

Hubble instrument lets scientists see dying star

An MIT scientist and colleagues have peered into the dust-obscured heart of the Egg Nebula to reveal a detailed portrait of a star's last gasps.

Dr. Joel H. Kastner, a research scientist at the Center for Space Research, made the observations with Drs. Raghendra Sahai and John Trauger of the Jet Propulsion Laboratory and David Weintraub of Vanderbilt University, using the new Near Infrared Camera and Multi-Object Spectrometer (NICMOS) aboard the recently refurbished Hubble Space Telescope.

The Egg Nebula, also known as CRL 2688 and located 3,000 light-years away in the constellation Cygnus, is an expanding cloud of gas and dust ejected by a dying Sun-like star that has burned most of its fuel. Studying the death of Sun-like stars is important for understanding how two of the elements crucial for human life—carbon and nitrogen, formed from hydrogen and helium inside stars—are expelled into the interstellar medium, where they eventually become the building blocks of new stars and planets.

Most of the carbon and nitrogen in the human body formed inside a star like CRL 2688 and was expelled back into space. The processes involved in this expulsion are now being better understood as a result of the capabilities of the Hubble with its new near-infrared camera.

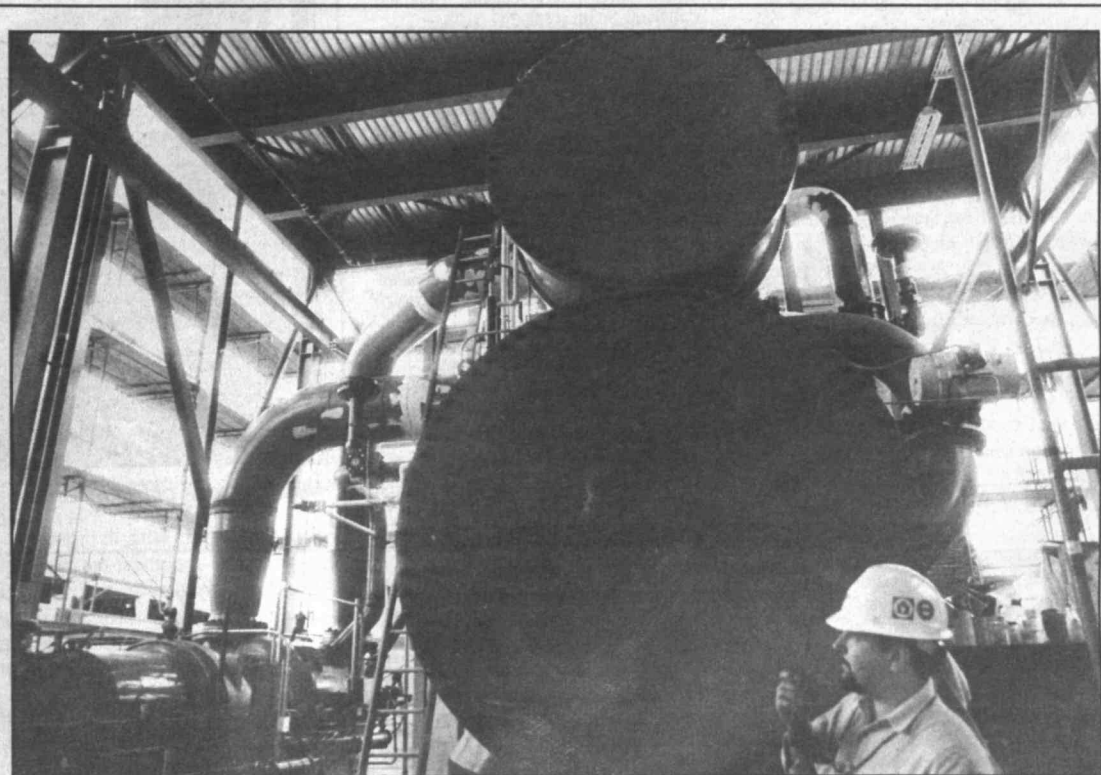
A long-held model for dying Sun-like stars is that they eject matter in a slowly expanding spherical wind. But objects like the Egg Nebula are forcing a shift in this theory, showing that dying stars also eject matter at high speeds (preferentially along their poles), and may even have multiple jet-like outflows from their surfaces.

The signature of the collision between the fast and slow outflows is the glow of hydrogen molecules captured in the NICMOS image. The detailed structure of the hydrogen-emitting region tells us about the earlier slow ejections of mass and the current jet-like wind.

The NICMOS image shows two spindle-like bubbles of molecular hydrogen and dust along the long axis of the nebula. The tips of the bubbles directly trace the shock front where the high-speed outflow (expanding at more than 62 miles per second) collides with the denser and slower-moving (12 miles per second) material of the "arcs" seen in a second image taken two years ago by the Wide Field and Planetary Camera 2 (WFPC2).

The NICMOS image also shows emission from hot hydrogen molecules in the regions that are dark in the WFPC2 image. This emission had been observed previously using ground-based telescopes, and it has presented a

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Tony Wisiewicz, project manager at the cooling plant, uses a walkie-talkie in front of the plant's new heat exchangers.

Photo by Donna Coveney

Water-cooling construction progresses

Construction of a cooling plant directly across from Building 39 on Vassar Street is nearing completion, and the new cold-water chiller is expected to be available for standby service in early June.

In addition, a new cooling tower behind the Central Utility Plant (CUP) on Albany Street should be completed in July. It will increase cooling tower capacity by 72 percent.

"The facility will be fully operational in automatic control in August," said Peter L. Cooper, assistant director for utilities at Physical Plant.

This is the first chiller addition to the CUP since 1972. The East Campus chilled water plant (Building E40) was installed in 1980.

The blue machine visible through the open steel at the

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Imagen team wins \$50K competition

Imagen, a three-person team that invented and hopes to market an image-retrieval software system, won the \$30,000 grand prize in the annual MIT \$50K Entrepreneurship Competition.

The Imagen team—consisting of graduate student Sajit Rao and postdoctoral associate Pamela Lipson of the Artificial Intelligence Laboratory and postdoctoral fellow Pawan Sinha of brain and cognitive sciences—competed against more than 80 other student teams. Advisors to the team were Chris Daly, an attorney at Nutter McClennen & Fish; Professor Tomaso Poggio of brain and cognitive sciences, and Professor of Computer and Science and Engineering Eric Grimson of AI Lab.

The \$30,000 prize will go toward launching the proposed Imagen business. The team plans to bring its system, which offers efficient image-storing and searching, to customers by late 1997.

The two runner-up teams, which each won \$10,000, were open, which proposes to market a low-cost white-board transcription software, and Eastern Delta, which aims to develop and sell a 3-D image display monitor.

The \$50K competition is designed to encourage students and researchers in the MIT community to act on their talent, ideas and energy to produce tomorrow's leading firms. In its eight-year history, the contest has awarded more than \$100,000 in cash and business startup services

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Plans readied for Commencement ceremonies

By Robert J. Sales
News Office

Some 1,900 seniors and graduate students will receive degrees at MIT's 131st Commencement on Friday, June 6. About 8,000 relatives and guests are expected to attend the scheduled outdoor exercises in Killian Court.

The Commencement program starting at 10am will feature United Nations Secretary-General Kofi Annan as the principal speaker. Mr. Annan, who was appointed to a five-year term as Secretary-General beginning January 1, received the SM in management from the Sloan School of Management in 1972. He has played a key diplomatic role in managing many of the crises the world has faced during his 30-year UN career.

"Mr. Annan's international perspec-

tive is particularly apt as MIT expands its activities with universities, governments and industries in many parts of the world to use technology and development as a means of improving global

well-being," said President Charles M. Vest. "We want not only to advance technologies but prepare our students to work effectively in this new global workplace."

Tech Day promises serious fun

By Robert J. Sales
News Office

Tech Day is always fun and games, but this year it's official.

The annual event, sponsored by the Alumni Association, will explore the theme "Technology at Play: The World of Sports, Games and Toys." The all-day program will take place at Kresge Auditorium and the Stratton Student Center on Saturday, June 7, the day

after Commencement.

"We want people to enjoy being there," said Woodie C. Flowers, Pappalardo Professor of Mechanical Engineering, the faculty advisor for Tech Day. "We want them to see people having fun and to have fun themselves. We also want them to walk away with the strong feeling that the educational mission has become much more important and complex."

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Campus/Draper shuttle service to be offered

More students eligible for T pass program

A daytime campus/Draper Lab shuttle and enhancement of the MBTA pass program for students have been announced by the Transportation and Parking Committee, chaired by Professor of Chemistry Alexander Klivanov.

The Charles River Transportation Management Association, in partnership with MIT and four other Cambridge employers, will operate a local shuttle service tentatively scheduled to begin on June 1. The shuttle will operate from 7am-7pm, Monday through Friday.

The shuttle route will begin at Kendall Square, then proceed northwest on Main Street to Draper Lab, south on Fulkerson Street and west on

Vassar to Memorial Drive. The shuttle will then go to 640 Memorial Drive and Building WW15, onto Waverly Street, turning at Fort Washington, proceeding via 640 Memorial Drive, down Memorial Drive to the Hyatt-Regency, and returning down Vassar Street to Draper and Kendall Square.

The experimental service will be evaluated over the next six months, and the route may change during that time. Initial shuttle stops will include Kendall Square/MIT Coop, Draper Lab, Building 38/34/36, corner of Ames and Vassar Streets, corner of Memorial Drive and Vassar Street, and 640 Memorial Drive/Building WW15. Drivers may stop at other locations if traffic conditions permit.

This shuttle is free to MIT employees, students and student family members living on campus, but riders must show the driver a valid MIT ID. The

MIT liaison for the service, John McDonald of the Parking and Transportation Office, will produce route maps and schedules during the next several weeks.

T-PASS PROGRAM

The subsidized MBTA-pass program established last year, which offers off-campus students a \$10 discount, is now open to some students who live on campus as well. Subsidized passes may now be purchased by registered students who work off campus and by those who are enrolled in courses off-campus. In both cases, students must be using the MBTA for their commutes.

All students are required to enroll in this program on a yearly basis. Applications for 1997-98 are available from the Parking and Transportation Office in Building E32.

President Vest will also speak at Commencement, giving his charge to the graduates.

The formal activities begin at 9:45am with the traditional academic procession, which leaves from the 77 Massachusetts Ave. entrance to the Institute, moving south for a short distance and then east on Memorial Drive to Killian Court. The procession will be led by chief marshal DuWayne J. Peterson Jr., 1996-97 president of the MIT Association of Alumni and Alumnae and president of the consulting firm DuWayne Peterson Associates in Pasadena, CA.

Dr. Paul E. Gray will preside at his final Commencement as chairman of the MIT Corporation. Dr. Gray, who was chancellor of MIT from 1971-80

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IN BRIEF

FACULTY MEETING

A regular meeting of the faculty will be held today at 3:15 in Rm 10-250. The full agenda and enclosures can be seen on the Web at <<http://nimrod.mit.edu/depts/archives/facmin/970521/970521.html>>.

BOOK DRIVE

The African Technology Forum is sponsoring a textbook drive for universities in Africa. ATF is looking for all types of books, but is especially interested in science and engineering texts. Books may be dropped in collection boxes at all dormitory desks, delivered to the ATF office (Rm 50-360), or picked up. For more information, contact Amy Smith, <mmadnot@mit.edu>.

Student Notices

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

ANNOUNCEMENTS

June Degree Candidates**—Degree candidates with federal and/or MIT-administered student loans must have an exit interview with a Bursar's Office loan counselor before graduation. Call x3-4007 or e-mail <ewolcott@mit.edu> to schedule an appointment.

Student Service Center will close on Friday, May 30, at 6pm, to get ready for the move to Bldg 11. Full service will resume on Monday, August 18. Requests for transcripts after May 30 go to the Registrar's Office. For service during the summer, contact: Bursar's Office, E19-215, x3-4132; Registrar's Office, Rm E19-335, x3-4784; Student Financial Aid Office, Rm 5-110, x3-4971.

RELIGIOUS ACTIVITIES

The Chapel is open for private meditation 7am-11pm daily. Regular Chapel services are:

Baptist Campus Ministry**—Weekly events: Tuesday night dinner at 5:15pm; Tuesday night bible study, 6pm; Monday graduate discussion, noon. Meets in Bldg W11.

Campus Crusade for Christ**—Weekly meeting on Wednesdays, 8pm, PDR 1 & 2, 3rd fl Student Center. Daily prayer, Rm W11-080 (CFL), 8am. More info: x2-1781 or <cabsfree@mit.edu>.

Tech Catholic Community**—Weekday Mass Tues & Thurs 5:05pm, Friday 12:05pm, Saturday 5pm, Sunday 9:30am & 5pm. Call x3-2981.

Christian Science Organization**—Thursdays at 7pm. Call x3-8797 or <cnorfod@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>.

Lutheran-Episcopal Ministry at MIT*—Regular Wednesday worship, 5:10pm, followed by supper in the Bldg W11 dining room. Bible Studies, Tuesdays 5:30-6:30pm, Bldg W11. 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@jimmy.harvard.edu>.

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

Other religious meetings:

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

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 or <crabtree@mit.edu>.

Hillel*—More info: x3-2982.

MIT Muslim Students Association*—5 daily prayers, Bldg W11; also Friday congregation 1:10-1:45pm, Rm W11-110. Info: x8-9285.

Crimewatch

The following incidents were reported to the MIT Campus Police between May 1-9:

- May 1:** Alumni Pool: 1) watch, sneakers and cash stolen, \$270; 2) \$20 cash and wallet stolen.
- May 2:** Lobby 10, six tables stolen, unknown value; WILG: 1) \$310 bike stolen, 2) \$200 bike stolen.
- May 3:** Bldg E51, female arrested for trespassing.
- May 4:** Bldg 31, suspicious activity.
- May 5:** Bldg 3, VCR stolen, \$200; Bldg 9, credit card stolen; WILG: \$150 bike stolen; Bldg 20, malicious damage to a vehicle.
- May 6:** Bldg 7, bike stolen, \$500; Bldg 68, bike stolen, \$500; Bldg 56, laptop stolen; Killian Court, \$42 cash stolen from a wallet; Westgate lot, attempted larceny of a Chevy Blazer; Westgate, bike stolen, \$90.
- May 7:** Bldg, E51, library books stolen from backpack, \$300; Bldg 68, 1) backpack stolen, \$180; 2) backpack, \$210, later recovered.
- May 8:** Bldg 7, \$80 cash stolen; Bldg 35, malicious damage; Alumni Pool, \$80 cash stolen; Bldg E15, laptop stolen, \$5,000; Student Ctr., male arrested for trespassing.
- May 9:** Bldg E51, suspicious activity; Bldg 34, eyeglasses stolen, \$190; Westgate lot, '89 Toyota stolen.

STUDENT JOBS

There are more job listings available at the Student Employment Office, Rm 5-119, or on the Web at <<http://web.mit.edu/seo/>> (student access only).

Off-Campus, Non-Technical. Boston real estate development firm seeks part time help. General office duties including telephones, light bookkeeping, word processing, filing, etc. Call Sarah Smith at 888-287-5108.

Off-Campus, Technical. Graphic communications intern needed. Duties: maintaining Hybridon's WWW site, uploading information and creating new features, updating and creating slides for presentations, maintaining Hybridon's slide library, working with Hybridon's MIS department to develop protocols for laptop driven presentations. Must know MS Word and Illustrator Programs and have some knowledge of Power Point. Must also be able to work on both Mac and IBM computers. If interested, call Jennifer Masse at 528-7687.

On-Campus, Non-Technical. Search stacks for missing items using barcodes left over from past recon. projects. Will also search online catalog and create reports for librarians to aid in the reordering process. Contact Nataly Reed at x3-9350.

For students with a Federal Work Study component in their aid package (see <<http://tute.mit.edu/seo/wwwc/sersum.html>> or contact Student Employment Office for full details).

Youth on Board. Work with the membership coordinator and youth staff to develop materials to promote Youth on Board's individual and organizational membership program, assist with the development of a recruitment plan, assist with database entry of new members, assist with youth staff initiated newsletter, disseminate information, and assist with the development of membership materials. Minimum requirements: familiar with Macintosh computers including Microsoft Word 5.0 (some graphics programs such as PageMaker desired), planning, writing, organizing and oral skills, ability to communicate effectively and work with a team. Fax cover letter and resume to Karen Young at 623-4359.

Outreach Services. Federated Dorchester Neighborhood Houses, Inc. is looking for a highly motivated individual to provide outreach services to the community organization. The responsibilities fall into several categories: community research, outreach, service planning, intervention, advocacy and documentation. Must have the ability to communicate clearly through the written and spoken word in English and relate well with people. Must have willingness to work evenings and weekends a the job requires. Ability to speak Spanish preferred as well as computer skills. Send resume to Brigette Henry at 90 Cushing Ave., 3rd fl., Dorchester, MA 02125.

Assistant Site Coordinator. The BELL Foundation is looking for an individual to assist in developing and implementing monthly lesson plans, learning curriculums, tutoring strategies, meet monthly with teachers, obtain supplies/learning materials, plan and organize community services/cultural activities, and submit written monthly reports. Qualifications: dependable, self-motivated, cooperative, comfortably interact with others, work flexible hours, and have passion for the education of Black children and development of the black community. Administrative and classroom experience preferred. Please fax resume with cover letter to Shonnesse Guion at 349-3545.

VOLUNTEERS

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

United South End Settlements After School Program needs volunteers to tutor children

Around the weld



Marty Joseph of Pipefitters Local 537 does some welding outside Building 26.

Photo by Donna Coveney

Developments combat many ills

While it's not quite the fountain of youth, new medical developments at MIT do hold the promise of helping people age more gracefully and possibly live longer.

In recent years, MIT scientists have successfully grown "mini livers," thwarted coronary artery disease and retrained muscles to move after a stroke. "We are now at a watershed time when technology is about to burst forward. We need to learn how to use it," said Elazer R. Edelman, Herman Von Helmholtz Associate Professor in the Harvard/MIT Division of Health Sciences and Technology.

Professor Edelman, who has a background in medicine and engineering, uses mechanics and digital signal processing to study atherosclerosis (the progressive blockage of arteries) at the molecular level, and to engineer new ways to thwart it.

"Atherosclerosis is the leading cause of death and dying in western civilization," accounting for one million deaths and 2.75 million hospitalizations each year, he said. There are several causes of the disease, including infection, inflammation and excessive fat consumption.

"Operations to deal with atherosclerosis are becoming increasingly sophisticated, but not increasingly successful," Professor Edelman said. Recent techniques include balloon angioplasty and the balloon-expandable vascular stent, a type of expanding mesh cylinder that can hold open and support a weak blood vessel. The balloon-expandable vascular stent was perfected in Professor Edelman's lab. "These treatments work well, but

only for a short period of time," he said. "We've delayed by three to nine months the inevitable progression of the disease, and have sometimes accelerated it." The stent, for example, may actually cause the removal of the endothelial cells that line blood vessels and help keep them strong. The removal of endothelial cells can cause infection and attract blockages.

Professor Edelman said his lab is looking at tissue engineering of endothelial cells using 3-D scaffoldings. A thin matrix of such engineered cells can essentially be wrapped around an artery, and the endothelial cells will actually diffuse into the blood vessel and repair it. He said such endothelial wraps currently are in Phase I clinical trials.

Linda G. Griffith, Karl Van Tassel Associate Professor of Chemical Engineering, also is engaged in tissue engineering using a biomaterial matrix to grow "mini livers." The research still is in development phase, but her laboratory has been able to grow rat liver tissue that appears to be similar in appearance to real liver tissue.

One key is to be able to use only small amounts of tissue donated by an individual patient to regrow large amounts of tissue on a complex biomaterial scaffold.

"We aim to make an 'organ' in vitro (outside the body)," said Professor Griffith. "There's a real shortage of donor organs, especially for pediatric livers, so for the past 15 years people have looked into taking a cell transplant approach to the liver." So far, Professor Griffith's lab has been able to grow liver cells, but not to the level of being transplantable.

Her research actually began with efforts to make an artificial ear for children either born without an ear lobe or who injured it after birth. She and her colleagues were able to devise an intricate biodegradable polymer scaffold using 3-D printing techniques to put cartilage cells onto the scaffold material. The cartilage cells grew to fill in the scaffold and form what looked like a human ear. The 3-D printing process, which builds up the polymer base and adds donor cells layer by layer, can be used to build up very fine internal structures as well.

Professor Griffith said the technology also is being applied to grow skin grafts using a small amount of donor material from patients with serious burns.

Professor Emilio Bizzi, head of the Department of Brain and Cognitive Sciences, is studying how the brain causes muscles to move, including how stroke victims can retrain their muscles even though cells critical to causing motion have been destroyed.

One of the discoveries in the past

few years is that there are slight differences in the way in which cells are packed into areas of the brain's cortex and represent different functions, such as control of arms, legs, the neck and back muscles, he said.

"What happens when a stroke hits these areas? A lot of cells die, but there still are a lot of cells left," Professor Bizzi said.

Professor Bizzi is researching how cells that are not usually assigned to motor tasks can actually be recruited to make up the functions of cells that died during a stroke. "We're studying monkeys now to see which areas of the cortex are used to learn new tasks," he said. "We still need to know how the frontal lobe handles complex and simple movements."

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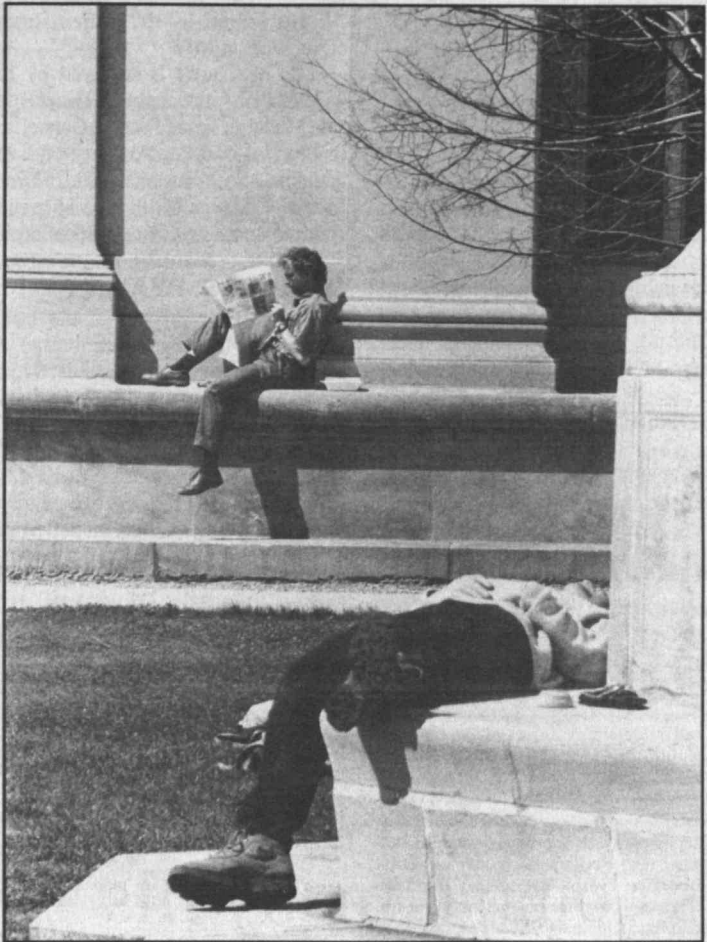
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Printed on Recycled Paper

Benchmarks



Bruce McHenry (left), a graduate student in mechanical engineering, peruses a newspaper while catching a few rays on Killian Court, while audio-visual operator Robert Parnigoni concentrates exclusively on the sun.
Photo by Donna Coveney

Logistics SM is first of its kind in US

■ By Sarah H. Wright
News Office

Logistics—the art and science of adding value to parts and products so they are available efficiently and on time all along an enterprise's supply chain—has been recognized as one of the most important factors in achieving and maintaining a competitive business advantage in today's global marketplace.

The Center for Transportation Studies (CTS) is developing a new master's degree, an interdepartmental program: the Masters of Engineering in Logistics (MEL), the first of its kind in the nation. The MEL program will begin admitting students in September 1998. The faculty approved the nine-month interdisciplinary program on April 19.

"Forward-looking companies now realize that logistics sells," said Professor Yossi Sheffi, director of CTS. "Advanced logistics practices not only reduce inventory, transportation and coordination costs, but they also lead to better customer service and increased sales."

Recognizing the importance of supply chain management—moving efficiently from raw materials to finished product in the consumer's hand—most leading corporations have reorganized. Functions such as transportation, material management, warehousing and distribution have been combined into a logistics function and process.

The new degree, said Professor Sheffi, "is another step forward in ad-

vancing MIT's leadership position in transportation and logistics."

The Masters of Engineering in Logistics degree is based on a series of courses, most of them new or modified substantially. It includes a new core curriculum in which students will be exposed to several courses integrated through case studies.

DRAWS FROM MANY SOURCES

The program will be offered in cooperation with several departments and organizations within MIT, including civil and environmental engineering, aeronautics and astronautics, and ocean engineering. These departments already participate in the Center's educational program. In addition, both the Sloan School of Management and the Center for Advanced Educational Services plan to integrate several of the new degree's offerings in their own programs.

CTS already offers two graduate degrees: the Masters of Science in Transportation (MST), and the interdepartmental PhD in transportation. The Center involves more than 50 faculty and research staff from across the Institute; it also manages its own corporate affiliates and public agencies' affiliates programs.

"CTS has grown and prospered along all these dimensions over the last several years as a result of the dedication and hard work of its faculty and staff," said Professor Sheffi.

CTS predicts a growing demand for logisticians due to the globalization of commerce, the continuing movement towards deregulation and privatization of transportation services worldwide, the recognition by industry of the necessity to move nimbly among markets and between suppliers, increasing environmental concerns which require recycling and safe disposition of manufacturing byproducts, and most importantly, the consumer's ever-higher expectations for better service, lower prices and greater choices.

In addition, realignments due to mergers and acquisitions create extended supply chains that require a continuous logistical redesign of supply and distribution networks.

To illustrate, Professor Sheffi cited the situation faced by Proctor & Gamble and Wal-Mart.

Proctor & Gamble, maker of paper, drugs and soap products, was Wal-Mart's largest supplier, and Wal-Mart was Proctor & Gamble's biggest customer. Traditional, transaction-based,

sometimes adversarial relationships between the two giants were costly in terms of erratic ordering patterns, excessive (and costly) inventories, and service failures. Recognizing the problem, the two companies developed over several years a joint logistics process involving information sharing, joint demand forecasting and coordinated shipments. This partnership laid the foundation for an industry-wide initiative called ECR, or Efficient Consumer Response.

From a logistics perspective, this trend toward cooperation up and down the supply chain is dramatically positive. Over the past several years, manufacturers practicing ECR have seen sales rise, inventories drop, and profits go up. Professor Sheffi notes that Proctor & Gamble estimates that retailers can save \$30 billion a year by a wider practice of ECR—that is, logistical—principles.

The new MEL program will be administered by an executive director and supervised by an industry steering committee. It will be governed by the transportation education committee—including faculty from across the School of Engineering—which already governs the Interdepartmental PhD and the MST degrees.

INTERNATIONAL CONSORTIUM

External "joint ventures" now envisioned for the MEL program include involving international institutions in the teaching process. As logistics is, by nature, an international subject, CTS plans to found a logistics teaching consortium comprised of international universities and logistics organizations from around the world.

The consortium will involve two-way distance learning. It will aim to create a cybercommunity of students, educators, researchers and practitioners, all involved in knowledge exchange. To this end, the logistics program will be "Web-enabled," involving extensive Web sites with many interactive features.

With the launching of the new logistics degree, CTS is expanding its commitment to education, including the two graduate transportation degrees it offers. Professor Sheffi noted that the transportation education committee is in the process of restructuring and strengthening the MST degree, examining the program, the market it serves and its educational objectives.

Three named as humanities heads

Dean Philip S. Khoury of the School of Humanities and Social Science has announced the appointments of three new department heads. Starting July 1, Professor Joshua Cohen will head the Department of Political Science and Professor James G. Paradis will head the Program in Writing and Humanistic Studies. Professor Robert Stalnaker will head the Department of Linguistics and Philosophy, beginning August 1.

Professor Cohen holds a joint appointment as professor of philosophy and Arthur and Ruth Sloan Professor of Political Science. He succeeds Dr. Richard J. Samuels, Ford International Professor of Political Science and director of the MIT Japan Program, who has served as head of the department since 1992.

"Josh Cohen is an extraordinary political philosopher with broad interests in the social sciences. He is a natural leader who has made substantive contributions to teaching and research across several disciplines," Dean Khoury said.

Professor Cohen's scholarship is widely known in the fields of philosophy and political science. His 1983 book, *On Democracy*, co-authored with Professor Joel Rogers of the University of Wisconsin, is highly regarded as an important work on the nature of democracy in a capitalist society. He has co-authored three other books with Professor Rogers: *Inequity and Intervention: The Federal Budget and Central America* (1986), *Rules of the Game* (1986), and *Associations and Democracy* (1995). Professor Cohen has edited two collections and has written essays and articles for a number of journals and other publications. He is editor-in-chief of the magazine *Boston Review* and serves on the advisory board of several other publications.

Professor Cohen received both the BA and MA degrees in philosophy from Yale University, and the PhD from Harvard University. He came to MIT as an instructor in philosophy and political science in 1977, and in 1979

became an assistant professor with a joint appointment in the Departments of Linguistics and Philosophy and Political Science. He was promoted to professor of philosophy and political science in 1990.

Professor Cohen has been honored several times for his educational contributions, receiving the Teaching Award given by the Department of Political Science in 1982, 1985 and 1989, and the Harold E. Edgerton Award for outstanding research, teaching and creativity in 1984.

Dr. Paradis, professor of science and technical communication, succeeds Dr. Alan P. Lightman, John E. Burchard Professor of Science and Writing, who has served as head of the Program since 1991. Professor Paradis formerly served as head of the Writing Program from 1982-85.

"Jim Paradis is an outstanding scholar of the Victorian era working at the intersections of literature, history and science studies," Dean Khoury said. "He has also made significant contributions to the emerging field of technical writing and is the obvious faculty member in the School of Humanities and Social Science to help steer the School's ongoing efforts to strengthen the communication skills of MIT undergraduates."

Professor Paradis is a noted scholar of literary and cultural perspectives on scientific rhetoric in the 19th century. He is also a developer, with Senior Lecturer Dr. Edward Barrett, of MIT's electronic classroom, which has become a model for similar classrooms around the country.

Professor Paradis' critical scholarship in Victorian Studies is highlighted by his book, *T. H. Huxley: Man's Place in Nature* (1978). He co-edited *Textual Dynamics of the Professions: Historical and Contemporary Studies of Writing in Professional Communities* (1991), and *Evolution and Ethics: T. H. Huxley's Evolutions and Ethics, With New Essays on its Victorian and Sociobiological Context* (1989). He is now working on a critical biography of Samuel Butler.

A graduate of St. John's University, Professor Paradis earned the MA from New York University and the PhD in English literature from the University of Washington. He came to MIT in 1977 as an assistant professor of technical communication and was promoted to full professor in the Program in Writing and Humanistic Studies in 1990.

Dr. Stalnaker, the Laurance S. Rockefeller Professor of Philosophy, will become head of the Department of Linguistics and Philosophy following the eight-year tenure in that role of Professor Wayne O'Neil of the linguistics section.

"Bob Stalnaker is one of the world's most accomplished philosophers of language and mind and has made significant intellectual contributions to his profession," said Dean Khoury. He is the author of *Inquiry* (1984) and a series of papers on the logic and semantics of conditional statements, many of which are included in *Ifs*, an anthology on conditionals, of which he is one of three editors.

Professor Stalnaker has also written extensively on the problem of intentionality and the relation between language and thought. His recent work on the foundations of formal semantic theories for modal and conditional logics helps to clarify the relations between concepts of necessity and possibility; causation and counterfactual dependence; probability, knowledge and common knowledge; and inductive reasoning and rational decision-making. Much of his work is interdisciplinary; he has written about the role of context in the semantics for natural language and the foundations of game theory.

Professor Stalnaker was appointed as a professor of philosophy at MIT in 1988 after 16 years as a professor of philosophy at Cornell University. He received the BA from Wesleyan University and the PhD from Princeton University. He is a fellow of the American Academy of Arts and Sciences and a member of the Executive Committee of the American Philosophical Association.



Stalnaker



Paradis



Cohen

Upgraded computer facility in MechE to be dedicated

The Department of Mechanical Engineering's undergraduate computer lab, which recently received a substantial equipment upgrade as a result of an alumnus donation, will be dedicated tomorrow as the Papken Der Torossian Undergraduate Computing Facility.

Twenty-one new, high-performance Silicon Graphics workstations running within the Athena operating system will be used by students in all the new courses in the department's revised curriculum.

The lab was made possible by a generous donation from Mr. Der Torossian (SB '60), chairman of the board and CEO of Silicon Valley Group (SVG), a supplier of lithography, photo-processing and other semiconductor manufacturing equipment. "It is an honor for me to help out in a small way to educate the best and the brightest at MIT," Mr. Der Torossian said.

The lab allows 20 students and one instructor to work interactively. There is a projection screen for computer displays as well as new network connections and furniture. A flatbed scanner and Power PC Macintosh have also been added to support Web page and presentation development.

During IAP, second-year students

in 2.670 (Mechanical Engineering Tools) use the lab to learn parametric CAD and numerical analysis as they design and analyze a miniature Stirling engine that they build during the course. Project-focused, experiential teaching methods like this are being adopted by the department in its new curriculum.

The idea, according to Professor Nam Suh, department head, is "to improve our teaching extensively. With modern computing, we can now numerically model, analyze and redesign real systems. We no longer need to restrict our teaching to simple unrealistic examples that can be solved in closed form. The new Papken Der Torossian Undergraduate Computing Facility is our first step in providing the required facilities to make this pedagogical change."

The department has completed the second year of its revamped curriculum, which incorporates a required core of classes in four areas: design and manufacture; dynamics, systems and controls; thermal and fluids engineering; and mechanics and materials. The software tool Pro/Engineer is used in the design courses, Matlab in the systems/controls and thermal fluids courses, and ABAQUS in the materials courses.

Graduating seniors reflect on four years at MIT

■ By Robert J. Sales
News Office

Four years ago, they were bright, motivated achievers new to MIT. At 18, they may have been a little intimidated by the Institute, obviously smart but scared they couldn't live up to the rigorous standards—in other words, typical freshmen.

But they have all survived, and some have even thrived. While their experiences have varied, all of them are glad they attended MIT. They didn't always feel that way during the past four years.

During R/O in August 1993, they shared a brief initial impression of MIT with Tech Talk. As seniors, we asked them to reflect on their MIT experience. Specifically, we asked them to address the following topics:

1. What was your perception of MIT upon arrival? How has that changed in four years?
2. What were your expectations? Did MIT live up to them?
3. Did you discover interests and talents that you were not aware of as a freshman? Have you developed them?
4. How have you changed in four years? What role did MIT play in those changes?
5. Are you happy you came to MIT? What did you like most about MIT? Least?
6. What are your plans?

Some of their responses were straightforward and succinct. Others were less direct, skirting the question to address a larger issue. Here are their answers:

DAN DOBBS

Hometown: Swansea, MA

Major: Mechanical engineering

1993 comment: "The research definitely will be one fun thing about MIT."

I showed up a week before most freshmen so that I could participate in Air Force ROTC's Freshman Orientation Program. This gave me the chance to interact with fellow freshmen and upperclassmen in a much smaller environment (although also a bit more stressful) than most freshmen did. I guess that I was a bit surprised that everyone seemed to be fairly normal. That view hasn't changed too much over the years.

I hoped and expected that MIT would challenge me and make me work to my full potential. Perhaps I wished a bit too hard. My freshman year was difficult, to put it mildly. Before I came here, I never really had to put all of my energy into schoolwork to get good grades. I could just pick up the home-

work and do it. Well, MIT was a far cry from those days. I think that the first two years can really be considered learning how to study and work. I've done a lot better since then, but it wasn't easy to learn what it really means to study.

I've worked to develop my ability to be a leader. Air Force ROTC has been a major contributor to that discovery and growth; so has my brotherhood in Chi Phi. Both of these organizations have challenged me and forced me to improve myself and my ability to lead and motivate others.

In four years at MIT, I would say that I have better learned how to interact with people who are very different from me. MIT's diversity has had a great impact on this growth. I feel that I am better able to accept and appreciate people who have different backgrounds or beliefs than I do.

Although this has not always been the case, I am now very glad that I chose to attend MIT. I don't think that any other academic institution would have challenged me in the ways that MIT has, and forced me to evaluate my beliefs and actions quite so deeply. I've met so many talented people and I've been able to work with people and projects that will truly affect the future.

The only regrets I have about MIT are that I didn't sink myself into the community quite as deeply as I wish I had. I hope that in my remaining time here, I can involve myself more deeply and reap the non-academic benefits which MIT has to offer.

I will be remaining at MIT this fall to finish my undergraduate education. I hope to be accepted into the MechE graduate program starting next spring, then finish my master's degree in one and a half years. After that, I'm headed off to the Air Force and hopefully Space Command, where I am strongly considering making a career of the Air Force.

MIKE LIU

Hometown: Woodbridge, IL

Major: Management

1993 comment: "They have a lot of stuff you can use and a lot of information here. If you need it, you can get it."

When I first arrived, I believed MIT would be a difficult four years, but that I would get a lot out of it and be well prepared to start my career. In my four years here, I have discovered that the road to graduation is not as impossible as it once seemed; one just has to realize that many others have succeeded and that you just have to figure out how they did it.

I expected that I would be able to lead a well-balanced college life. MIT lived up to that expectation, with the many clubs and organizations on campus and the very extensive intramural program.

As a freshman, I took 6.001. Even though I did not pursue Course VI, I did discover that I liked the challenge of

programming. Since then, I've learned to program extensive macros in Excel, and I've been able to take on some freelance consulting where I use these skills to benefit others. I've also discovered the World Wide Web and HTML, which can be an eternal time sink.

I don't think I've really changed much in my four years here. I'm a little older, and hopefully a little wiser. The thing that has probably changed me the most is the experience I've had with my friends here.

I'm really happy I came to MIT. I think most of us share the same feelings, but won't admit it. I really enjoyed learning to skate through IM



Liu (1997)

hockey, having a lot of IMs to give me lots of breaks from work, and being able to go into the city whenever I felt like going out. What I liked least about MIT was how you had to go to so many different places on campus

to get things done. But improvements have been made, i.e., the new Student Services office off the Infinite Corridor.

I will be heading to New York after graduation to work at an investment management firm. It looks like a promising experience and I hope to come back to MIT in the future to do some recruiting.

DOUG HOWIE

Hometown: Terrell, TX

Major: Materials science and engineering

1993 Comment: "It's so nice to have people like you because most of us come from a place where we're (unusual)... I'm looking forward to doing research and learning all sorts of things I never really wanted to know but that are interesting."

MIT has played a very different role in my scholastic and professional development than I thought it would. I once thought the MIT experience was about gaining pure knowledge, but I now think it's more about learning where and how to obtain knowledge and what to do with it once you have it.

Upon arrival, I was told that MIT is a time to build my "tool chest." I was going to learn how to solve problems, and to an extent that is true. However, the more potent effects for me were the identification of how "I" solve problems (not how "to" solve problems) and a greater cognizance of what I bring to a situation simply by being the person that I have always been. If anything, I neglected talents I already had.

I think I look much better (shallow shallow!) and that I project a more positive self-image. As a freshman I

subscribed to a nonchalant individuality. As long as I didn't hurt anyone, I felt that no one had a right to an opinion about my appearance, or comportment, or anything for that matter. I have really changed in this regard. I found that I can build bridges of understanding



Howie (1993)

and friendship by changing my thinking about truly small things. I am not saying that I don't have a right to my personality quirks—I do—but at what expense? As my mom says, I had to "choose my battles." Some of my past wars were not worth waging, and by winning some of them, I lost even more. Like it or not, I was missing out on opportunities to know some really great people and (as friends finally helped me understand) those people were missing out on a chance to know a really great me.

I have no regrets. Good, bad or indifferent, I believe that God intersects every step on my path. I don't think he condones my unwise choices, nor do I think he laughs at my confusion, but I think he turns all things into manifold opportunities for good.

Honestly speaking, MIT was distasteful medicine to me. I have experienced my full emotional range probably twice as many times as any "normal" person should have. However, I know that much wisdom has preceded me here. I am only 22 years old, so I can't possibly understand all of the wisdom that's embedded in my MIT experience, but I think those things will become accessible to me as needed.

I plan to pursue a PhD in polymer science and engineering at UMass-Amherst. After that, I can only speculate. Only God knows, and only time will let us in on life's little secrets.

CRISTINA VILLARREAL

Hometown: Orosi, CA

Major: Chemical engineering

1993 Comment: "I like the social atmosphere. Everyone's friendly and glad to meet new people. I'm looking forward to a good year. I hope to pass all my classes."

I was very intimidated just by the pure reputation that MIT has. I knew MIT was a very tough and grueling

place and that it wasn't meant for everyone. These past four years have definitely reinforced my initial perceptions.

I have become a much stronger and more independent person. I also realized that it is possible to live on caffeine and five hours of sleep every night. This place has managed to stretch my brain beyond belief and has brought a new meaning to the word endurance.

I definitely do not regret coming to MIT, although I did have my doubts. Sometimes I would ask, "Why didn't I go to Stanford?" In all seriousness, MIT has shaped my life. After these four years, I feel that I can conquer the world. I seriously do not believe that I will ever experience anything as difficult.

Without a doubt, the best thing about MIT has been the people I have met and the friends that I will love and cherish for the rest of my life. The worst thing has been the tremendous amount of work that is required. There is absolutely no way that everything will be accomplished.

Once you figure that out, things become more manageable.

Upon graduation, I have decided to relax and take a break. In fact, I believe all of us graduates can use a well-deserved break. For the next year or so, I will be working for a wonderful pharmaceutical company in New Jersey, yet my ultimate goal is to become a physician. I plan to attend medical school and practice medicine back in my home state of California.

I would like to thank my parents for allowing their only daughter to travel to the far ends of the East Coast in order to obtain an invaluable education. My family has given me an incredible amount of support. There were times when I felt like quitting and packing my bags. I would have never made it past these four years without those 3am phone calls to my older brother, who always seemed to know what to say.



Villarreal (1993)

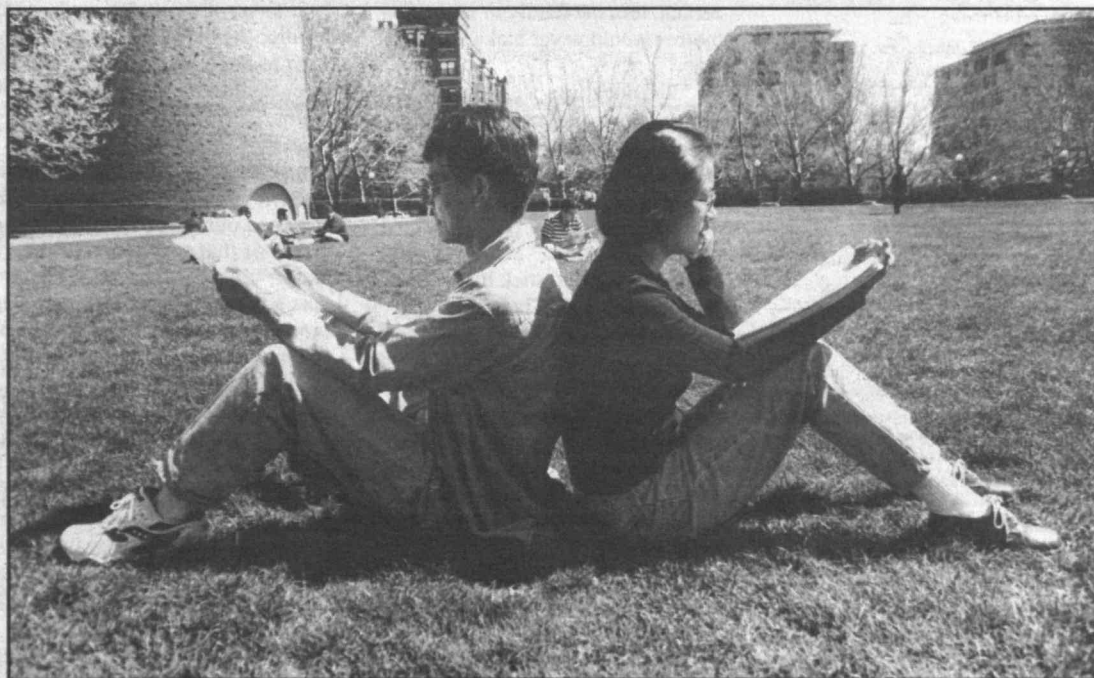


Villarreal (1997)



Dobbs (1993)

Sitting for exams



Nicholas Lam Pak Ng, a senior in computer science, and Anna Pan, a senior in chemical engineering, form studious bookends on Kresge Oval as they prepare for their last exams at MIT.

Photo by Donna Coveney

Students prepare for big day

(continued from page 1)
and president from 1980-90, will complete his service as chairman on July 1. He will continue to teach at MIT.

The invocation will be given by the Rev. Constance Parvey, MIT Lutheran chaplain.

Following the Secretary-General's speech, Constantine A. Morfopoulos, president of the Graduate Student Council, will deliver a salute to MIT from the graduate student body. Pardis C. Sabeti, president of the Class of 1997, will present the senior class gift to Dr. Vest, who will then give the charge.

For the awarding of more than 2,000 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 advanced degrees. The two lines of students will approach the stage simultaneously as their names are announced in an alternating pattern as the degrees are handed out.

Those receiving their doctoral degrees on Friday also will attend a special hooding ceremony on the day before Commencement, (Thursday, June 5) 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. Vest

will hold a reception for graduates and their guests at several locations in or near McDermott Court.

Only severe weather could cause a change in plans for the Commencement festivities. In that event, information will be available on Commencement morning through radio announcements and on a recorded message that can be heard by calling x3-7669.

In the event of bad weather, arrangements have been made for a backup program in Rockwell Cage open to graduating students, faculty and participants in the ceremony, but not families and friends because of limited space. Families and friends would view a closed-circuit telecast of the ceremony at several locations. Following the ceremony, bachelor of science degrees would be awarded by President Vest in the Johnson Athletics Center, while advanced degrees would be distributed by school deans at five different locations.

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 15 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 Vice Admiral Patricia Ann Tracey, chief of naval education and training.

Tech Night features MIT soloists

Serving as a kickoff to both Tech Week and Commencement exercises, the centennial Tech Night at Pops performance on Thursday, June 5 at Symphony Hall will feature two members of MIT's music faculty as soloists in a

Arts at MIT

program conducted by Boston Pops Laureate Conductor John Williams.

Pianist David Deveau, senior lecturer at MIT, will be featured as soloist in Mozart's *Piano Concerto No. 23 in A Major, K. 488*. Mr. Deveau is a

chamber musician and has appeared as soloist with orchestras throughout North America, including the Boston Symphony Orchestra and multiple appearances with the Boston Pops Orchestra.

Soprano soloist Ellen T. Harris, Class of 1949 Professor of Music and MIT's first Associate Provost for the Arts, will make her Boston Pops debut with selections from *My Fair Lady*. As a vocalist, Professor Harris has per-

formed a diverse repertoire ranging from early opera to the National Anthem at Fenway Park.

The Tech Night program will also include *Bugler's Dream* and *Olympic Fanfare* by John Williams, Gluck's *Dance of the Blessed Spirits* from *Orfeo ed Euridice*, Elgar's *Pomp and Circumstance March No. 1* and a musical tribute to Jerome Robbins.

Any tickets still available for Tech Night at the Pops will be sold on the day of the performance (Thursday, June 5) at Kresge Auditorium from noon-6pm. For more information, call x3-8203.

'Artists Behind the Desk' series returns

Hollywood hasn't got a monopoly on sequels. The Artists Behind the Desk Series, showcasing performances and artwork by MIT support staff members, plans a Part III this fall.

Originating in fall 1989 with a juried

exhibition in Compton Gallery and expanding five years later to include a concert and reading series in Killian Hall, the Artists Behind the Desk series allows support-staff artists at MIT to present their sometimes hidden artistic talents and abilities.

During October and November, concerts and readings of original poetry, prose and plays will be offered in Killian Hall and in Kresge Little Theater, along with an exhibition of visual artworks in Compton Gallery. The series is sponsored by the Working Group on Support Staff Issues and the Council for the Arts at MIT, with support from the music section and the MIT Museum.

Organizers hope the series will again "provide an opportunity to acknowledge, celebrate and display the otherwise unsung artistry of MIT's support staff personnel," according to Paul Rivenberg of the Plasma Fusion Center and Trudy Morris of the Housing Office, co-chairs of the Artists Behind the Desk Task Group.

The visual artists, writers and musicians whose works will be presented

will be drawn exclusively from the more than 1,600 support staff employees at MIT and Lincoln Laboratory. Only members of the support staff will be considered for inclusion, with the exception of staff members who are active members of the Working Group.

"MIT is fortunate to have talented members of the support staff who are also willing to share with the entire community," said Joan Rice, vice president for human resources, in her letter of support for the Working Group's grant proposal to the Council for the Arts.

Tapes, manuscripts and slides of work are due by noon on Friday, July 11. For submission guidelines and entry forms or to help get this show on the road—or into Compton, Kresge and Killian—contact a member of the Task Group: Lisa Feltner, <lfeltner@mit.edu>, x3-7156; Mary Pat McNally, <mcnally@psfc.mit.edu>, x3-0857; Ms. Morris, <rainbow@mit.edu>, x3-4954; Mr. Rivenberg, <rivenberg@psfc.mit.edu>, x3-8101; or Kate Schenck, <kates@mit.edu>, x3-5921.

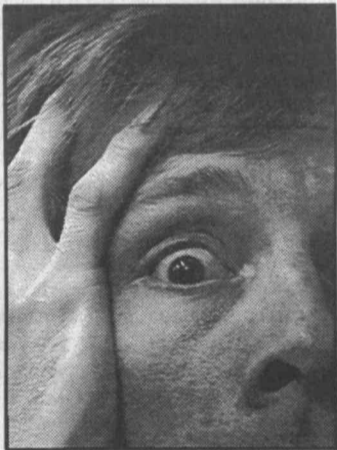
Arts News

■ Boston Globe music critic Richard Dyer praised the "unflagging vigor of invention in Machover's music, on the way it looks for a groove, locks into it, springs free in perpetually surprising ways, over a rhythm as exciting as rock and a bass line as solid as the foundation of a baroque church" in his review of the Boston Modern Orchestra Project's May 17 concert which included Professor **Tod Machover's** concerto for hyperviolin and chamber orchestra, *Forever and Ever*.

■ **Christopher Adler** (SB '94, music and mathematics) won an Honorable Mention in the ASCAP Foundation/Morton Gould Young Composer Awards competition for *Three Lai*, a work for khaen (Lao mouth organ), violin and viola. The piece was written in 1996 and premiered at Duke University, where Mr. Adler is a PhD candidate in music composition.

■ Actress **Zoe Caldwell Whitehead**, who was a member of the Council for the Arts at MIT from 1983-89, mentioned MIT in her May 5th performance of *Come a-Waltzing With Me* at the Huntington Theatre. Recalling her efforts at finding a topic for a 1983 speech at MIT, Ms. Caldwell segued into a discussion of computers, artificial intelligence, love and loneliness.

Hamlet's back in Elsinore



Tucker

In the MIT Community Players' production of Lee Blessing's *Fortinbras*, which picks up where Shakespeare's *Hamlet* leaves off, the now-dead Prince of Denmark (played by Greg Tucker, a postdoctoral associate in civil engineering) finds that the afterlife has its frustrations—as do his fellow ghosts still inhabiting Elsinore.

The two-act comedy directed by Ronni Marshak will be presented Thursday through Saturday, May 22-24 at 8pm in Kresge Little Theater. Tickets won't be sold ahead of time; the suggested donation at the door is \$5 for students and \$8 for others. For more information, call x3-2530 or e-mail <mitcp-info@mit.edu>.

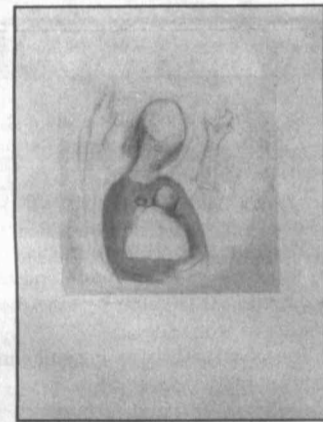
Music of Bali



Evan Ziporyn, associate professor of music and theatre arts, leads Gamelan Galak Tika, the Balinese group he founded at MIT, in a noontime concert outside the Stratton Student Center. The gamelan recently performed a new piece he wrote entitled Amok!

Photo by Donna Coveney

Art exhibit



This work is among the figurative images in pencil and oil stick on display in Olivia Fischer Fox: *Body Language* at the Sloan School Dean's Gallery. Ms. Fox of Cambridge says that depicting the human body is a means of communicating a part of the human experience.

Jazz event



Vocalist Grace Chung will perform a jazz program with Pedro Verdugo (bass) and seniors Solomon Douglas (piano) and Michael Protz (drums) tonight at the Muddy Charles Pub from 8-10pm. For more information, call 578-0246 or e-mail <graceyc@goldilocks.lcs.mit.edu>.

Institute Arts

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/www/>>.

MUSIC

Live Jazz at the Muddy Charles*—May 21: Grace Chung (vocals), Pedro Verdugo (bass), Solomon Douglas '97 (piano) and Michael Protz '97 (drums), 8-10pm, Muddy Charles Pub at Walker Memorial. 578-0246 or <graceyc@mit.edu>.

MIT Guild of Bell Ringers*—Change ringing on hand bells. Beginners always welcome. Will also ring for occasions. Meets Mondays, 6:30pm, 2nd floor balcony of Lobby 7. More info: Ken, 784-6114

DANCE

MIT Folkdance Club*—Sun—International Dancing: Early teaching for beginners—7-8pm; Teaching & requests—8-11pm, Sala de Puerto Rico or Lobby 13. Tues—Advanced Balkan Dancing: Regular teaching & requests, 8-11pm, Student Ctr 4th floor. Weds—Israeli

Dancing: Early teaching for beginners—7-8pm; Teaching & requests—8-11pm, Sala de Puerto Rico or Lobby 13. MIT/Wellesley students free, \$1 others. Call x3-FOLK or e-mail <fdc-request@mit.edu> for locations on a given week.

THEATER

Fortinbras*—May 22-24: MIT Community Players production of play by Lee Blessing, directed by Ronni Marshak. Suggested donation at door: \$8, \$5 MIT students. 8pm, Kresge Little Theater. Info: x3-2530 or <mitcp-info@mit.edu>.

EXHIBITS

List Visual Arts Center (E15)*—Kay Rosen. New work by Gary, IN-based artist exploring the linguistic and graphical mutability of the written word and modes of communication, both visual and verbal. *Nahum Zenil: Witness to the Self*. Paintings by contemporary Mexican artist exploring themes of personal and cultural identity. *Luis Gonzalez Palma*. Contemporary Guatemalan photographer's work

portrays indigenous Guatemalans in a poetic and evocative way. All shows run through June 29. Hours: Tues-Thurs & weekends 12-6pm; Fri 12-8pm; closed holidays. Curatorial Office Hours—Meet the curatorial staff for informal discussions—Weds, 12:30-1:30pm. More info: x3-4680.

MIT Museum (N52)*—*Gestural Engineering: The Sculpture of Arthur Ganson*. Permanent installation of Ganson's whimsical kinetic sculptures address emotional and philosophical issues between the animate and inanimate, human and machine. Ganson is a former MIT Artist-in-Residence. *What's So Funny About Science?* Exhibition of cartoons of New Yorker science cartoonist Sidney Harris. Through May 31. Ongoing: *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 1-5. More info: x3-4444.

Compton Gallery—*On the Surface of Things: An Exhibition of Images in Science and Engineering Photographs*. Photographs by science photographer Felice Frankel, who has

been a visiting lecturer and artist-in-residence at the Edgerton Center since 1994, communicate recent research in a variety of disciplines at MIT and other institutions. Through June 27. MIT Museum's Compton Gallery. Weekdays: 9-5. x3-4444

Hart Nautical Gallery*—*Ships for Victory: American Shipbuilding's Finest Hour*. Shipbuilding production during World War II. Permanent Exhibition of MIT Museum's Ship Models. Ongoing. Weekdays 9-5pm. More info: x3-5942.

The Dean's Gallery—*Olivia Fischer Fox: Body Language*. Figurative images in pencil and oil stick on paper by the Cambridge-based artist. Through June 16. Weekdays 9-5pm. x3-9455 or <<http://web.mit.edu/deans-gallery/www/>>.

Doc Edgerton Strobe Alley. Photographs, instruments, and memorabilia that document Harold Edgerton's invention of the strobe light. Also, several hands-on corridor experiments. Bldg 4, 4th floor corridor. x3-4629

ORIZURU: Japanese Paper Cranes. Folded sculptures by Prof Akira Naito, Professor Emeritus of Nihon University, whose Janu-

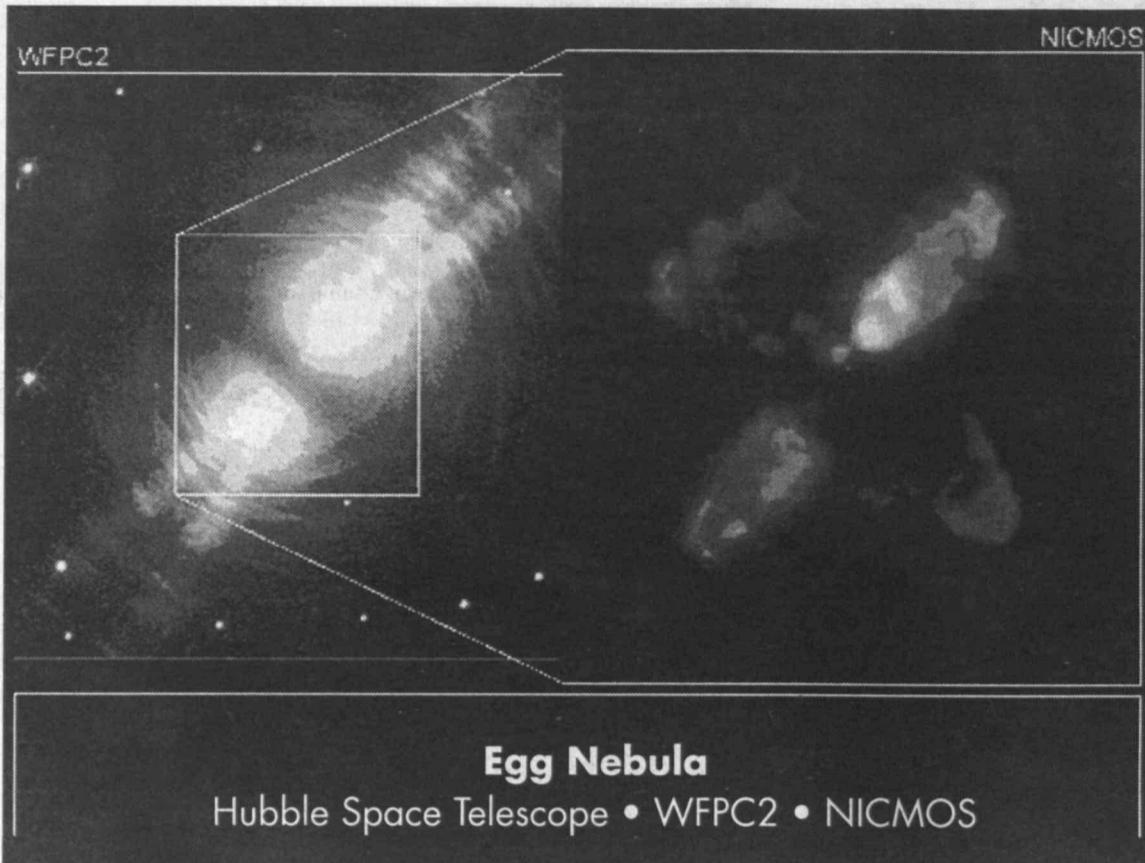
ary visit to MIT was sponsored by individuals in Mechanical Engineering, the MIT-Japan Program and Foreign Languages and Literatures. Hallway gallery outside Rm 4-405. x8-7940 or e-mail <lavin@mit.edu>. The MIT community is welcome to attend meetings of the MIT Origami Club. E-mail <origami-request@mit.edu> or see <<http://web.mit.edu/origami/>>.

Wiesner Student Art Gallery—Prize Winners' Exhibition. Featuring the three student winners of the 1997 Schnitzer Prize in the Visual Arts: Francisco Ortiz (G), Benjamin C. Matteo '97, Xingheng Wang '99. Through June 14. Wiesner Student Art Gallery (2nd floor, Stratton Student Ctr). x3-7019

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

OTHER

Applications for Wiesner Student Art Gallery**—All students welcome to apply to put up an exhibit. Call x3-3913.



Egg Nebula
Hubble Space Telescope • WFPC2 • NICMOS

The Egg Nebula, the expanding cloud of gas and dust ejected by the dying star, is shown on the left as it appears in visible light with Hubble's Wide Field and Planetary Camera 2 and on the right as it appears in infrared light with the new Near Infrared Camera and Multi-Object Spectrometer. Photo courtesy NASA

Hubble offers glimpse of dying star

(continued from page 1)

puzzle, since it's not clear to astronomers how shock fronts could develop along the star's equator and not just toward its poles.

With the far superior sensitivity and detail provided by the Hubble images, it should be possible to unravel this mystery. "One possibility is that an explosive event occurred on the surface of the star several hundred years

ago, scattering material in many directions at high speed, and the glowing hydrogen molecules trace the collision of this ejected material with previously ejected gas," Dr. Kastner said.

The current data, obtained through the Early Release Observation program in cooperation with the NICMOS instrument team, are part of a more detailed NICMOS and WFPC2 study of the Egg Nebula by Drs. Sahai, Trauger,

Kastner and Weintraub.

The Egg Nebula is an important prototype of similar nebulae which surround both dying and newborn stars. It also represents a nearby small-scale model of the structure at the center of quasars, where a luminous compact object is embedded in a dust torus with radiation and mass flowing out a hole in two oppositely directed beams.

The work was funded by NASA.

Imagen team wins \$50K contest

(continued from page 1)

to student entrepreneur teams that submitted compelling and viable business plans. The competition also develops and maintains a network of mentors, investors and potential partners to help teams act on their plans.

Among the 25 companies that have emerged from the competition are Firefly Network (finalist, 1995), SensAble Technologies (winner, 1995), Weblines Communications (winner 1996), net.Genesis (finalist, 1995), Diva (entrant, 1992), Stylus Innovation (winner, 1991).

The teams accepted their prizes before a record crowd of 900 in Kresge Auditorium on May 14. Keynote speaker Kevin Kinsella (SB '67), president and CEO of California-based Sequana Therapeutics, opened the

event, after which each of the seven \$50K finalist teams presented its plan to the audience.

The three prize-winning teams receive their monetary awards in three installments: one-third immediately, one-third upon incorporation and the final third next fall after proving their viability as a business.

The other finalists' team names and proposed products were:

- **InfraScan**—infrared technology to diagnosis cancer, particularly breast cancer.

- **Io Corp.**—integrated, open-architecture bio-informatics technology and software tools to enable bio/pharmaceutical companies to discover and develop products more efficiently.

- **Perfect Underwear**—applying the concept of mass customization to the

world of intimate apparel using 3-D scanner technology combined with a trademarked measurement system.

- **Sensoria Inc.**—portable vapor detection systems for explosives detection, illicit drug detection, medical diagnostics, and food quality control.

This year's \$50K judges were Steve Brown and Jack Turner of the Technology Licensing Office; Brad Feld, entrepreneur and VC, Intensity Ventures; Joe Hadzima, general counsel, Quantum Energy; Stephen Henkenmeier, Price Waterhouse; Steve Henry, patent attorney, Wolf, Greenfield & Sacks; David Morgenthaler, Morgenthaler Ventures; Jean Notis-McConarty, partner, Coopers & Lybrand; John Piccione, attorney, Sullivan & Worcester; and Dan Schwinn, founder, Shiva, Avidyne.

Here & There

Many researchers and students at MIT closely watched the historical chess match between Garry Kasparov and Deep Blue, IBM's supercomputer, and a number of them were asked for their observations by journalists.

Sherry Turkle, professor in the Program in Science, Technology and Society, remarked in the Arizona Republic (May 13) on a change between this year's match and the 1996 contest in how most people—perhaps including Mr. Kasparov himself—saw Deep Blue. "The difference this time is there is a greater public recognition that the computer played more like a person," she said.

Public perception of IBM has become somewhat more sympathetic since Kasparov's defeat, she added. The perception of Deep Blue's maker as "more organized, more neural, not a clunky kind of computer intelligence... really has been facilitated by this match."

Charles Leiserson, professor of computer science and engineering, said in the Boston Herald (May 13) that the match results did not presage a takeover of the world of chess by marching automatons. Deep Blue's victory was most relevant "if you viewed it not as a competition with the machine, but in cooperation with the machine," he said.

Professor Leiserson, whose own chess-playing computer, Cilkchess, can analyze two million possible moves per second, saw Deep Blue and IBM's triumph as a challenge and an opportunity. "If I had sufficient hardware to run, we'd give them a run for their money," he said.

Marvin L. Minsky, Toshiba Professor of Media Arts and Sciences, saw Deep Blue's victory as a good demonstration of progress in computer intelligence but hardly a threat to even a small child's questions.

"Nobody knows how to get a machine to understand even a simple children's story," he told The Boston

Globe (May 13). It is still far beyond the capacity of any computer, he said, to be able to "respond intelligently" to a plot-based question such as, "Why did Jane do that?"

Rather than a giant leap for computer-kind, Deep Blue's victory represents a limited step in a slow, steady progression from Alan Turing's first chess-playing program of 50 years ago, Professor Minsky said, adding that he would "not be surprised if, 100 years from now, an old IBM 360 (a 1960s computer) could beat any human opponent" if it contained the right software.

As for Kasparov's suspicions that Deep Blue had been rigged, **William Neveitt**, a graduate student in electrical engineering and computer science studying artificial intelligence, commented to the Gannett News Service, "this isn't like crawling in with a screwdriver and being out of there in five minutes."

Sarah H. Wright

Awards & Honors

Three MIT faculty members are among the 164 artists, scholars and scientists to win 1997 Guggenheim Fellowships totaling \$4.89 million. They are **Sallie W. Chisholm**, McAfee Professor of Engineering in the Departments of Civil and Environmental Engineering and Biology; **Lily E. Kay**, Associate Professor of the History of Science in the Program in Science, Technology and Society; and **Cynthia Griffin Wolff**, Class of 1922 Professor of Humanities in the Program in Writing and Humanistic Studies.

Guggenheim Fellows are appointed "on the basis of unusually distinguished achievement in the past and exceptional promise for future accomplishment." This year's recipients were chosen from among 2,876 applicants. During its 73-year history, the John Simon Guggenheim Memorial Foundation has granted nearly \$176 million in Fellowships.

According to the foundation, Professor Chisholm will use her award for studies in ocean fertilization. Professor Kay will study Warren S. McCulloch and the making of modern neuroscience, while Professor Wolff will do a biographical study of Willa Cather.

George B. Benedek, Alfred H. Caspary Professor of Physics and Biological Physics, has been awarded the Proctor Medal for "outstanding research in basic or clinical sciences as applied to ophthalmology," the Association for Research in Vision and Ophthalmology has announced.

Professor Benedek has participated in research both to develop instruments to detect signs of early-stage cataracts and eye drops to thwart the development of cataracts.

His research has encompassed areas including nuclear magnetic resonance, semiconductor physics, the physics of high pressures and shock waves, critical phenomena in ferromagnets and fluids, quasielastic light-scattering spectroscopy, and the theory of transparency of the eye. He is co-author, with MIT Professor of Physics Felix M.H. Villars, of a three-volume text, *Physics with Illustrative Examples from Medicine and Biology*, and co-author, with Dr. David Miller, of *Intraocular Light Scattering: Theory and Clinical Applications*.



Benedek

The US Department of Transportation's Federal Highway Administration has awarded Dwight David Eisenhower Transportation Fellowships for postgraduate research in transportation to 102 recipients, including three graduate students from MIT: **Clare Epstein** of urban studies and planning, and **Brian Perreault** and **Michael Ramming** of electrical engineering and computer science.

The \$10,000-per-year award will help fund Ms. Epstein's study of the Tren Urbano system, a heavy rail line now under construction in San Juan, Puerto Rico. Mr. Perreault, who founded a company called Magnemotion and expects to receive the PhD in June, is finishing his thesis on a flexible, inexpensive system that implements accurate position-sensing and communications between a vehicle and the wayside, or vehicle and vehicle. Mr. Ramming is studying how travelers use information such as times, costs, safety and comfort in evaluating their various travel options.

Dr. Alan Grossman, associate professor of biology, has been

awarded the 1997 Eli Lilly & Co. Award, presented to a scientist under the age of 40 to stimulate fundamental research in microbiology and immunology.

Professor Grossman's research "has contributed fundamentally to the understanding not only of microbial physiology, but of general biological processes," according to a statement from the American Society of Microbiology, which will present the award on May 9. "His work epitomizes the power of combining sophisticated molecular genetics with a deep appreciation of the physiology of the bacterial cell. This combination has enabled him to unravel the integrated and interactive decision-making processes in microbial development and commitment to cell fate, and serves as a guide to approaching complex and fundamental biological questions."

Purdue University has bestowed an honorary Doctor of Science degree on Professor Emeritus of Mathematics **Bertram Kostant**. "Among his professional peers, Kostant is widely hailed for his four decades of work in representation theory, including such mathematical realms as the Lie groups or Lie algebras, homogeneous spaces, differential geometry and mathematical physics," the Purdue announcement notes. "He is also known for the mentoring role he has played to generations of researchers."

Professor Kostant received his bachelor's degree in mathematics from Purdue in 1950. He came to MIT in 1962 and was awarded emeritus rank in 1993, though he continued at the Institute as a senior lecturer until 1996.

MIT sports information director **Roger Crosley** has been named the winner of the College Division Irving T. Marsh Award by the Eastern College Athletic Conference-Sports Information Directors Association. The Marsh Award is given annually to an ECAC-SIDA member for contributions and dedication to, and excellence in, the field of collegiate sports information. Marsh Awards are given for both the College Division (NCAA Divisions II & III) and University Division (Division I) each year. Mr. Crosley has been treasurer of ECAC-SIDA for 11 years.



Crosley

Louis J. DiBerardinis, associate director of the Environmental Medical Service, has won the 1997 Chemical Health and Safety Award from the American Chemical Society. The award, which recognizes contributions to chemical health and safety, was presented "in recognition of his many contributions to laboratory ventilation, which have advanced and helped further the standardization of laboratory hood performance," according to the March/April 1997 issue of Chemical Health and Safety. Mr. DiBerardinis is past president of the American Academy of Industrial Hygiene.

Neuro-Dynamic Programming, by Professors of Electrical Engineering **Dimitri Bertsekas** and **John Tsitsiklis** of the Laboratory for Information and Decision Systems, won the 1997 INFORMS/CTST Prize, awarded for research excellence in the interface between operations research and computer science. The methods presented in the book combine dynamic programming, neural networks and learning to address complex sequential decision and resource allocation problems in the presence of uncertainty.