

Two hundred tons of steel and cement, twice the weight to be carried by the columns of the Sports and Fitness Center, were used in this load test of the first footing for the new center, which will be on the filled land of the MIT campus. Engineers found sand 20 feet down and hollowed out a bulb for the pressure-injected footing for the column of cement to stand on. (See related photo below.)
Photo by Donna Coveney

MIT Sports and Fitness Center groundbreaking planned for Friday

By Robert J. Sales
News Office

The captain of the women's swim team joins MIT's top officials and key donors at the groundbreaking for the \$45 million MIT Sports and Fitness Center site next to the Johnson Athletic Center on Friday at 3:30pm.

The participation of senior Lauren Erb, the swim captain, is apropos since the center will house a 50-meter Olympic-class swimming pool. Even though she is a senior and will not benefit from the new pool herself, Ms. Erb is excited about the opportunities it will provide for MIT swimmers.

"The pool is amazing and will add a lot to both the swim team and the community in general," she said. "Right now the swim team is transitioning into becoming a dominant team and the new pool will definitely help the team's future growth. The size of the pool will be such that the swim and dive team will be able to get more pool time and there will also be a lot more open-swim times."

Besides Ms. Erb, speakers at the Athletic Center ceremony will be President Charles M. Vest, Director of Athletics Richard A. Hill, Dean for Student Life Larry G. Benedict and Thomas J. Allen, the Howard W. Johnson Professor at the Sloan School of Management and MIT's faculty athletic representative to the National Collegiate Athletic Association (NCAA). Cambridge Mayor Anthony D. Gallucio will offer remarks. Chancellor Lawrence S. Bacow will assist with the groundbreaking.

Also attending will be significant donors for the project, including Albert Zesiger (SB 1951) and Barrie Zesiger (a member of the MIT Corporation); Alex d'Arbeloff (SB 1949, chair of the MIT Corporation) and Brit d'Arbeloff (SM 1961); Thomas P. Gerrity Jr. (SB 1963) and Ann Gerrity; and Thomas Folger (SB 1949) and Dorothy Folger.

The ceremony will take place under a tent between the Johnson Athletic Center, Rockwell Cage and Briggs Fieldhouse. A reception will follow in

a tent adjacent to the lobby of the Johnson Athletic Center.

The MIT Marching Band and cheerleaders will signal the start of the ceremony as they enter the tent, playing the MIT fight song. They will perform again at the conclusion of the program.

After the speakers have concluded their remarks, President Vest will invite all of the speakers, donors, Chancellor Bacow, Daniel Martin of the athletic department and student representatives to join him at the pile of dirt for the ceremonial shoveling.

Members of the community are invited to the groundbreaking and the reception that follows. Color photos of the facility will be displayed in the lobby of the Johnson Athletic Center. After the ceremony, tours of the newly renovated indoor track will be conducted.

Designed by the architectural firms of Roche & Dinkeloo and Sasaki Associates, the center will include:

- An Olympic-class pool more than

(continued on page 12)



Inside the 200-ton test block, Rusty Brown (center) and Lance Mugford (far right) monitor test equipment calculating the load on the column and footing.
Photo by Donna Coveney

New financial plan presented to faculty

By Kenneth D. Campbell
News Office

President Charles Vest gave an overview at last week's faculty meeting of the myriad ideas, buildings, finances and people behind the next decade, "MIT's most intense period of change since the post-war years."

The next 10 years will see extraordinary intellectual ferment, widespread initiatives and innovations in education, changes in campus life and \$900 million worth of expenditures for new construction, renovation and support of graduate students.

Examining the trends of the past

decade, Dr. Vest displayed charts showing that research revenues have dropped as a percent of campus operating expenses, going from 66 percent in 1965 to 51 percent in 1990 to 38 percent in 2000.

That 13 percent drop since 1990 has been offset by gifts, endowment and other income, which have jumped from 25 percent in 1990 to 37 percent in 2000. Tuition has remained at about the same proportion: 24 percent in 1990 and 25 percent in 2000. Projections out to the year 2010 forecast 36 percent of revenues from research, 40 percent from gifts and 24 percent from tuition.

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Protein found to detect kidney failure early

A Harvard-MIT researcher and colleagues have discovered a protein detectable in urine that may serve as a new marker for early detection of acute kidney failure.

"Introduction of therapy early in the disease process is likely to lead to a reduction in fatality rates," said Joseph V. Bonventre, co-director of the Harvard-MIT Division of Health Sciences and Technology (HST) and the Robert H. Ebert Professor of Molecular Medicine at Harvard Medical School. The research results may also help in the development of better strategies for testing new drugs designed to protect the kidney.

The discovery of Kidney Injury Molecule 1 (KIM-1) in damaged animal and human kidneys and in human kidney urine was announced October 13 at the American Society of Nephrology's 33rd Annual Meeting and Scientific Exposition in Toronto.

Professor Bonventre's colleagues in the discovery of KIM-1 in the urine include Drs. Won Han of Massachusetts General Hospital and Veronique Bailly of Biogen Corporation.

Acute kidney failure is a major complication among hospitalized patients and carries a significant fatality rate despite advances in supportive care.

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IN BRIEF

PE LOTTERY

The lottery for second quarter Physical Education classes ends tomorrow at 1pm. For more information, see story on page 4.

DOCUMENT DILEMMAS

Learn the best way to get a document from your desktop into the mail at a workshop presented by CopyTech and Mail Services in the Bush Room (10-105) on Monday, Oct. 30 from 9:30-11am. Refreshments and prizes will be available.

HALLOWEEN PARTY

MIT Medical will hold a Halloween party on Sunday, Oct. 29 at 2pm in the E23 atrium with refreshments, the annual exhibition of children's artwork, music and two magic shows, at 2:20pm and 2:50pm. The party is open to the entire MIT community. Costumes are encouraged.

INVESTMENT REVIEWS

The Benefits Office and Fidelity Investments will hold quarterly investment reviews focusing on the third quarter 2000 market environment and discussing the MIT 401(k) Plan investment options in detail. The reviews are scheduled for:

- Wednesday, Nov. 8 at noon in the Bush Room (10-105)
- Thursday, Nov. 9 at noon in Twenty Chimneys, Stratton Student Center and
- Thursday, Nov. 9 at 9pm in Lincoln Lab Auditorium.

Freshman is reigning US women's chess champ

By Robert J. Sales
News Office

Freshman Elina Groberman started playing chess at age six in her native Moldova, which was then part of the Soviet Union.

Eleven years later, Moldova is an independent republic, her hometown of Kishinev has been renamed Chisinau, and at age 17 Ms. Groberman is the reigning US women's chess co-champion.

After her family moved to the United States in 1995 and settled in Brooklyn when she was 12, Ms. Groberman started taking lessons from acclaimed Ukrainian coach Mikhail Troshin and playing in tournaments virtually every weekend. "My parents thought that chess would be good for my overall development," said Ms. Groberman, who is the only competitive player in her family.

The dedication and hard work paid off.

Ms. Groberman, who plans to major in economics or computer science, took time out from her MIT studies to tie for first place with Camilla Baginskaite of Lithuania in the women's tournament at the US Chess Championships in Seattle September 25-October 6, winning \$7,250. In addition, Ms. Groberman received a \$400

(continued on page 7)

D'Arbeloff grants awarded for proposals to improve first year

■ By Sarah H. Wright
News Office

D'Arbeloff grants totalling a million dollars have been awarded to fund seven proposals for innovation in education at MIT.

The projects, designed to enhance and potentially transform the academic and residential experience of MIT's first-year students, were selected by the grants subcommittee of the Council on Educational Technology (CET) in consultation with the Committee on the Undergraduate Program (CUP).

The proposals include innovations in teaching first-year physics and math; in exposing students to the wide variety of opportunities in science, technology, bioengineering and medicine; and in solving complex problems in a multi-disciplinary, project-based learning environment. Three of the funded proposals are for projects designed to improve mentoring and advising.

The d'Arbeloff Fund for Excellence in MIT Education was established in 1999 with a \$10 million gift from Alex and Brit d'Arbeloff.

At that time, MIT President Charles M. Vest said, "Educational change is in the wind at MIT and throughout academia. This magnificent gift will enable our faculty to translate into action the wealth of new pedagogical ideas welling up through MIT."

Commented Mr. d'Arbeloff (SB

1949), "The challenge is to generate ideas from the faculty that will turn into concrete programs to make the freshman year at MIT a model for the rest of higher education in science and engineering."

Professor Robert Redwine, Dean for Undergraduate Education and chair of the CET grants subcommittee, anticipated that this year's d'Arbeloff grants would lead to "important and lasting changes in student life and learning at MIT. The pilots that are now under way are some of the most exciting experiments we have attempted in a long time. Perhaps even more important, it is likely that successful experiments will be scalable and sustainable for many students at the Institute," he said.

Dean Redwine also noted the "truly critical importance" of endowed funds that target educational innovation. "We are fortunate that such funding has become available just as many faculty are anxious to devote their efforts to renewing and revitalizing the educational experience at MIT," he said.

Professor Rosalind H. Williams was chair of the CET Grants Subcommittee at the time the awardees were selected (June 1999). She enthusiastically described the d'Arbeloff grants and the selection process as exemplifying a "chain of giving" that began with flexible and generous donors and included a wide community (continued on page 5)

Show and tell



As part of Family Weekend, Dean of Architecture William Mitchell (center, gesturing) gave a campus tour to visiting parents, grandparents and siblings. A record 1,740 visitors from 545 families came to campus to participate in lectures, tours and gatherings last Friday through Sunday. Photo by Donna Coveney

Vest receives NAE Bueche award for statesmanship in science

■ By Kenneth D. Campbell
News Office

MIT President Charles Vest was honored Sunday by the National Academy of Engineering (NAE) for his "outstanding university leadership, commitment and effectiveness in helping mold government policy in support of research, and forging linkages between academia and industry."

Dr. Vest, the 18th recipient of the NAE's prestigious annual Arthur M. Bueche Award for statesmanship in science and technology, received the award's gold medallion at a ceremony at the National Academies building in Washington.

Dr. Vest, in his remarks, said that when he became president of MIT in 1990, there was an "urgent need to revitalize the relationship between the federal government and our nation's public and private research universities."

He said the bipartisan understanding of this partnership, which had been so important to the nation's prosperity, health, quality of life and security, seemed at the time to be slipping away because of the end of the Cold War and a lack of interest by academic and industry leaders in talking to Congress and the public.

Dr. Vest said that with the help of leaders of industry such as Norm Augustine and John Young, a widening circle of academic colleagues and the tutelage of MIT Vice President for Federal Relations Jack Crowley, "I have tried to help spread the word that science and engineering are essential to our future; that it is a proper and essential role of the federal government to support research in our universities; and that the glory of this system is the intimate interweaving of research and education."

The importance of advances in science and engineering, he said, is shown by the growth of life expectancy in the US—from 55 in 1900 to nearly 80 today—and by the growth in the American economy. During the past half century, over 50 percent of the growth in the US economy "is due to scientific and technological innovation, which largely flowed from our university laboratories."

Changes in corporate research and development have also affected science, he said. "We now must think of science and engineering policy, or perhaps even innovation policy, and it must include private industry as well as government and academia."

He said US corporations "are mostly out of the business of moderate- or

long-range corporate R&D. They have gained astounding efficiencies and value by integrating near-term R&D into the broader context of product development."

As a result of these changes, corporations "now gain much of their actual innovation by buying successful start-up companies, whose intellectual capital often flows from our universities."

"All three parties—government, industry and academia—need to better understand and shape this system," he said, adding that "the role of the federal government in supporting research and advanced education will remain absolutely essential."

Dr. Vest said a new challenge in the public perception of science and technology is that "the number of young American men and women pursuing science, mathematics and engineering is declining at the very moment when science and technology are so clearly key to our future."

"We must turn this around," he said, noting that "our responsibility for human capital, for educating and developing the talents of young people, is the most important agenda item of all."

"We must help students at every level experience the joy of discovery, the love of analyzing and understanding our wondrous universe, the thrill of design and the power of synthesis and creativity," said Dr. Vest.

BUECHE AWARD

The principal criteria established for the Bueche award are demonstrated statesmanship in the field of technology; active engagement in the determination of science and technology public policy; active participation on behalf of technology; and active contributions to industry-government-university relationships.

The NAE established the award in 1982 to honor Arthur M. Bueche, who was senior vice president for corporate technology at General Electric and a member of the NAE Council who spoke out for the advancement of technology. The honoree receives a gold medallion, a certificate and a \$2,500 cash award.

Previous recipients of the award include four national science advisors, three of whom have strong connections to MIT: H. Guyford Stever, formerly a professor and department head at MIT; Jerome B. Wiesner, the late president of MIT; and Edward E. David (SM 1947), a Life member of the MIT Corporation. Another MIT-related recipient is Professor Emeritus Robert C. Seamans, Jr., who was honored in 1994.

Kim and Weinberg elected to Institute of Medicine

■ By Deborah Halber
News Office

Associate head and professor of biology Peter S. Kim and professor of biology Robert A. Weinberg were among 60 new members named to the Institute of Medicine (IOM) of the National Academies last week.

Professors Kim and Weinberg are members of the Whitehead Institute for Biomedical Research. Professor Kim also is an investigator at the Howard Hughes Medical Institute.

In addition to the IOM, the National Academies include the National Academy of Science, the National Academy of Engineering and the National Research Council.

The IOM has 613 members. In addition, five people were honored by direct election to senior membership, bringing that total to 711. The number of foreign associates totals 56 with the

election of five this year.

Current active members elect new members from among candidates chosen for their major contributions to health and medicine or to related fields such as social and behavioral sciences, law, administration and economics.

Election to the IOM is an honor and also entails an obligation to work on behalf of the organization in its governance and studies. With their election, members make a commitment to devote a significant amount of time as volunteers on committees engaged in a broad range of studies on health policy issues. Current IOM projects include studies on the creation of a medical system to support long-duration space travel beyond Earth orbit, the development of new technologies for the early detection of breast cancer, and the safety and efficacy of the anthrax vaccine used by the US military.

Community asked to improve campus recycling rate

■ By Janet Snover
Executive Vice President's Office

MIT's recycling rate has slipped recently, from 17 percent in April to about 10 percent in August, and the Environmental Programs Task Force (EPTF) is seeking the help and participation of the entire campus community to reach the goal of recycling 30 percent of our waste by January 1.

"There has been a great deal of interest at MIT in our expanded recycling program, which is designed to make recycling easy by making bins widely available on campus," said Jamie Lewis Keith, managing director for environmental programs and risk management and senior counsel. "Now we need to ask everyone on campus to participate in this Institute-wide initiative in order to meet our 30 percent goal by January 1. It isn't hard to participate, but it does take community awareness to ensure that recycling is an ongoing success."

cling is an ongoing success."

As announced in the past, the expanded program allows recycling of mixed paper, glass bottles, aluminum cans, plastics numbered one through seven (the designation is on the bottom), and food-preparation compost from several sites. Bottles, cans and plastics must be empty, but don't need to be washed out.

In terms of tonnage, paper represents the largest of these recyclable commodities, so community members are asked to put all paper waste—other than the very few excluded types—in the recycling bins, rather than in the trash.

The kinds of paper that can be recycled in either the gray, desk-side bins (regardless of what the labels on the bin say), or in the paper recycling bins with blue tops in common areas across the campus are: all white or colored office papers (with or without staples), computer printouts, envelopes, (remove metal clasps first),

newspapers, glossy paper, magazines, catalogs, phonebooks, post-it notes and memos, carbonless forms, small pieces of cardboard and file folders (with metal bands removed).

Large cardboard boxes should be flattened and placed beside a paper recycling bin. Styrofoam packing materials should be saved for reuse or discarded in the trash.

The only paper products that cannot be placed in the paper recycling bins are hardcover books, carbon paper, paper in which food has been wrapped, coffee cups, juice cartons, paper towels, napkins and paper plates. Even though some of these products might be biodegradable, they are not recyclable in the MIT program and may contaminate whole batches of correctly recycled papers.

While collecting trash, custodians empty desk-side recycling bins if they are full. Custodial carts are equipped with a single bin containing two separate bags, a gray one for trash and a

clear bag for recycled paper. The larger bins for commingled recyclables (cans, bottles and plastics) in common areas around campus are emptied by custodians when they are full.

Several changes are under way to make recycling more convenient for the custodial staff. Instead of having to transport the bags with recyclables to a few special collection points, custodians will soon be able to leave them in more locations. Grounds Services workers Gus Carita and Bob Silva, whose work will focus primarily on supporting recycling, will pick up the recyclables from the collection points. In addition, they will soon begin using a vehicle powered by natural gas to pick up recyclables daily and deliver them to a central location, where an outside vendor will collect them.

Community members with questions about the program should contact Kevin Healy, recycling coordinator in Facilities, at <khealy@mit.edu> or x3-6360.

D'Arbeloff grants made to improve freshman experience

(continued from page 3)
of support.

"Alex and Brit have contributed not only the \$10 million dollars, but also their creativity and enthusiasm. The chain has continued in the form of a collaborative process for deciding how to use the funds most effectively for educational innovation at MIT. The chain then linked, most importantly, with faculty. Both individuals and small groups of faculty submitted dozens of innovative and exciting proposals," she said.

Four of the d'Arbeloff grants have been awarded to curriculum development projects and three are pilot programs designed to build stronger ties within the MIT community for first-year students, through innova-

tions in advising or mentoring systems.

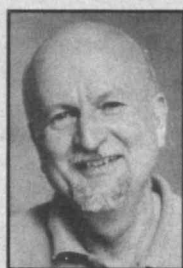
Studio Physics at MIT: The Rebirth of Wonder

Professor John Belcher taught the large lectures (about 700 students) in 8.02 (Physics II) once each term for three years in the early 1990s.

"As a result of that experience I simply do not believe the large lecture format is a very effective way to teach. What the Department of Physics hopes to do with Technology-Enabled Active Learning (TEAL) is develop a more engaging course in which students learn more, and are more engaged in that learning process," he said.

What was lost in the lecture hall

may be regained in the hands-on, active-learning "studio" approach, Professor Belcher said. The studio concept refers to the hands-on method of teaching used in the fine arts, he said.



Belcher

in particular, which is a very subtle and abstract topic, visualizing is a crucial part of the learning process."

In keeping with Professor Williams's characterization of the d'Arbeloff grants process as a chain of giving, Professor Belcher said, "It helps enormously to have the chair of the Corporation advocating for these initiatives."

Factories and Laboratories: A New Undergraduate Seminar

Three faculty in the program in Science, Technology and Society were awarded a d'Arbeloff grant for a field-trip-based program to help MIT freshmen become more aware of opportunities in science, technology, bioengineering and medicine, and of how these areas intersect.

The faculty: Deborah Fitzgerald, associate professor of the history of technology and director of graduate studies for the program; Evelyn Hammonds, associate professor of the history of science;



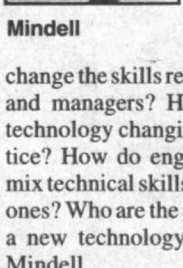
Fitzgerald

and David Mindell, Frances and David Dibner Associate Professor of the History of Engineering and Manufacturing, hope to expose students to all dimensions of the scientific enterprise.

Professor Mindell summarized the project's several goals. "Factories expose students to environments of technological production, with all their engineering, economic and social complexity. Laboratories reveal the day-to-day workings of the scientific enterprise, with all its intellectual, practical and institutional dimensions," he said.

Specific goals of the project include getting students out into the real world of science and technology; establishing the relevance of the General Institute Requirements subjects to daily technical practice; setting up conversations "across generations" of MIT students and graduates; teaching them how to be sophisticated observers of the complex social relationships that factories and laboratories embody and to decide for themselves what they find interesting and worthwhile.

"Ultimately, we want to teach students to ask new questions, such as 'How does the introduction of new technology change the skills required of production workers? How does it change the skills required of engineers and managers? How is information technology changing laboratory practice? How do engineering managers mix technical skills with interpersonal ones? Who are the anticipated users of a new technology?'" said Professor Mindell.



Mindell

Solving Complex Problems: Mission 2004

Professor Kip V. Hodges of the Department of Earth, Atmospheric and Planetary Sciences has developed a pilot freshman subject to provide students an opportunity to experience an "expanded learning community" and to "work as teams on a large, interdisciplinary problem—this year, the design of a mission to Mars to search for signs of past or present life," he said.

"Not only has Mission 2004 engaged freshmen innovatively, but it has also widened the pool of 'staff' beyond faculty and graduate teaching assistants. Upperclassmen from all over the Institute will serve as mentor/coaches for the design teams, and so will alumni and non-alumni professional mentors," he said.



Hodges

"Pilot programs of this magnitude could not be developed at MIT were it not for the d'Arbeloff funds. I only hope that the students appreciate the beneficence of the d'Arbeloffs in funding this and other educational initiatives," said Professor Hodges.

Pedagogical Initiatives in Math

Professors of Mathematics Haynes Miller, David Jerison and Gil Strang were awarded a d'Arbeloff fund grant to support a comprehensive planning effort during 2000-01 to develop initiatives in the first-year mathematics program.

"Science lectures have traditionally been enlivened by guns firing, Bessemer processes melting down, the professor atop a rocket and so forth. In 18.03 (Differential Equations) we have for years thrown books to illustrate the Euler dynamical system. Recent progress in graphics software has opened the possibility of bringing more dramatic simulations into the classroom. We intend to build on this," they said.



Jerison

The vision of the mathematics program designers will affect several arenas: lectures, which will be interactive and technologically enhanced; homework, which requires new strategies; an online reference encyclopedia; a modularized syllabus; freshman advising seminars; and department laboratory courses.

"Mathematics is the common language of the MIT community. Luckily, technological advances offer alternatives to chalk and blackboard which, after all, are Stone Age implements," their proposal states. "Our long-term goal is to bring new life to all the current formats and to introduce others as well."

The math initiative will also explore "better uses for human resources than the painfully isolated, repetitive drudgery of grading homework" for faculty and the ineffectiveness of it for students. The pilot will experiment with automated routine homework submission, interactive simulations and multi-user environments so teams can work cooperatively on homework assignments.

The math pilot designers also noted the need for freshmen to be encouraged, through advising seminars, to "keep their ultimate goals in sight" despite MIT's daunting workload.

BIOMatrix: Advising and Tutoring in Real-Life Issues

Martha Gray, Edward Hood Taplin Professor of Medical and Electrical Engineering and co-director of the Harvard-MIT Division of Health Sciences and Technology (HST), and Dr. Rick Mitchell, associate master, HST, responded to the challenge to transform the freshman experience by developing a pilot program, Biomedical

Sciences and Biomedical Engineering MIT Advising and Tutoring in Real-Life Issues (BIOMatrix).

"As the interests and career paths of our undergraduates become increasingly diverse, the need for advice, guidance and mentoring increases. The goal of this pilot is to provide a non-didactic, hands-on opportunity to observe and participate in activities related to the biological sciences. The goals are to provide a sustainable mentoring mechanism that is relatively undifferentiated in terms of choice of biomedical career and to offer students the chance to join a 'family' of HST faculty, graduate students and alumni," the program creators wrote.

"This program will offer students the opportunity of having at least one faculty member who knows them well by the time they graduate and of having informal intellectual contact with people actually working in the disciplines the students are exploring," they said.

Planning is under way to introduce BIOMatrix to freshmen next spring.

Advising Pilots for 2000-01

The Office of the Dean for Undergraduate Education (DUE) was awarded a d'Arbeloff grant to establish pilot residence-based advising programs in McCormick Hall and Random Hall. The DUE also received a planning grant to redesign academic information delivery through aggressive use of information technology to support student advising.

The pilot advising programs in McCormick and, on a lesser scale, in Random Hall are designed to explore the connection between the residential community and advising. The goals of this program include the creation of residence-based "families" of freshmen, upper-class students, graduate students and faculty who establish their identity through the living group.

The McCormick pilot was in place for this year's freshmen and consists of eight residence-based advising cohorts, including six freshman advising seminar groups. The goals of the program include creating residence-based families of students, associate advisors, graduate resident tutors, faculty advisors, housemasters and staff.

The pilot based in Random Hall has the same focus as the McCormick Hall program but without a seminar or advising component. Instead of faculty advisors, Random has introduced an improved House Fellows program that is augmented by residence-based associate advisors.

Advising in the First Two Years: Improving Delivery of Academic Information to Students and Advisors

A planning grant was awarded to the DUE to undertake a strategic look at the early advising experience of MIT undergraduates with a view to improving the information provided to advisors. Pilot programs will be undertaken that apply new technology to student and faculty needs including academic program planning, secure communication, registration and course changes, identification of educational opportunities and assistance with study skills, problem-solving and time management.

"The end goal of this project is to enable advisors to focus on the relationship and academic value to the student, the academic program and to the Institute rather than on locating, interpreting and applying information from diverse, inconsistent sources," wrote the authors of this proposal. The faculty sponsor of this planning grant is J. Kim Vandiver, professor of ocean engineering and Dean for Undergraduate Research.

"We are convinced that properly developed and applied information technology will provide advisor and advisee with robust advising support. We also believe that such technology will permit others to be virtual partners in the advising relationship and that it will open the door to increased participation by alumni," the authors of the proposal wrote.

Five get HST's Taplin Award for research

Five scientists have received John F. and Virginia B. Taplin Awards from the Harvard-MIT Division of Health Sciences and Technology (HST), awards given annually to help build the educational and training infrastructure of the division.

This year's winners will receive the following Taplin grants, totaling \$42,000 per researcher for a three-year period. The winners and their projects are listed below.

—Bertrand Delgutte, principal research scientist in the Research Lab for Electronics, for "Laboratory Exercise in Neural Modeling for Speech and Hearing and Neuroengineering."

—Donald E. Ingber, an affiliated faculty member of HST, to establish a new "Bicomplicity Initiative" within the division.

—Isaac S. Kohane, research affiliate at the Lab for Computer Science, and Professor Gregory Stephanopoulos of chemistry for "Multi-institutional HST-based Training Grant for Functional Genomics and Bioinformatics."

—Lucila Ohno-Machado, an affiliated

faculty member of HST, for "Building a Curriculum for Biomedical Informatics."

"We are deeply grateful to John and Virginia Taplin for their generosity and commitment to HST," said Dr. Martha Gray, co-director of HST and holder of the Edward Hood Taplin Professorship in Health Sciences and Technology. "The Taplin Awards have become critical to HST's ability to stay current with the constant changes in our fields and maintain the highest quality education and training for physician-scientists who are dedicated to finding solutions to unmet medical needs."

John Taplin graduated from MIT in 1935 and pursued a successful career as an inventor and entrepreneur. He was responsible for the development of the Fenwal plastic blood bag, long the world standard for transporting and handling blood. The Taplins are committed to the translation of scientific discovery into applications that can generate preventive, diagnostic and therapeutic innovations.



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MIT Health Plan

NASA chief discusses aerospace

■ By Cheryl Balian
Special to MIT Tech Talk

Future breakthroughs in aerospace systems will occur only if traditionally separate disciplines—nanotechnology, biotechnology and infotechnology—are integrated, said NASA Administrator Dan Goldin at the System Design and Management (SDM) Distinguished Lecture Series on Complex Systems October 16. He also described elements key to a 21st-century education.

Mr. Goldin addressed a packed Wong Auditorium consisting of SDM and Leaders for Manufacturing (LFM) students, faculty and staff, among others. "Your future will be unbelievable," he said, drawing a parallel between the rapid evolution of technology and career opportunities in the 21st century. "There will be a tsunami of technological change across the planet. MIT is at the leading edge and the students in this room will help lead that change." To achieve this, he said students should cultivate a career enhanced by continuous learning, as they will be constantly challenged to develop groundbreaking ideas.

Mr. Goldin proclaimed NASA, a partner enterprise to the LFM-SDM programs, to be on the cutting edge of aerospace technology. "In the next generation, NASA will create ultra-efficient, reliable spacecraft, while decreasing costs," he said. "One project we're currently working on is the transfer of air transport technology's analog systems to more efficient digital." NASA's autonomous space vehicles of the future will be able to travel in space for up to two years, resisting adverse climates and conditions. "As 'thinking spacecraft,' they will be networked as colonies, able to exchange and interpret information, from analyzing a glitch to being able to repair themselves."

But developing such intelligent aerospace systems will only occur if three "revolutionary" technologies are integrated.

"Together, nanotechnology, biotechnology and infotechnology will overturn current patterns," said Mr. Goldin. Nanotechnology aims to create useful materials and systems through control of matter at the smallest scales. Biotechnology applies knowledge and techniques that mimic biological systems to produce engineering applications like precise molecular control. And greater progress in infotechnology will enable spacecraft to process data along a hierarchy of knowledge, just as humans do, from sensing the environment to responding accordingly.

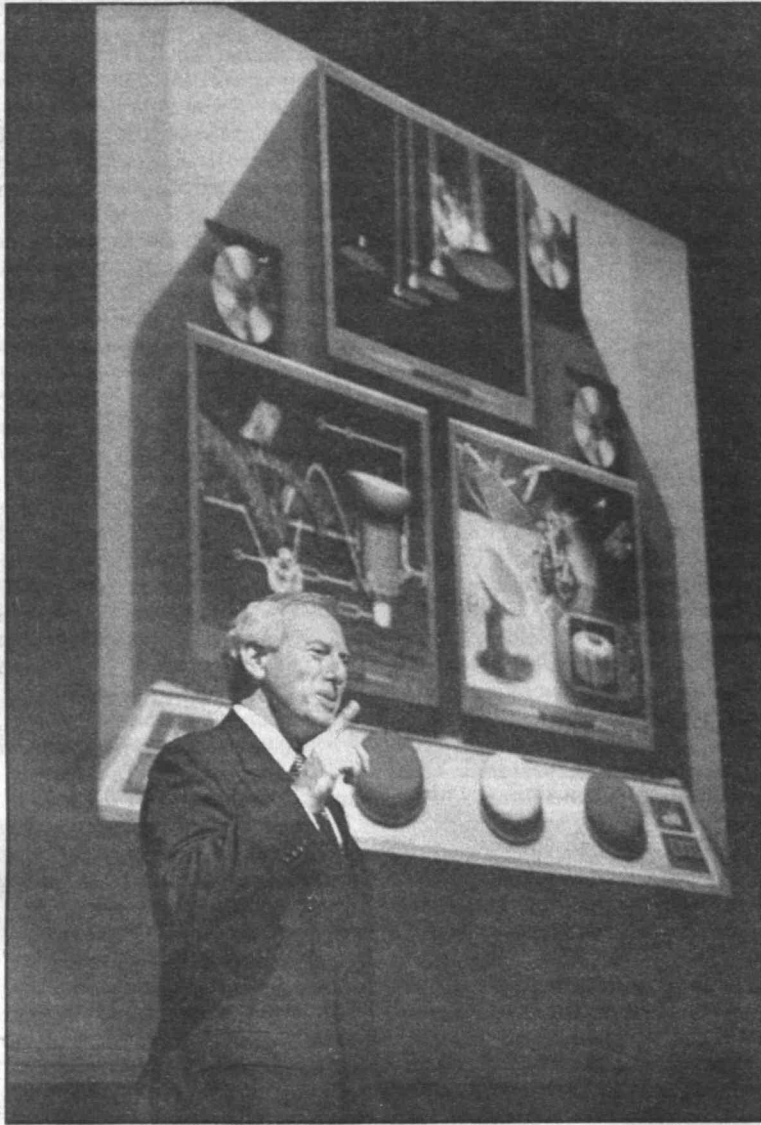
"These three disciplines can't be separate. They must come together to form intelligent, evolvable systems," Mr. Goldin emphasized. He offered a situation ripe for benefit from integrated practices: "Presently, there are over 2,000 independent cells in American air-traffic control systems, with 18,000 air-traffic controllers trying to bring it all together as they guide flights. Wouldn't a centralized control point in cyberspace be better and safer, rather than a piecemeal system?"

Goldin offered a similar assessment of 21st-century education. "The incredible pace of change and economic pressures in high tech are creating a revolution in engineering schooling. The separate arms of academic curriculum and hands-on training must come together, to mirror market patterns. And lifelong learning will be crucial to professional success."

Goldin concluded his presentation with the mantra, "Collaborate. Integrate. Innovate. If not, you'll stagnate and evaporate." His audience responded enthusiastically.

Karl Pilon, team leader at Sikorsky Aircraft and a second year SDM student, said, "This was a terrific look at what's coming in the aerospace industry. Sikorsky shares the same goal as NASA of converting air-traffic control from analog to digital. It's reassuring to know we're working on the same challenges."

"Dan Goldin paints a vision of the



NASA Administrator Daniel Goldin talked to a group of students last week about the future of aerospace. Photo by L. Barry Hetherington

future that serves as an incentive to our students in their education and careers ahead," said Paul Lagace, LFM-SDM co-director and a professor of aeronautics and astronautics.

Professor Tom Magnanti, a co-founder of the SDM program and dean of MIT's School of Engineering, said, "The revolutionary technologies Dan Goldin outlined as key to our future resonate beautifully with the School of Engineering's strategic thrusts in bioengineering, engineering systems, tiny technologies and information, computation and communication. In-

deed, it is reassuring to observe so much convergence in our thinking about what technologies will be critical to society's future prosperity."

Mr. Goldin made his presentation during a week-long visit to campus by SDM students who are participants in MIT's first degree-granting, graduate-level program offered primarily at a distance. The students make regular trips to campus to give them the opportunity to network, take classes and seminars, and view nearby industrial sites that offer insight into how industries address complex systems.

Current estimates of near-Earth asteroids said to be too low

An MIT researcher said yesterday that the number of near-Earth asteroids (NEAs) may be higher than recent estimates.

Research presented by graduate student Scott Stuart at a meeting of the American Astronomical Society's Division of Planetary Science in Pasadena, CA, showed that because the inclinations—angles of orbit in relation to the plane of the Earth's orbit around the sun—of known NEAs are not representative of the entire population, there may be more undetected NEAs out there.

NEAs with low inclinations are easier to find than highly inclined NEAs, Mr. Stuart noted. Thus, the known NEAs tend to have low inclinations rather than being representative of the population.

With the new determination of higher inclinations for the NEA population, researchers at Lincoln Laboratory now estimate that there is a mean total of more than 1,100 near-Earth asteroids bigger than one kilometer (0.6 miles) in diameter. Recent estimates had ranged from 750 to 900. Those prior estimates used a small number of asteroid detections and assumed that the NEAs have lower inclinations than suggested by Lincoln Near-Earth Asteroid Research (LINEAR) Project data.

This new number is consistent with earlier estimates of the population made by the late astro-geologist Eugene Shoemaker, who based his analysis on the number of asteroid impact craters on the moon.

NEAs are objects within our solar system whose orbits may bring them close to the Earth. While no currently known NEAs are now on a collision course with the Earth, many NEAs remain undetected.

The amount of damage that would be caused by an asteroid depends on its size. Asteroids bigger than one kilometer are thought to be capable of causing extensive damage on a global scale.

Astronomers find and catalog asteroids by imaging large swaths of sky with telescopes and searching for objects that move against the background

of fixed stars. By tracking an asteroid's location over several months, astronomers can calculate the orbit that the asteroid follows and determine whether it could pose a hazard to the Earth.

LINEAR has been scanning the skies to discover and catalog NEAs and to provide advance warning if any are bound for Earth. Since March 1998, LINEAR has found 70 percent of all near-Earth asteroids discovered worldwide. It is a major contributor toward NASA's goal of cataloging 90 percent of NEAs larger than one kilometer within the next 10 years.

No one yet knows exactly how many NEAs are out there. However, it is possible to make estimates of the number remaining to be discovered based on the number already found and the amount of searching that has been done to discover them.

LINEAR has detected more than 400 different near-Earth asteroids. This 10-fold increase in detections has allowed researchers to investigate more accurately the inclination distribution of NEAs.

Mr. Stuart is a participant in the MIT Lincoln Laboratory Scholars program, an employee education program, working with Richard Binzel, professor of earth, atmospheric and planetary sciences at MIT, and a member of the LINEAR project team. Principal investigator of the LINEAR project at Lincoln Laboratory is Grant Stokes, assistant division head.

The LINEAR project, conducted by Lincoln Laboratory, is sponsored by NASA and the United States Air Force.

Environmental Tip

Buy recycled products
—help reduce landfill
use and incineration.

Environmental Programs
Task Force

Contact: Kevin Healy
recycling@mit.edu

Robots and Beyond exhibit explores world of AI

The MIT Museum's new exhibit, *Robots and Beyond*, provides a multimedia excursion into the world of artificial intelligence (AI), throwing open the doors of MIT's Artificial Intelligence Laboratory, where scientists have been probing the mysteries of AI for four decades.

The exhibit opens this weekend, October 28 and 29, from 12-5pm at the museum's main exhibition center, 265 Massachusetts Avenue. Admission is free with an MIT ID, \$5 for adults, \$2 for students and seniors, and \$1 for children under 18.

OPENING FESTIVITIES

Because the debut coincides with the Museum's popular FAST program (*Family Adventures in Science and Technology*), special interactive activities will take place from 2-4pm each day. Visitors will get a chance to meet researchers from the AI Lab and explore the world of AI, what the future holds and how it will affect everyday life. In honor of Halloween, visitors will also get the opportunity to transform themselves into cyborgs, androids or robots. The FAST programs are sponsored by the AI Lab and the MIT Theater Department.

What distinguishes the *Robots and Beyond* exhibition is that it focuses on the research and experimentation of AI, as much as the excitement of the final product. The moment visitors enter the exhibition, they will be participating in research at MIT. Many of the exhibits will be both experimental

and experiential, with the visitor getting a behind-the-scenes look at the process of evolution that precedes a successful invention.

On view will be such famous MIT robots as Kismet and Cog, which is designed to translate its environment through sensors, both visual and tactile. Through prototypes and other media, the visitor will be able to follow the evolution of Cog from a fairly primitive robot to one of sensory sophistication.

Robots and Beyond will illustrate what people learn from computers and what computers learn from people. In many ways, AI is infinitely less intelligent than human beings. A two-year-old child, for example, can instantly tell the difference between a dog and a cat, but a computer would find the differentiation difficult. Both cat and dog have four legs and a tail, some dogs are as small as cats, so a computer could mistake a small dog for a cat. Not all barks and meows are standard either, so sound does not necessarily clear up the computer's confusion. Similarly, a robot has a difficult time distinguishing a man from a woman; there are simply too many superficial variables.

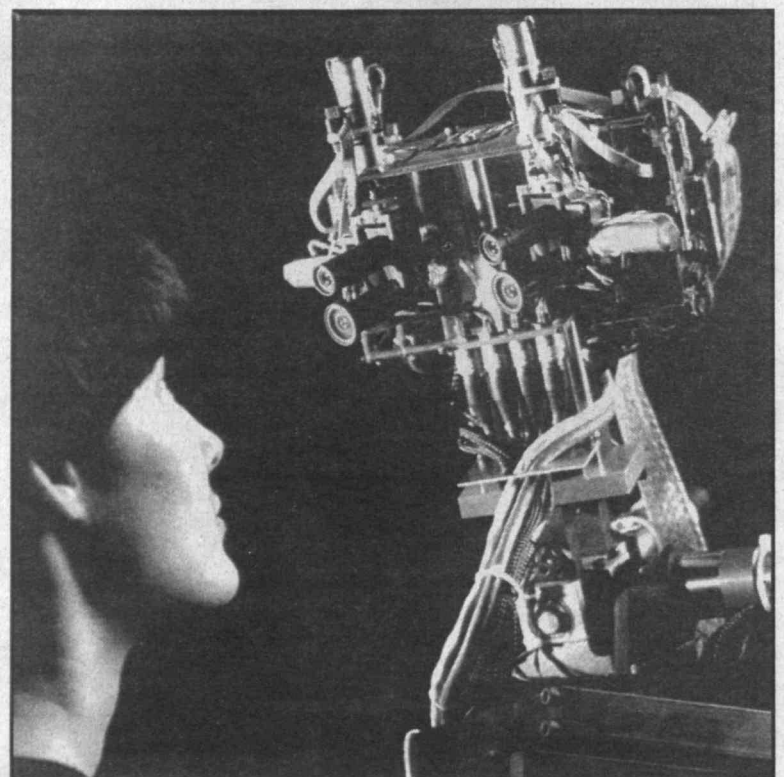
But computers leave human beings in the dust in other areas. They can discern intricate patterns and identify complex matching patterns, such as in fingerprints. Human beings would not have the ability to read each other's fingerprints or irises to confirm identification, but computers can instantly process the complex network

of patterns and determine if one matches another.

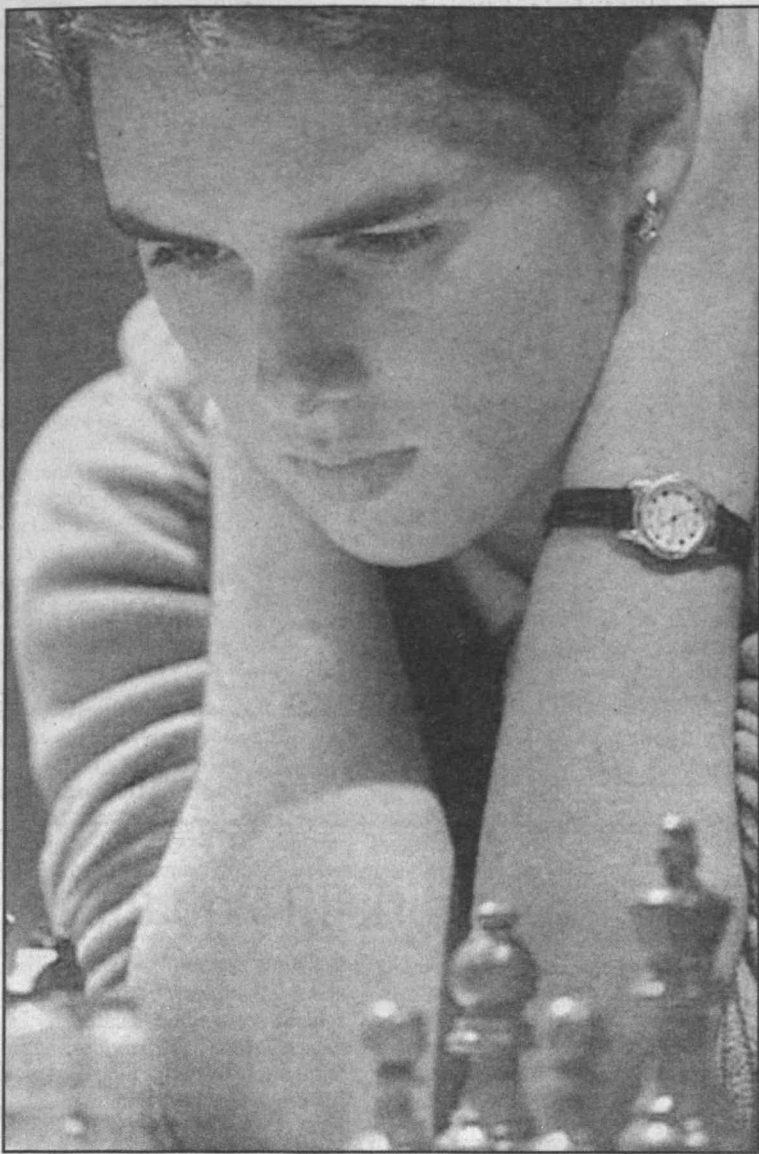
Visitors to *Robots & Beyond* will be able to experience the latest iris-recognition technology. Each and every human iris is one of a kind, and IridianTechnologies™ has put the unique attributes of the iris to work to

create an identification system that is many times more accurate than other biometrics like fingerprints or voice recognition.

For more information on *Robots and Beyond* and the FAST programs, see the museum's web site at <<http://web.mit.edu/museum>>.



Cog, a robot from the Artificial Intelligence Lab, looks at an AI researcher at the MIT Museum's exhibit on robots. Photo © Sam Ogden



Elina Groberman, now 17, has been playing chess since age six.

Freshman ties for title of US women's chess champion

(continued from page 1) prize for her brilliant play in defeating fellow Brooklynite Olga Segalchik in the eighth round.

Before play began, Ms. Groberman was pessimistic about her chances in the round-robin tournament. In 1999 she had finished ninth and she did not think she was properly prepared to compete against players ranked as highly as the nine opponents she would face.

"As with any sport, one has to stay in shape, and that comes from practice and study," she said. "I did not study for the month prior to the event. So I was ready for the worst. And each win just made me a bit less pessimistic as the possibility of placing last diminished."

"Now people ask how I can explain my result. I can't, except that I was very relaxed and had cooperation from my opponents."

As a result of her success in Seattle, Ms. Groberman has been invited to join the US team in a match against China, to play in the next US Women's Championship, and to represent the United States in the Women's World Chess Championship.

"My participation in these events will depend upon my ability to keep up with the work I will be missing in school since the tournaments will be held during school session," said Ms. Groberman, a graduate of Peter Stuyvesant High School.

She won three consecutive New York State women's championships

from 1996-98. She tied for first place in the girls-under-18 Pan-American championship in Brazil in 1998 and played in the World Junior Chess Championships in France in 1997 and in Spain in 1998 and 1999.

As a high school freshman, she was a member of the 1997 New York City champion chess team at Edward R. Murrow High School. She transferred to Stuyvesant as a sophomore and was the No. 1 player on its team, which has won 98 city and national championships, 99 state titles, and has been the Pan-American scholastic champion 99 times.

While in Cambridge, she plays speed chess in Harvard Square and friendly matches with MIT freshman Tamer Karetakin. She expects to play in the Boston University Open next month and other local tournaments.

As talented as she is, chess is only an avocation for Ms. Groberman.

"My ambitions are very simple—to play as well as I can and enjoy as much as I can," she said. "Other than that, it depends on how things go. All I know is that I don't want to become a professional chess player. For me, college and education come first."

Alumni did well in stiff competition at rowing regatta

Three of the top six finishers in the Men's Championship Single event in Sunday's Head of the Charles competition were MIT alumni.

Don Smith (MBA 1999) finished third, followed by Steve Tucker (SB 1991) in fourth place and Mike Perry (SB 1999) in sixth.

The gold and silver winners at the Sydney Olympics finished first and second.

In addition, dozens of MIT undergraduates, faculty and alumni/ac participated in the largest two-day rowing regatta in the world, with 5,500 entrants:

- The 1969 lightweight crew finished eighth in the 50-and-over Masters Eight race, using the same lineup that won the national championship that year and competed at the Henley Royal

Grad student sets up program to teach Java course in Nairobi

■ By Denise Brehm
News Office

At a time when MIT is opening the doors of collaborative programs in Ireland and England, one graduate student initiated a small partnership of his own this summer at a college in Nairobi, teaching a web programming course designed to acquaint his fellow Kenyans with the opportunities of e-commerce.

Paul Njoroge, a 24-year-old graduate student in electrical engineering and computer science who earned the SB in June, and three other MIT students and alumni taught a six-week Java course to college men and women at Strathmore College in Nairobi. One of the instructors, Eric Traub (SB 1999), also installed the LINUX operating system on Strathmore's computer network at the college's request and provided a one-week training program for the systems administrators.

Mr. Njoroge, Mr. Traub of Florida, Andrew Nevins, a graduate student in linguistics from California, and Kenyan Martin Mbaya (SB 2000) traveled to Nairobi in July after spending much of the previous six months planning the curriculum and raising the money for the project. Other students at MIT involved are Solomon Assefa, a graduate student in electrical engineering from Ethiopia who helped prepare the curriculum and will help with future planning, and Saria Hassan, a senior in biology and chemistry from Sudan who is helping to plan the next phase of the project.

Mr. Njoroge first envisioned the MIT Africa Internet Technology Initiative (AITI) while attending a Leadershape summer program after his sophomore year at MIT. He developed the idea with the help of Professor Paul Gray of electrical engineering, president emeritus of MIT. "We had to sit down and flesh out what I wanted to do. At the time, my ideas were very nebulous," said Mr. Njoroge. "I'd heard of the MIT-SETI program in China, and wanted to do something similar for Africa."

RETURNING TO OLD SCHOOL

Once the plan was fleshed out, Mr. Njoroge had to find a place to carry it out. He chose Strathmore in part because he and Mr. Mbaya, who now works for an Internet company in Chicago called TenFold, were familiar with it; they spent a year at the college before matriculating at MIT. (They are two of three students from Strathmore to be accepted by MIT to date.) But it also fulfilled the other qualifications: it had a computer lab and it was in a section of Nairobi equipped with a modernized digital telecommunication system containing the necessary bandwidth to handle the requirements of web work.

Although the students they taught at Strathmore were familiar with the

Internet (the college offers an HTML course), they weren't necessarily aware of the opportunities it offers.

"The question is: When they're hooked up to the Internet, so what? They have to learn to use it as a resource," said Mr. Njoroge. "I want to show them it's possible not only to browse the web, but to create applications, for instance for e-commerce."

The top 45 students from the college—roughly 50 percent men and 50 percent women—were allowed to enroll in the Java course. Mornings were spent on theory and programming concepts; afternoons the students worked on problem sets. The 17-year-olds were divided into groups of five and asked to build or improve upon a web site for a local organization, such as a school or an NGO. The fifth week was devoted solely to work on those projects.

"When I saw the projects these students did and how they applied the things we taught them it was a feeling of exhilaration similar to what you'd get if you climbed Mt. Everest."

—Paul Njoroge

The course was a challenge for the students as well as the young instructors. "We went pretty fast at first and we could tell by their expressions that they were lost. The MIT firehose approach just wasn't effective," said Mr. Njoroge. "So we slowed down, gave more examples and then people started asking questions that indicated they were following us." Other lessons learned by the instructors include the need for printed, as opposed to online, reference materials (the computers

couldn't be used after 7pm when the school closed) and a better student/teacher ratio.

The instructors brought in four professional web developers ("future Bill Gateses of Kenya," said Mr. Njoroge) to give one-hour talks about the industry. Those teachers introduced the students to the real world of e-commerce and offered a few part-time internships. Ayisi Makatiani (SB 1990), founder of the ISP provider Africa Online, presented certificates of completion at the closing ceremony. During the summer, the Nairobi Standard Daily, a local TV station and the East Africa weekly newspaper all ran stories about the course and its young initiators.

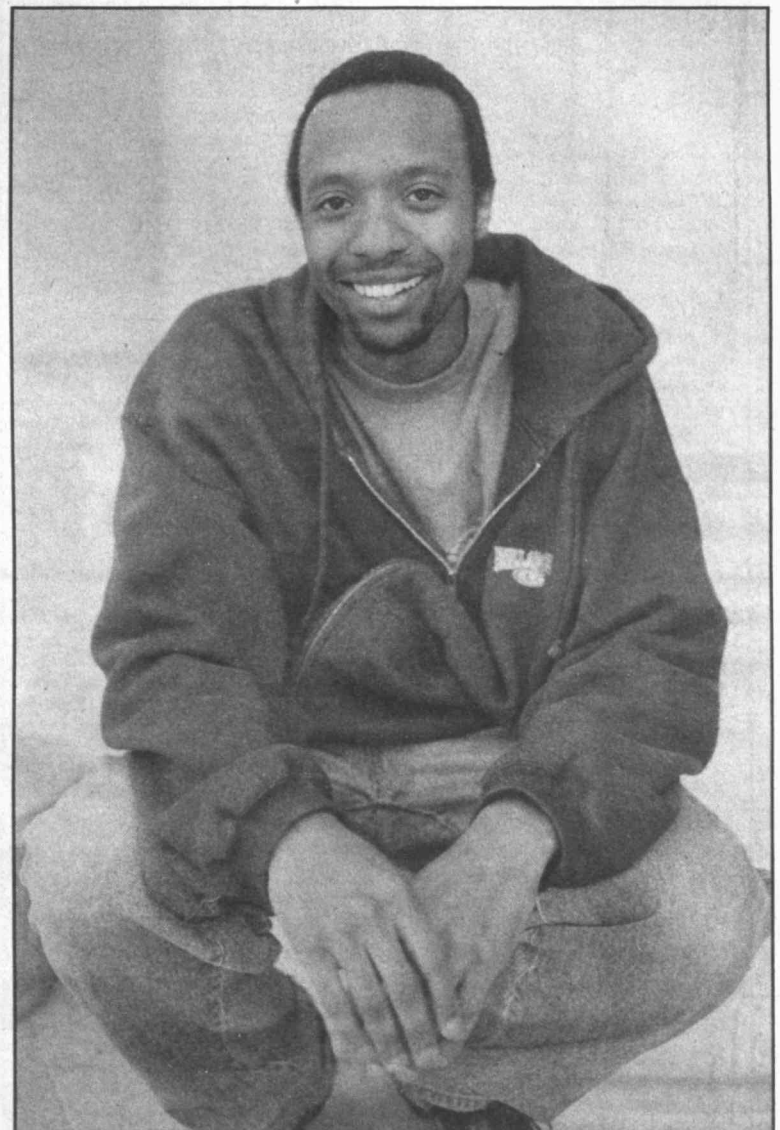
Following the work, the college treated the young instructors to a three-day safari in the Masai Mara, a region near the Tanzanian border about 250 kilometers from Nairobi.

RAISING CAPITAL

Mr. Njoroge and the other AITI planners raised \$45,000 to get the project off the ground. The 3-Com company, founded by Bob Metcalfe (SB 1969), developer of the Ethernet, donated nearly \$27,000 worth of equipment for the Strathmore project. Other donors include Africa Online; Isaac Colbert, Dean of the Graduate School; Associate Provost Phillip Clay; the MIT International Science and Technology Initiatives program (MISTI); the Chancellors office; Professor and Mrs. Paul Gray; and Gordon Baty and Cathryn Baty, coordinator of the Hosts to International Student program at MIT.

The AITI team is now busy planning next summer's program between problem sets and tests. One possibility: teaching students from other schools or even other countries in Strathmore's computer lab. "We're thinking big right now. We're going to expand the proposal. We're going for big bucks," said Mr. Njoroge.

"When I saw the projects these students did and how they applied the things we taught them it was a feeling of exhilaration similar to what you'd get if you climbed Mt. Everest," he said. "We did do something."



Paul Njoroge, a graduate student in electrical engineering and computer science, initiated, planned and taught a summer computer course in his hometown of Kenya this year. He and several other students raised funds to get the project off the ground. Photo by Donna Coveney

Environmental Tip

Collect aluminum, plastics and glass recyclables in the office and make a trip once a week to a recycling bin.

Environmental Programs
Task Force

Contact: Kevin Healy
recycling@mit.edu

Bridge between biology and chemical engineering explored

■ By Deborah Halber and Elizabeth Thomson
News Office

Several professors explored research at the interface of engineering and biology at a workshop last week aptly symbolized by the walkway between MIT's biology and chemical engineering buildings.

In opening remarks at Materials Day, October 16, Professor Douglas A. Lauffenburger noted that good engineering is supported by the pillars of physics, math and chemistry. "Biology has to take its place alongside these [to develop] the technologies of the future," said Dr. Lauffenburger, the J.R. Mares Professor of Chemical Engineering and co-director of the Division of Bioengineering and Environmental Health (BEH).

"The goal of this workshop is to sensitize the materials [engineering] community to ways in which this pillar can be built," he said.

The evolution of prosthetics, he said, is a good example of how the relationship between biology and engineering is changing. Replacement limbs were originally made of wood, then metals, then plastics. "Now molecular biology has shown that a very sophisticated system of living cells continuously regenerates... bone." As a result, "today we don't try to replace the bone, but rather try to regenerate it from its biological components." The challenge: "How do you engineer cells to get a living system that's not an inanimate mimic?"

Among the day's speakers was Professor Roger D. Kamm of the Department of Mechanical Engineering and BEH. He described his work to understand how cells respond to mechanical stress. He explained that such stress "has a variety of extremely important implications." For example, it is key to diseases like arthritis and atherosclerosis. Mechanical stress can, however, be beneficial, "and used to our advantage to elicit a desired cellular response."

To study the mechanical stress on cells, Professor Kamm has applied several tools of materials science, from standard stress-strain tests to atomic force microscopy. He and colleagues have also developed simulations looking at the stress on cells as they squeeze through capillaries in the body.

Saying her research is "inspired by nature," Barbara Imperiali, the Ellen Swallow Richards Professor of Chemistry, uses synthetic fluorescent polypeptide structures as sensors to detect metal ions in a variety of media.

The design of these sensors involves a metal ion recognition site and a reporting site. Solid phase peptide synthesis can be used to synthesize and screen libraries of potential sensors for optimal properties. These new sensors may have environmental and physiological applications. For example, with specifically designed peptide architecture, Professor Imperiali can zoom in on specific metal ions in blood serum. This could lead to a rapid, inexpensive, noninvasive method of screening for zinc and other metal ions in blood.

Professor Imperiali's group has now come up with strategies for sensing biologically important metals such as divalent copper, trivalent iron and divalent nickel. Trivalent iron in the bloodstream may indicate certain medical problems; different levels of copper could help diagnose disease.

Other MIT speakers at Materials Day were Professor Paul T. Matsudaira, Department of Biology and BEH; Professor Anne M. Mayes, Department of Materials Science and Engineering; and Professor Linda G. Griffith, Department of Chemical Engineering.

Materials Day was sponsored by the Materials Processing Center. It was co-chaired by Professor Lauffenburger and Professor Robert E. Cohen, the St. Laurent Professor of Chemical Engineering. "It was a lot of fun to select [speakers and projects] from across campus that bear on this interface," Professor Lauffenburger said.



In his talk on Materials Day, Professor Douglas Lauffenburger used this walkway between the biology building (right) and the chemical engineering building as a metaphor for research at the interface between the two disciplines.
Photo by Donna Coveney

MIT named a winner for work-life quality

■ By Sarah H. Wright
News Office

MIT has been named the winner among large businesses in the Boston area for the quality of its work-life and family policies. The award, known as the Boston's Best Companies for Working Families Award, arose from an initiative sponsored by the Boston Parents' Paper; the online parenting information service, LocalMom.com; and the Boston College Center for Work & Family.

Laura Avakian, vice president for Human Resources at MIT, will accept the award at a gala breakfast celebration at the Hotel Meridian today.

"We are delighted with this recognition of MIT's commitment to helping our employees and faculty balance work and family matters. It is particularly meaningful because the award is based in part on our staff's responses to a confidential survey. We will continue to listen to our employees to find

innovative approaches to improving the quality of work life here," said Ms. Avakian.

"We need to move ahead together with other companies to meet the challenging work of organizational change and to develop resources so people can have healthy family lives," said Kathy Simons, co-director of MIT's Family Resource Center.

The winner in the small business category was Crittenton Hastings House, a non-profit in Boston that helps individuals and families, particularly teen parents, with housing, education,

life skills and job training. The three sponsors of the awards also presented special recognition awards to John Hancock Financial Services Inc. and State Street Corp. for their own work-life programs and the high satisfaction level of their employees.

The Parents' Paper initiative began a year ago in an effort to highlight companies that have best met the work-life needs of employees.

Both LocalMom.com and the Boston Parents' Paper will run special articles on the initiative in their respective upcoming editions.

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- E-mail address (return address must be mit.edu): <ttads@mit.edu>
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Deadline is noon Friday before publication.

■ FOR SALE

Great looking storage: lowboy style mahogany cedar chest (top opens) w/Queen Anne legs, one large drawer, must sell, \$225. Drew <sexton@mit.edu> or x3-5912.

The Furniture Exchange (WW15, 350 Brookline St, open Tues & Thurs 10-4) has for sale a small used antique drafting table, a spinnet piano, and a guitar. Call x3-4293 during business hours.

Sansui 2000 amp/rec, Yamaha SR50 surround sound amp, Audio Source 10 band graphic equalizer, ADC Sound Image spkrs, Realistic Minimus-7 spkrs, \$275/all. Contact 978-640-3935.

GE cube fridge, 1.7 cu. ft., almost new, \$45. Charles x3-5481 or x5-9569.

Craftsman band saw, 12" on stand w/casters, gd cond, \$75; stainless double kitchen sink, 22"x33", \$25. Ray 978-681-1812.

■ ANIMALS

Free healthy guinea pigs: Spike & Mike are best friends, confirmed bachelors, love humans, carrots, & cable TV, both have curly black hair, wise

black eyes, I sings, I doesn't. Young owner allergic. Contact: <shwright@mit.edu>

■ VEHICLES

1986 Dodge Colt Vista wagon, 125K, 5-sp manual, 7-pass, passed insp, 3 new tires, AM/FM, ps/pb, pm, rear window defrost, gd commuter car, \$750 or bst. Tony 781-981-1043 or <filip@LL.mit.edu>

1989 Ford Econoline, runs & looks good, 250 van, white, roof racks & shelving; also ladders, pipe staging & much more; all for \$2900. Tom 781-233-6077.

1990 Toyota Corolla, exc cond, gd car, 113K, wt, radio/cass, auto, a/c, \$3,000 or bst. Erika x3-2629, 427-4894, <tzen@cag.lcs.mit.edu>

1990 full-sized Chevy Blazer, 163K mi, a/c, 4WD, gd cond, nds starter, \$2995. or bst. Contact: 781-883-3761.

1991 Eagle Talon TSI AWD, 2-dr coupe, 113K, auto, leather, rear spoiler, ps, pb, new trs/brks/bearings/wtr pump, 9000 sticker, \$4795 or bst. Contact: 978-692-4696, <Tgallardo@haystack.mit.edu>

1993 Jeep Grand Cherokee Larado, full time 4WD, exc cond, dealer maint, 82K miles, all options (ps, pb, auto, V8, tow pkg, more.) Mark x8-8399 or <msprague@mit.edu>

1994 LeBaron convertible, only driven to Mass on Sundays (chaplain's car), 78K mi, AM/FM/cass, white w/red int, \$7500 or bst. Cyndi x2-1778 or 508-540-9221.

■ HOUSING

Medford: mod 1BR, w/w carpet, 3-season encl porch, laundry hookup off kitchen, no pets, avail immed, \$1100/mo. Kevin 781-395-8554.

Somerville: furn room w/priv bath & use of kitchen & washer/dryer; rent is \$400 plus checking in on elderly, yet active owner. Fran 617-625-8987.

■ WANTED

Wanted: Infant highchair in good condition. Please call x3-1554 or e-mail <crwsun@mit.edu>

Cambridge Univ post-doc, F, looking for comfortable room for 3 months, arriving first week of Nov, non-smkr. Contact Prof. T. Wierzbicki at <wierz@mit.edu> or x3-2104.

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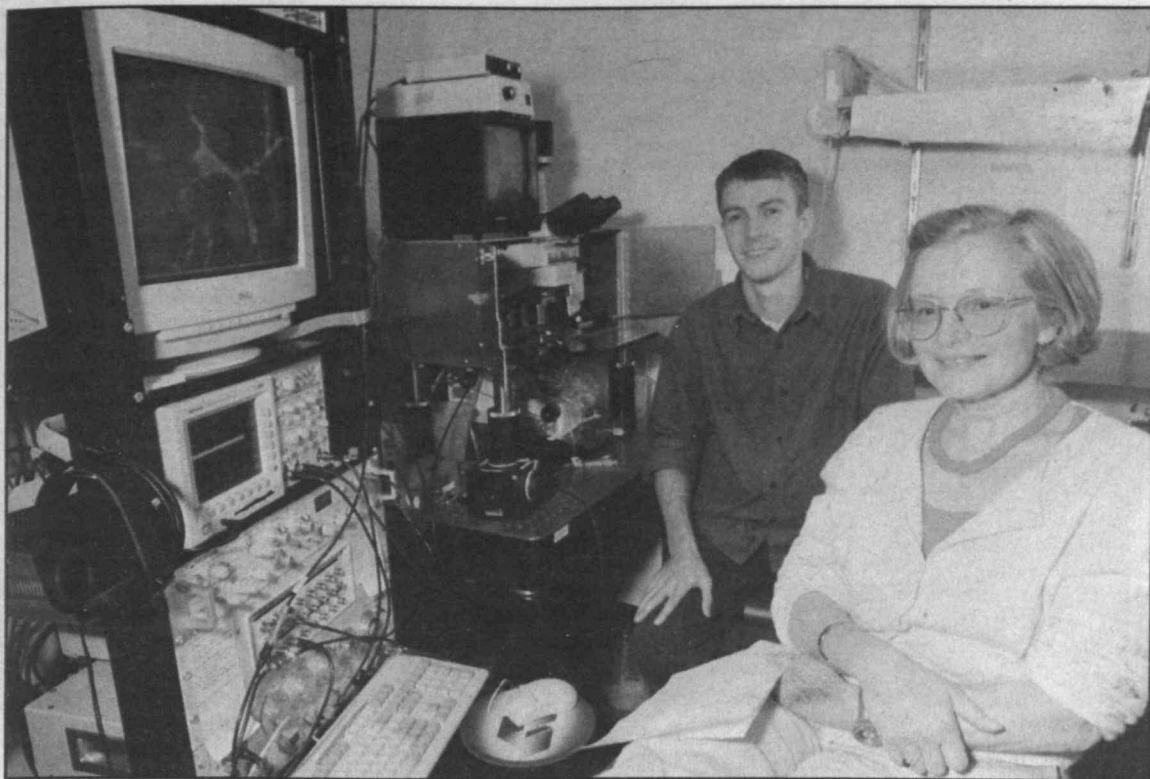
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Biology professor Martha Constantine-Paton (right), graduate student Matthew Townsend and others have identified a molecule that may help the brain to learn. On the computer screen, they show evidence that direct input from the retina was received by neurons in the brain. Photo by Donna Coveney

Researchers identify molecule that may give brain a learning boost

■ By Deborah Halber
News Office

Researchers report in the October issue of *Neuron* that they have uncovered a new and unexpected control system for a key receptor of nerve cell signals. This central nervous system receptor mediates intelligence and brain adaptability.

This is one of the first studies to explore receptor control through a mechanism not tied to gene expression. It may lead to "interventions that amplify or maintain this receptor's response," said author Martha Constantine-Paton, professor of biology and brain and cognitive sciences. "This may prove useful in the clinical treatment of a variety of neurological dysfunctions and also help us understand how brain activity controls the plasticity of the developing brain."

Professor Constantine-Paton, who studies the development of brain circuitry in the central nervous system, says the research, conducted with colleagues at Yale and MIT, points to a common enzyme called calcineurin as a potential means for controlling the N-methyl D aspartate (NMDA) receptor in the brain.

DR. JEKYLL AND MR. HYDE

The NMDA receptor is the Dr. Jekyll/Mr. Hyde of the central nervous system. Responsible for much of the rapid, intense development of children's brains as they learn and grow, it also leads to some of the devastating and permanent effects of stroke or other brain damage caused by genetics, disease or the environment.

The NMDA receptor is a complex molecule of interest to many researchers because it appears to be related to intelligence. When active, this receptor enhances communications among brain cells. When one of the genes contributing to the NMDA receptor is overexpressed in mice, those mice do better on behavioral tests of learning.

The mechanisms that help modulate NMDA receptor function during development are poorly understood, but if the NMDA receptor could be manipulated, scientists would have a powerful tool for altering brain plasticity or reversing disease. "Control of this receptor's function is centrally important to many aspects of neuroscience," Professor Constantine-Paton said.

Blocking glutamate receptors such as the NMDA receptor has been explored as a possible way to decrease brain damage that can occur in epileptic seizures and stroke.

"Our findings suggest that understanding the control of calcineurin and

its effects on NMDA receptor activity could provide important and unexpected insights into the mechanisms" of brain plasticity and neurological disease in both developing and mature brains, wrote Professor Constantine-Paton and her co-authors, Jian Shi of biology and Matthew Townsend of the Interdepartmental Neuroscience Program at Yale.

FINE-TUNING YOUNG BRAINS

As they develop, our brains get "tuned" in several ways: through the expression of genes and through input from our senses and motor activity. Most of this tuning occurs in the first month of life in animals and during the first few years of life in humans.

Neurons in young brains are de-

"This may prove useful in the clinical treatment of a variety of neurological dysfunctions."

—Prof. Constantine-Paton

signed to let in a lot of excitatory electrical current.

Like dams that prevent flooding, however, mechanisms within the cell eventually turn down the receptors that drive the current. Over-excitation—too much current—can damage and kill brain cells. Excitotoxicity is believed to contribute to the degeneration of brain cells connected with neurological disorders such as trauma, stroke, epilepsy, Huntington's and Lou Gehrig's disease and AIDS-related dementia.

Once the cell mechanisms that shut down NMDA receptors develop, the brain's rate of adaptive reorganization slows. There is far less plasticity in the adult brain, which is why brain damage in adults is so devastating. Without the ability to shape new circuits, the brain cannot compensate for damaged ones.

POSSIBLE INTERVENTION

The mechanism that shuts down the receptors' activity was thought to involve the expression of new genes. At a certain point in the cell's development, it seemed that a genetic switch was flipped to produce a new protein that turned down NMDA receptor function.

Unlike much other research in this area, Professor Constantine-Paton's work does not focus only on gene acti-

vation. She is exploring the role of an enzyme that modifies existing proteins.

Calcineurin is a common calcium-activated protein, one of the most prominent in the brain. Calcium enters neurons through the NMDA receptor. Dr. Constantine-Paton and her colleagues show that blocking calcineurin, which otherwise removes phosphate from certain proteins, can keep the NMDA receptor active at an earlier developmental level. This function of calcineurin is novel because it is very long-lasting and it may play an important role in modulating the plasticity of the developing central nervous system.

The *Neuron* paper reports that the change in the receptor's efficacy that can be induced with calcineurin is large and much more rapid than that achieved through new gene expression. This leads to the tempting quest to recreate the plasticity of the young brain in an older brain by depressing calcineurin at the receptors of mature cells.

"This is exciting because this effect of calcineurin does not require a new pattern of gene expression," Dr. Constantine-Paton said. "It provides another level of control. Calcineurin is something that is present and active near mature brain receptors, but its effects were believed to be only short-lived, so now there is the potential for manipulating it to create more or less potent neuron signals in regions of the adult brain."

TOO MUCH OF A GOOD THING

In their study of young rats' visual systems, the researchers found that NMDA receptors are still going strong at day 10 after birth. Electrical current is still flooding the cells. Then, between days 10 and 11, calcineurin turns on, stays on and immediately halves the duration of the current.

Prolonged activation of calcineurin could protect neurons from excitotoxicity in the face of seizure, ischemia, trauma or disease-induced increases in NMDA receptor activity, the authors wrote.

"This can give us the potential to intervene and exert a finer level of control over the central nervous system," Dr. Constantine-Paton said. "It also provides clues to how the system regulates itself that go beyond a description of the molecules that make it up."

"This work suggests a role for this enzyme in development and regulation. It can exert control over the NMDA receptor," Dr. Constantine-Paton said. "Now we ask, 'How is it working?'"

This work is supported by the National Institutes of Health and the National Institute of Mental Health.

Nanoscale quantum dot lasers may be possible

Scientists at MIT and the US Department of Energy's Los Alamos National Laboratory have demonstrated that nanoscale semiconductor particles called "nanocrystal quantum dots" offer the necessary performance for efficient emission of laser light. The research appeared in the October 13 issue of *Science*.

The demonstrated performance opens the door for developing novel optical and optoelectronic devices, such as tunable lasers, optical amplifiers and light-emitting diodes from assemblies of these invisibly small particles.

"Our results provide a proof-of-principle and should motivate the development of nanocrystal quantum-dot-based lasers and amplifiers," said Los Alamos' Victor Klimov, who led the research effort at Los Alamos. The MIT team was led by Mounqi Bawendi, professor of chemistry.

The quantum dots used in the study were developed and synthesized at MIT and provided to the Los Alamos team. The stimulated emission was observed at both Los Alamos and MIT. The main thrust of Professor Bawendi's research is to understand the electronic, magnetic and vibrational properties of nanocrystallites, either isolated or in organized structures, using modern laser-based condensed matter optical and magneto-optical techniques.

Quantum dots are so small that quantum-mechanical effects come into play in controlling their behavior. Quantum mechanics applies in the microscopic realm but is largely unseen and unfelt in our macroscopic world.

CONTROLLED ENERGY

Quantum dot lasers work like other semiconductor lasers, such as those found in home-audio compact disc players. Just as in the semiconductor laser chip in a CD player, the goal of a

quantum dot laser is to manipulate the material into a high energy state and then properly convert it to a low energy state. The result is the net release of energy, which emerges as a photon.

The challenge, however, is that there are competing mechanisms by which the energy can be released, such as vibrational energy or electron kinetic energy. In quantum dots, the electrons are confined within a very small volume that forces them to strongly interact with each other. These strong interactions can lead to deactivation of the dot through the so-called "Auger process," preventing it from emitting a photon.

The researchers examined quantum dots formed of several types of crystalline material. They showed that the quantum dots exhibit sufficiently large optical gain for stimulated emission to overcome the nonradiative Auger process. Stimulated emission, or lasing, was only possible, however, when the dots were densely packed in the sample.

Quantum dots offer this performance over a range of temperatures, making them suitable for a variety of applications, and also can be "tuned" to emit at different wavelengths, or colors. The emission wavelength of a quantum dot is a function of its size, so by making dots of different sizes scientists can create light of different colors.

The quantum dot material used by the researchers is easily manipulated through well-established chemical synthesis methods. Fabricating densely packed quantum dot arrays should be a straightforward material processing challenge, the researchers noted.



Bawendi

Here & There

MIT ON NOVA

An MIT professor was key to the October 24 season premiere of the Public Broadcasting System's *NOVA* series. The film, called *Lincoln's Secret Weapon*, is about the famous Civil War ship *USS Monitor* that sank off North Carolina only months after its famous battle with the *CSS Virginia*.

Professor David Mindell of the Program in Science, Technology and Society is the author of *War, Technology, and Experience Aboard the USS Monitor*. He consulted on the film and "is a bit of a talking head in it."

The program will be repeated late at night all this week. Check local listings for other PBS station times.

For more information on Professor Mindell's book—or to order a copy—go to <http://web.mit.edu/mindell/www>.

COMPUTING THE FUTURE

"Seth Lloyd has seen the future of computing, and it's bright. Blindingly bright. For, according to Lloyd, the ultimate computer will be nothing like an IBM ThinkPad and everything like a 'billion-degree piece of the big bang,'" writes Marcus Chown in the September 2 issue of *New Scientist* magazine.

Dr. Lloyd, an MIT associate professor of mechanical engineering, predicts that in 200 years the desktop computer will be powered by a nuclear fireball. He's referring to the ultimate result of Moore's law, which says that every 18 months computers' processing power doubles.

Computer Weekly also picked up on his comments. "Do I hear any takers for Microsoft Nuclear Office 2200?" the magazine asked in its September 7 issue.

TO FERTILIZE OR NOT?

Some scientists believe that fertilizing the oceans could solve greenhouse warming by spiking the population of microscopic plants; those plants, in turn, would remove significant amounts of the greenhouse gas carbon dioxide from the atmosphere. Professor Sallie W. (Penny) Chisholm disagrees, and regularly talks and writes about why.

The issue came to the fore yet again with a paper in a recent issue of the journal *Nature* describing a fertilization experiment off the coast of Antarctica. The experiment did indeed prompt a population explosion among the plankton there.

Professor Chisholm, of the departments of biology and civil and environmental engineering, wrote an accompanying piece "about the (somewhat frightening) implications of the experiment."

For example, she wrote, "Although seductive in its simplicity, in practice the idea [of fertilizing the oceans to combat greenhouse warming] would threaten the whole ocean ecosystem. Artificial fertilization with iron would probably have many unintended side effects."

Professor Chisholm's comments appeared in several media stories about the *Nature* work.

BEST OF THE WEB

One of MIT's web sites was cited by *Popular Science* magazine as one of the 50 best science and technology sites on the Internet. Invention Dimension, the site developed by the Lemelson-MIT Awards Program, "enchants, inspires and entertains emerging Edisons and simple gadget fanatics alike," reports the magazine in its October 2000 issue.

Elizabeth Thomson

Mathematician Professor Dirk Struik dies at 106

Professor Emeritus Dirk J. Struik, a highly respected analyst and geometer and an internationally acclaimed historian of mathematics, died at his home in Belmont on Saturday. He celebrated his 106th birthday on September 30.

Professor Struik was a member of the MIT mathematics faculty from 1928 until 1960, and remained intellectually active throughout his life.



Struik

Beginning in 1912, Professor Struik was educated very broadly in mathematics and physics at the University of Leiden, taking courses from Lorentz and de Sitter. After a short interruption (for lack of funds), he was invited by J. A. Schouten to do research on tensor analysis and differential geometry. It was during this time that he met and soon married Saly Ruth Ramler, a Czech mathematician and accomplished modern dancer. Dr. Ramler wrote her doctorate on the axiomatics of affine geometry under G. Pick and G. Kowalewski at the University of Prague in 1918, and as Professor Struik later wrote, "Ruth may well have been the first woman at the more than 500-year-old university to receive a doctorate in mathematics."

With a stipend from a Rockefeller Fellowship, the Struiks moved to Rome and then to Göttingen, which was becoming a major mathematical center. There they met and worked with Cartan, Courant, Hilbert, Landau and Noether, among others. Professor Struik also collaborated with MIT Professor Norbert Wiener, who in the spring of 1926 offered him a lectureship beginning that fall.

"Struik has become the instructor responsible for half the world's basic knowledge of the history of mathematics."

— Evelyn Simha

Professor Struik's long and successful career in differential geometry led to a great many mathematical papers and books, including the 1950 text *Lectures in Classical Differential Geometry*. He had been interested since spending time in Rome in the history of mathematics. In 1948 he published *A Concise History of Mathematics, Volumes I & II and Yankee Science in the Making*. One reviewer of the first book said that "the author takes care to distinguish between established facts, plausible theories, wild hypotheses and traditional ideas."

In a centennial tribute to Professor Struik in 1994 by the Dibner Institute for the History of Science and Technology, Executive Director Evelyn Simha said: "As an historian of mathematics, he is particularly important to us here at this center for advanced research in the history of science and technology, because of his great and influential book, *A Concise History of Mathematics*, beautifully balanced between technicalities and generalities, translated into uncountable languages, most recently Persian. With this book and his historical scholarship, Struik has become the instructor responsible for half the world's basic knowledge of the history of mathematics."

Professor Struik held an abiding interest in Marxism. Following World

War II and into the McCarthy period, his political views attracted attention, and in September 1951 he was indicted by a Middlesex County Grand Jury on charges of advocating the overthrow of the United States and Massachusetts governments. At the time of the indictment, MIT suspended Professor Struik from teaching duties with full pay and benefits until the case could be dealt with in the courts. After five years, the charges were dropped without trial, due to lack of evidence and a US Supreme Court ruling that states do not have jurisdiction in such matters.

In May 1956, MIT President James R. Killian Jr. reinstated Professor Struik. The following October, acting on the recommendations of a faculty review committee, the MIT Corporation's executive committee upheld the restoration of Dr. Struik's tenure but censured him "for conduct unbecoming" an MIT professor, based largely on his use of the Fifth Amendment before the House Un-American Activities Committee and "his comparative lack of candor with members of the administration."

On this subject, Dibner Institute Executive Director Evelyn Simha noted in her 1994 tribute: "From the very beginning, personally and professionally, and continuing even now, Professor Struik's great concern for people in oppressed situations has been the backdrop for all his activities, has informed his life and work in fact, even when it brought him hard times." Later, she added: "He wanted to link mathematics with the socio-economic background against which mathematics developed, questioning the weight of social and economic forces in the development even of the 'pure math' of the Greeks, for example. He is now interested in ethno-mathematics and remains unshaken in his social and political beliefs."

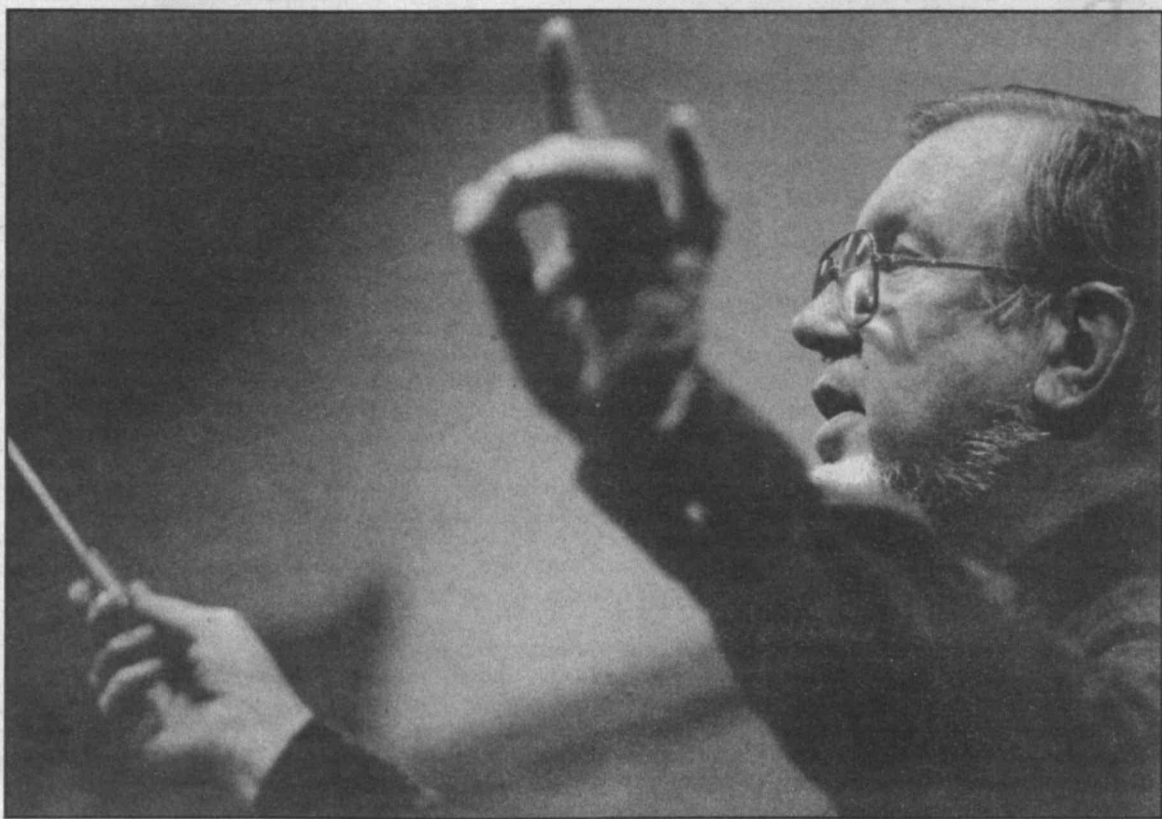
Professor Struik continued his scholarly and teaching work after his retirement in 1960. In 1975 he was awarded a Gold Medal of Achievement by the National University of Mexico "for his services to the teaching and development of mathematics in Mexico over the years." In March and April that year, Professor Struik gave a series of lectures on the History of Mathematics to the MIT Concourse Forum. In Hamburg, Germany, in May 1989, he was awarded the first Kenneth Ownsworth May Prize for outstanding contributions to the history of mathematics by the International Commission on the History of Mathematics & International Union of the History and Philosophy of Science.

Born in Rotterdam in the Netherlands, Professor Struik was educated at the University of Leiden in Holland, where he received his doctorate in 1922. He was an assistant at the Technical University in Delft from 1917 to 1924, and an International Education Fellow in Italy and Germany from 1924 to 1926.

He came to MIT in 1926 as a lecturer in mathematics and was appointed an assistant professor in 1928. He was promoted to associate professor in 1931 and professor in 1940. He became an American citizen in 1934. He retired from MIT in 1960 as Professor Emeritus of Mathematics. In 1972 he was made an honorary research associate in the History of Science Department at Harvard University.

Asked what he missed most when he turned 100, Professor Struik said simply, "My wife." Dr. Ramler, his wife of 70 years, died in 1993 at the age of 99.

Professor Struik is survived by three daughters, Ruth Rebekka Struik, a mathematics professor emerita at the University of Colorado; Anne Macchi of Arlington, MA, a retired teacher; and Gwendolyn Bray of New Zealand, an ecologist; 10 grandchildren and three great-grandchildren. A memorial will be scheduled by the Department of Mathematics.



John Corley conducting in 1988.

Photo by Donna Coveney

John Corley, director of Concert Band for 51 years, dies of cancer at 81

John D. Corley, director of MIT's Concert Band for 51 seasons, died of cancer on October 19 at age 81.

Mr. Corley directed the Concert Band from its inception in 1948 until his retirement last spring. During that time, he oversaw the commission of about 50 new works, developed a repertoire of more than 350 pieces and worked with more than 1,000 MIT students.

Mr. Corley received a standing ovation when he was introduced in the audience at the School of Humanities, Arts, and Social Sciences 50th anniversary concert last month. The concert featured a performance of *Time Into Gold* by Adrian Childs (SB 1994), commissioned by the MIT Concert Band for its 50th Anniversary Concert in May 1999 and Mr. Corley's simultaneous retirement.

"John Corley is part of the history of music at MIT," said Professor Peter Child of music and theater arts last year on the occasion of Mr. Corley's retirement. "In true MIT spirit, he always emphasized innovative and newly composed work alongside the tried and true. He gave student composers opportunities to hear and conduct their work with the band. John is loved and respected by his colleagues and students for his personal charm and exceptional moral decency."

AN INSPIRATION TO STUDENTS

Mr. Corley's dedication to his students—and their devotion to him—was apparent at his retirement concert

last year, which was attended by more than 70 former students from across the country. In a tribute to Mr. Corley at that event, President Charles M. Vest referred to the generations of MIT students he had taught and mentored and "who have drawn inspiration from his guidance and enthusiasm. For half a century no one has been more devoted to the cause of music at MIT, or more beloved for his musical achievements, than John Corley."

In a tribute to Mr. Corley at his funeral service on Monday, one of his former students, Charlie Marge (SB 1984), described how Mr. Corley challenged him and other students in ways that enabled them to grow as musicians and people. "Rather than selecting music that everyone could play perfectly, he found works that pushed the limits of our abilities," said Mr. Marge. "Instead of sticking with familiar tonalities, he opened up to us a world of modern music that we didn't even know was there, and encouraged us and our audiences to be open-minded about it," he said.

"By challenging us to only play music originally written for concert band and by commissioning new works for band, he taught us a fundamental respect for composers, and enabled us...to make a meaningful contribution that reached far beyond the MIT campus. By encouraging student leadership he gave us opportunities to grow as future leaders in life," said Mr. Marge.

At various stages in his career, Mr. Corley directed the MIT Symphony

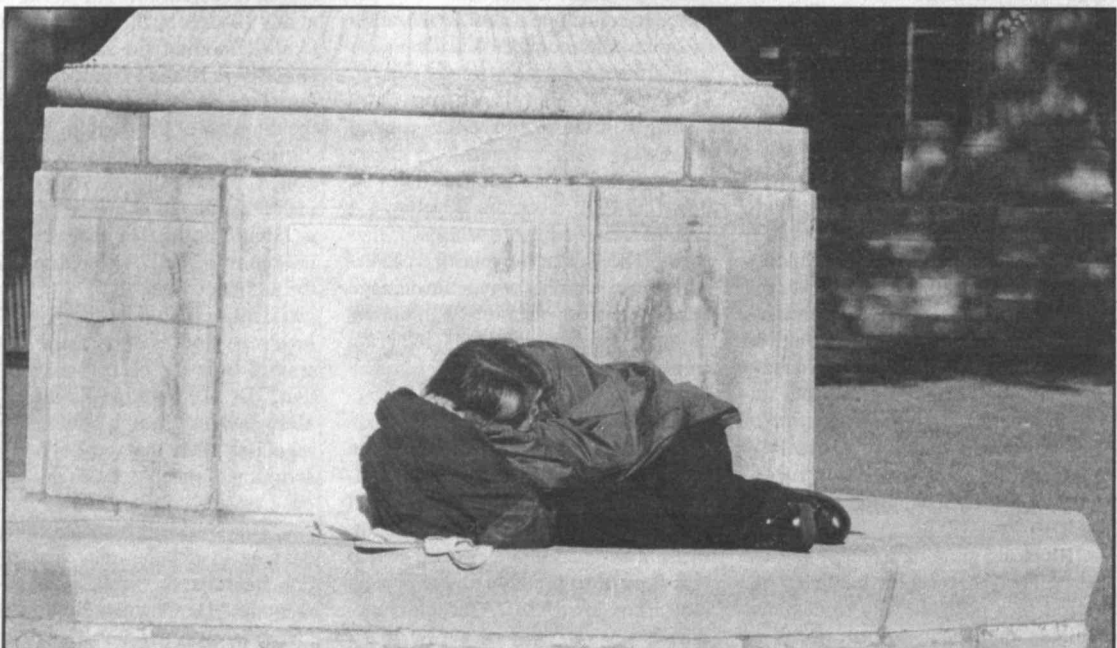
Orchestra (1955-65), founded and directed the Boston Brass Ensemble, taught conducting at the Boston Conservatory of Music, directed the Boston Conservatory's Wind Ensemble and served as music director of the Brookline Public Schools. He was a member of the New England Conservatory of Music's Board of Trustees and a member of the board of advisers at Berklee College of Music.

Mr. Corley received bachelor's and master's degrees in music from Boston University and began his career in Iceland as the youngest band leader in the United States Army, where he conducted more than 700 concerts for Allied troops. In 1993 the MIT Concert Band went on tour to Iceland, a surprise the students had arranged for him. In 1999, just prior to his retirement, Mr. Corley was presented with the Gordon Y Billard Award, presented annually to a member of the MIT faculty, non-faculty employee or one not necessarily affiliated with the Institute, for exemplary service.

The Concert Band, now under the direction of Thomas Reynolds, will perform the commissioned piece, "Corley's March" in Mr. Corley's honor at its fall concert this Sunday, Oct. 29 at 8pm in Kresge Auditorium.

Mr. Corley is survived by three sons, John D. III of Quincy, Gene of Watertown, and Bruce of Newton; three daughters, Sally of Roslindale, and Johanna and Erica, both of Newton; a brother, Robert of Zephyr Hills, FL; and four grandchildren.

Fall slumber



Ariya Dararutana, a sophomore in electrical engineering and computer science, huddled in warm clothes outside in the sunshine despite the chill in the air, taking advantage of the last warm rays of fall.

Photo by Donna Coveney

Recital features works by MIT composer/pianist/lecturer

■ By Lynn Heinemann
Office of the Arts

Emily Dickinson was a reclusive, introspective New England poet. Jim Sagel was a poet/author from Colorado who fell in love with the richness of Hispanic culture and language. MIT composer/pianist/lecturer Charles Shadle finds a commonality between the two, and his recital of new works this Friday at 8pm in Killian Hall features compositions based on works by both writers: *Six Dickinson Songs* and *Estrella Fugaz*, a song cycle of poems by Mr. Sagel.

"Both are poets of epiphany, particularly epiphanies generated by small events or moments," claims Mr. Shadle. "There are enormous differences—both are very specific, in terms of time and place, but they do carry on a wonderful conversation."

Mr. Shadle wrote *Estrella Fugaz* especially for the concert's special guest, baritone Carlos Archuleta, after discovering that Mr. Sagel was

Mr. Archuleta's uncle. "I selected the poems, but they were certainly written for Carlos' voice and interpretive gifts," Mr. Shadle said.

Mr. Sagel, who was born and raised in northern Colorado, moved to Espanola, NM where he began his "re-education," learning to make adobe, speak Spanish and grow chiles. A writer of many books of poetry, fiction and nonfiction, in

1981 Mr. Sagel won the Premio Casa de los Americas award, widely regarded as the

Latin American equivalent of the Pulitzer Prize. For many years he was the director of Humanities and Southwest Studies at the University of New Mexico, Los Alamos.

Other featured artists at Friday's concert include MIT students Óle Nielsen (flute) and Dawn Perlner (violin) and MIT Affiliated Artist Margaret O'Keefe, who will perform *Six Dickinson Songs*. For more information about the concert, call x3-2826.

Arts at MIT

Arts News

Senior Lecturer Martin Marks and Institute Professor John Harbison will take part in an "Aaron Copland at 100" celebration this week at Northeastern University. Mr. Marks will participate in a discussion today on "Copland's Influence on American Film," part of an all-day festival showing six films scored by Copland.

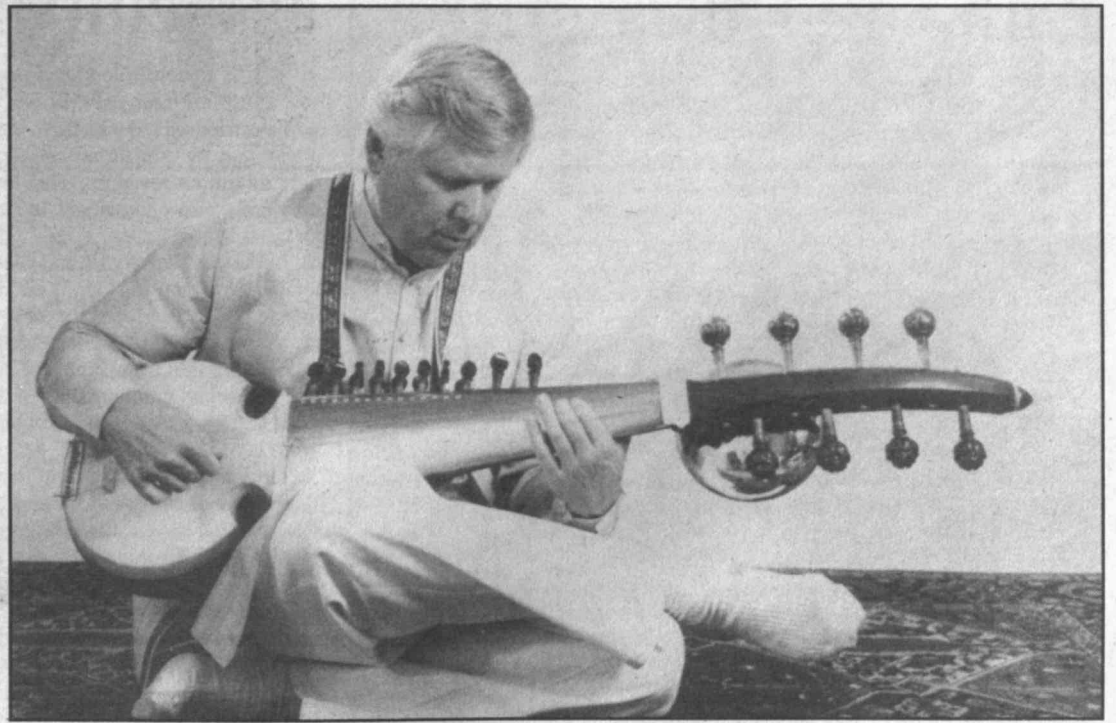
Professor Harbison will take part in a symposium tomorrow titled, "Boston Remembers Aaron Copland." For more information, call (617) 373-2249 or (617) 373-2671.

Wellesley College Theater will present the New England premiere of Music and Theater Arts Lecturer

Laura Harrington's musical *Joan of Arc* from November 8-11. With music by Tony Award-nominated composer Mel Marvin, *Joan of Arc* will feature a cast of actors from both Wellesley College and the Boston theater communities. For tickets and information, call (781) 283-2000. On November 7-11, Ms. Harrington's *Hallowed Ground* will receive a full staging at the University of Alabama at Tuscaloosa. Set in the last days of the Civil War, *Hallowed Ground* recently won the University of Alabama's new play contest, called Janusfest.

The MIT Gilbert and Sullivan Players made an appearance on national television as an answer on the October 17 broadcast of the game show *Jeopardy*. The clue, "This Cambridge engineering school has a Gilbert and Sullivan Players group," was correctly answered, "What is MIT?"

Sarod serenade



Senior Lecturer George Ruckert brings the lyricism and power of his sarod playing to MIT in a concert on Sunday, Oct. 29 at 4pm in Wong Auditorium. Mr. Ruckert, who began studying with renowned Indian sarodist, Ali Akbar Khan in 1967, will be accompanied by Swapan Chaudhuri on tabla. For more information, see <<http://web.mit.edu/mta/mithas/>> or the Arts Calendar below.

Jumpha Lahiri to speak on campus

Pulitzer Prize winner Jhumpha Lahiri—called a "dazzling storyteller with a distinctive voice, an eye for nuance, an ear for irony," by author Amy Tan—will present a reading in the MIT Writers Series on Thursday, Nov. 2, at 7pm in Rm 10-250.

Ms. Lahiri, who was born in London, raised in New England and now lives in New York City, sets her stories in both India and the US, portraying the uneasy mixing of Indian and American values.

When Ms. Lahiri's collection of short stories *Interpreter of Mala-*

dies: Stories from Boston, Bengal and Beyond won the 2000 Pulitzer Prize for fiction, she became the first person of South Asian origin to

win an individual prize. *Interpreter of Maladies* was selected for both the O. Henry Award and inclusion in *The Best American Short Stories*. One of the stories, "A Temporary Matter," is being made into an hour-long film for the Public Broadcasting Service's East-West series.

For more information about the reading, call x3-7894.



Means found for predicting kidney failure

(continued from page 1)

Traditional blood and urine tests do not allow for early detection of the disease, particularly in patients with normal baseline kidney function.

To test whether the presence of KIM-1 in the urine serves as a marker for acute kidney failure, the researchers collected and analyzed samples from patients with various forms of kidney disease. The amount of KIM-1 was noticeably greater in urine samples from patients with acute kidney failure associated with either decreased blood flow to the organ or severe generalized infection.

Until recently, efforts to measure proteins in the urine as general markers to screen and identify the site of injury within the kidney have been disappointing. The research by Professor Bonventre and colleagues comes at a time of growing demand for new methods to detect kidney failure at an early stage using minimally invasive tests.

This work was supported by a MERIT award from the NIH and from the Biogen Corporation.

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/>>.

* Open to public
* Open to MIT Community only

October 25-November 5

MUSIC

Chapel Concerts*—Oct 26: The Leonora String Quartet: Barbara Englesberg, violin; Edward Wu, violin; Kenneth Stalberg, viola; Joel Cohen, cello. Ravel & Haydn Quartets. Nov 2: MIT Chamber Orchestra, Dante Anzolini, dir. Noon, Chapel. x3-2826.

Coffee House*—Oct 26: Carol Cheung (G), flute. 8pm, 24-Hour Coffee House (3rd floor Stratton Student Ctr). x3-3913 or <cacpb@mit.edu>.

Faculty Recital*—Oct 27. Recent music by Lecturer Charles Shadle. See story above. 8pm, Killian Hall. x3-2826.

MITHAS Concert*—Oct 29. Sr. Lecturer George Ruckert, sarod, with Swapan Chaudhuri, tabla. MITHAS founder trained w/maestro Ali Akbar Khan. \$15; \$12—students & srs, MITHAS & New England Hindu Temple members. 4pm, Wong Aud. x8-7971 or <<http://web.mit.edu/mta/mithas/>>.

MIT Concert Band Fall Concert*—Oct 29. Thomas Reynolds, dir; Jen Hazel and Robert Rucinski '99, assistant conductors. Works by Bernstein, Holst and Shostakovich. 8pm, Kresge Aud. <band-officers@mit.edu> or <<http://web.mit.edu/band/>>.

MIT Artists Behind the Desk Performance*—Nov 1. Peter Allen, composer, vocalist, synthesizer demo. Mr. Allen is a senior technician, electrical, mechanical with MIT's Magnet Laboratory. 12-1pm, Killian Hall. x8-0401, <abdesk@mit.edu> or <<http://web.mit.edu/committees/wgssi/abd.html>>.

Carnatic Violin*—Nov 3. Violinist M.S. Gopalakrishnan's accompanied by his daughter M. Narmada, violin and Tiruvarur Bakthavathsalam, mridangam. Presented by MITHAS. \$15; \$12—students & srs, MITHAS & Hindu Temple members. 7:30pm, Wong Aud. x8-7971 or <<http://web.mit.edu/mta/mithas/>>.

MIT Chamber Orchestra*—Nov 3. Dante Anzolini, dir. 8pm, Killian Hall. x3-2826.

MIT Chamber Chorus*—Nov 5. William Catter, dir. 3pm, Kresge Auditorium. x3-2826.

THEATER

Richard III*—Nov 2-4, 9-11. Shakespeare Ensemble directed by Kurt Lancaster. \$8, \$6 students w/ID & senior citizens. 8pm, Kresge Little Theater. x3-

2903, <ensemble-tickets@mit.edu> or <<http://www.mit.edu/activities/ensemble/>>.

Children of Eden*—Nov 3-5, 9-11. Musical Theatre Guild's production of musical retelling of *Genesis* by John Caird (book) and Stephen Schwartz (music and lyrics). Tickets: \$9, \$8 sr citizens, MIT faculty & staff, students elsewhere; \$6 MIT & Wellesley students; group rates available in advance. 8pm (4pm on 11/5), Sala de Puerto Rico. Info/reservations: x3-6294, <mtg-tickets@mit.edu> or <<http://web.mit.edu/mtg/www/>>.

READINGS

MIT Writers Series: Jhumpha Lahiri*—Nov 2. Readings by the Pulitzer Prize winner for *Interpreter of Maladies*. 7pm, Rm 10-250. x3-7894 or <<http://web.mit.edu/humanistic/www/writersseries/jhumpalahiri.html>>.

EXHIBITS

List Visual Arts Center: Global Conceptualism: Points of Origin, 1950s-1980s. More than 200 works by more than 130 international artists examining the diverse forms of conceptualist practice over several generations. **Reception**—Nov 2, 5:30-7:30pm. List Visual Arts Ctr (E15). Oct 24-Dec 17. Tues-Thurs & Weekends 12-6pm; Fri 12-8pm; closed holidays. x3-4680 or <<http://web.mit.edu/lvac/www/>>.

Artistic Dialogue*—Nov 3. MIT Elting E. Morison Professor of History John Dower, Pulitzer Prize-winning author of *Embracing Defeat Japan in the Wake of World War II* and Dr. Reiko Tomii, *Global Conceptualism* exhibition curator. 5:30pm, Rm E15-054. x3-4680.

MIT Museum* (N52): Robots and Beyond. Exploring Artificial Intelligence at MIT. Opens Oct 28-29. **FAST Weekend***—Oct 28-29. Family Adventures in Science & Technology presents "Robots Plus." Meet researchers from MIT's Artificial Intelligence Lab. Make yourself into a cyborg, android or robot. Free w/Museum admission. 2-4pm, MIT Museum. x2-2827 or <fastsci@mit.edu>.

Ongoing Exhibits: Gestural Engineering: The Sculpture of Arthur Ganson; MIT Hall of Flashes; Light Sculptures by Bill Parker; Flashes of Inspiration: The Work of Doc Edgerton; Thinkapalooza. Admission: \$5; \$2 students/seniors; \$1 children 5-18; free with MIT ID. 265 Mass Ave. Tues-Fri 10am-5pm, Weekends 12-5pm. x3-4444 or <<http://web.mit.edu/museum/>>.

Compton Gallery*—A 50-Year Reflection: *Humanities Arts, and Social Sciences at MIT.* Celebrating the 50th anniversary of the School of Humanities and Social Science (now called the School of Humanities, Arts, and Social Sciences). Through Jan 26. Compton Gallery (Rm 10-150). Weekdays 9am-5pm. x3-4444. <<http://web.mit.edu/compton/>>.

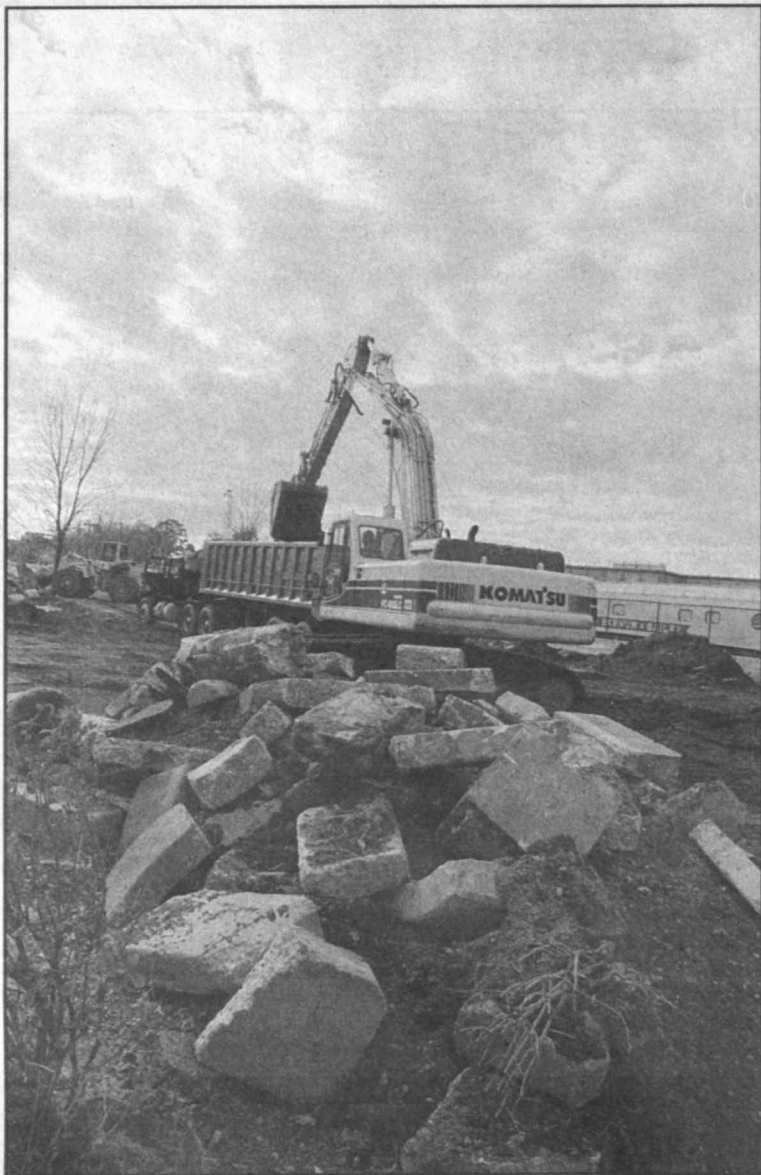
<web.mit.edu/museum/exhibits/compton.html> or <<http://web.mit.edu/shss/www/>>.

The Dean's Gallery—Mary A. Harman: Breaking the Mold. Images using multiple print processes to explore issues of women's individuality and sanity. Through Nov 2. The Dean's Gallery, Sloan School of Management, E52-466. Weekdays 9-5pm. x3-9455 or <<http://web.mit.edu/deans-gallery/www/>>.

Institute Archives and Special Collections Object of the Month—Oct: "Tech Songs, 1903" illustrates how MIT students of 100 years ago found a common bond and an outlet for frustration in songs about undergraduate life. Hallway exhibit case across from Rm 14N-118. x3-5136 or <<http://libraries.mit.edu/archives/>>.

Religious Activities Center: Peace Through Humor: Visions of Peace from the Hands of Children. Exhibition of paintings hosted by MIT Hillel. Through Oct. 31, weekdays, 9am-5pm, W11 (40 Amherst St.). MIT Hillel, x3-2982.

Wiesner Student Art Gallery: Reflections in Dreamscape II. Series of pastel paintings by Changhui Yang (G), based on a painting trip to Lyme Regis, a small sea town on the south coast of England. Through Nov 18. Wiesner Student Gallery (Stratton Student Ctr 2nd floor). x3-2980.



Work began recently on the Vassar Street site of the new undergraduate dormitory, Simmons Hall. Portions of the West Parking Lot have been closed off and the concrete torn to rubble. Photo by Donna Coveney

Undergraduate dorm to be named Simmons Hall, after donors

The new 350-student undergraduate residence on Vassar Street will be called Simmons Hall in honor of Richard P. Simmons (SB 1953) and family in recognition of their major support of student life and campus activities.

A groundbreaking ceremony will be held in December. The \$40 million dormitory is scheduled to open in September 2002.

In donating \$20 million to MIT last November, Mr. Simmons said the new Sports and Fitness Center and the undergraduate residence are examples of important steps that MIT is taking toward developing a new campus environment. "For MIT to continue to provide the kind of educational experience [necessary] to retain its worldwide reputation as an outstand-

ing university, it must be willing to allocate resources specifically focused on quality of life issues at MIT," he said.

In addition to the students' quarters, the new residence will have suites to accommodate a housemaster, associate housemaster, graduate resident advisors, and accommodations for visiting artists and scholars.

Incorporated into the design are public and private spaces for residents, including study lounge areas and computer rooms. The building is designed in an open plan—open to light and air, and open to residents who will live, eat, study and be entertained within its spaces.

The project was designed by Steven Holl Associates and Perry Dean Rogers & Partners.

Groundbreaking for Sports and Fitness Center planned

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three times the size of the Alumni Pool that will accommodate full-scale swimming meets or up to 18 lanes for side-to-side lap swimming. There also will be a separate teaching pool.

- A state-of-the-art health-fitness center that will accommodate 200 to 250 users for recreational workouts and rehabilitation. The current facility, in duPont's basement, handles 50.
- A multi-activity court that will supplement the courts in Rockwell Cage for volleyball, aerobics, recreational basketball, in-line hockey and other activities.

- Six squash courts to replace courts in the Alumni Pool building that will be converted for general fitness. The new courts will be built to the international specifications now standard in squash competition.
- 600 lockers in addition to swimming and water polo team rooms.

- A sports medicine center, administrative offices and other support facilities.

At the ground-floor level, the center ties the entrance of the Johnson ice rink and field house to an entrance from Vassar Street on the north and the Dupont facility and Stratton Student Center on the East.

"This creates a passage for students from which activities in the pool and the health-fitness center will be visible," said architect Kevin Roche. "On the third floor, a similar passage is laid out overlooking the pool and health-fitness center that will pass by the basketball court and the six squash courts. Thus a student moving throughout any part of the center will see all of the major activities and be encouraged to participate."

The community barbecue pits on the site will be moved to a new location to be determined.

Institute financial plan presented at faculty meeting by Vest, Curry

(continued from page 1)

"These are real sea-changes, and we have tried to deal with them in such a way that we don't grow too dependent on tuition revenues. That leaves only gifts and endowment income," Dr. Vest said.

In the past year, gifts and pledges totaled \$357 million. Dr. Vest commended Vice President for Resource Development Barbara Stowe for the success of the Campaign for MIT, which reached commitments of \$978 million, 65 percent of the \$1.5 billion goal, as of June 30.

Dr. Vest said that the four years of increases in endowment, compared to the operating budget, is what "gives us hope that this financial plan can keep us excellent, and help us thrive going into the future." In 1990, the total operating budget was just over \$1 billion and the market value of the endowment securities portfolio ("Pool A") was \$1.4 billion. In fiscal year 2000, which closed in June, the total operating budget was \$1.38 billion and the market value of the Pool A portfolio had more than quadrupled to \$6.3 billion.

"This is an absolutely dramatic response due to the incredible economic period we have had in the last half of this decade. While nobody would predict that this [endowment] curve would keep on going at its present slope, we hopefully will build the underlying financial strength to realize our aspirations," he said.

Dr. Vest praised Treasurer Allan Bufferd for managing an extraordinary 57.7 percent increase in this endowment portfolio in the past year. The net assets of all funds, buildings and equipment—a more comprehensive measurement—increased 49.6% this past year, from \$5.5 billion to \$8.2 billion.

Executive Vice President John Curry said the endowment portfolio increase "provides a buffer, an extra comfort" as MIT gradually scales up its operating expenditures—\$30 million in 2001, more than \$100 million by 2005 and a 10-year total of \$900 million—for the changes that will transform MIT: new construction, renovation and deferred maintenance, and graduate education support. Mr. Curry noted, however, that an endowment fund restricted to, say, a professorship cannot be used to pay for new construction.

Renovation and deferred maintenance will grow from a current level of \$4 million to about \$35 million a year from 2003 to 2010.

Other major outlays in the years 2001 to 2010 include approximately \$8 million a year in presidential fellowships to graduate students; \$10 million, growing to \$15 million a year for remission of graduate summer tuition in order to be competitive with other institutions; and \$8 million, growing to \$35 million a year in new construction.

BUILDING BOOM

The construction boom includes the Simmons Hall undergraduate residence

under construction on Vassar Street; the restoration of Baker House; future facilities for more than 700 graduate students in the renovated NW30 on Albany Street and the residence hall at Sydney and Pacific streets; the Sports and Fitness Center; the Stata Center for Computer, Information and Intelligence Sciences; the Aero/Astro Learning Lab for Complex Systems; the Media Lab expansion; the McGovern Institute for Brain Research and the related neuroscience complex for the Center for Learning and Memory and the Department of Brain and Cognitive Sciences faculty; and a new building for the Sloan School of Management.

In addition, major renovations are being done on the chemistry building and classrooms, the life safety systems in undergraduate and graduate residences, duPont locker rooms, the indoor and outdoor tracks, and the Student Center coffeehouse and ground floor restaurant.

CORE NEEDS

Mr. Curry said that the core needs—for graduate education support, new construction and deferred maintenance—were parts of the long-range financial plan that were built into the capital campaign and the financial plan. Dr. Vest noted that extra efforts would have to be made in areas such as support for graduate students, where it is more difficult to raise funds.

Dr. Vest identified some of the major academic priorities being pursued by the faculty as information technology and intelligence sciences; neuroscience and brain and cognitive science; the interface of basic biology, bioengineering and medicine; 21st century business and entrepreneurship; and visual and performing arts and new media.

In the past year, he said, significant

progress had been made in these fields. He cited more than a dozen projects, including the building projects plus the Oxygen Project at the Laboratory for Computer Science, the Hewlett Packard partnership, the Division of Bioengineering and Environmental Health, the duPont partnership in biological materials, Sloan's E-business track, a partnership with Merrill Lynch, the Comparative Media Studies program, and plans for a laboratory for the performing arts in the Wiesner Building.

In the learning environment, the ideas of the Task Force on Student Life and Learning—exploring the integration of academics, research and community—have resulted in a number of innovations in teaching, fellowships, mentorship, technology-enhanced learning, and in residential campus life.

Technology-enhanced learning initiatives underway include the Cambridge-MIT Institute, the MIT Singapore Alliance and the Electronic Media Creation Center, enabled in part by the Educational Technology Council, Microsoft I-Campus and the d'Arbeloff Fund for Excellence in MIT Education.

Campus life changes include the residential system redesign, improved freshman orientation, Institute-sponsored social events like the Millennium Ball, and more than a tripling of funds for campus-wide student events.

Changes in financial aid are occurring under the undergraduate and graduate level. At the graduate level, summer tuition has been eliminated and presidential fellowships are being instituted.

Diversity of faculty, students and staff has been advanced by the "catalytic report" of the women faculty in the School of Science, the new Council on Faculty Diversity and the Task Force on Minority Student Achievement, Dr. Vest said.

Vassar Street focus of noise and vibration next 4 months

Vassar Street will be a roadway of noise, vibration and traffic disruption on both sides of Massachusetts Avenue in the weeks ahead, as major work begins at both the Stata Center and Simmons Hall, the new undergraduate residence.

Steel piling installation will begin this week at Simmons Hall, continuing for three weeks and causing excessive noise. Excavation of soil is planned for later this month and will continue through the end of November. Project completion: August 2002.

STATA CENTER

The excavation of the 3.2-acre Stata Center site begins next week, bringing with it a constant flow of heavy trucks, vibration, noise and traffic disruption for the next four months.

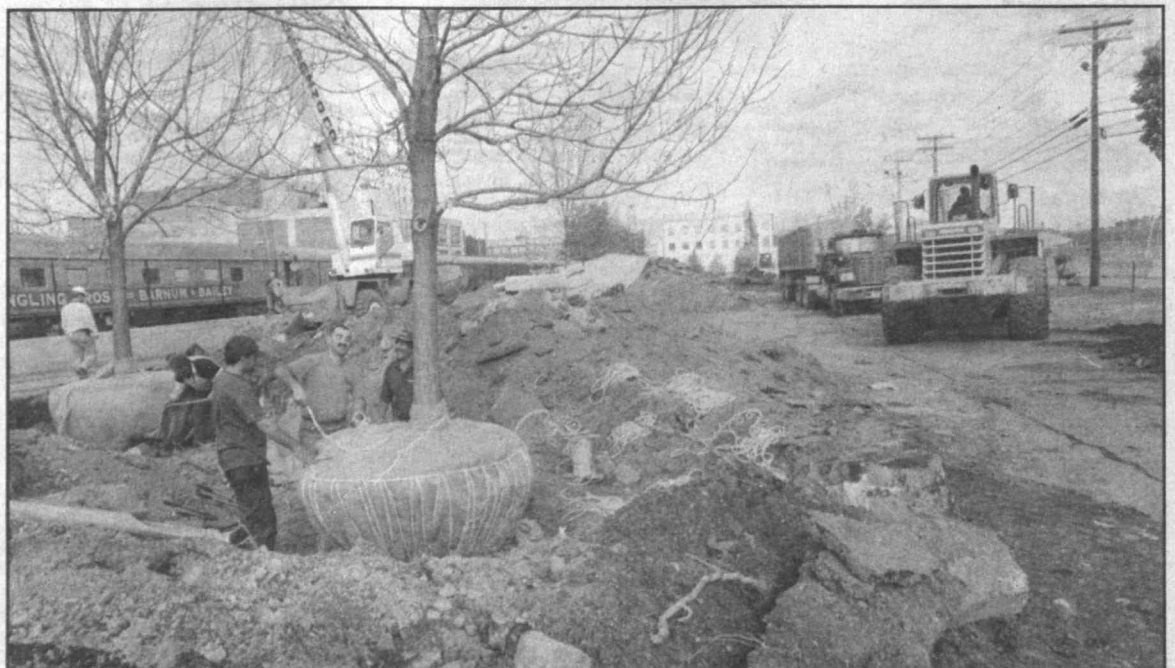
Major sources of noise will be from the trucks and from pounding the tie rods into the slurry walls. Updates will be posted next week on the new construction web page, "The Evolving Campus" at <<http://web.mit.edu/buildings/>>, linked from the MIT Home Page in the "About MIT" section.

SPORTS AND FITNESS CENTER

The groundbreaking is scheduled for Friday outside the Johnson Athletics Center.

Parking: Half of Kresge Lot will be used as the construction staging area beginning Monday. Overflow parking will be available in the West Garage (MIT ID card needed) for Kresge permit holders.

Pedestrians: Construction of the fence has begun, but gates will be open until November.



Construction workers carefully move a tree from the site of a new undergraduate dorm on Vassar St. Photo by Donna Coveney