, Spanish and soon Chinese.

Both the Shakespeare and language programs were developed through the school's Laboratory for Advanced Technology in the Humanities.

SCHOOL OF SCIENCE

An experiment going up on the space shuttle on June 2 will search for a phenomenon predicted but as yet unseen by physicists: antimatter. The experiment, a particle physics detector known as the Alpha Magnetic Spectrometer, is led by Nobel laureate Samuel Ting, the Thomas Dudley Cabot Professor of Physics at MIT.

The AMS was one of the projects that Robert J. Birgeneau, dean of the School of Science and Cecil and Ida Green Professor of Physics, shared with his audience as an example of the cutting-edge research being conducted through the school. "In addition to the matter that makes up you and me, there should be antimatter, the exact complement of matter," explained Professor Birgeneau. Similarly, "just as we have a universe made of matter, it's equally likely that there are universes of antimatter with antipeople. So where are these other universes?"

LAB FOR COMPUTER SCIENCE

Will it rain in Boston tomorrow? Where is it snowing in the US today? Those were two of the questions asked of Jupiter, a computer telephone interface for weather information, at a live demonstration of the technology. The demonstration was part of Victor W. Zue's talk on research highlights from the Laboratory for Computer Science (LCS).

To access Jupiter, a user calls an 800 number and can query the system about the weather in 500 cities worldwide. The technology is part of LCS efforts to allow humans to converse with machines. LCS "conversational interfaces" are emerging that, among other things, "deal with continuous speech by unknown users, have a vocabulary of thousands of words, and handle multiple languages (English, Spanish and Mandarin Chinese)," said Dr. Zue, LCS associate director and a senior research scientist.

And for those who are wondering: on the day of the demo (May 6), it was snowing in Alaska and North Dakota.

Other speakers at the May 6 morning sessions of the conference were J. David Litster, vice president for research, dean for graduate education and professor of physics; Andrew B. Lippman, associate director of the Media Laboratory and a lecturer in the Program in Media Arts and Sciences; and Vincent W. S. Chan, head of the Communications and Information Technology Division at Lincoln Laboratory Speakers on May 7 were Daniel Roos, associate dean for systems engineering and a professor in the Department of Civil and Environmental Engineering; Emilio Bizzi, the Eugene McDermott Professor in the Brain Sciences and Human Behavior; Rosalind W. Picard, the NEC Development Professor of Computers and Communications and associate professor of media technology in the Media Lab; Michael S. Scott Morton, the Jay W. Forrester Professor of Management at the Sloan School; and Warren P. Seering, the Weber-Shaughness Professor of Mechanical Engineering and director of the Center for Innovation in Product Development.



It's a fact

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

HUMANITIES/SOCIAL SCIENCE

'Who would have thought that MIT would become one of the world's great centers for the study of Shakespeare?" said Philip S. Khoury, dean of the School of Humanities and Social Science and a professor of history. Yet that is indeed the case, due to an MIT program for the study and interpretation of the bard's plays via multi-

To find out, Professor Ting and colleagues designed AMS to look for "remnants of antiuniverses created at the same time our universe was created."

Professor Birgeneau noted that even if AMS does not provide evidence for antimatter, there has never been such a high-resolution detector in space before. "So I guarantee that interesting things will be observed."

effects of all these different receptors," Professor Swager said. His team has developed several different types of molecular wires.

Also at the session, Professor Stephen D. Senturia talked about the remote detection of chemical agents, pollutants and other compounds using microelectromechanical systems (MEMS). The MEMS device he and his colleagues are developing is key to an advanced spectroscopy technique for detecting such compounds. Dr. Senturia is the Barton L. Weller Professor of Electrical Engineering.

Associate Professor Kenneth S. Breuer of the Department of Aeronautics and Astronautics concluded the session with a talk on "MEMS Sensors and Actuators for Measurement and Control of Flows."

Elizabeth A. Thomson