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Rene White, a graduate student in biological oceanography and an Ida Green fellow, digs for soft-shell clams (*Mya arenaria*) to study a blood disease that occurs in the clam population and that some equate with a type of leukemia. Clams are dug, identified as having the disease, then replaced in their natural habitat and monitored over time to determine how the disease progresses. Does it kill? How does it impact reproduction? Rene and colleagues also look for bivalve clams (*Solemya velum*), which have no digestive tracts. They hope to find out how nutrients are assimilated in the absence of a digestive tract. This would assist in forming a model system for similar creatures recently discovered living in deep-sea hydrothermal vent systems.

—Photo by Donna Coveney

No Tech Talk

Tech Talk will not be published October 11 because of the Columbus Day holiday. The Institute Calendar in the October 4 issue will cover the period of October 4-22.

The deadline for submitting calendar listings, notices and classified ads will be, as usual, noon Friday, Sept. 29.

Kidspace

Technology Children's Center has three full-time openings available for children aged two years, nine months to five. For more information, call x3-5907.

EAPS' Lindzen is critical of global warming prediction

By EUGENE F. MALLOVE

News Office

Dire predictions of global warming through the greenhouse effect were roundly criticized last week by Professor Richard Lindzen of the Department of Earth, Atmospheric and Planetary Sciences.

"I argue that the greenhouse effect does not seem to be as significant as suggested," Professor Lindzen said. He spoke last week before an audience of 250 scientists at the Alexander von Humboldt Foundation Colloquium at Kresge Auditorium.

"I personally feel that the likelihood over the next century of greenhouse warming reaching magnitudes comparable to natural variability seems small," he said. "And I certainly feel that there is time and need for research before making major policy decisions."

Professor Lindzen characterized the question of possible global warming as "a region in which the uncertainty is vast." He then proceeded systematically to expose major difficulties with projections of global climate.

Has warming already occurred?

What does the temperature record already show about global warming? Do the data conclusively indicate about one-half degree centigrade (plus or minus 0.2 degree) global warming over the last century, as some proponents suggest? No, contends Professor Lindzen.

Professor Lindzen cited many problems with the temperature records, an

example being the representation of the Atlantic Ocean with only four island measurement sites. Urbanization also creates problems in interpreting the temperature record, he said. There is the problem of making corrections for the greater inherent warming over cities—in moving weather stations from a city to an outlying airport, for example.

"The trouble with many of these records," he said, "is that the corrections are of the order of the effects, and most of us know that when we're in that boat we need a long series and great care to derive a meaningful signal."

Nor, he said, was the temperature data collected in a very systematic and uniform way prior to 1880, so comparisons often begin with temperatures around 1880. "The trouble is that the earlier data suggest that one is starting at what probably was an anomalous minimum near 1880. The entire record would more likely be saying that the rise is 0.1 degree plus or minus 0.3 degree."

He referred to MIT Professor Reginald Newell's work that suggests that between the 19th century and the present there appears to be no change in ocean surface temperatures. Moreover, the record for the 48 contiguous states shows no evidence for warming over the past century.

"As far as the data goes, I would argue that we really don't have the basis for saying it's a half degree plus or minus 0.2. That is false use of science. What we have is data

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Science Smarts colloquium set

An MIT Colloquium on "Science Smarts: The Scandal of Scientific Illiteracy" will be held Monday, Oct. 16, the Institute Colloquium Committee has announced.

The speakers will be President Paul E. Gray, F. James Rutherford, chief education officer for the American Association for the Advancement of Science, and Sandra G. Spooner, assistant superintendent of schools in Cambridge.

Presentations will begin at 4pm in Kresge following a reception and refreshments in Kresge lobby at 3:15pm. A short question-and-answer period will follow.

At about 5:45pm, students and invited guests will return to student living groups for dinner and more discussion on the subject.

The committee, in announcing the topic, said that while there is a growing national consciousness of the need for reform in science and math education, the approach to that goal has been subject to debate and controversy.

The committee said Dr. Gray, "as head of the premier institution of scientific and technological learning, speaks with authority of what impact MIT and its students can have." Mr. Rutherford of the AAAS is director of Project 2061, named for the date of the return of Halley's Comet. The project is taking a long view of science education with a goal to detailed reform no sooner than the end of the next decade. Ms. Spooner, the committee said, "knows the challenge of tackling scientific illiteracy at the local level where teachers encounter students in the classroom."

For more information and information on how to become part of a living-group dinner/discussion, contact Donna Friedman, x3-9762.

The MIT Colloquium is a semiannual event supported by student efforts focused in the Interfraternity Conference, the Dormitory Council, the Student Committee on Educational Policy and the Graduate Student Council.

Hurricane's fury seen to have upper bound

For those who suffer damage or injury in a hurricane it may not be particularly consoling, but a definable upper limit exists to such a storm's intensity. So says Professor Kerry A. Emanuel of the Department of Earth, Atmospheric and Planetary Sciences, whose research specialty is hurricanes.

"We know from theory that hurricanes cannot get arbitrarily intense," says Professor Emanuel. "In fact, of the hurricanes that form, only a very small percentage achieve this upper limit—for reasons that are not understood. But occasionally one will. Gilbert was an example, Camille back in 1969, and Alan was pretty close in 1980."

Moreover, he says, "If we actually calculate this upper bound from environmental conditions in the present climate and look at a map of hurricane intensity, the two

distributions fit quite well."

The upper bound of intensity can be measured by the central pressure deficit [below normal pressure] within the hurricane. Average surface atmospheric pressure is about 1,015 millibars. Currently the lower limits are around 880 millibars in the Gulf of Mexico and the western Pacific. Most hurricanes don't come near this limit, though Gilbert was 885 millibars.

"The pressure deficit is correlated with the square of the wind speed," says Dr. Emanuel, "which in turn is a measure of the force on objects."

Professor Emanuel says that the limit of hurricane intensity changes as a function of the ocean temperature and of the temperature at the tropopause, the boundary between the troposphere and the strato-

sphere, which is about 15 kilometers up.

Professor Emanuel published an article in *Nature* about two years ago in which he demonstrated the sensitivity of the upper limit on hurricane intensity to climate change in general. In his view, computer projections of global warming are very uncertain, but he concludes: "If the tropical ocean temperatures were to go up a few degrees centigrade as some projections suggest, then the upper limit on the intensity of hurricanes will go up appreciably."

If the tropical ocean temperatures were to increase by two or three degrees centigrade, the minimum hurricane pressure would go down as low as 800 millibars in the Gulf of Mexico. "The pressure drop would also be about 50 percent more, and there-

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CEHS seeks grant proposals

The Center for Environmental Health Sciences (CEHS) has announced the availability of funding for MIT faculty interested in conducting feasibility projects related to the environmental health sciences.

Professor William G. Thilly, director of the cross-disciplinary research center established to explore how hazardous substances in the environment affect human health, said the environmental health sciences "include those parts of established disciplines that are focused on discovering which interactions between humans and chemicals, radiation, or biologicals are harmful to health."

The Center's faculty are continuously exploring ways to attract new groups throughout the Institute to participate in research and teaching efforts through the Center. To that end faculty from a variety of disciplines are encouraged to apply for grants of up to \$10,000 per project and to test out new ideas.

In the past the CEHS has funded researchers from the chemical engineering, chemistry, civil engineering, physics, materials science and engineering, and biology departments. Recent projects which were funded include the development of a controlled-temperature air sampling device through the Department of Chemical Engi-

neering, which has proven to be extremely effective in collecting volatile components of combustion exhaust, urban air and indoor air, Professor Thilly said. Future applications of this device may allow the characterization of low molecular weight volatile compounds in human exhalation.

Individuals interested in applying for funding for this fiscal year should forward a one-page description of a proposed research project and a detailed budget of support required to complete the proposed work no later than Oct. 15 to: Professor William G. Thilly, Center for Environmental Health Sciences, Building E18, Room 666.

The grant which supports these projects is received from the National Institute of Environmental Health Sciences, and runs from April 1, 1989 through March 31, 1994. Funds which are awarded during the current fiscal year must be utilized by the end of March. The Administrative Office for the Center may be contacted at x3-6220 if further information is needed.

'Information society' to be discussed

A panel of computer industry leaders and commentators will meet at MIT at 7:30pm Thursday, September 28, for a public discussion of the choices we face in creating an "information society."

The discussion will be held in Rm. 10-250.

The panelists will be Mitch Kapur, founder of Lotus Development Corp.; Esther Dyson, well-known computer industry analyst and editor of *Release 1.0*; Shoshana Zuboff, Harvard Business School professor and author of *In the Age of the Smart Machine: The Future of Work and Power*, and Paul Starr, Princeton University professor and Pulitzer Prize-winning author of *The Social Transformation of American Medicine*.

Thomas W. Malone, Patrick J. McGovern Professor of Information Systems at the MIT School of Management and director of the new MIT Center for Coordination Science, will moderate.

The MIT Center for Coordination Science and the Institute for the Study of Human Knowledge are sponsoring the discussion, which is part of a series of symposia and other activities to increase understanding of how computers and other information technologies may affect people's lives, work, and social relationships. According to Professor Malone, "There are probably no inevitable 'impacts' of computers on people. Instead, we as a society have choices to make about how we use this powerful new technology."

Rape Awareness Week events planned

"Shame," a film about a woman who befriends a teenage girl who has just been raped, will be shown Monday, Oct. 2, to kick off MIT Rape Awareness Week, October 2-6.

Daily events for Rape Awareness Week, sponsored by the MIT Association for Women Students, are as follows:

Monday, October 2—"Shame," 7:30pm, Rm 6-120. A discussion will follow.

Tuesday, October 3—"It Can't Happen Here," a panel discussion on the realities of date rape, 5pm, Rm 26-100. Panelists are Ann Russo, a lecturer in the Women's Studies Program, Cheryl Vossmer, an officer in the Campus Police, and a representative from the Boston Area Rape Crisis Center.

Wednesday, October 4—A men's-only seminar on rape led by Men Against Sexual Assault, 6:30pm, Rm 6-120, and a women's-only class on self-defense, 7pm, DuPont Wrestling Room (wear loose clothing).

Thursday, October 5—Rally on the steps of the Student Center, 6:30pm, followed by a women's Take Back the Night march and a men's candlelight vigil.

Friday, October 6—Rock against Rape, a 9pm dance at the Student Center. Admission is \$3; proceeds will go to local rape crisis centers.

Senior develops standing device

By CHARLES H. BALL
News Office

Penny L. Plummer, an MIT student from Fort Worth, Tex., took on her senior project as a technical challenge in mechanical engineering. But the real goal was never far from her mind.

"The psychological effect of being in a wheelchair can be very harmful," she explained. "People are always looking down at you. A vertical wheelchair not only raises the person, it also raises their self-esteem by enabling them to see people at the same eye-level."

Now, several months after she began, Ms. Plummer has designed and built a prototype of a "standup mobility device" that would enable a disabled person to move about freely in a near-standing position in such places as the home, office or classroom.

"It's still in the development stage, it's not a finished product by any means," she said recently while demonstrating the device in a basement mechanical engineering laboratory at MIT. "But it's coming along and we hope to test it with disabled people this spring, incorporate their suggestions and perhaps have a finished working model by the end of the school year."

Ms. Plummer's device doesn't look anything like an ordinary wheelchair. Nor is it really intended to take the place of a wheelchair.

Its purpose is explained by Ms. Plummer's faculty advisor for the project, Professor Ernesto E. Blanco, who consults both at Beth Israel Hospital and Massachusetts General in Boston and is widely recognized for his work in microsurgery instrumentation.

"We're not talking about a wheelchair in the normal sense of the word, that enables a disabled person to get about freely, crossing streets, for example," he said. "The idea is to provide mobility for people who normally stand up while working."

"Virtually everything in our society, except for desks, operates on the premise that people usually stand while working. This device is for people who are disabled and who must work at normal height. It reduces the effect of the disability tremendously.

"I'm thinking of teachers, for instance, who want to use the blackboard while lecturing, or store clerks who can reach shelves more easily, or housewives, particularly in the kitchen," he continued. "I was at a concert this summer given by the violinist Itzhak Perlman, who is disabled, and this device would allow him to stand in public while playing if he desired to do so."

Ms. Plummer added, "Its most effective use might be in offices, where the appearance of physical disability can be awfully distracting and put someone at a disadvantage."

For the device designed by Ms. Plummer, a five-wheel assembly taken from a desk chair serves as the base for a telescoping pole topped by a bicycle seat. The user, strapped into the device at the waist, and with the feet also placed in straps, propels the device using two four-pronged canes, also adjustable as to length.

The prototype does not yet automatically shift from a sitting to a standing position, but Ms. Plummer plans to accomplish that shortly using either pneumatic cylinders or a cable system. She's also developing a braking system to stabilize the chair for getting into and out of it.

At present, she said, the chair's stability in motion is very good. "We're having a small problem with cracks in floors," she said, "but larger casters should take care of that." She also plans to replace the bicycle seat with a scooter-type cushioned seat, although it must remain small enough for the legs to extend comfortably on both sides.

The user's legs are flexed while in the sitting position, as they would be in a normal wheelchair, and fully extended in the standing position. The user is raised to a height of nearly six feet.

"Its main limitation is that while it can be used by people confined to wheelchairs by illness, age or injury and by paraplegics, it is not suitable for quadraplegics," Ms. Plummer said. "But we think it also can be used by amputees."

The idea for the standup device came from Professor Blanco, Ms. Plummer said, when she asked him to recommend a research project she could pursue under MIT's



MIT senior Penny Plummer demonstrates her "standup mobility device," intended to enable wheelchair-bound persons to move about in a near-standing position in classrooms, offices and homes.

—Photo by Donna Coveney

Undergraduate Research Opportunity Program (UROP), which encourages undergraduates to participate with MIT faculty and staff members in a wide range of research activities.

"When we started out, I thought our idea might be unique," Ms. Plummer said. But she has recently learned of at least one other elevated wheelchair, although she said it is motorized, appears to be used as a regular wheelchair and is much more cumbersome than her device.

"Mine is more a lightweight device," she said. "It's manually propelled and it's meant to be more cost-efficient."

Ms. Plummer built her prototype over the summer, with the help of funds from UROP, shop personnel and material obtained by Robert J. Morrison at the MIT Furniture Exchange. "Without him, I couldn't have gotten the project off the ground," Ms. Plummer said.

Why has it taken so long for a vertical wheelchair to materialize?

Ms. Plummer returns to her original thought. "I think it's just a case that people have developed sensitivity to the problems of the handicapped. Now we have wheelchairs, and handicapped people can get around, but if we can offer them something that gives them a boost both physically and psychologically, so much the better."

Take a SPIN

SPIN, the Sponsored Programs Information Network, is available at MIT through the Office of Sponsored Programs (OSP).

SPIN is a database with profiles of thousands of government, foundation and corporate sponsors of research and training programs in academic disciplines. It also includes information on instrumentation, travel, curriculum development and sabbatical projects. The program was developed and is maintained by the Research Foundation of SUNY.

Researchers seeking potential sponsors may request a SPIN search at OSP where staff members are available to help design and run a search tailored to specific needs. For more information, call Diane Eisenhour, x3-2921.

CU seeks to return 'forgotten' money

The Supervisory Audit Committee of the MIT Employees Federal Credit Union is looking for some 60 members or former members of the community who have savings they may have forgotten in the Credit Union.

But they must get in touch with the Credit Union by November 1 or the money in their accounts will be turned over to the state treasurer. The law provides for accounts that have been inactive for five years to be turned over to the state.

These are the people the Credit Union is seeking:

Paul Gerard Adams, Subhash Chandra Agrawal, Benjamin H. Ashton, Susan F. Bairos, Craig M. Baker, Martin Beckerman, Daniel Alan Bergman, Arthur D. Bernhardt, Philip W. Bohunicky, William M. Bucelewicz.

Charles R. Burgess, John W. Burke, Joseph K. Cleetus, Susan Ruth Coccovillo, Gerard C. Coletta, John or Ann Collins, Keith Edmund Crowe, Sandra A. Delphin, Joseph R. Dipietro, Linda Joy Dorfman, Nancy Jean or Lawrence E. Dorion.

Isaac Y. Efrat, Angelo R. Fanara, Richard M. Fand, Joyce L. Fletcher or Nancy A. Stuart, Jay Wyland Flynn, Carol A. Gaston, Michael L. Gens, Catherine Spotow Gibbes, Sherilyn N. Harrison or James Harrison, William H. Henneman, Steven H. Izen.

Sushila Kanodia, Doris Katz, Elizabeth Jean Keating, William T. Kennedy, George E. King Jr., Karen M. Kinney, Randall L. Kroken, Richard Albert Larose, Frederick David Leach, Homer D. Lewis Jr., Angelo Maurici, Elizabeth Gay Matteson, Richard V. McDevitt, Namiko H. McFarling, Susan M. McNeil.

Horst Joseph Metz, John J. Moriarty Jr., Elizabeth A. Moskowitz, John P. Moussouris, Peter T. Newman, Frances A. Oliverio, Diane L. Payment, Frank V. Permatteo, Debra Lynn Pierre-Louis, Juan C. Pons.

Jeanne P. or Steven R. Rapacki, Susan M. Sheldon, Miriam Sherburne, Maria Sirgo, Christine Ann or Richard Charles Smith, James F. Smith, Maria Spahija, Salvatore A. Tuccelli, Dimitri Vvedensky, Paul C. Xirouchakis, Walter Timothy Zwirble.

Readers who know the whereabouts of any of these people should drop a note to one of the members of the CU Supervisory Audit Committee:

R.H. Gagnon—Draper MS 69
Chuck Shaw—Rm E19-655
Lois Levine—Rm 5-119
John Matarese—Draper MS 69
Howard Miller—Rm 7-206.

Hurricane's fury has upper bound

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fore the force that the wind exerts would be about 50 percent more. The wind speed itself would be more like 20 to 25 percent higher," he says.

"But again this is an upper bound. We cannot say anything about the average intensity of hurricanes, nor can we say anything at all about their frequency—something I cannot emphasize enough. The factors that determine the frequency of hurricanes are very, very different."

The statistics of hurricane frequency are too poor to draw any firm conclusions, he says. "There is little doubt that New England and the east coast in general have experienced a hurricane 'drought' in the last 15 years. There were many hurricanes in the '50s and early '60s and then very few, and this probably reflects random variability."

Hurricane tracking is aided considerably by satellite monitoring, but the present generation of weather satellites are "next to useless" for hurricane forecasting. "If you want to make a good quantitative forecast, you need to have good quantitative initial conditions, which means the three dimensional distributions of wind, temperature, and water vapor content in the atmosphere," he says.

With very good initial conditions, it should be possible to predict hurricanes a week to ten days in advance, he suggests. Presently, there is no way to do even this.

"One peculiarity of hurricanes, which is responsible for the fact that they're relatively rare, is that they are examples of finite amplitude instability—a fancy way of saying that hurricanes never form spontaneously. There is almost always a huge reservoir of potential energy for hurricanes,

yet hurricanes are relatively rare. That means you give the atmosphere a little push and nothing happens—a substantial perturbation of the right geometric form is needed.

"To get a hurricane, you quite literally have to have a kicker—a trigger of some kind, which in practice is some storm whose mechanism is dynamically independent from the hurricane."

"A hurricane in the mature stage is actually a very beautiful Carnot heat engine," says Dr. Emanuel. "It takes latent heat from the ocean at high temperature. At very low temperature—say minus 80°C in the very high atmosphere, the excess heat is radiated off as electromagnetic radiation into space. Something has to get this engine started and that is what interests me. I'm working on why it is true in the first place that small perturbations don't amplify."

"Once we answer this intellectually challenging question, we can begin to find out how to forecast hurricanes."

Professor Emanuel mentioned another idea about hurricanes that he is considering, his belief that hurricanes rarely reach their upper limit because they have the ability to churn up cold water from deeper in the ocean—a phenomenon that has actually been observed. For example, Gilbert cooled off a large swath of water in the Gulf of Mexico by about 5°C.

This self-limiting mechanism might be particularly effective, he says, if the surface warm water layer isn't deep and if the hurricane is big and slow moving. He claims to have seen some evidence for this in the behavior of Hugo and other hurricanes that he has studied.

Here & There

There was a time, admits **Carley Sherry**, an administrative assistant in the Department of Linguistics and Philosophy, when she wondered why she continued to live in Cambridge and work in Building 20.

For one thing, she found the barracks-like surroundings of Building 20 something of a downer. And then a few months ago someone stole her daughter's bicycle from their house on Maple Avenue in Cambridge. But that wasn't all. Her daughter Heather, 12, a student at the Longfellow School, arranged on her own for the purchase of a new \$360 mountain-style bike by paying for it over time with money earned from babysitting. Then came the crusher. Two weeks ago, someone broke into the house and took several items, including the bike. The police told Carley the thieves most likely had seen the new bike and went after it.

"So why do I stay in Cambridge and work in Building 20?" Carley asks.

The following note her daughter received explains it all, she said:

"Dear Heather, Some linguists and philosophers and friends from MIT heard about the theft of your bike. It made us sad and angry. So we decided to do something about it by muttering a bunch of words that only linguists and philosophers and friends understand. It worked! Here is a check so you can replace your bike! It comes with tons of good wishes and three important pieces of advice: 1. Have your chain oiled; 2. Make sure your tires have the right pressure; and 3. Enjoy!"

Carley's reaction: "You know, I'm honored to work in Building 20."

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Retired mathematics professor **Dirk Jan Struik** has received a major new honor—the first Kenneth Ownsworth May Prize for History of Mathematics—in time for his 95th birthday this Saturday, September 30.

Dr. Struik, who lives in Belmont and says he "never felt better," traveled to Hamburg, Germany, in August to receive the prestigious prize at the 18th International Conference on the History of Science.

It was presented to Dr. Struik by The International Commission on the History of Mathematics and the International Union of the History and Philosophy of Science "in recognition of an outstanding career devoted to scholarship and the international appreciation of the history of mathematics."

ics." He shared it with Professor A.P. Juschkewitch of Moscow.

Dr. Struik came to MIT as a lecturer in 1926, became an assistant professor two years later, advanced through the faculty ranks to full professor and became emeritus in 1960. He is the author of several books in the fields of mathematics and the history of science.

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CLIPS AND QUOTES:

—Meteorology professor **Kerry A. Emanuel** told The Boston Globe there are still shortcomings in the tools and methods used for tracking hurricanes, such as Hugo, whose higher clouds can be as much as two-thirds of a storm: "We just don't get a good measurement of the upper part of the storm."

—A letter writer took Boston Woman magazine to task for not including a section for women in science among an "Interesting Women" feature. She nominated three from MIT: Professors **Sheila Widnall** (aeronautics and astronautics), **Vera Kistiakowski** (physics) and **Susan Carey** (brain and cognitive sciences).

—Charlie Ball

Sloan Foundation president to speak

Ralph E. Gomory, president of the Alfred P. Sloan Foundation, will speak on "Models of the Product Development Process" Thursday, Sept. 28, at 4pm in Bowen Hall (E51-329).

Dr. Gomory was senior vice president for science and technology at IBM until last June. A graduate of Williams College, Dr. Gomory studied at Cambridge University and received the PhD degree from Princeton University. He chairs the advisory committee to the President on High Temperature Superconductivity and has been a member of the boards of several academic institutions and national scientific societies.

The lecture is part of the series on Critical Issues in Science and Technology Policy sponsored jointly by the Program in Science, Technology and Society and the Center for Technology, Policy and Industrial Development.

This Week in sports

The MIT football team scored its second highest single game point total in Saturday's 45-13 trouncing of Stonehill College. Senior quarterback Tim Day of Oklahoma City led the Beavers with a 241-yard, three-touchdown passing afternoon. Day tied his own school single-game record with the three touchdown passes, and became the career leader in TD tosses with 14.

Wide receiver Tony Lapes, a senior from Cohutta, Ga., had his second best day as a collegian, pulling in 7 balls for 172 yards. Lapes hauled in two of Day's scoring strikes, while running back Shane LaHousse grabbed the third. Day, LaHousse and junior fullback Garret Moose all scored on the ground. Day was named to the ECAC Division III New England Weekly Honor Roll for his play, and was named the first Offensive Player of the Week in the new Eastern Collegiate Football Conference. Lapes was ranked in the top ten receivers in the country for his efforts against Stonehill.

Sophomore Mike Piepergerdes from Kansas City, Mo., finished 10th in last Saturday's Southeastern Massachusetts Invitational Meet.

The Engineers finished fifth in the 17 team field.

Despite heavy winds and muddy conditions, the women's Cross Country team fared well at the Southeastern Massachusetts Cross Country Invitational this past weekend. The overall team performance was strong for this point in the season. Tufts swept the meet with ninety points, while MIT finished ninth out of seventeen

teams, with 221 points. "Performances were outstanding for such a short training period. Improvements, even from last week's meet, were significant," said team member Sharlene Day '91.

Captain Theresa Fuentes '91 led the team, finishing 11th in collegiate scoring, 14th overall, out of a field of 120 runners. She was followed by Chris Goh '92 in 24th place and Amy Rovelstad '92 in 59th place. The varsity was rounded out by Kristen Nummerdor '93 in 62nd, Gabrielle Rocap '92 in 67th and Stacy Holander '92 in 87th. The team was missing its seventh runner, Sharlene Day '91, due to a back injury.

The junior varsity team showed signs of strong improvement and development. "There are many new faces on the team this year. The JV performance ensured a strong and lasting future for the women's cross country team. We are looking forward to a promising season," were Captain Theresa Fuentes's sentiments. Junior varsity runners included Theresa Derderian '92, Jean Condon '92, Nora Nerses '91, Darlene Ford '93, Sharlene Afshani '93, Jen Hill '92 and Cindy Evanko '92. The women will be competing at the Connecticut College invitational this coming weekend.

The MIT men's basketball team will compete in the Eastern Invitational Basketball Tournament at Catholic University in February. MIT will join the host school, Mary Washington College, Babson College, Colby College, Emory University, Nazareth (NY) College and Vassar College in the tournament.

THE MIT MUSEUM

MIT Museum Bldg (N52)—Lahore: The City Within. The cultural, artistic, and architectural center of Pakistan explored through historical and modern photographs, maps, textiles, and paintings, with performances, films and lectures. Through Dec 17. **Image and Imagination: 150 Years of Photography.** An exploration of photography's technological evolution. Includes artifacts, hands-on equipment, and photographs. Co-sponsored by the Polaroid Corporate Archives. Sept 24 through Dec 31. **Math in 3D: Geometric Sculptures by Morton C. Bradley, Jr.** Revolving sculptures based on mathematical formulae. Form and color relations lend these works a unique visual appeal, ongoing. **Holography: Types and Applications.** Changing exhibit demonstrating the uses of this three-dimensional imaging medium. Works include scientific, medical, technical, and artistic imaging drawn from the work of the Spatial Imaging Group at MIT's Media Laboratory, ongoing. **Light Sculptures by Bill Parker, MIT '74.** Changeable, touchable plasma sculptures by the artist who developed this medium, ongoing. Hours: Tues-Fri 9am-5pm. MIT Museum closed to the public on Mondays; Open 12-4pm Sat-Sun.

HART NAUTICAL GALLERY

Ongoing exhibits: George Owen '94: Yacht Designer—Line drawings and half-models designed by one of the early professors of naval architecture at MIT. **Half Models in Naval Architecture and Ship Building—**Half-models, ship drawings and photographs illustrate how the half model has aided ship and yacht designers and builders.

Edgerton's Strobe Alley—Exhibits of high speed photography. Main corridor, 4th floor.

CORRIDOR EXHIBITS

Corridor Exhibits: Building 1 & 5, 2nd floor: John Ripley Freeman Lobby, Building 4: Norbert Wiener, Karl Taylor Compton. Community Service Fund, Ellen Swallow Richards. Women at MIT. An overview of the admission of women at MIT. Five photographic panels with text documenting the circumstances that increased the number of women in the classroom since Ellen Swallow Richards. Building 6: Laboratory for Physical Chemistry.

WIESNER STUDENT ART GALLERY

A selection of works from the Student Art Association on view until Sept 30, Student Center 2nd fl. The Association offers classes in painting, drawing, photography & pottery. Info x3-7019.

OTHER EXHIBITS

Institute Archives and Special Collections—1887: The Founding of the Lawrence Experiment Station. Second in a series of three exhibits in commemoration of the Lawrence Experiment Station's 100th anniversary. **Jerome C. Hunsaker, Father of Aeronautics at MIT.** Chronicles his founding of aeronautics at the Institute; his design and construction of Navy airships and NC-4, the first airplane to cross the Atlantic, and his role in leading the Dept of Aeronautical Engineering from 1939-51. **Happy 50th, Class of '39.** Hall exhibit cases in 14N, 1st floor.

Sports

HOME EVENTS: Sept 28: W's Soccer vs Simmons College, 3:30pm; Field Hockey vs Wellesley College, 4pm. **Sept 30:** W's Tennis vs Mt. Holyoke, 11am; Baseball vs UMass-Boston, 12noon; Field Hockey vs Clark University, 1pm; Football vs Western New England College, 1pm. **Oct 1:** Varsity Golf vs

Tufts University, 1:15pm. **Oct 3:** Fall Baseball vs Brandeis University, 3pm; M's V Tennis vs Babson College, 3:30pm; Field Hockey vs Simmons College, 4:30pm; W's V Volleyball vs Brandeis University, 7pm. **Oct 4:** Baseball vs Boston College, 3pm; M's V Tennis vs Harvard University, 3:30pm. **Oct 5:** W's Soccer vs Curry College, 3:30pm; Field Hockey vs Pine Manor College, 4pm. **Oct 6:** Baseball vs Merrimack College, 4pm. **Oct 7:** M's V Sailing Smith Trophy, 9:30am; Football vs UMass-Boston, 1pm; Water Polo MIT Invitational. **Oct 8:** Varsity Golf vs University of Vermont, 1pm.

Wellesley Events

Jewett Arts Center—Style and Science: Examining a Polykleitan Statue. A technical and stylistic analysis of the most important work of classical sculpture in the Wellesley College Museum collection. Through Oct 22. **Giorgio Vasari's Holy Family: Master and Pupil in a Renaissance Workshop.** Examination of a Renaissance masterpiece reveals clues to the structure of the Renaissance workshop. Through Oct 22. **150 Years of Photography, Part I: Invention.** Exhibition of daguerreotypes, cyanotypes and cartes-de-viste from the permanent collection. Through Oct 22.

Jewett Arts Ctr Gallery—150 Years of Photography, Part I: Invention. Daguerreotypes, cyanotypes and cartes-de-viste by pioneering photographers. Through Oct 22.

The Wellesley Polykleitan Statue: Reading an Ancient Sculpture—Gregory Leftwich, asst prof of Greek Art, Boston University, Wellesley College Museum Gallery Talk, Sept 27, 12:30pm, Jewett Main Gallery.

How White Privilege Commonly Frames US Academic Writing: Examples to Consider from 5 Disciplines—Peggy McIntosh, associate director, Ctr for Research on Women, Luncheon Seminar, Thurs, Sept 28, 12:30-1:30pm, Cheever House. Info: 235-0320 x2500.

Giorgio Vasari's Holy Family—Jean Cadogan, guest curator, Wellesley College Museum Gallery Talk, Oct 3, 4:30pm, Jewett Main Gallery.

The Nomura Kyogen Players—Featuring one of Japan's most renowned actors, Mansaku Nomura, will perform two kyogen comedies, "Tied to a Stick," and "Snail." Oct 5, 8pm, Wellesley College, Alumni Hall. Reception with actors to follow.

Florentine Mannered Ladies—Lilian Armstrong, Mildred Kemper Prof of Art, Wellesley College, Wellesley College Museum Gallery Talk, Oct 8, 12:30pm, Jewett Main Gallery.

MIT Cable Listings—Submit announcement in writing to Rm 9-050. We prefer a day's warning, but faster action may be possible. Useful also for correcting errors, notifying about cancellations, and dealing with emergencies. If you have met the Tech Talk deadline, your announcement is automatically put on cable (except for exhibits and some multi-meetings programs). We are now accepting requests via e-mail. Announcements are shown on MIT Cable channel 12, which is displayed on the receivers in Lobbies 7 and 10. Announcements should be of interest to the general MIT community. Classified ad type messages will not be accepted. Messages should include: date, title of event, speaker or sponsor, time and location. MIT Cable reserves the right to edit your message to fit the screen. Include your MIT phone number. E-mail your announcements to: tv-messages@telecom.mit.edu. Messages will usually be posted within 24 hours of their receipt.

Send notices for Wednesday, October 4 through Sunday, October 22 to Calendar Editor Rm 5-111, before 12noon Friday, September 29.



THE ARTS

The MIT Office of the Arts today presents the first Arts Month-at-a-Glance for the 1989-90 year. Please save these pages for reference during the month.

Last of September

Two noon concerts: The Barbecue Brass Quintet plays rags, jazz and pop tunes from the roaring 20's to La Bamba in a special outside Thursday noon Chapel Series tomorrow, Sept. 28, 12:05pm on the Kresge Oval. Next day, mezzo-soprano Patricia Griffin (below) sings, with pianist Sheila Waxman, in the *Voices at Noon* series in Killian Hall Friday, Sept. 28, at 12:05pm. 253-2906



October at MIT

4 Wed

Urdu Music, Dance and Poetry
MIT Museum Lecture: "The Magic of Classical Music, Dance, and Urdu Poetry"—Performance/Demonstration by Dr. Brian Silver, chief, Urdu Division, Voice of America. In connection with the exhibition about Pakistan's ancient city of Lahore. 7pm, MIT Museum. 253-4444

5 Thurs

No Dogs Allowed in Chapel
No Dogs Allowed, the wind trio founded by three MIT alums 20 years ago, plays the Thursday noon Chapel series in MIT's Chapel. Francois Devienne's Trio; Peter Schickele's *Diversions*; Francois Poulenc's Sonata; Swan Hennessy's Trio. 12:05pm, Chapel. 253-2906

6 Fri

Jazz Masterclass
Masterclass by jazz pianist Michel Camilo. Funded by the Marvin Asnes Performing Arts Series. 12:05pm, Killian Hall. 253-2906

Jazz Master Performs
Michel Camilo, chosen by Billboard Magazine as the "Number One Jazz Pianist" is brought free to the MIT campus as the first performance in the new Marvin Asnes Performing Arts Concert Series. One national critic said Camilo is "bursting with joy... the surprise hit of the year." 8pm, Kresge Auditorium. 253-2906

Trouble in Paradise Begins at List
Some 15 New England artists appear in *Trouble in Paradise*, addressing American political and social issues, including freedom of expression, homelessness, militarism, environmental pollution, AIDS and substance abuse. Opening with a reception today, 5-7pm, at the List Visual Arts Center in the Wiesner Building. Weekdays 12-6, Weekends 1-5. 253-4680

8 Sun

Still Performance Closes at List
Collaborative photographs by Rimma and Valery Gerlovin, Soviet emigre artists, mixing language and portraiture as they style and photograph each other's faces. List Visual Arts Center. Weekdays, 12-6 Weekends 1-5. 253-4680

11 Wed

Pakistan Dance and Music
Lecture/Film of North Indian classical dance, Kathak, from the Mughal Court, with introductory talk by Vishakha Desai, assistant curator of Indian, Southeast Asian and Islamic Art at the Boston Museum of Fine Arts. In connection with the Lahore exhibit, 7pm, MIT Museum. 253-4444

12 Thurs

Chamber Music in Chapel
Charles River Chamber Players: John Curtis, guitar and Jane Garvin, flute. Faure, Tekemitsu, Miyagi, Pinkham. 12:05pm, Chapel. 253-2906

MIT Artists Behind Desks
Opening today in the Compton Gallery (off Lobby 10), a selection of works from 29 visual artists employed at MIT. Everyone is invited to today's reception, 5-7, for *Artists Behind The Desks*, a juried MIT Support Staff Exhibition. A black and white version of one selection, *Summertime*, a color photograph by Bea Bailey who works in the Vision and Modeling Group of the Media Lab. A professional photographer in her off-campus life, Bailey posed an MIT friend in this picture. Her model is Lynne Butler who is a lab technician in biology and who is shown wearing the wedding dress in which last year she married Charles Butler, a technical assistant in Graphic Arts. This exhibit runs from Oct. 13-Jan.12, weekdays 9-5, Saturdays, noon-4. 253-4444



13 Fri

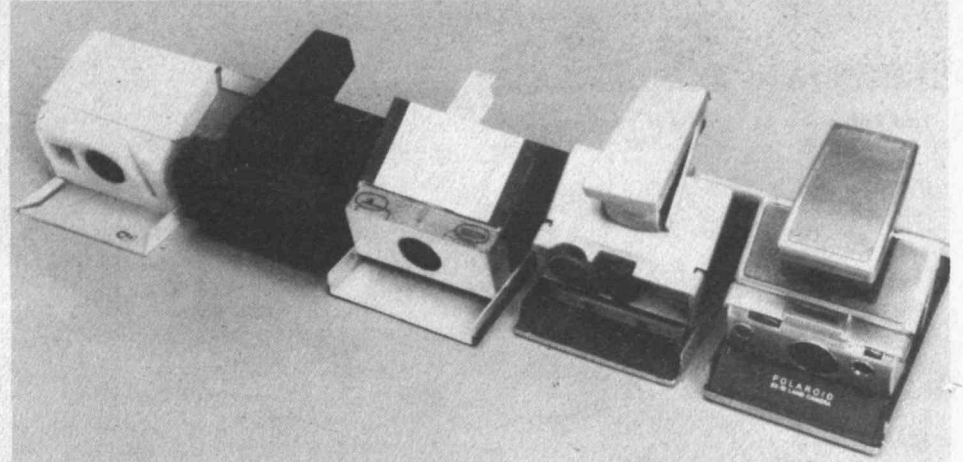
Kalajian in Voices Recital
Mezzo-soprano Jocelyn Kalajian (below) & Larissa Sokoloff, piano. Ravel, Mahler, Brahms, Williams, in the *Voices at Noon* series, 12:05pm, Killian Hall. 253-2906



List Center presents photographer
Richard Ross: Museology Triptychs is the title of a new exhibition of the photographs of this Santa Barbara-based artist who uses a child's plastic camera to seize details of old master paintings from museums around the world. His strangely lit and scaled juxtapositions create "soap opera of art history." List Center. Weekdays 12-6, Weekends 1-5. 253-4680

14 Sat

Museum holds Family Workshop
"Imaging Your Imagination: A Hands-On Workshop in Photography"—Family workshop led by Elaine O'Neil, photographer/lecturer at the School of the Museum of Fine Arts. In connection with the MIT Museum's *Image and Imagination* photography exhibit. 1-2:30pm, MIT Museum. 253-4444. Preregistration required: 253-4422



18 Wed

20th Century Photography and Beyond
"The Advent of Electronic Imaging"—Slide lecture by Polaroid's Richard Kee, accompanying the photography exhibit. Above, design models from Polaroid Archives show part of the process of designing a camera. 7pm, MIT Museum. 253-4444

19 Thurs

Jazz Quartet plays Chapel
The Steve Durgin Jazz Players; piano, brass, drums and vocals quartet performs old standards, up-tempo jazz, Bossa nova, Latin and showtunes. 12:05pm, Chapel.

Poetry at the Media Lab
Reading by poet David Slavitt, author of *Equinox*, presented in Media Lab series. 7:30pm, Bartos Theater. 253-0684

20 Fri

American String Quartet
This year's Guest Artist Series begins with the American String Quartet (below) playing Schubert's Quartet in B-flat Major No. 8, Op. 168; Berg Quartet No. 3; Beethoven Quartet in F Major Op. 59 No. 1. 8pm, Kresge Auditorium. 253-2906



26 Thurs

Baroque Comes to Chapel
Jan Pfeiffer, baroque cello and John Finney, harpsichord. Vivaldi and Bach. 12:05pm, MIT Chapel. 253-2906

27 Fri

Hearing Voices in Killian
Mezzo-soprano Gloria Raymond with Karen Sauer, piano. Schubert, Duparc, and Copland, in the *Voices at Noon* Series. 12:05pm, Killian Hall. 253-2906

MIT Affiliated Artist Concert
Eleanor Perrone, piano. All-Chopin program. 8pm, Killian Hall. 253-2906

28 Sat

MIT Symphony Orchestra
David Epstein, director. Schoenberg's Suite for String Orchestra and Sibelius' Symphony No. 2. 8:30pm, Kresge Auditorium. Pick up free tickets in Lobby 10 and from the Information desk in the Student Center. \$1 at the door. 253-2906

30 Mon

Disguised Musicians
In its annual Halloween Extravaganza, the MIT Concert Band, John Corley, director, with everyone in costume. This unusual all-wind and percussion band went out on the new music limb 40 years ago and has become known for commissioning and playing pieces from modern masters, from young composers and from students. 6pm, Lobby 7. 253-2906

All Month

MIT Museum
Lahore: The City Within
Exploration of the cultural, artistic, and architectural center of Pakistan.

Image and Imagination: 150 Years of Photography
The evolution of the technology of photography from earliest days to visions of the future. MIT Museum, 265 Mass Ave. Tues-Fri 9-5, Weekends 10-4. 253-4444

List Visual Arts Center
Remo Campopiano: In Residence
Minneapolis-based artist Remo Campopiano creates a room-sized installation, including among other elements, a coffee-table landscape inhabited by a colony of live ants, to weave together strands from an array of thought systems, myths, and matters of the heart. Weekdays 12-6 Weekends 1-5. 253-4680

All events are free except where prices are noted.

These events came from the Arts Network. Celia Metcalf, regular designer for the Month-at-a-glance, is on vacation. This page was compiled, edited, and designed by China Altman and Lynn Heinemann.



*Photos by
Donna Coveney*

Andrea Arenovski, a graduate student in biological oceanography, measures marsh grass (*Spartina alterniflora*) in Great Sippewissett Marsh in Falmouth. She is studying the effect of factors such as salinity and sulfide concentrations on nitrogen uptake and retention in the grass. The tall form of *Spartina* occurs along the creek banks, which are frequently flooded and washed by the tides. It is possible that the more oxidized sediments and lower sul-

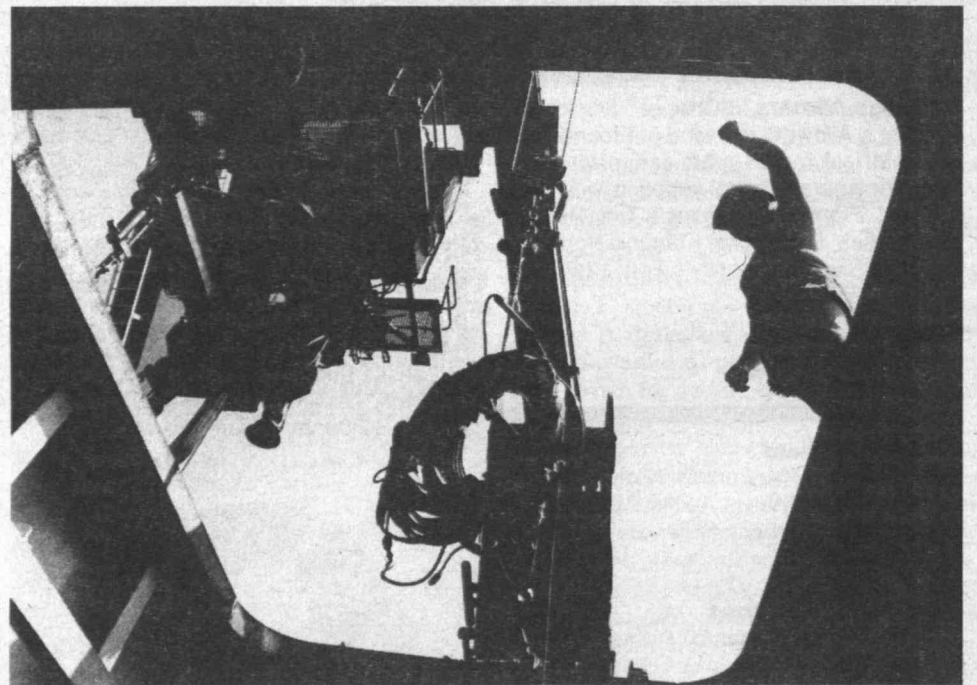
fide concentrations there allow for a more productive growth form. A few meters from the creek bank sulfide builds up in the soil, less oxygen is available, and the plant can't take up nitrogen because of the sulfides. Stunted growth results. To maintain osmotic balance the plants must excrete salt. One hypothesis is that increased washing of plants by the tides may reduce the possible damaging effects of salt crystallization on the leaves.



Niall Slowey, an MIT/WHOI joint program graduate student in geological oceanography, prepares core sub-samples of carbonate sediment taken from the ocean floor in the Bahamas in 1988. Niall is trying to understand changes in the concentration of nutrients and temperatures of thermocline waters in the western North Atlantic since the last Ice Age. The different sections of core samples represent a time line; different depths in the core were deposited at different times in the past. The core gives him a history of how water has changed through time at the ocean floor. The carbonate sediment that comprises the core sample consists of shells of organisms that live on the sea floor. Niall can infer changes in the water chemistry and temperature over time from the chemistry of the sediments, or nutrient concentrations, during different periods in the core sample.

MIT beyond Cambridge

Staff photojournalist Donna Coveney visited the Woods Hole Oceanographic Institution (WHOI) this summer to record some of the MIT projects being conducted there. WHOI is an independent institution which, with MIT, operates five joint graduate degree programs in physical, chemical and biological oceanography, marine geology and geophysics, and oceanographic engineering. The Joint Program involves the MIT Departments of Earth, Atmospheric and Planetary Sciences; Biology; Civil Engineering; Electrical Engineering and Computer Science; Mechanical Engineering; and Ocean Engineering.



Gear is offloaded from the hold of the Atlantis II, a research vessel belonging to WHOI, as it prepares to depart for Bermuda. The Atlantis II is 210 feet long and houses seven laboratories (a total of 3,000 square feet of lab space), 28 officers and crew, 19 scientists and nine members of the deep submergence sub Alvin team. Alvin is also housed aboard the Atlantis II, and is launched from it for research purposes while at sea.