

Sea Rover swim



Ocean Systems Management/Ocean Engineering graduate students Jon Grant and Paul Lemoine carefully lower the ROV (remotely operated vehicle) Sea Rover off the back of Asterias, a Woods Hole Oceanographic Institution research vessel, in Eel Pond at Woods Hole. They are participating in a two-week field engineering lab necessary to complete their one-year master's program in conjunction with WHOI and MIT. See page 8 for more photos.

Photo by Donna Coveney

MIT to aid research on shipping

MIT and FastShip Atlantic, Inc., of Alexandria, VA, have announced a long-term program to collaborate on research and development of a new high-speed freighter that holds the promise of revolutionizing ocean transportation of high-value cargo.

MIT has agreed to assist with marketing research and long-term technical research for the new ship technology on which FastShip Atlantic's proposed 1998 service is based.

FastShip's advanced hull design, propulsion technology and innovative loading system will allow it to transport cargo across the North Atlantic, door-to-door, in five to seven days, the company says. Conventional freighters take anywhere from 14 to 35 days to do the same job.

The collaboration with MIT "is a major milestone in the development of FastShip," said Terry Johnson, president of the company that will build FastShips and operate them on the North Atlantic and Pacific trade routes. "No other institution can come close to matching MIT's combination of outstanding ocean engineering with a proven track record of commercializing new technologies."

Professor Chrystostomos Chryssostomidis, head of the Department of Ocean Engineering and director of the Sea Grant Program, said, "MIT is delighted to participate in the technology and economic research associated with this exciting project. The commercialization of the technology developed by MIT and FastShip could lead to a rebound in American competitiveness in ship-building and an expanded role for

the US in global transportation of high-value cargoes."

Professor Yossi Sheffi, director of the Center for Transportation Studies, said, "The Center for Transportation Studies is glad to join forces with the Department of Ocean Engineering and other faculty across MIT to help bring the FastShip concept to commercial success. This option will change logistics patterns worldwide, allowing US goods to be delivered consistently and competitively in Europe and throughout the world. It will open new markets for ocean carriers and inland transportation modes."

The MIT and FastShip Atlantic agreement calls for close research and

Provost names Berger to direct new international program

The establishment of the MIT International Science and Technology Initiative (MISTI) and the appointment of Professor Suzanne Berger, a leading scholar of comparative politics and political economy, to direct it have been announced by Provost Mark S. Wrighton.



Berger

Provost Wrighton also announced that Dr. Berger, a member of the Department of Political Science, has been selected as the first holder of a new professorship established by the Raphael Dorman and Helen Starbuck Memorial Fund. The professorship has been des-

ignated for a distinguished faculty member working in the area of international relations.

"In connection with her current role as leader of MIT's International Science and Technology Initiative, and based on her distinguished record of academic achievement, it is most fitting that Dr. Berger be the inaugural holder of the Raphael Dorman and Helen Starbuck Professorship," the provost said.

The establishment of MISTI reflects the broad consensus at MIT that it is important for education and research to reflect a global view, Professor Wrighton said. MISTI's programs will be coordinated administratively within MIT's Center for International Studies (CIS), which is headed by Professor Kenneth A. Oye.

"The rationale for this internation-

alization of education and research was in part laid out in two major MIT studies and in President Vest's inaugural address," Professor Wrighton said. *Made in America*, the report of the MIT Commission on Industrial Productivity, emphasized our country's need to learn to live in the world economy and underscored MIT's obligation to provide the kind of education in cultures, practices and languages that would enable this.

The other study, the provost continued, was that of the Committee on International Relationships of MIT in a Technologically Competitive World, which stated in 1991: "MIT's responsibility to the nation in which it was founded and nurtured is served first and foremost by maintenance of its position as a premier institution in education and research in science and technology. The commitment to maintain preeminence requires that MIT be thoroughly engaged in international activities in science and technology and that its faculty, students and research staff be able to interact fully and openly with, and stay abreast of, research wherever it is carried out."

The committee, headed by MIT Professor Eugene Skolnikoff of political science, a former director of the CIS, said that "to prepare MIT's graduates better for the realities of today's global society and marketplace, the faculty and administration should take steps to strengthen the international dimensions of the undergraduate curriculum."

1991 RECOMMENDATIONS

Under Professor Berger's leadership, MISTI is setting up programs and opportunities for research, study and work abroad. The goal is to give life to the recommendations of the 1991 committee and to the inaugural address call of President Vest to make "the matter of international context and opportunity an integral part of an MIT education."

At present, MIT provides many opportunities for foreign students, scholars and companies to learn how to operate in an American research environment, Professor Berger said. "Through MISTI, we seek to secure the same opportunities for our own students abroad," she said.

The new international programs will develop over a period of years. In the first phase, Professor Berger said, a set of programs for China is being developed with four objectives:

- Encourage and facilitate faculty-driven and faculty-desired research projects in China.
- Deepen on-campus educational programs in Chinese language, history and

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US-Russian work tests sky-mapping technique

By Elizabeth A. Thomson
News Office

A US-Russian experiment involving MIT scientists has provided important data on a new technique to map the sky—specifically the ionosphere, or upper atmosphere. The data will help scientists from around the world refine the technique, which could become a tool useful for monitoring the ionospheric storms that can wreak havoc on satellites, for example.

Recent papers have discussed both the experiment itself, which among other things tested Russian and American approaches to the technique, and a severe ionospheric storm that the scientists observed during the experiment.

That storm, the result of a "solar bullet" of charged particles from the sun, "is of very high geophysical importance," said John C. Foster, assistant director of Haystack Observatory and a principal investigator for the work. As a result, he said, the experiment "was not just a technical success, it was a scientific success as well" because of the large amount of data that the scientists collected on the storm.

Scientists involved in the experiment are from Haystack, Moscow State University, the Polar Geophysical Institute in Murmansk, and the US Air Force's Phillips Laboratory in Bedford, MA.

The ionosphere is a highly variable medium found at an altitude of 100 to 1,000 kilometers. The Russian-American Tomography Experiment, or RATE, tested a technique called ionospheric radio tomography that could become an inexpensive way to map the ionosphere continuously on a global scale.

"With continuous coverage, you could call up a map of the ionosphere much like weather forecasters now call up weather maps," Dr. Foster said. Such an ability would greatly aid sci-

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Seminars offer outlet for teacher creativity

By Alice C. Waugh
News Office

When Vicky Diadiuk switched jobs from physicist to registrar, she was afraid that her days in the laboratory might be over. But that was before she began teaching freshman advisor seminars at the Edgerton Center.

Dr. Diadiuk, who received the SB in physics in 1972 and the ScD, also in physics, in 1978, worked as a research staff member in the electro-optics group at Lincoln Labs until 1991, when defense cutbacks made continued funding for her research look uncertain. She consequently took on a new job on campus as associate registrar for curriculum services, "but I was still eager

to stay in touch with the technical stuff," she said.

Her opportunity came when she saw an article about the Edgerton Center in the faculty newsletter, describing the availability of space for hands-on seminars. She had already co-lead a freshman advisor seminar on recycling in the fall of 1992, so she knew how rewarding they could be. The experimental component was an added bonus. So after obtaining approval from Professor Kim Vandiver, the director of the Edgerton Center, she taught her first hands-on seminar, Devices for Optical Communications. "This was my chance to teach students how to actually build something," she said. "They provided an incredibly welcom-

ing environment."

In her 1993 seminar, students built a demonstration optical voice link as a display for the Corridor Lab project. It shows how sound is converted to an optical signal and transmitted by an optical fiber. Passers-by can push a button and speak into a microphone; the signal travels through a light-emitting diode (LED) whose output goes through a plastic fiber-optic cable to a photodetector, which drives a speaker. The link is on display on the third floor of Building 4. This IAP, some of the students returned on their own initiative to upgrade the electronics in the display. Dr. Diadiuk has repeated the seminar for other groups

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IN BRIEF

INSURANCE REMINDER

The special life insurance plan open enrollment period will end Tuesday, Jan. 31. Coverage for eligible employees who enroll during January will begin February 1. Employees may make life insurance changes at any time after the special enrollment period, but must first provide evidence of insurability. Enrollment forms are available by calling BenTalk, x3-5000. Call the Benefits Office, x3-0500, or x7060 at Lincoln Laboratory, with questions.

Osgood named director of minority education

Associate Professor Leo Osgood Jr., a member of the Office of Undergraduate Education and Student Affairs and the Department of Athletics for 18 years, has been appointed director of MIT's Office of Minority Education, effective February 1.

The appointment, reported in The Tech earlier this month, was announced formally this week by Professor Arthur C. Smith, dean of undergraduate education and student affairs, to whom the director of the OME reports.

Professor Osgood is MIT's head basketball coach and the Institute's "on-call" dean, handling student emergencies after normal business hours on weekdays and during weekends. He came to MIT in 1977 as assistant coach and in 1983 became associate coach and assistant dean for student affairs in the counseling section. He has been dean on call and head coach for nine years. He plans to end his coaching career at the conclusion of this season.

The appointment of Professor Osgood was enthusiastically recommended by a search committee headed by Professor Rafael Bras, head of the Department of Civil and Environmental Engineering. There were about 140 applicants for the post. It became open in September when Dean Judy Jackson resigned to pursue a doctoral program in education at Harvard. Professor Emeritus David Gordon Wilson of the Department of Mechanical Engineering has been serving as interim OME director.

"Professor Bras's committee, in recommending Professor Osgood for the position, said he had all the qualities that a dean of the OME should have," Professor Smith said. "I agree completely with the committee's assessment. Leo Osgood has a wealth of experience at MIT. He understands the Institute and he understands MIT students. He has served as assistant counseling dean in the Office of Student Affairs and has

been both a board member and a liaison to the OME over the years."

The new OME dean has also been involved with Project Interphase, an OME program for minority students held the summer before they matriculate at MIT.

Professor Osgood also has served for several years on MIT's Martin Luther King Jr. Committee and is currently its co-chairman with Professor Michael S. Feld of the Department of Physics. The MLK Committee conceived and developed the concept for a new program to increase the presence of minority scholars on campus—the Martin Luther King Jr. Visiting Scholars Program. That program was formally announced earlier this month by Provost Mark S. Wrighton.

Professor Osgood has been active as well in efforts to foster the development of the minority members of the MIT staff. He co-chaired a presidential task force for career development of minority administrators at the Institute which filed its report three years ago.

Professor Osgood holds the BS degree in business administration and the MS in education, both from Northeastern University. He was a highly successful basketball player at Northeastern and was inducted into the school's Athletic Hall of Fame in 1989.

A native of Charleston, SC, Professor Osgood came to Boston as a young boy. He has been active for years in programs for city youth. In 1990 he represented MIT in the YMCA's Black Achievers Program. In nominating him for the program, the late MIT vice president Constantine B. Simonides, to whom the Department of Athletics reported, said: "Leo Osgood is a leader. He is someone that young people can look up to for his accomplishments... He is a disciplined coach who is both kind and tough, a combination that may be a requirement for success at MIT, but represents a balance very difficult to achieve."

Professor Osgood was the first president of the Northeastern University Black Alumni Association (1985) and serves on the boards of the Boston Branch of the NAACP and the Lena Park Community Development Corporation.

Alvin Drake appointed to Ford professorship

Dean Joel Moses of the School of Engineering has announced the appointment of Dr. Alvin W. Drake, professor of systems science and engineering, as the Ford Professor of Engineering in the Department of Electrical Engineering and Computer Science.

Dean Moses said the chair is awarded to outstanding faculty in recognition of special accomplishments. "Al Drake is widely known in the School of Engineering for his innovative teaching of applied probability and his mentoring of graduate teaching assistants. In institute-wide, he is a key figure in efforts to help TAs improve their teaching skills," Dean Moses said.

In 1992, he was the recipient of the School of Engineering's Bose Award for excellence in teaching.

In a letter to the Electrical Engineering and Computer Science faculty, Professor Paul Penfield, head of the department, noted that "Dr. Drake is known for his insightful, caring, compassionate approach to education."

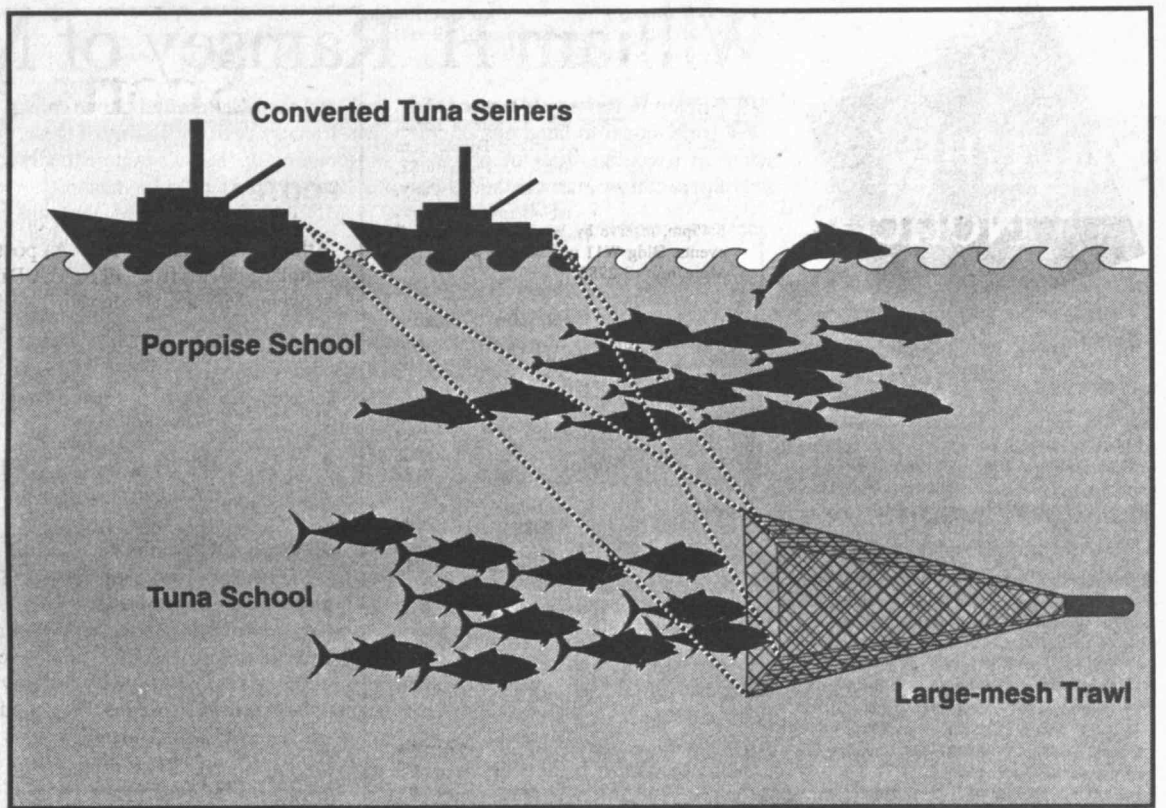
Dr. Drake's principal fields of interest are applied probability, public systems applications of operations research, risk assessment and probabilistic issues in manufacturing. He holds four degrees from MIT: the SB and SM (both 1958), the EE (1961) and the ScD

(1962). He was appointed an assistant professor in 1962, then went on military leave for two years serving in the US Army Signal Corps (he received the Army Research and Development Award for work on tropospheric scatter communication) and returned to MIT in 1964. He was named associate director of the Operations Research Center in 1966, associate professor in 1967, and professor in 1973. He was the housemaster of the MIT Alumni Houses for seven years.

Most of his professional activities outside of MIT have been in the public sector. With two associates, he helped found the New England States Police Advisory Compact. He served on the American Blood Commission as vice chair of the donor recruitment task force and on the board of directors for the Northeast Regional Blood Program of the American Red Cross. His longest-running professional organization membership is in the Association of Donor Recruitment Professionals.

Professor Drake is the author of *Fundamentals of Applied Probability* (McGraw-Hill, 1967) and co-author of *The American Blood Supply* (MIT Press, 1982). He is an editor and contributor to *Analysis of Public Systems* (MIT Press, 1972). With Dr. Ralph Keeney, he authored a video presentation and study guide, "Decision Analysis" (MIT Center for Advanced Engineering Studies, 1977).

The appointment, effective January 1, is for a five-year renewable term.



Side view of the proposed fishing method.

Graphic by Lisa Damtoft

Sea Grant experiment shows promise for pair-trawling for tuna

By Andrea Cohen
MIT Sea Grant

Drawn to the sea, they travel in pairs, are partial to moonless nights and considered all but illicit. But don't get the wrong idea—these couples are fishing boats trawling for tuna on the southern side of Georges Bank, at the edge of the continental shelf.

In an experiment sponsored by the MIT Sea Grant Program and approved by the National Marine Fishery Services (NMFS), a small group of New England fishermen are hauling in bigeye, yellow fin and albacore tuna by a method not yet approved for this fishery. The fishermen hope that the data from this experiment will convince the NMFS to revise its regulations to authorize commercial pair trawling for tuna.

On the East Coast, traditional commercial tuna fishing methods include long-lining and gill netting, both of which involve bycatch levels that concern fishermen and environmentalists alike. [Bycatch is the capture of unwanted species or undersize members of the species sought.]

The problem with long-lining, in which miles of line with hooks and bait are set out at sea, is that sharks and other game fish are also caught. And gill nets, which are long panels of webbing that

catch fish by entanglement, can also capture marine mammals, turtles and diving seabirds. Fishermen participating in the MIT experiment hope to show that bycatch is less of a problem with pair trawling than with these other techniques.

According to MIT Sea Grant fisheries engineer Clifford Goudey, who is coordinating the experiment, pair trawling is effective with tuna because these fast-swimming fish must be caught with large nets. And because of their speed, tuna would tend to scatter with a boat operating directly above them. With pair trawling, each vessel pulls on one side of a net. By carefully coordinating the speed of their boats, the distance between boats and the length of tow wires, fishermen can precisely control the net's position.

Captain John Riemer, whose boat is part of the experiment, believes that the catch from this experiment could convince the NMFS to reconsider its position on appropriate gear for tuna fishing.

"In my opinion, pair trawling is much cleaner than other methods," he said. "We think it's efficient and conservation-minded, and you land a good product." Capt. Riemer formerly pair-trawled for codfish, a practice that was outlawed earlier this year.

Pair-trawling for tuna provides boats with an alternative to goundfishing for cod, haddock and yellowtail flounder. Once staples of the New England fishing community, those stocks are now severely depleted.

In order to monitor the experiment, NMFS observers are accompanying fishermen on most of their trips. Fishermen from the 10 boats also provide Mr. Goudey with details of their activities. In addition to data about the kinds and numbers of fish caught, participants keep careful records of the towing geometry, the net's depth, environmental conditions and other factors that influence the performance of the gear. All this information should aid in optimizing the method for catching tuna, while reducing or eliminating the take of undersized or prohibited species.

Mr. Goudey points out that no method of fishing can be 100 percent free of bycatch. However, he says that through the use of specific setting and hauling techniques, and an emphasis on individual vessel accountability, "we have seen remarkably low levels of incidental takes." The experiment concluded at the end of December, after which the vessels returned to other, more traditional fisheries.

Mail Tip #3

(Tech Talk is presenting a series of suggestions devised by the reengineering Mail Team to help our large community make better use of the mails.)

Check the destination the next time you get ready to send express mail; you could save your department money. If the destination is within eastern Massachusetts, sending first-class mail by the US Postal Service will usually get it there overnight, the same as express mail.

Using express mail service—either the US Postal Service or overnight delivery companies such as DHL and Federal Express—can be very expensive. Even so, many MIT offices send express letters to downtown Boston and surrounding cities, all at unnecessary extra expense. The only time you should use express mail for local destinations is when you need to verify next-day receipt.

For questions or suggestions about making better use of the mails, contact the Mail Team at x3-7247, or <mitmc@mitvma.mit.edu>.

Hammel wins research award

Dr. Heidi B. Hammel, a principal research scientist in the Department of Earth, Atmospheric and Planetary Sciences, has received additional recognition for her work last July monitoring the collision of fragments from the comet Shoemaker-Levy 9 with the planet Jupiter.



Hammel

Provost Mark S. Wrighton has selected her to receive a \$3,000 research allowance given at his discretion in honor of the late Vladimir Karapetoff, a distinguished scientist, electrical engineer and musician. Funds for the award were contributed

by his late wife, Rosalie M. (Cobb) Karapetoff, who received the SM degree from MIT in 1923.

The award honors individuals at MIT who have—by research, theorizing or teaching—made valuable discoveries for, or contribution to, the benefit of science and/or mankind.

As team leader for interpreting Hubble Space Telescope images of the comet-Jupiter collisions, observed at Johns Hopkins University's Space Telescopic Science Institute, Dr. Hammel gained widespread public attention for her enthusiastic descriptions of the effects of the collisions.

"I have judged your research to be a 'most valuable discovery for the benefit of science,'" Professor Wrighton said. "You have also been selected for your generous work to disseminate your findings and to contribute to the education of the public."

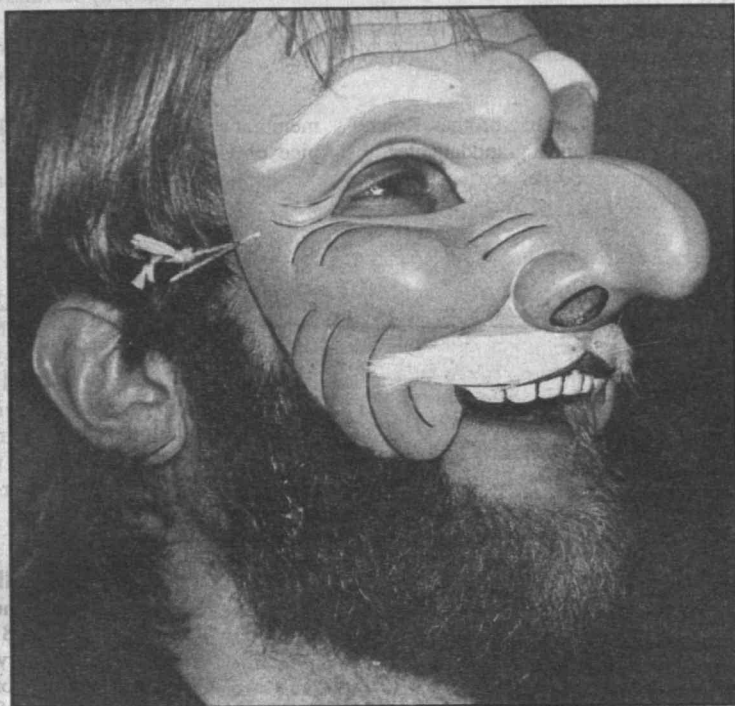
English classes begin in February

The MIT Women's League will again offer beginning, intermediate and advanced English conversation classes for international women during the spring term. Registration will be held Tuesday, Feb. 14, 9-11am in the Bush Room (10-105). Classes will be held Tuesdays and Thursdays, 9:15-11am, beginning February 16. Thursday

classes are followed by an informal coffee hour.

Space is limited, so the League accepts applications on a first-come, first-served basis. There is a class fee of \$40 per student. Babysitting is \$100 per child. For more information, call Jan Kirtley at 277-2628 or Sis de Bordenave in the Women's League office, x3-3656.

South Seas steps



In an IAP course on Balinese Masked Theater, participants created stories with movement and masks. In photo at left, Kermit Dunkelberg, lecturer in music and theater arts, takes on a whole new persona with his mask. At right, dancers Dunkelberg, Rosa Ren '94 and Siu-Li Khoe, a junior in electrical science and engineering, follow the synchronous lead of I. Nyoman Catra, a Balinese practitioner of Topeng, a type of traditional masked theater.

Photos by Donna Coveney

Awards & Honors

MIT technology is the basis for a refrigerator for superconducting devices that won a 1994 R&D 100 award from R&D Magazine. The award recognizes the refrigerator as one of the 100 most technologically significant new products of 1994.

Superconductivity offers the promise of products that are capable of tremendous power and speed when certain materials are cooled below a critical temperature. At this temperature, superconductive materials lose all electrical resistance and are capable of carrying very large currents with no heat generation.

The B100 cryocooler, developed by Boreas, Inc., offers significant advantages over other technologies for cooling superconducting materials. It is based on a technology in which helium gas is compressed and expanded in a unique thermodynamic cycle.

That technology, known as the Boreas cycle, was invented in the MIT Cryogenic Engineering Laboratory in 1984 by Joseph L. Smith Jr., Samuel C. Collins Senior Professor of Mechanical Engineering and director of the laboratory, and Dr. Alan Crunkleton, then an MIT graduate student.

Professor Smith and Dr. Crunkleton went on to found Boreas, Inc., in 1988. Dr. Crunkleton is president of the company.

Professor Theodore Postol of the Program in Science, Technology and Society has been awarded the 1995 Hilliard Roderick Prize in Science, Arms Control and International Security by the American Association for the Advancement of Science. The award honors individuals who make outstanding contributions that advance our understanding of issues related to arms control and international security, and that have an important scientific or technical dimension.

Professor Postol, who is also affiliated with the Defense and Arms Control Studies Program, is being honored for his expertise in and presentation of technical analyses related to a number of controversial issues. These include strategic and tactical missile defenses, the potential effects of superfires from nuclear attacks near urban areas and poten-

tial civilian casualties from nuclear counterforce attacks.

The award, which will be presented to Professor Postol in February at the AAAS annual meeting in Atlanta, consists of a medal and \$5,000. The award was established by the Hilliard Roderick Foundation for the Prevention of Inadvertent Nuclear War.

A device developed by Professor Lee Grodzins of physics that can measure the amount of lead in paint was one of four finalists in the environment category of the 1994 Discover Awards. The awards, conferred by Discover magazine, celebrate "those individuals and organizations who have made a significant impact on the world in which we live."

The XL Spectrum Analyzer is "the first hand-held device that uses low-energy X-rays to measure the amount of lead in paint," according to Discover. "Grodzins' \$12,000 instrument has enormous appeal for lead inspectors because it's the first pocket-size machine that can quickly and accurately measure the lead present in paint on exposed surfaces, where it is most likely to be inhaled or ingested. The XL can analyze a painted wall and determine the amount of lead in the paint within 20 seconds."

The magazine went on to note that "with results from the XL, home-owners can zero in on the offending lead rather than undertaking a more expensive and intrusive abatement procedure over a wider area."

The XL is produced by Professor Grodzins' environmental products company, Niton, in Bedford. Charles Parsons, MIT PhD '92 and head of research and development at the company, helped turn Professor Grodzins' ideas into the award-winning device.

Joseph F. Shea, former senior lecturer, and Professor Alan H. Epstein, both of the Department of Aeronautics and Astronautics, have been honored by the American Institute of Aeronautics and Astronautics.

Dr. Shea has been elected an Honorary Fellow "for a lifetime of technical leadership in the nation's ballistic missile and Apollo programs, as well as outstanding contributions to industry and education." The award is the organization's highest.

Professor Epstein has been elected an AIAA Fellow, an action that recog-

nizes those who have distinguished themselves in the field of aerospace and who show strong potential for leadership in the future. Only one Fellow is chosen for every 1,000 voting members of the AIAA, the world's leading professional society in its field.

The Air Traffic Control Association (ATCA) has awarded its 1994 William A. Patenteau Memorial Award for outstanding contribution to the field of air traffic control research to Paul R. Drouilhet of Lincoln Laboratory.

The presentation, made by ATCA Chairman Garland Castleberry at the

Sullivan, a panelist in a session on "Child, Family and School, a Triangle," spoke in Portuguese on Parents Forum, a program which she founded. She learned Portuguese when she taught English at the University of Coimbra in 1977-78.

Citing his contributions to tribology, materials processing and manufacturing, the Korea Broadcasting System has selected Professor Nam P. Suh as a recipient of a 1995 Distinguished Overseas Korean Prize. Dr. Suh, the Ralph and Eloise Cross Professor of Manufacturing and head of the Depart-

ment of Mechanical Engineering, was also cited for his accomplishments in establishing university-industry research programs and for his commitment to public service.

Lincoln Laboratory's Weather Sensing Group (Group 43), led by Dr. James E. Evans, has received an "outstanding performance" award from the Federal Aviation Administration. The award recognizes Group 43's work in developing the prototype Integrated Terminal Weather System (ITWS), which the FAA has tested in Memphis, TN, and Orlando, FL. The prototype ITWS system uses algorithms

developed by the group to process and graphically display immediately usable weather data for air traffic personnel. The data is obtained from FAA and National Weather Service sensors, as well as from aircraft in flight, and processed to provide air traffic control personnel with current information on weather in the terminal area and short-term (up to 30 minutes) predictions of significant weather phenomena.

Stefan Thomke, who is completing a doctoral program in electrical engineering (his home department) and management, has been awarded first prize in the Product Development and Management Association's 1994 Dissertation Proposal competition. The title of his doctoral thesis is "The Economics of Experimentation in the Design of New Products and Processes." It examines the relative economics of performing various experiments involving simulation, mass screening and rapid prototyping during the new-product development process.

The winning dissertation was one of 21 selected for evaluation by five reviewers in the international contest. Mr. Thomke presented his proposal at the organization's international conference, held in November in Boston.

Mr. Thomke's thesis committee includes Professor Eric A. Von Hippel of the Sloan School, thesis supervisor; Don P. Clausing, the Bernard M. Gordon Adjunct Professor of Engineering Innovation and Practice in the Department of Electrical Engineering and Computer Science, and Associate Professor Steven D. Eppinger of the Sloan School.

Dr. Thomas F. Quatieri of the Lincoln Laboratory staff has received the IEEE Signal Processing Society's Senior Award for his paper, "Energy Separation in Signal Modulations With Application to Speech Analysis," which he wrote with Professors Petros Maragos of the Georgia Institute of Technology and James F. Kaiser of Duke University. The award was the third he has received in recent years from the IEEE.



Paul R. Drouilhet of Lincoln Laboratory, left, receives award from Air Traffic Control Association Chairman Garland Castleberry. Chairman-elect Frank Frisbie is in the center.

ATC Convention in Washington, cited Mr. Drouilhet's contribution to the quality, safety and efficiency of the air traffic control system. Mr. Drouilhet is currently assigned to the Federal Aviation Administration headquarters from the Lincoln Laboratory Director's Office.

Eve Sullivan, senior editorial assistant in the Center for Theoretical Physics, gave a presentation at the fifth annual meeting of the Portuguese Association of Child and Adolescent Psychiatry held in December in Coimbra, Portugal on the topic, "New Paths in Child and Adolescent Psychiatry." Ms.

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Vicky Diadiuk (ScD '78) works with Patrick Pelletier (left) and Mark Adoorian, both sophomores in computer science and engineering, in the Edgerton Center lab where she teaches a freshman advisor seminar on Devices for Optical Communication. Photo by Donna Coveney

Seminars let teachers share skills

(continued from page 1)
of students who have built other devices.

For the students, such seminars provide a means of learning electronics, assembly and machining skills to complement textbook engineering know-how. "They now appreciate that building something is a lot more than just putting it down on paper. They know, for example, what technicians

do, and the skills of the machinists who make these fancy parts," Dr. Diadiuk said. Because of limited budgets, they also learn how to locate and adapt used parts they need to make things, she added.

Teaching a seminar can also be a rewarding experience for the advisor/instructors. "It's like a mini UROP; it becomes very dynamic very quickly," Dr. Diadiuk said. "I got to know them

[the students] really well." Advisors—quite a few of whom are administrators like herself rather than faculty or research staff—are assisted by upperclassmen who are associate advisors, she added. "One gets lots of guidance. It's really fun and it's not that hard."

Professor Vandiver hopes that other MIT staff with technical skills will volunteer to teach an advisor seminar at the Center. "These kinds of people are really valuable," he said. Anyone with hands-on knowledge in areas such as electronics, machining, photography or physics and who is interested in teaching a seminar is invited to call him at x3-4366 or email <kimv@mit.edu>.

Berger to head new international program

(continued from page 1)
politics.

- Seek collaborations with research and educational institutions in China.
- Develop the MISTI/China link as a collaboration in which other institutions elsewhere in the world might participate.

Dr. Berger is best known for her contributions to the study of Western Europe. Much of her research has analyzed the persistence of differences among advanced industrial societies. In 1986 she founded Seminar XXI, an MIT program on international politics that is taught in Washington, DC, for members of government and business. She was a co-author of *Made in America: Regaining the Productive Edge* (MIT Press, 1989). She is a member of the operating committee of the Industrial Performance Center at MIT and of the Center for International Studies.

Dr. Berger received the BA degree from the University of Chicago in 1960 and the PhD from Harvard University in 1967. She joined MIT in 1968. She continues as a senior research associate at Harvard's Center for European Studies.

Her honors include the French-American Foundation Chair in American Civilization at the Ecole des Hautes Etudes in Paris, Guggenheim and Woodrow Wilson fellowships, and grants from the Ford Foundation and the American Philosophical Society. She is a fellow of the American Academy of Arts and Sciences, a member of the Council on Foreign Relations, and a member of the German American Academic Council.

Dr. Berger headed the Department of Political Science from 1989 to 1992. She has been Ford International Professor of Political Science since 1985.

Student's mother slain

Susan Ginsburg Hadden, the University of Texas professor who was murdered January 15 in Cambodia, is the mother of an MIT student, William J. Hadden IV, a junior in architecture and a member of Theta Delta Chi fraternity.

His father, James Hadden Jr., was wounded seriously in the attack and was taken first to a hospital in Phnom Penh and then to Singapore, according to news accounts. One news report attributed the attack to Khmer Rouge guerrillas. Another blamed it on bandits. Also killed in the attack was a Cambodian, described in one news account as the driver of the tourist van and in another account as the interpreter.

Ms. Hadden, a professor at the Lyndon Baines Johnson School of Public Affairs at the University of Texas, was on her way to the ancient Khmer capital of Angkor when the van—one in a convoy of four—was attacked with a grenade launcher. Four police traveling with the caravan fired at the attack-

ers, a news report said. The New York Times, quoting friends of Professor Hadden, said the visit was her lifelong dream and her husband had arranged the trip as a 50th birthday present.

Free aid booklet

A free handbook is available for prospective and present college students explaining how to find out if they are eligible to receive federal, state and college-supported financial aid, where to get the application forms they will need, when to apply and where to get more information.

The Handbook on Admissions and Financial Aid at Independent Colleges in Massachusetts is available by calling voice mail (617) 497-3049.

Published annually by the Association of Independent Colleges and Universities in Massachusetts (AICUM), the booklet also includes statistical information on 56 independent institutions in Massachusetts.

US-Russian work tests sky-mapping technique

(continued from page 1)

entists' understanding of the ionosphere and could ultimately help them predict the storms there that affect radio signals, satellites and more. Dr. Foster noted that in recent months two Canadian satellites "were effectively destroyed" by ionospheric storms.

Ionospheric radio tomography involves a satellite that sends radio signals through the ionosphere to receivers located at intervals on the ground. By analyzing the radio signals once they reach Earth, scientists can determine variations in the density of the electrically charged gas that makes up the ionosphere. From there, they can map these variations to get the general structure of the ionosphere, including small-scale phenomena.

The technique could lead to global maps of the ionosphere because the receivers involved are small and portable, and could be distributed around the world. In contrast, the large radar facilities currently used to produce images of the ionosphere—there are six such facilities in the world, including the Millstone Hill Research Radar at Haystack—are "much more expensive to build and operate, precluding a large world-wide network," Dr. Foster said.

For RATE, which was conducted for 10 days in the fall of 1993, the scientists placed four receivers provided by the Russians in a north-south line along the northeastern US and eastern Canada. Russian navigation satellites flew over these sites every hour, sending down radio signals to all four receivers simultaneously. The resulting data were then analyzed to produce an image of the ionosphere using mathematical algorithms developed by the Russians.

Concurrently, the Air Force scien-

tists placed US receivers at the same four sites and recorded signals from US satellites. They analyzed the data with their own set of algorithms.

The scientists then compared the American and Russian images produced via the experimental tomographic techniques to actual images of the ionosphere made over the same period from the Millstone Hill radar facility.

The result? Both the Russian and American tomographic images "compared very well to the Millstone Hill results," Dr. Foster said, though the Air Force results "were not quite as refined as the Russians." This is largely because the mathematical algorithms the Russian group used are more highly developed, Dr. Foster said. (The two groups have approached ionospheric radio tomography using mathematical techniques that are completely different.) However, Dr. Foster said, the Air Force receivers are more sophisticated than those of the Russians.

A paper on the work by 11 members of the RATE team was published last month in the *International Journal of Imaging Systems and Technology*. Haystack authors are Dr. Foster and principal research scientists Michael J. Buonsanto and John M. Holt. (Other RATE papers were presented at a conference in Wales last summer.)

The scientists are continuing to use the data to improve the satellite hardware and refine the mathematics. In addition, they are sharing the data with other scientists around the world who hope to refine their own tomographic algorithms (there are more than half a dozen different approaches toward analyzing the data, Dr. Foster said). After applying their algorithms to the data collected by the Russian and American receivers, these scientists can then cross-calibrate their own results by comparing them to the actual images produced at Millstone Hill.

"People are working with each other," he said. "Everyone is interested in making this technique work."

Because RATE coincided with a major magnetic storm in the atmosphere, the data it generated have great scientific interest. Several other scientific instruments that were operating simultaneously augment documentation on the storm. With that wealth of data, "we may be able to understand some new phenomena we observed related to magnetic storms," Dr. Foster said.

This month Dr. Foster presented a paper on the storm at a meeting of the Union of International Radio Scientists, where his overview of the storm included data collected "from the solar wind [the charged particles emitted by the sun that ultimately caused the storm] through the magnetosphere [the region around the Earth dominated by the planet's magnetic field] to the ionosphere."

The large amount of data on the storm will lead to "many more papers on the geophysics of what took place," Dr. Foster said.

A total of four Russian, 12 MIT, and four Phillips Laboratory researchers were involved in RATE. The MIT scientists most directly involved in the work were Drs. Foster and Holt at Haystack. Other Haystack researchers were Dr. Buonsanto, Dwight Sipler, Tab Gallardo, Aaron D. Pailles, Steve Sawicki, Chris E. Farrell, Alex P. Carson, Glenn Campbell, David Kotchman and Steve J. Cariglia.

The Russian principal investigators for the experiment were Professor Vyatcheslav E. Kunitsyn of Moscow State University and Professor Evgeny D. Tereshchenko of the Polar Geophysical Institute. The Phillips Laboratory principal investigator was John A. Klobuchar.

Participation of the Russian and MIT research teams involved in RATE was supported by the NSF; the Phillips Laboratory work was funded by the US Air Force. The Russian team acknowledges the Russian Ministry of Science for partial support of the research.

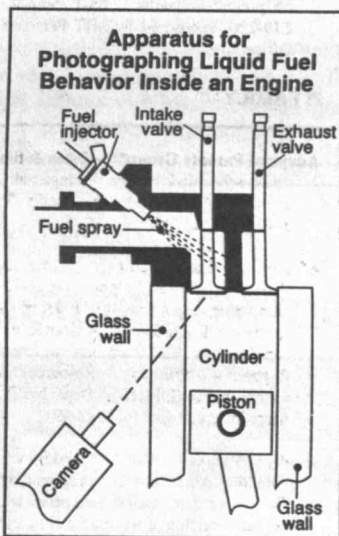
Notes from the Lab

FUEL BEHAVIOR INSIDE AN AUTO ENGINE

Using a high-speed video camera, MIT researchers have for the first time directly observed how liquid fuel enters the cylinder of an automobile engine when the engine is starting up—a condition conducive to the creation of hydrocarbons, key ingredients in the formation of smog.

The researchers found that instead of coming in as small droplets that can vaporize and burn, a surprisingly large fraction of the fuel enters as large droplets that form liquid films that coat the inside of the cylinder and may subsequently be swept out as hydrocarbons in the exhaust.

How to prevent that behavior is not yet clear, but tests show that little is gained by using an air-assisted fuel injector now being developed by automobile manufacturers. The work, which is led by Professor Wai Cheng of the Department of Mechanical Engineering and the Energy Laboratory, is funded by the Energy Laboratory's Consortium on Energy Research. The diagram at left is courtesy of the Energy Laboratory. In parallel work Dr. Cheng and colleagues have developed a computer model that can predict the vaporization behavior of a complex fuel. The model's predictions match up well with experimental measurements. Once fully developed and tested, the model should provide valuable insights into how proposed and mandated changes in fuels will affect the vaporization process, hence engine start-up behavior and emissions. The computer-modeling work is supported by the Energy Laboratory's Consortium on Engine/Fuel Interactions. (Source: e-lab, a publication of the MIT Energy Laboratory.)



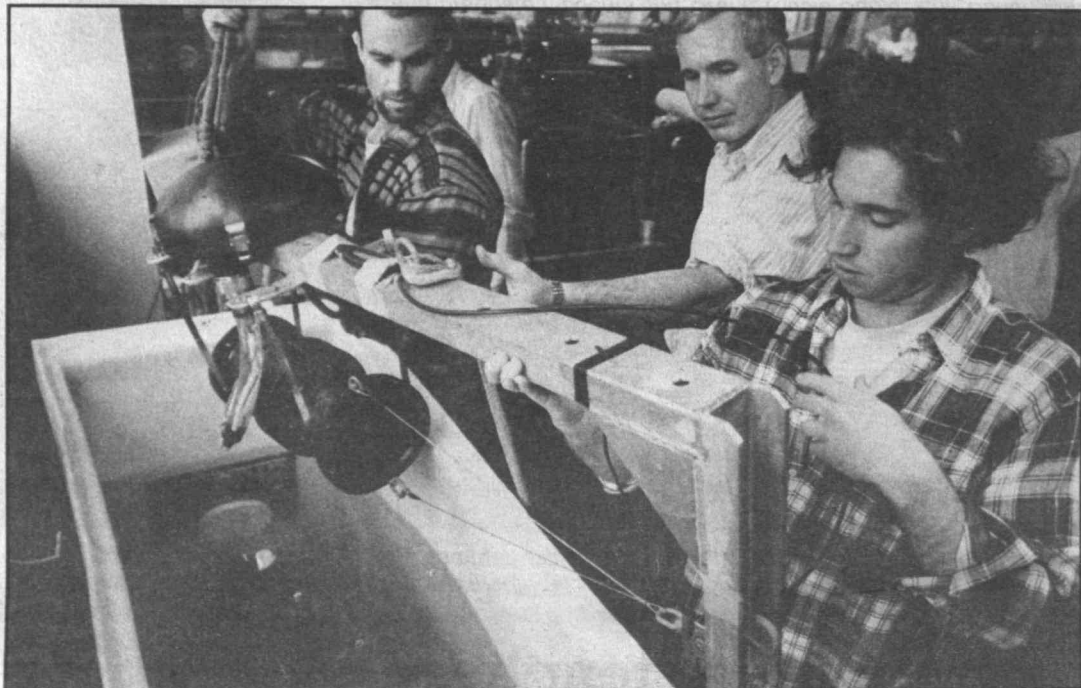
THE MYSTERY OF MEMORY CELLS

We're all familiar with the fact that successful immunization leads to long-term protection against the infectious agent (e.g., a virus). This is because some of the cells that produce antibodies for a given infection develop into long-lived "memory cells" that remain in the body. These cells respond rapidly and vigorously to a later challenge by the same infectious agent, producing large amounts of specific antibodies. However, the molecular basis for the establishment of these memory cells is unknown. Jianzhu Chen, a professor in the Department of Biology and the Center for Cancer Research, is working to solve this mystery via genetic manipulations of the immune system in mice. His work is supported by the Arthritis Foundation and the NIH. (Source: Center for Cancer Research Newsletter)

This column features summaries of MIT research drawn from several sources. If you have an item to suggest, send it to Elizabeth Thomson, Rm 5-111, or <thomson@mit.edu>.



Nicole Suoja, a graduate student in Ocean Engineering, lowers an instrument to measure waves (wave gauge) into the water off a dock at Woods Hole. The instrumentation measures directional distribution and size of short sea waves.



Graduate students Jon Grant, left, and Paul Lemoine, far right, place thruster on a test jig calibrated to take data on thruster performance into water at Woods Hole Oceanographic Institute, where they are doing a two-week field engineering lab which is a requirement for the master's degree.

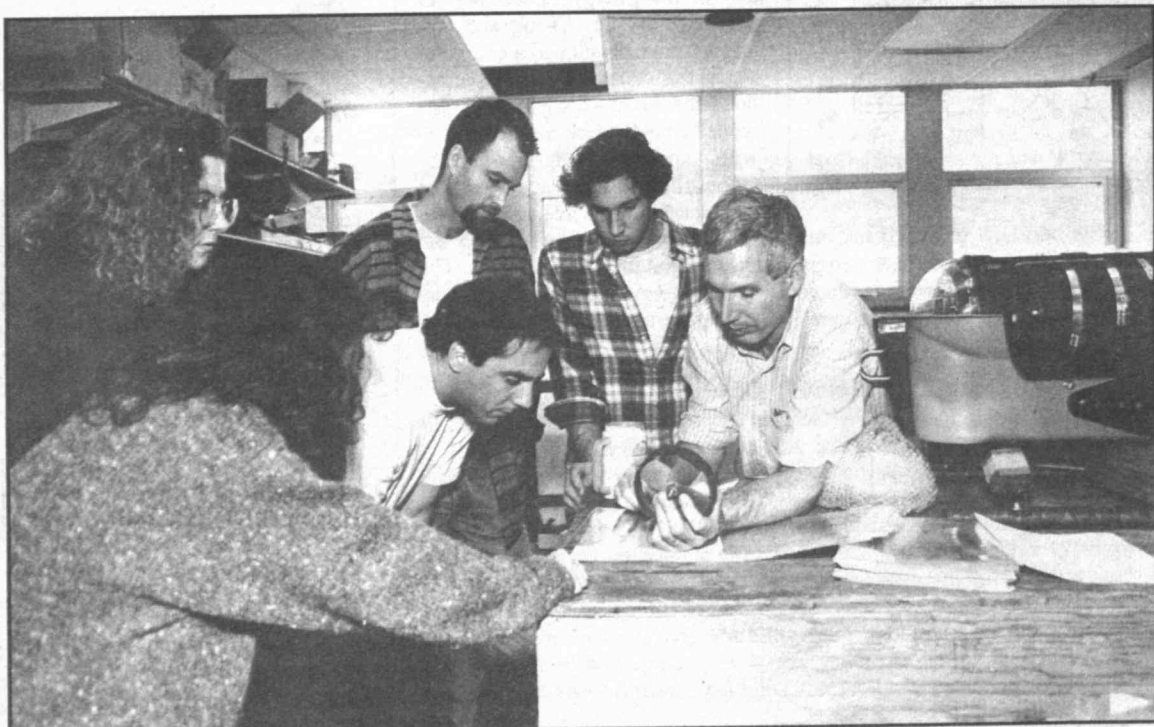
Marine Adventures

The Department of Ocean Engineering has a new program in Marine Environmental Systems which offers a Master of Engineering degree program for professional development. Recognizing the rapidly growing need in the marine field for environmental training to understand and manage complex systems, the department created a program that focuses on the multi-disciplinary nature of ocean-related environmental problems and that offers hands-on experience and training. Ocean Engineering faculty interests spans ocean science, engineering and management and the department has formal ties to the Woods Hole Oceanographic Institution (WHOI).

The program's goal is to produce professionals who are intellectually and practically conversant in the engineering of ocean-based systems and who can:

- Understand and monitor the ocean environment.
- Plan, design, build and use technologies to maintain the integrity of the oceans and their resources.
- Manage the large marine systems and activities they support.

Photos by Donna Coveney



Woods Hole Oceanographic Research Engineer Ned Forrester explains propulsion system to MIT students during the disassembly of an ROV (remotely operated vehicle). Left to right: Claudia Rodriguez, Nicole Suoja (bending over), Joseph Curcio, Jon Grant and Paul Lemoine.



Christopher von Alt of WHOI, Khary Bridgewater, '95, and Claudia Rodriguez pitch Remus, a lightweight AUV (automated underwater vehicle), off the WHOI research vessel Asterias into Eel Pond in Woods Hole as part of a two-week field engineering lab required for their master's degree in the Ocean Engineering department. Among those looking on are Ocean Engineering Professor Judith Kildow and graduate students Jon Grant, Nicole Suoja, Erik Burian and Joseph Curcio.