

Professor Kim Vandiver, the new dean for undergraduate research, with a pipe from a pipe organ that he uses for a demonstration in his class on mechanical vibration.

Photo by Donna Coveney

## Vandiver discusses plans as dean for undergraduate research

By Denise Brehm  
News Office

Professor J. Kim Vandiver, founding director of the Edgerton Center and former director of the Experimental Study Group, is once again paving a path in undergraduate education at the Institute. As of July 1, he became dean for undergraduate research, a new rendering of the former position of dean for undergraduate curriculum.

In the newly defined position—which reports to the dean for undergraduate education, Rosalind Williams—Professor Vandiver hopes to change the undergraduate academic experience at MIT as

recommended by the Task Force for Student Life and Learning. His goal is to incorporate more and earlier opportunities for students to get involved in real-life problem solving, engage in research, and perhaps most importantly, develop relationships with faculty mentors.

“The position of dean for undergraduate curriculum was constantly being redefined in response to changes at the Institute during the three years that Kip Hodges held the job,” said Dean Williams. “When Kip decided to step down in July, it was really time for us to take stock.”

“The Task Force specifically suggested tighter

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## Award-winning invention cuts costs, boosts performance of automobile engines

By Elizabeth A. Thomson  
News Office

Whoever invited Alex Slocum to give a talk for Ford Motor Co. engineers two years ago deserves a raise.

The talk, which summarized ongoing research in Professor Slocum’s mechanical engineering lab, sparked a collaboration that has led to an invention that could cut manufacturing costs for many automotive engines and is the grist for an MIT PhD thesis. The frosting on the cake: a 1999 R&D 100 Award, shared by Ford, MIT and Aesop, Inc., which the researchers will receive at a ceremony in Chicago on September 23.

Dr. Slocum, a MacVicar Faculty Fellow, has now won nine R&D 100 Awards, which honor the 100 most technologically significant new products of the year.

### TO BUILD AN ENGINE

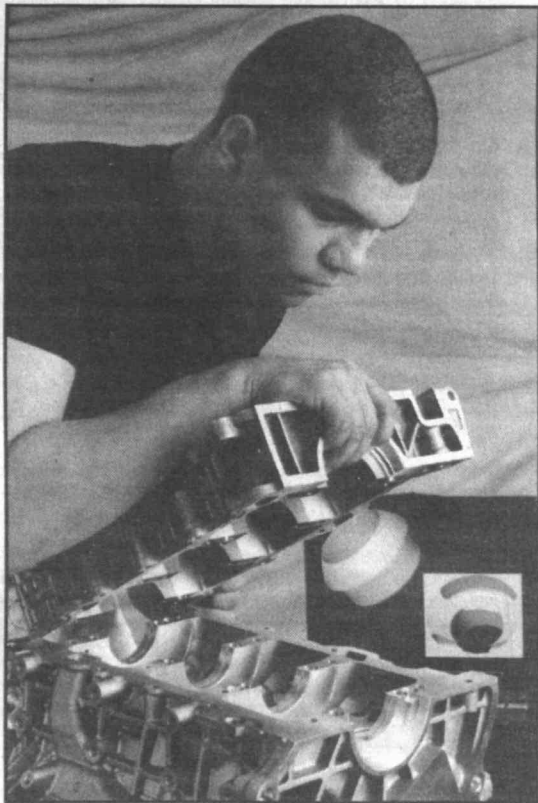
The current award-winning invention is a new way to align one or more components of automotive engines with extreme precision. Such an operation is critical to engine performance. In the production of an engine, the two main components are bolted together and a hole is machined lengthwise between the two. Then the two halves are taken apart again to put in the crankshaft and bearings that fit within the hole.

“When the halves are reassembled (with the crankshaft and bearings in place), it’s important that they are lined up to within five millionths of a meter of their original bolted position, or the engine will not work properly or possibly fail,” said Martin L. Culpepper, the graduate student in mechanical engineering who is a co-winner of the R&D 100 Award with Professor Slocum; Robert Rines of Aesop, Inc.; and F. Zafar Shaikh, Joe Schim and Gary Vrsek of Ford. The inventors will also be presenting a paper on the work at a November meeting of the American Society of Mechanical Engineers.

Currently, engine manufacturers solve the alignment problem by machining eight holes into each of the main

engine components, then fitting them together via dowel pins inserted in the holes. Among other drawbacks, “this design is costly to manufacture as it requires machining/gauging 16 precision holes and eight hollow dowel pins.”

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Graduate student Martin L. Culpepper is a co-winner of an R&D 100 Award for the Kinni-Mate Coupling for aligning and attaching engine components.  
Shannon Culpepper/Shadow & Shape Studio

## Work probes why habits are hard to make, break

By Deborah Halber  
News Office

An MIT researcher who studies an area deep within the brain has uncovered clues about why good habits are so hard to make and bad habits are so hard to break. Her work may also help those who suffer from extreme addictions and certain brain disorders.

“We all live mostly by habit,” said Ann M. Graybiel, the Rosenblith Professor of Neuroscience. Habits—and automatic learned responses such as those used in driving and bike-riding—may serve to free up the “thinking” parts of the brain for more creative purposes.

As anyone who has ever tried to quit smoking or lose weight knows, habits do not come and go easily. And extreme habits, such as addictions or actions repeated uncontrollably, are the dark side of the brain’s ability to relegate tasks to the basal ganglia, three large nuclei of nerve clusters buried below the cerebral hemispheres in the forebrain.

Professor Graybiel is tantalized by new evidence that there may be sensory tricks that break the destructive endless loops that seem to be tied to malfunctions of this brain region. If researchers could come up with a simple antidote to a seemingly unconquerable urge like the nicotine addict’s craving for a cigarette, she says, it might help millions break free from the clutches of addictions.

Professor Graybiel hopes that her research will lead to cures or improved quality of life for those with motion control disorders such as Tourette’s syndrome. She also is investigating the idea that the basal ganglia may be tied to conditions seen primarily as “thought” disorders, such as obsessive-compulsive disorder (which is like an out-of-control habit) or schizophrenia.

Working with Professor Graybiel are postdoctoral associates Yasuo Kubota and Naotaka Fujii of the Department of Brain and Cognitive Sciences; postdoctoral fellows Hu Dan, Pablo Blazquez, Juan Canales and Chris-

tine Capper-Loup; and graduate student Toshi Sakamoto.

### BURIED IN THE BRAIN

The basal ganglia’s work falls somewhere in between that of the cortex—which is active in the “here and now” skills like talking, thinking and learning—and the brain stem, which controls automatic body functions like breathing and blinking.

For a long time, the function of the basal ganglia remained a mystery. It is known that they are involved in the control of movement.

Lesions in the basal ganglia occur in motor disorders such as Parkinson’s disease and Huntington’s chorea. Neurotransmitters in the striatum, an area deep within the basal ganglia, may also be involved in Tourette’s syndrome, depression, attention deficit disorder and addiction.

Certain psychological disorders have physical components. In obsessive-compulsive disorder, for instance, the same useless movement might be

repeated over and over. Parkinson’s patients seem unable to initiate a sequence of movements such as rising from a chair or walking from one place to another, but once the action is initiated, they have no trouble performing it.



Graybiel

Professor Graybiel (whose research team is responsible for much of our current knowledge about neurotransmitter systems and gene expression in the basal ganglia) and her colleagues have uncovered evidence that the basal ganglia is tied to much more than motor control.

They see that its main inputs come from cognitive parts of the brain such as the frontal lobes, so Professor Graybiel is not surprised that the basal ganglia demonstrate a strong reaction to

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## Technique lets scientists ‘see’ minute ear-cell movements

By Rachel Bredemeier  
Electrical Engineering  
and Computer Science

(This article is reprinted with permission from the September 1999 issue of Electrical Engineering and Computer Science, the department’s newsletter.)

The inner ear is sensitive to sounds that vibrate the eardrum by less than the radius of a hydrogen atom, though the mechanisms by which this happens are not fully understood. Now, Associate Professor Dennis M. Freeman and colleagues in the Research Laboratory of Electronics’ Auditory Physiology Research group have devised methods to “see” the motions of inner ear cells that barely blur high-resolution images from an optical microscope.

The key to the approach is the marriage of the computer with video microscopy. To gain insight into the signal-processing functions of the ear, Professor Freeman has devised techniques to make slow-motion, three-dimensional movies of sensory cells and their neighbors during sound stimulation. The movies resolve not only the motions of cells but also individual motions of the 50 to 100 microscopic sensory hairs that protrude from each sensory cell.

By analyzing these movies with algorithms from machine vision, quantitative measurements, accurate to a billionth of a meter, are possible. These

measurements allow direct tests of how the million moving parts in each of our ears cooperate to provide our remarkable sense of hearing.

Many factors contributed to Professor Freeman’s investigations of auditory physiology. “My family has a history of hearing problems, and I have a slight hearing problem myself,” said Dr. Freeman, the W.M. Keck Career Development Associate Professor in Biomedical Engineering in the Department of Electrical Engineering and Computer Science.

He started out working with Dr. Lou Braid, the Henry Ellis Warren Professor of Electrical Engineering, on making a better hearing aid. The signal

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## IN BRIEF

### WOMEN INVITED

All women who are new to MIT are invited to a reception hosted by Mrs. Rebecca Vest and the MIT Women’s League on Tuesday, Sept. 28 at the President’s House from 4:30-6pm. At 5pm, brief presentations by some campus departments will be followed by a question-and-answer session. Anyone with questions may call x3-3656.





The 1999-2000 Knight Science Journalism Fellowships program. Back row, left to right: Martha Henry (program coordinator), Ganapati Mudur, Andreas Schriber, Peter Spotts, David Chandler, David Talbot, DongHo Shin. Front row, left to right: Wayt Gibbs, Susan Lewis, Boyce Rensberger (program director), Karen Hopkin, Melissa Schorr. Photo by Graham Ramsay

## Ten journalists are Knight Fellows

For the 17th year, MIT's lecture halls and laboratories are being infiltrated by science journalists.

Ten newspaper and magazine writers and television producers—all selected by the Knight Science Journalism Fellowships program—are on campus, spending a sabbatical year away from their regular jobs and working to gain deeper familiarity with science and technology. Seven are Americans and one each is from India, Switzerland and Korea.

The 1999-2000 class of Knight Fellows will be introduced to the MIT community at a reception Wednesday, Sept. 22 from 4-6pm in the Bush Room (10-110). President Charles M. Vest will speak at the reception, which is sponsored jointly by the MIT News

Office and Technology Review magazine.

This year's Knight Fellows are:

- David Chandler, who has covered physical sciences for the Boston Globe for 15 years.
- W. Wayt Gibbs, a senior writer for Scientific American, who says he has covered 23 disciplines in science and engineering for the magazine.
- Karen Hopkin, a freelancer who has a PhD in biochemistry and writes for various magazines and web sites.
- Susan K. Lewis, a writer, director and producer for WGBH's long-running Nova science series.
- Ganapati S. Mudur, who covers science and medicine for the Telegraph, a leading Calcutta daily newspaper.
- Melissa Schorr, who covered health

issues for the Las Vegas Sun and writes about women's health for various magazines.

- Andreas Schriber, a producer and editor of science and environmental programs for Swiss Television DRS.
- DongHo Shin, chief science writer for the Hankyoreh, a major daily newspaper in Seoul. Shin became a Knight Fellow last January and will continue through the fall semester.
- Peter N. Spotts, who covers science and technology for the Christian Science Monitor.
- David Talbot, a reporter for the Boston Herald who specializes in investigative stories that focus on environmental hazards.

Knight Fellowships, funded chiefly by an endowment from the John S. and James L. Knight Foundation, are designed to improve the quality of science journalism in the mass media by offering experienced reporters the opportunity to take courses at MIT for a full academic year.

"When science reporters are doing their regular jobs, they rarely have time to learn more than the minimum needed to write the story of the moment," says Boyce Rensberger, the program's director. "So they often miss the background, the context, the process of science that's needed to give perspective. That's what these fellowships provide. The vast majority of the 162 science writers who have been in the program since it began have told us that the year made a huge difference in the quality of their work."

Mr. Rensberger, who was a full-time science journalist for 32 years, mainly at the Washington Post and the New York Times, took over the Knight directorship last year upon the retirement of Victor K. McElheny, who created the program in 1983. Martha Henry is the program coordinator.

## Foundation grants another \$2.2M to Knight program

The Knight Science Journalism Fellowships program has been awarded \$2.2 million by the John S. and James L. Knight Foundation.

Of that grant, \$2 million—plus another \$1 million in matching funds to be raised by the program—is to build the endowment, and \$200,000 is to enable the program immediately to increase the number of stipends it can award fellows while the new money is phased in over four years.

The new grant, announced earlier this week at the foundation's headquarters in Miami, raises the organization's investment in the MIT fellowships program to \$7 million. The Institute itself has contributed \$2.5 million to the endowment. The program, which is wholly supported by the

endowment, allows working journalists to spend a full academic year studying at MIT.

The enlarged endowment also ensures long-term support for the program's new series of one-week mini-fellowships that bring journalists to MIT for intensive courses in specific fields. The first of these, "Genes and Cells: Boot Camp for the Genetic Revolution," is to be staged in early December.

The Knight Foundation makes national grants in journalism, education and the arts. Its fourth program, community initiatives, is concentrated in 26 towns where the Knight brothers published newspapers, but the foundation is wholly independent of those newspapers.

## More faculty named to professorships

Four more faculty members have been appointed to named professorships.

Professor of Biology Nancy H. Hopkins has been appointed to the Amgen, Inc. Professorship for a five-year term. The chair is intended to encourage education and research in biological and chemical sciences, biotechnology and other areas related to the life sciences.

After receiving the BS from Radcliffe College (1964) and the PhD from Harvard University's Department of Molecular Biology and Biochemistry (1971), Professor Hopkins was a postdoctoral fellow of James D. Watson at Harvard and at the Cold Spring Harbor Laboratory, where she worked on DNA tumor viruses. She joined the MIT faculty as an assistant professor in 1973 in the Center for Cancer Research and worked on RNA tumor viruses that cause leukemia in mice. She was promoted to professor of biology in 1982. In 1995, she was named chair of the first Committee on Women Faculty in the School of Science at MIT.

Nine years ago, Professor Hopkins switched fields to work in developmental biology. Her lab developed techniques for making transgenic zebrafish, including a technique called insertional mutagenesis. Using this technique, her lab is now engaged in a large experiment to isolate genes required for the normal development of the zebrafish embryo. This research is believed to be important to the eventual understanding and possible treatment of human diseases including cancer and birth defects.

Associate Professor Earl Miller is the newest recipient of the Class of 1956 Career Development Professorship for a three-year term, established by the class at its 25th reunion.

Professor Miller received the BA in psychology from Kent State University in 1985, and the MA (1987) and PhD (1990) in psychology and neuroscience from Princeton University. He was a postdoctoral fellow at the National Institute of Mental Health from 1990-95. Dr. Miller was appointed an assistant professor in MIT's Center for Learning and Memory and the Department of Brain and Cognitive Sciences in 1995 and was promoted to associate professor with tenure on July 1, 1999. He has received several academic awards including a Pew Scholar Award (1996), a McKnight Scholar Award (1996), a Sloan Research Fellowship (1996) and a John Merck

Scholar Award (1998).

Professor Miller's work focuses on the neural basis of high-level cognitive functions, including the mechanisms of attention, learning and memory needed for intelligent behavior. He studies the activity of neurons in the prefrontal cortex, the brain region most highly developed in primates and most closely associated with complex thought.

Professor Wanda J. Orlikowski of the Sloan School of Management has been selected to hold the Eaton-Peabody Professorship of Communication Sciences for a five-year term.

Professor Orlikowski joined the MIT faculty as an assistant professor of information technologies in 1989, was promoted to associate professor in 1994, and received tenure in 1996. She received the BComm in 1977 and the MComm in 1982 from the University of Witwatersrand, and the MPhil (1986) and PhD (1988), both from New York University.

Professor Orlikowski's research interests focus on the dynamic interaction between organizations and information technology, with particular emphasis on the role of organizing structures, cultures and work practices

in technology change. She has conducted multiple studies of collaborative technologies such as electronic mail, web tools and groupware, and examined their ongoing use in organizational communication, coordination and distributed work. She is currently investigating the patterns, meanings and experiences of working virtually, and exploring the social and technological implications of such new ways of organizing.

Assistant Professor Sanjay E. Sarma of mechanical engineering is the next holder of the Cecil and Ida Green Career Development Professorship for a three-year term. The chair was created by the Greens to recognize excellence in teaching.

Dr. Sarma received the BTech from the Indian Institute of Technology in 1989, the ME from Carnegie Mellon University in 1992 and the PhD from the University of California at Berkeley in 1995. He was named an assistant professor at MIT in January 1996.

Professor Sarma's research is in the areas of computer-aided design (CAD), computer-aided manufacturing (CAM), solid modeling, computational geometry, and machine tool design and automation. He wrote his thesis on a methodology for integrating CAD and CAM in milling and has patent applications pending for three things: a haptic device for CAD/CAM, a technique for five-axis toolpath generation and an apparatus for reference-free part encapsulation.



Hopkins



Orlikowski



Miller

### HUMANITIES APPOINTMENT

Josey Twombly has joined the School of Humanities and Social Science as assistant dean for development. Before coming to MIT, she was director of major gifts at Harvard University.



Twombly

Ms. Twombly holds a bachelor's degree from Skidmore College (1970) and a master's degree from Russell Sage College (1976). From 1986-90, she worked at Ketchum, Inc., directing capital campaigns and feasibility and planning studies for a variety of non-profit clients. She has also worked for Williams Col-

lege from 1992-96 as regional director of special gifts during the college's Third Century Campaign, and as associate director of capital giving.

## Schools of Engineering, Humanities make appointments

Dick K.P. Yue, professor of hydrodynamic and ocean engineering, has been named as associate dean of the School of Engineering.

Professor Yue received all his degrees from MIT (SB 1974, SM 1976, ScD 1980) and has been a faculty member in the Department of Ocean Engineering since 1983. His main research contributions are in theoretical and computational hydrodynamics. He is internationally recognized for his expertise on ocean and coastal wave dynamics, and for his extensive work in nonlinear wave-wave and wave-bottom interactions, and large-amplitude motions and loads on

marine structures. He has also made fundamental contributions to the understanding of the hydrodynamics of fish swimming and the application of these principles to the design of underwater vehicles, and the study of vortical and turbulent flows in the air-sea interface, and their effects on surface waves and interface processes.

Professor Yue directs the Vortical Flow Research Laboratory and is associate director of the MIT Testing Tank Facility. Since 1985, he has served as chair of the Ocean Engineering Undergraduate Program. He has been active in the Education Committee of the School of Engineering, and at the Institute level, he has served on the Committee on Student Affairs, and the Committee on Undergraduate Admissions and Financial Aid.



Yue

### Throwing it away?

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

<reuse-request@mit.edu>



# Facilities offices ready to move this Friday

■ By Ruth T. Davis  
Facilities Communications

The administrative offices in the Department of Facilities are moving out of their Building E18 locations on Friday, September 24. Those areas include the Director's Office, the IT Group and the finance and accounting area.

Their new location will be right across Main Street at Three Cambridge Center above the MIT Coop. Although MIT will lease the space for three to four years, the offices are considered on-campus and will have the MIT address of Rm NE20-277.

"MIT is a research university, so we must move to accommodate that research," said Victoria V. Sirianni, director of Facilities. The Center for Learning and Memory led by Professor Susumu Tonegawa will occupy the Building E18 space that has housed Facilities for more than 35 years.

However, not all of the staff in Rm E18-207 will relocate to Building NE20. In October, Design and Construction (DCS) and the Capital Projects Group will move to Building 45, where they will join other Facilities staff who have been there for several months already. Building 45 serves as the central office for the Stata Center project and is undergoing renovations to accommodate the additional Facilities staff.

DCS and the Capital Projects Group will share resources of staff, technology and other office support during the upcoming capital development.

"As MIT enters a period of increased construction activity, we want to ensure that we coordinate and enhance communication with the MIT community," said David Myers, manager of Design and Construction. "Housing DCS and the Capital Projects Group in the same location will allow for a collaboration of activities that will enable us to do that."

Although the Facilities staff on the second floor of Building E18 are moving, the areas housed on the first floor are not. The Operations Center as well as Repair and Maintenance will remain on the first floor of Buildings E18 and E19 for now. Last month the Key Issuance area was also moved from the

second floor to Rm E18-172 to accommodate the incoming research labs.

"Our department has kept pace with technological advances, so we will be able to serve the MIT community even though we will be in decentralized locations," said Ms. Sirianni. "Of course, our ideal situation is to be in a space that accommodates all of our areas." Therefore, over the next few months the department will study its business processes and present a space proposal for one location to the Executive Vice President John Curry.

The telephone and fax numbers for the Rm NE20 staff will be the same as they were in Building E18. The DCS staff will retain their phone numbers but will have a different fax number at their new location that will be announced at a later date.

The architectural firm of Perry and Radford, who also designed the renovation of Building N42 two years ago, was hired to configure the necessary space changes for Rm NE20-277. Renovations to the space were kept to a minimum and include alterations to accommodate two people to an office and one person cubicle spaces with three-quarter-height partitions.

Although the MIT community may encounter some disruption of communication to the Director's Office and the finance and accounting area during the days surrounding the move, Repair and Maintenance will operate business as usual, as will Custodial and Mail Services. Information Systems and the Facilities I/T Group will work over the weekend to ensure that phones and computers in Rm NE20-277 are ready to go on Monday morning.

Facilities will join several other MIT departments housed in Building NE20 including the MIT Sea Grant College Program, the Center for Transportation Studies, and the Department of Brain and Cognitive Sciences.

The building, managed by Boston Properties, also contains businesses not affiliated with MIT. A private security guard is posted in the lobby and requires identification before allowing anyone to enter the building. Therefore, MIT employees visiting Building NE20 should have their ID with them when coming to do business with the Facilities staff.

## Technology and Culture Forum to feature Deutch

On Monday, September 27, Institute Professor John Deutch, former provost and former CIA director, will speak at a Technology and Culture Forum. The title of his program is "Beyond Science & Engineering: Re-Inventing Education for the 21st Century."

The forum will take place at 7pm

in Rm 6-120 and will include a panel of respondents representing various MIT perspectives: John-Paul Clarke (SM 1991, SM, ScD), the Charles Stark Draper Assistant Professor of Aeronautics and Astronautics; Zojeila Flores, a senior in biology; and Kevin Shea, a graduate student in chemistry.

## Retirees Directory reminder

The deadline for inclusion in the 1999-2000 Retirees Directory is rapidly approaching. Members of the Retirees Association should return their membership form (and \$10 membership fee check) as soon as possible to the Association of MIT Retirees, MIT Rm 50-005, 77 Massachusetts Ave., Cambridge, MA 02139-4307.

Retirees who would like to be included in and receive a copy of the directory should send name, address, telephone number, e-mail address and a check for \$5 for Directory-Only membership. Those who elect this level of membership will receive no other mailings from the Association.

## MIT experts guides available

Guides to MIT experts on medically related research and on the environment are available through the MIT News Office.

The 1997-98 MIT Media Guide to Experts on Medicine, Physiology and Health features research descriptions and contact information for almost 200 MIT faculty and scientists.

The MIT Media Guide to Experts on the Environment, published in 1995, features researchers working in fields ranging from air pollution to waste remediation.

The guides are available to members of the media and the MIT community. To obtain a copy, contact Myles Crowley at x3-2700 or <mcrowley@mit.edu>.



Cambridge animal control officer Mark McCabe returns a goose rescued from Rm 10-250 to its home on the Charles River near the Hyatt Hotel on Memorial Drive.  
Photo by Donna Coveney

## 'Goose-napper' leaves animal in 10-250

A white goose, probably one of a small group of birds that lives between the BU bridge and the Hyatt Hotel on Memorial Drive, was placed sometime over the weekend in Rm 10-250. It was removed Monday and returned to its flock by a Cambridge animal control officer.

The adult bird "wasn't harmed, but it was put in a situation it didn't want to be in," said Mark McCabe,

director of animal control for the City of Cambridge, who took the bird out of the building. He said the unusual flock of 15-20 white geese lives year-round in the area because they are fed by someone at the pumping station at Magazine Beach.

The identity of the goose-napper is not known. Mr. McCabe noted that there is a cruelty to animals statute in Massachusetts under which an of-

fender could be fined \$500 and imprisoned for up to one year. In this case, he said, because the bird was not harmed, he probably would have been more interested in educating rather than prosecuting the offender.

"The animal was put in a situation where it was stressed. It was not in its natural habitat, that's for sure," he said.

## Bates to hold open house, symposium

The MIT Bates Linear Accelerator Center will host an open house on Sunday, October 3 from noon-4 pm. Everyone (including family members) is welcome.

Bates is a world-class scientific facility that carries out frontier research in the field of nuclear physics. Many of the 85 scientific and technical personnel will be on hand to greet visitors and show them around the facility. Visitors can explore the huge detectors, OOPS (Out-of-Plane Spectrometer) and BLAST (Bates Large Acceptance Toroid), in the South Experimental Hall; see the control room; and try their hands at a scientific demonstration like Newton's Folly or figure out how we can get an object to roll uphill.

The central research focus at Bates is the study of the fundamental properties of the proton, including its magnetism and shape. A new major detector is under construction that will probe

the fundamental origin of magnetism.

The Bates Laboratory is supported by the US Department of Energy and operated by MIT as a national facility. The lab is located off Route 62 (west) on 21 Manning Road. For directions and a virtual tour of the facility, go to <[http://www-1ns.mit.edu/~eluc/whats\\_new/openhouse.html](http://www-1ns.mit.edu/~eluc/whats_new/openhouse.html)>.

### BATES25 SYMPOSIUM

To celebrate its 25th anniversary, Bates is planning the "Bates25" scientific symposium on the MIT campus from November 3-5. The event will include talks on electromagnetic nuclear physics, where the field is going and where Bates is today. Co-chairs for the event, which has two dozen confirmed speakers, are Dr. William Turchinets, former Bates associate director, and Dr. William T. Donnelly, a senior research scientist in the Department of Physics.

The cost of the event, including a dinner dance, is \$125. For more information and updates, see <<http://mitbates.mit.edu/bates25/>>.

## Science library offers database training

This fall, the Science Library is presenting a series of workshops on the most commonly used online databases for scientists and engineers. The titles, dates and times are listed below. For updates and more information, see <<http://libraries.mit.edu/science/>>.

- Electronic Resources Workshop (no pre-registration required)  
September 23, 4-5pm, Rm 14-0645  
October 27, noon-1pm, Rm 1-115
- Web of Science Workshop—citation databases in science, technology, social science, arts and humanities. Pre-registration is required; contact <[plin@mit.edu](mailto:plin@mit.edu)> or x3-9321.  
October 6, 4-5pm, Rm 1-115  
November 8, noon-1pm, Rm 1-115
- INSPEC workshop—physics, computers and control, electrical engineering. Pre-registration is required; contact <[gcsheerra@mit.edu](mailto:gcsheerra@mit.edu)> or x3-5648.  
October 14, 6:30-8pm, Rm 14-0637  
November 16, 3:30-5pm, Rm 1-115
- Introduction to Beilstein CrossFire and SciFinder Scholar—chemistry. Preregistration is required; contact <[kajosalo@mit.edu](mailto:kajosalo@mit.edu)>. Walk-ins may attend if space available.  
October 22, 2-4pm, Rm 14-0645
- Everything You Want to Know about Patents (no pre-registration required)  
November 30, 3-5pm, location to be announced.
- Uncover Table of Contents Service (no pre-registration required)  
November 17, noon-1pm, Rm E53-220.

## Museum series starts with 'electric' performance

What do a suitcase full of stuffed animals, a seashell, and a nine-year-old superhero have to do with electricity? Families can discover the answer to this puzzle and many more at "The Amazing Adventures of Zap Girl, The Planet's Fastest Superhero." The funny, fast-paced, theatrical performance about the mysteries of electricity takes place Sunday, Sept. 26 from 2-4pm at the MIT Museum.

This "performance science" event—the first of the season's Family Adventures in Science and Technology or F.A.S.T. Sundays—will give families the opportunity to investigate electrical safety, atoms, electrons, circuits and conductors through hands-on activities. Students from the Department of Electrical Engineering

and Computer Science (EECS) will be on hand to talk about developments in the department's Digital Project Lab.

At next month's F.A.S.T., which falls on Halloween, families will explore another facet of EECS with a program about wearable science.

F.A.S.T. Sundays, which debuted last spring with popular programs in aeronautics, materials science and robotics, take place on the last Sunday of each month from 2-4pm. The program is free and open to the public with admission to the MIT Museum, which is \$5 for adults, \$2 for seniors and students, \$1 for children under 18, and free with an MIT ID. For more information, call the hotline at x3-4444 or see the museum's web site at <<http://web.mit.edu/museum/>>.



# Find your arts desires through wide range of MIT programs

As the school year begins, everyone focuses on class schedules, syllabi and textbooks, but MIT community members can take a break from problem sets and computer screens and take advantage of a rich assortment of creative pursuits, performances and exhibitions—nearly all of which are free.

"There's a wonderful synergy at MIT among art, science, technology and the creativity that is at the center of MIT's identity," said Mary Haller, director of arts communication in the Office of the Arts, established to oversee, coordinate, support and facilitate arts activities.

## VISITING ARTISTS

Each year, hundreds of musicians, theater artists, writers, poets, visual artists and architects visit MIT through various departments and programs. They're here as part of a series or in a one-time special event—as long-term artists-in-residence or discrete recitalists—teaching or performing or sometimes both.

The music and theater arts section's Guest Artist Series includes concerts by the Miro String Quartet (October

22), the St. Petersburg String Quartet (October 30) and the Philharmonia Orchestra of Yale (November 7).

Performance artist, social and cultural critic, author and NPR commentator Guillermo Gómez-Peña and interdisciplinary artist Roberto Sifuentes will be visiting artists at MIT (October 28–November 1 and January 2000) and will both present the 1999 Abramowitz Memorial Lecture on November 1.

A number of artists-in-residence are continuing longer-term residencies at MIT: kinetic sculptor Arthur Ganson, in his fifth year at MIT, works with students in mechanical engineering; also in her fifth year at MIT, science photographer Felice Frankel pursues her "visualizing science" work with students and faculty; holographers Susan Gamble and Michael Wenyon begin their fourth year of digital photography and holography at Haystack Observatory, working to-

wards a spring exhibition at the Compton Gallery.

## FREEBIES FROM CAMIT

The Council for the Arts at MIT (CAMIT) offers MIT students free tickets to some of the area's finest music, theater and dance events. Students this year have already been to the Huntington Theater for *Mrs. Warren's Profession* and are now signing up for trips to the American Repertory Theater for *We Won't Pay! We Won't Pay!* and *Ivanov*, "The Soul of Mbirá" and an evening with David Sedaris. Watch for ads in *The Tech* and see <<http://web.mit.edu/arts/excursions.html>> for announcements.

The Council for the Arts also sponsors a program with the Boston Symphony Orchestra whereby MIT students can obtain free tickets for selected concerts during the BSO's Symphony Hall season.

In addition, it funds MIT's mem-

bership with Boston's Museum of Fine Arts, so students can receive free admission just by showing their MIT ID at the museum. Those who work at MIT can come to the Office of the Arts (Rm E15-205) to borrow one of eight membership passes to the MFA for free admission.

## DO YOUR OWN THING

You don't have to leave campus to get an "arts fix." The Student Art Association offers instruction, studio experience and 24-hour facilities for artists working at all levels in a varied and extensive range of media.

In performing arts, MIT has nearly two dozen established music groups,

such as the Symphony Orchestra, Gamelan Galak Tika (New England's only Balinese gamelan orchestra), chamber ensembles, and numerous a cappella ensembles. In fact, MIT has three substantial programs in world music: Gamelan Galak Tika, MITCAN (African music and dance) and MITHAS (classical performing arts of South Asia).

Theater productions range from classic interpretations by the Shakespeare Ensemble to innovative stagings by the Musical Theatre Guild to improvisational comedy by Roadkill Buffet to original student-written productions in the Playwrights-in-Performance series.

## Arts at MIT

## Helen Elaine Lee reads from her new novel

Although Helen Elaine Lee, assistant professor in the Program in Writing and Humanistic Studies, is on leave from her teaching duties this fall, she will return to the Institute for an authors@mit event to read from her new novel, *Water Marked*, a story of two estranged African-American sisters who reunite in a search to understand their father and their family history. The reading will be Tuesday, Sept. 28 at 5:30pm in the Humanities Library.



Lee

Professor Lee's own family history determined her career path. Her mother, a literature professor, and her father, a defense attorney, both had a love of language. Professor Lee began writing after she graduated from Harvard Law School, composing stories and her

first novel during her nine years as a practicing lawyer.

"Both my parents had been passionate about their work," she said. "I decided that law was a wrong turn for me—I just didn't have that passion for it."

Professor Lee observes that in this sense, her life mirrors the philosophy of one of her *Water Marked* characters, who says it's "most important to find life's 'quick'—the place where you feel most plugged in and alive."

"Because law was not my gift, I looked to see how else I could participate in the world," Professor Lee said. "I found that writing made me feel most alive. For me, writing was how to find the 'quick.'"

"In everything I write, I'm interested in how people make art out of loss, in risk-taking and renewal," she said.

Professor Anita Desai, a colleague in the Program in Writing and Humanistic Studies, wrote that in *Water Marked*, Professor Lee "blurs the boundaries between prose and poetry,

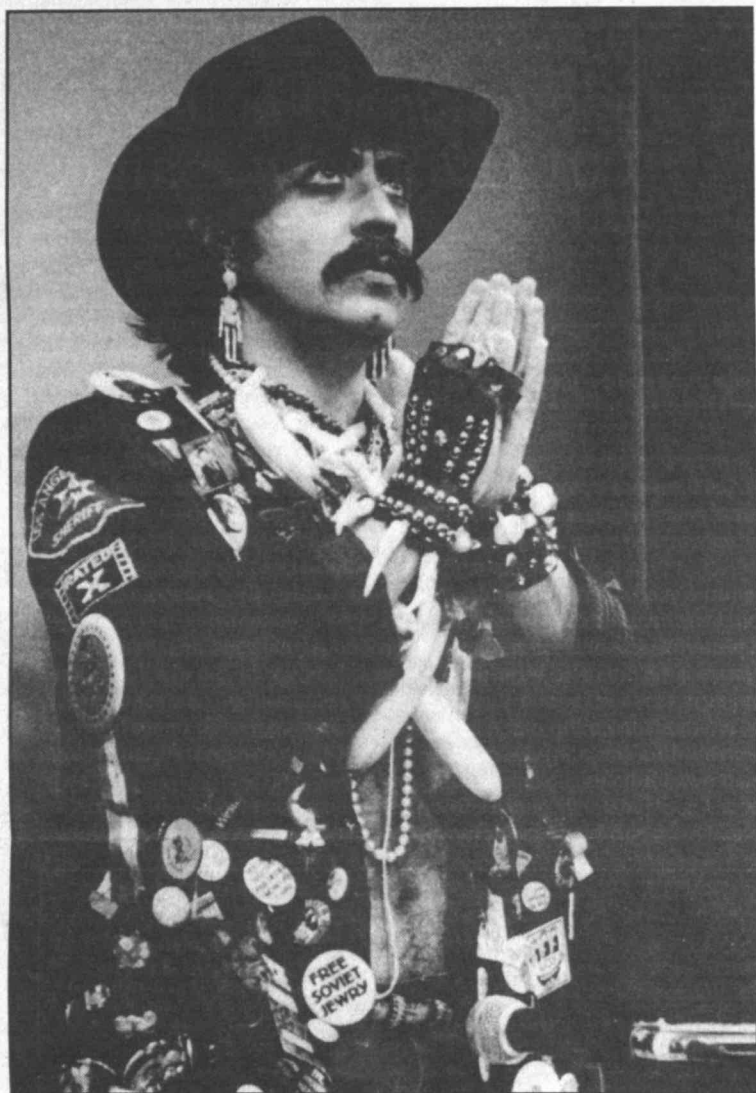
life and art."

Publishers Weekly called *Water Marked* "moving, infused with eloquent imagery and emotional weight."

Following a term off for maternity, Professor Lee is on leave on an Old Dominion Fellowship, which is awarded to nontenured professors in their third or fourth year of appointment to provide them with a paid semester's leave to pursue research. Eligibility is restricted to nontenured faculty members working on humanistic subjects in anthropology/archaeology, foreign languages and literatures, Science, Technology and Society, history, literature, music, philosophy and writing. She will return to MIT in spring 2000.

Authors@mit is sponsored by the MIT Press Bookstore and MIT Libraries and cosponsored by the Program in Women's Studies. For more information, call x3-5249, send e-mail to <[authors@mit.edu](mailto:authors@mit.edu)> or see <<http://mitpress.mit.edu/bookstore/events>>.

Lynn Heinemann



Performance artist Guillermo Gómez-Peña, as Border Brujo, in a 1989 performance in San Diego. Photo by Becky Cohen

## 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

### September 22-October 3

#### MUSIC

**CANCELLED—SONOS\***—Sept 24. The "hands across the river" ensemble includes MIT Professor Marcus Thompson, viola and Senior Lecturer David Deveau, piano and BU's Bayla Keyes, violin and Michael Reynolds, cello. 8pm, Killian Hall (14W-111). x3-2826.

**CANCELLED—Affiliated Artist Concert\***—Sept 25. Margaret O'Keefe, soprano, Carlos Archuleta, baritone. Concert of Spanish music. 8pm, Killian Hall. x3-2826.

**MIT Women's Chorale First Rehearsal\***—Sept 30. 7:45-10pm in the Emma Rogers Rm (10-340). New members welcome through Oct 14. Jennifer Recklet, x3-1614.

**Mala Chandrasekhar: Carnatic Flute\***—Oct 3. S. Indian flute. MITHAS (MIT Heritage of South Asia) concert. Also: H.N. Bhaskar, violin and Madipakkam Suresh, mridangam. Winner of Kalaimamani Award from Tamil Nadu Government, South Indian flutist Mala Chandrasekhar, a pioneer in women's music and playing the flute in concert, is on her first American tour. \$15; \$12—students & seniors, MITHAS & New England Hindu Temple members; \$10 MIT students. 4pm, Wong Auditorium (E51). x8-7971 or <<http://web.mit.edu/mta/mithas/>>.

**Singers Needed\*—Mondays.** The Meridian Singers, MIT's mixed classical and madrigal chorus, is recruiting for all parts, especially tenors and basses. Must be able to sing well and carry your part in a mixed SATB chorus. Performs at various times during the year. Repertoire consists of madrigal, classical, and early as well as contemporary folk music. Membership comprised of MIT staff and students and is open to the public. Noon, Rm 4-148. Nancy Howells, dir, x3-1948 or <[chowells@mit.edu](mailto:chowells@mit.edu)>.

**MIT Guild of Bell Ringers\***—Change ringing on hand bells. Beginners always welcome. Will also ring for occasions. Meets Mondays, 6:30pm, 2nd floor balcony of Lobby 7. Roberta Young, x3-3573, <[rey@mit.edu](mailto:rey@mit.edu)> or <<http://web.mit.edu/bellringers/www/>>.

#### READINGS

**authors@mit: Helen Elaine Lee\***—Sept 28. The assistant prof. in the Program in Writing and Humanistic Studies reads from her new novel, *Water Marked* (Scribner). authors@mit is sponsored by The MIT Press Bookstore and MIT Libraries; cosponsored with Program in Women's Studies. 5:30pm, Humanities Library, 2nd floor Hayden Memorial Library. x3-5249, <[authors@mit.edu](mailto:authors@mit.edu)> or <<http://mitpress.mit.edu/bookstore/events>>.

#### EXHIBITS

**List Visual Arts Center\* (E15): Annual Student Loan Art Exhibition.** Annual exhibition featuring over 300 framed contemporary prints and photographs from MIT's permanent collections. Through the LVAC's unique Student Loan Program, the original signed prints, artist-designed posters, and

photographs will all find homes in the dormitories and work spaces of MIT students at the close of the exhibition. Works include those by 20th century artists Berenice Abbott, Alexander Calder, Jasper Johns, Robert Motherwell, and Andy Warhol. pick-up: Sept 22-23; free-for-all: Sept 24. Daily 12-6pm, List Visual Arts Ctr, E15. x3-4680.

**MIT Museum\* (N52): Flashes of Inspiration: The Work of Doc Edgerton.** Long-term installation celebrates the life and work of Prof Harold ("Doc") Edgerton (1903-1991), whose work with stroboscopic light redefined photography. Doc first came to MIT as a graduate student and remained for 60 years, as professor in the Department of Electrical Engineering and Computer Science. **Ongoing Exhibits.** *Gestural Engineering: The Sculpture of Arthur Ganson*; *LightForest: The Holographic Rainforest*; *Holography: Artists and Inventors*; *MIT Hall of Hacks*; *Light Sculptures by Bill Parker*; *Math-in-3D: Geometric Sculptures by Morton C. Bradley, Jr.*; *MathSpace*. 265 Mass Ave. Tues-Fri 10-5, Weekends 12-5. x3-4444.

**"Family Adventures in Science and Technology" or "F.A.S.T. Sundays"**—Sept 26. Families work with MIT students and staff in interactive activities to explore the mysteries of science and technology. No reservation required. Free with the price of Museum admission. F.A.S.T. Sunday takes place on the last Sunday of every month. 2-4pm, MIT Museum. x3-4422.

**Compton Gallery—Dreams in Brick and Mortar: MIT, Alvar Aalto, and the Design of Baker House.** Exhibition celebrating the 50th anniversary rededication of the Finnish architect's masterpiece of student life—to this day, the most popular dormitory at MIT. **Opening reception: Sept 30, 5-7pm.** Compton Gallery (Rm 10-150). Sept 30-Jan 28. Weekdays 9-5. Special weekend view-

ing: Oct 2-3, 16-17 and Nov 6-7 from 10-5pm. x3-4444 or <<http://web.mit.edu/museum/exhibits/compton.html>> or <<http://web.mit.edu/bakerhouse/>>.

**Hart Nautical Gallery—Deep Frontiers: Ocean Engineering at MIT.** Long-term exhibit exploring the latest advances in underwater research. Opens March 19. *Ship Models: The Evolution of Ship Design.* Ongoing. Daily 9am-8pm. x3-5942.

**The Dean's Gallery—Material Shape.** Doug Bosch's works focus on the raw essence and behavior of materials. Nylon, wax, honeydew, pollen, plant bristle and linseed oil are combined through the media of sculpture and photography to create invented, organic forms and images. Bosch's attention to materials reveals a structure and depth which is romantic in style and reminiscent of early scientific experimentation. Sept 15 through Nov 4. The Dean's Gallery, Sloan School of Management, E52-466. Weekdays 9-5pm. x3-9455 or <<http://web.mit.edu/deans-gallery/www/>>.

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

**Strobe Alley—Never Stop Learning: The Life and Legacy of Harold Edgerton.** Photographs, instruments and memorabilia documenting the life of Harold Edgerton, inventor of the strobe light. Bldg 4, 4th floor corridor. x3-4444.

**Institute Archives and Special Collections: Object of the Month: The Telephone Banquet Program.** Technology Review called the alumni banquet of June 14, 1916, "the greatest celebration ever held by any institution of learning in the world." Through Sept

30. Hallway exhibit across from Rm 14N-118. x3-5136.

**Rotch Library: The Coincidence of Opposing Extremities: Mathematico-Architectural Planning Principles of the Central European Baroque Church.** Exhibition on architectural design, using photographs of central European churches. Through Oct 15. Rotch Library, Rm 7-238. x8-6693.

#### OTHER

**Arts Colloquium\*\*—Sept 24.** All MIT faculty and arts staff are invited to hear Laura Harrington, lecturer in the Theater Arts Section speak on her work at 12noon. Lunch will be served; reservations required. For more information, contact Laura Moses (x3-9821 or [laura@mit.edu](mailto:laura@mit.edu)) by Sept 21. One in a series of arts colloquia organized by Associate Provost for the Arts Alan Brody.

**Arts Grants Deadline\*—Sept 24.** First deadline for 1999-2000 Council for the Arts funding. Forms available at the Office of the Arts, E15-205. x3-4005

**Interpreting Aalto: Baker House and MIT\*—Oct 1-2.** Two-day Dept of Architecture conference celebrating the restoration, rededication and 50th anniversary of Baker House. MIT students \$35; non-MIT students \$50; MIT faculty and staff \$50; all others \$75. Credit card payments may be faxed to x8-7005 or register on-line at <<http://architecture.mit.edu/events/aac/>>. Info: x3-1700.

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

## Graybiel studies habits

(continued from page 1)

things like reward signals. As an animal is rewarded for learning new behavior, changes occur in the neurons of its basal ganglia.

"Reward is incredibly powerful and drives a lot of the learning we do," she said.

New scanning methods show that this deep section of the brain lights up when we develop and express sequential motor acts, and also in response to rewards. With the new ability for researchers to see the brain's electrical activity while learning is in progress, they can actually see patterns of activity change permanently after learning takes place.

### IT'S HABIT-FORMING

Learning a habit is different from other kinds of learning: often we are not aware of developing a habit, and we develop it slowly over time. "The process doesn't seem to go in reverse, or else we don't have access to the means to reverse it," Professor Graybiel said.

Unlike an association between an object and a word ("Oh, so that's a blue jay!"), learning a habit is very slow. It takes many repetitions, often reinforced with positive feedback, before an action or series of actions become a habit.

Strong positive or negative motivators help develop or break habits. Positive feedback works better than negative. "The brain has an absolutely fabulous system for getting reward signals," said Professor Graybiel. The system is so sensitive that researchers have seen nerve cells fire in response to a single word, evoking a craving long after a habit has been kicked.

Negative feedback, like feeling sick after eating or drinking something, can nip a bad behavior in the bud. In certain behaviors, like drinking alcohol, consequences such as a hangover occur too long after the original binge to do much good as a deterrent.

Many receptors are housed in the basal ganglia, which draw neurotransmitters such as dopamine like a magnet. And like a strong magnet, these receptors don't easily let things go. Once the basal ganglia have been exposed to a powerful addictive agent, they seem to recognize it forever.

Graybiel and her colleagues are looking at how long this kind of response lasts. They have found that even a single dose of an addictive drug will evoke a physiological response after three weeks of abstinence similar to the response that it evoked after a few days. They hope to study the response after as much as a year of withdrawal.

While humans and animals have inborn pattern generators (people automatically swing their arms when they walk like their ape ancestors; birds are

born knowing how to peck), humans can develop these automatic behaviors on their own.

When the light turns green, we position one foot to press on the gas pedal, tighten our grip on the steering wheel and get ready to go, even though there is no evolutionary precedent for driving. "The brain is so malleable, we can make our own pattern generators," Professor Graybiel said.

She suspects, however, that the more fine-tuning aspects of physical habits are accomplished elsewhere in the brain. While pounding out *Chopsticks* on the piano may become automatic, caressing the keys to produce just the right nuances of a Chopin prelude is not the same function, she says.

What we're doing when we learn a new habit may end up triggering the habit itself because, she said, as we develop habits we develop "chunks" of behavior. The process of walking, for instance, involves a series of movements, not just an isolated lifting or lowering of a foot.

When we repeat a behavior, physiological changes may occur not only in the parts of the brain responsible for motor control but also in the parts that deal with more cognitive functions.

The basal ganglia are the only places in the brain to deal with both physical and cognitive actions simultaneously, leading researchers to speculate that the way we program movements and the way we program thoughts may be deeply related.

### RESPONDING TO THE CALL

When animals see a light flash or hear a beep when they get something to drink, they come to associate the light or sound with quenching their thirst. Researchers can see physical changes in their brains as the habit forms. "After a week, you begin to see a change," Professor Graybiel said. "The neurons in the striatum actually change what they respond to. The brain changes when you pick up a simple habit."

While nerve impulses travel at lightning speed, genes take a little longer to change, but they too change in response to stimuli. But because brains are as individualized as our fingerprints, no two brains have an identical response to an identical stimulus. While it may take one person one week to develop a habit, good or bad, it may take another person considerably more time.

"Learning more about dynamic changes that occur in the brain as we make and break habits has great therapeutic potential. We may learn, for example, what a harmless habit has in common with an addiction and what is different about the two. This is a subject that interests us all," Professor Graybiel said.



Associate Professor Dennis M. Freeman and RLE colleagues have devised methods to "see" the motions of cells in the inner ear.

## Minute ear-cell movements visualized

(continued from page 1)

processing worked exactly as planned, but it didn't seem to help people with hearing loss. Frustrated by the setback, Professor Freeman decided to take a month off to study how the ear worked.

"I wanted to work on figuring out how the ear processed sound, with the goal of providing information that would help engineer better hearing aids. It turned out that the answers to my questions were hard to find, and it became a career in itself to understand the physiology."

"I really wanted to understand the neural code for sound, but that was already known to be quite complicated. Evidence suggested that motions of cells might be important," Professor Freeman said.

At this point, his focus shifted to physiological modeling to the hydrodynamics of sensory cells in the inner ear. He analyzed mathematical models to determine how the mechanically sensitive parts of the sensory hair cells should move. However, after the models were analyzed, there were no data available to test the theory. So the next step was to figure out how to get experimental data.

To measure motions as small as nanometers, Professor Freeman and his colleagues use video microscopy. The development of the charge-coupled device camera brought high quality and video together, but motions in the ear are much smaller than the pixels of a camera. Working on an entirely different class of problems, Berthold Horn and his colleagues at the Artificial Intelligence Lab developed powerful algorithms to determine motions from video images, algorithms that can reliably measure motions much smaller than a pixel.

Only one problem remains. The interesting motions of sensory cells in the inner ear are at audio frequencies and are faster than the fastest commercial cameras. To overcome this problem, Professor Freeman uses stroboscopic illumination to slow the apparent motion. The result is slow-

motion, three-dimensional movies of inner ear motions.

He and his group have demonstrated motion measurements with much greater precision than had previously been thought possible. Using methods similar to their auditory research, they have extended their research into the realm of microelectromechanical systems (MEMS), including micro-fabricated silicon structures that measure acceleration and angular velocity.

### THE FUTURE

The invention of the transistor made it possible to make much smaller electronic devices than had previously been possible. The development of very large scale integration (VLSI) is perhaps even more significant. It is inconceivable that one could fabricate a modern computer with discrete components. MEMS are allowing the large-scale integration of not just electronic, but also mechanical, optical and fluidic devices.

"What if we could make a machine with a million moving parts? Will VLSI have the same enormous effect on mechanics, optics, and fluidics that it had on electronics?" Professor Freeman said. "I suspect yes. After all, the inner ear is a biological VLSI micromechanical system. Why shouldn't we use the same ideas in making artificial systems? And our toolbox is getting bigger. It is inevitable that we will learn to assemble biological parts into artificial machines."

Today, molecular biologists can determine the structure of an ion channel and its exact sequence of amino acids. Then they can manipulate and change its structure, and figure out the relation between a molecule's structure and function. This biological endeavor looks a lot more like engineering than did any aspect of biology just 10 years ago.

Professor Freeman's research is sponsored by the NIH (the hearing project) and DARPA (the MEMS project).

## Faculty updated on Task Force, residence system, capital projects

(continued from page 6)

### Recognize student/faculty community involvement

- Dr. Kolenbrander has been appointed associate dean in ODSUE.
- Continued support for LeaderShape. Make residence system an integral part of the education program
- Integrate housing, dining, the first-year program and orientation.
- Residential System Steering Committee (RSSC) report.
- Founders Group created for new undergraduate residence.
- Actions by Committee on Student Affairs to stimulate new initiatives.
- Orientation revised around the "Navigating the Freshman Year" theme.
- Phase in a system to house all undergraduates in residence halls during the first year
- Decision to house all freshmen on campus in 2001.
- Planned construction of a new undergraduate residence.
- Creation of the RSSC.
- Involve undergraduates, graduate students and faculty in shared experience during orientation
- Pre-orientation programs expanded.
- First-night welcoming dinner.

- Residence Midway.
- Killian Court freshman picnic revived.
- Create groups of 10 freshmen with upperclass orientation leaders.
- Upgrade academic expo.
- Encourage better faculty-student interaction in housing system
- Incorporate five faculty units in new undergraduate residence.
- A commitment to develop faculty housing adjacent to west campus over time.
- New initiatives to be brought forward by the Founders' Group.
- Encourage community interaction through the dining system
- Richard Berlin named to newly created position of dining director.
- Commitment to upgrade facilities.
- Central role planned in new residence.
- Revive "Take a Professor to Lunch" program.
- Attractive and convenient sites needed for community interaction
- Enhance spaces in new facilities.
- Coffee/juice bar adjacent to exercise area in planned sports and fitness center planned.
- New performing arts facilities planned for Wiesner Building.
- "Student Street" included in Stata

- Center plans.
- Artificial turf field completely refurbished.
- Create groups of 10 freshmen with upperclass orientation leaders.
- Fund activities that encourage community interaction
- Student activities funding tripled.
- Request process streamlined.
- Funds expanded for graduate student orientation.
- Expanded planning for large-scale Institute functions.
- Education and research on campus
- Focus international and distance learning activities on enhancing educational opportunity at MIT.
- Created Office of the Chancellor to focus high-level attention on integration of educational, research and student life activities across schools and departments.
- Information technology and the library system
- Expand technology-related library staff.
- Expand digital resources available through the libraries.
- Create strategic planning group involving the president, provost, chancellor and those they may designate
- Group formed and has been meeting regularly with the Executive Vice President since last year.

- Process for departmental planning sharpened by chancellor and provost; budget process separated from strategic planning.
- Strengthen faculty governance by streamlining committee structure to support educational triad
- Continue closer coordination between ODSUE and Committee on the Undergraduate Program.
- Continue tighter coupling between faculty governance initiatives and administration financial planning.

### RESIDENTIAL PLAN

Dean Kolenbrander reviewed the process followed by the Steering Committee from the design contest last January through the final report issued this month. He said the report and minutes from subsequent public discussions of the proposals will be presented to Chancellor Bacow on October 1.

"You can't say the students feel one specific way, or the faculty feels this way," he said. "There is a wide range of opinion."

### CAPITAL PROJECTS

Vice President Curry reviewed the progress and status of projects in

progress, related projects and projects in development.

**Undergraduate residence**—Target occupancy date: 2001. Architect: Steven Holl. Site: Vassar Street. To house 350 students and include suites for five housemasters and/or visiting faculty.

**Stata Center**—Target date: 2003. Architect: Frank O. Gehry. Site: Building 20. Halfway through design development. 300,000 square feet. Site work underway.

**Sports and Fitness Center**—Target date: 2002. Architect: Kevin Roche. Site: behind Stratton Student Center. New swimming pool, exercise facility. Construction drawings in works.

**Media Laboratory extension**—Target date: 2003. Architect: Fumihiko Maki. Site: south of Wiesner Building. Will include significant space for performing arts. Schematic design underway.

Related projects include a central utility plan expansion to provide chilled water, improvements to Vassar Street, a new Albany Street garage and Campus Plan 2000. Projects in programmatic development include a graduate student residence, a neuroscience complex and a new building for the Sloan School of Management.