

September 28, 1988
Volume 33 Number 7

No Tech Talk

Tech Talk will not be published October 12 because of the Columbus Day observance October 10.

The Institute Calendar in next week's paper will cover the period from October 5 through October 23. The deadline for listings in the Calendar, Institute Notices and Classified Ads will be noon Friday, Sept. 30.

Forum opens

"The Candidates and Family Issues" will be the topic when the Women's Forum reconvenes Monday, Oct. 3, at noon in the Bush Room (10-105).

Speakers will be Lisa Dukakis, national constituencies coordinator of the Dukakis campaign, and Michael Duffy, communications director of the Massachusetts Republican State Committee.

The program, jointly sponsored by the Child Care Office, will explore how Michael Dukakis and George Bush will address issues of child care, education, health care and employment equity. All members of the community, men as well as women, are welcome to attend.

Vax advance

The VAX Resource Center (VRC) has an agreement with CompuServe Data Technologies to provide System 1032 Relational Database software for VAX/VMS systems at MIT. In addition to essentially free use in academic applications, the agreement provides for substantial discounts for use in funded research projects.

For further details, call the VRC staff at x3-0514 or stop by Rm 10-256.

Tennis notes

—Telephone reservations for the J.B. Carr Tennis Courts will be accepted daily 9-11am through Friday, Oct. 28. Reservations may be made one day in advance at x3-2914. At 11am each day, the reservation sheet will be posted at the tennis facility. No reservations will be taken for weekend play.

—Applications for the Faculty-Staff Tennis Tournament are now available at the Murphy Equipment Center. The practice of mailing applications to previous participants has been changed. All applications now must be picked up. Participants must complete first-round play by Saturday, Oct. 8. Questions about the tournament may be addressed to Candy Royer, Rm W32-129, x3-2438.



Mrs. Stratton and President Emeritus Julius A. Stratton cut a cake celebrating the dedication of the Catherine N. Stratton Lounge in the renovated Student Center. The lounge, a welcoming "living room," occupies the atrium at the entrance of the building and honors Mrs. Stratton for her "unflagging dedication to the quality of the social and aesthetic environment" of MIT. The dedication took place last Thursday evening and the



building officially reopened Friday when, for the second time in 23 years, Dr. Stratton, who as President brought about its construction, cut the dedicatory ribbon. At right, a student gets a sandwich from the new grille counter in the expanded Lobdell Food Court, which is now open daily 7:30am-11pm. Other sections of the building will open as work on them is completed.

—Photos by Donna Coveney and L. Barry Hetherington

ChemE centennial is planned

By ROBERT C. DI IORIO
Staff Writer

A century of chemical engineering education at MIT—where the discipline was invented—will be celebrated next week with a Centennial Convocation on Saturday, October 8.

The convocation, in the words of Professor Clark K. Colton, chairman of the centennial committee, will "take a brief glance at where we came from and discuss ideas on where we should be going."

The event is sponsored by the Depart-

ment of Chemical Engineering and the American Institute of Chemical Engineers.

There will be two symposia October 8 in Kresge Auditorium. The first will deal with the past and future of chemical engineering and research. The second will look at the role of chemical engineering in the national economy and international competitiveness.

The first symposium will begin at 9am with opening remarks by Professor John M. Deutch, MIT provost. Other speakers will be: Professor L.E. Scriven of the Uni-

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Another revolution

The fall issue of Chapter One, the American Institute of Chemical Engineers magazine for students, has a cover story on the 100th anniversary of chemical engineering education at MIT.

Written by Lois Anne DeLong, editor, the magazine article begins:

"Something about the state of Massachusetts seems to inspire revolution. Just as the American Revolution began in this state, so did a revolution in technical thinking that helped formalize a brand new discipline—chemical engineering.

"The site of this revolution, which began 100 years ago and continues today, is ... the Massachusetts Institute of Technology. It was at MIT that the practice of industrial chemistry, which had been developed throughout Europe, particularly in Germany, began to coalesce into something unique."

Mysterious deep-ocean glow discovered

By EUGENE F. MALLOVE
Staff Writer

An unusual glow from the Pacific Ocean floor has been linked to a biological finding initiated by an observant MIT graduate student. Last July, a sensitive electronic camera first detected the glow from the ocean depths when it was carried by the Alvin submersible to hydrothermal vents—openings along the ridges where tectonic plates meet.

Cindy Lee Van Dover, a third-year graduate student in the MIT-Woods Hole Oceanographic Institution (WHOI) Joint Program

in Oceanography and Oceanographic Engineering, is credited with the perceptive observation that, in effect, led to a double discovery: (1) "Eyeless" shrimp that seem, nonetheless, to have unusual receptors for light, and (2) The mystery illumination emanating from hot water spewed by vents on the ocean bottom.

When she began her graduate studies two years ago, Ms. Van Dover's advisor, Dr. Fred Grassle, gave her the challenging task of finding out how a "blind" crustacean was linked to the food chain near its habitat. The shrimp, known as "Rimicaris exocu-

Russian to present Fairchild lecture

Dr. Victor Gurfinkel of the USSR's Institute of Information Transmission Problems, which is part of the Soviet Academy of Sciences, will speak at MIT on Friday, Sept. 30.

He will deliver the second lecture in a new series, the Sherman Fairchild Program in Computational Approaches to the Brain Sciences.

Dr. Gurfinkel will speak at 4:30pm in Rm E25-111. His subject will be "The Coordination and Regulation of Movements." The community is invited.

The series is part of a program sponsored at MIT by the Fairchild Foundation which involves research on how the brain processes information. The program includes the Department of Brain and Cognitive Sciences, the Artificial Intelligence Laboratory, the Department of Mechanical Engineering, the Research Laboratory of Electronics and the Center for Cognitive Sciences. The program's inaugural lecturer last year was Edwin Land, founder of Polaroid Corp. and director of the Rowland Institute.

lata" (Latin for "eyeless"), thrives near hydrothermal vents, which force water—often as hot as 350°C—into the ocean. Through chemical precipitation, the mineral-laden streams form "chimneys" tens of feet high on which the shrimp swarm—occasionally 1500 shrimp per square meter.

Ms. Van Dover's discovery began in the fall of 1986, when she noticed that each shrimp had a white reflective patch on its back that showed up on photographs and videotapes taken on earlier Alvin dives. In

(continued on page 8)

MIT glassblower wows the crowds at DC festival

By ELIZABETH A. THOMSON
Staff Writer

Walk into any MIT lab and look at the glass.

No doubt you'll find simple beakers, flasks, and a pipette or two (small tubes with calibrations for measuring liquids), but perhaps you'll also see strange, modified flasks with protruding spouts, or large labyrinths of connecting tubes, hollow spheres and tiny coils... truly the stuff of Hollywood's "mad scientist."

Meet Robert DiGiacomo, MIT's premier glassblower and the man responsible for these exotic creations. For 32 years Mr. DiGiacomo has plied his trade hidden away in the basement of Building 6. But a master glassblower is rare, and word got out. This June the Smithsonian Institution moved Mr. DiGiacomo and half his lab (including a 200-pound bench lathe) to the National Mall in Washington, D.C., for 12 days.

There he fascinated over half a million people at the Festival of American Folklife, which featured a large program on the folk traditions of Massachusetts, and suddenly the laurels poured in. Presidential candidate Michael Dukakis capped the excitement with a congratulatory letter soon to be proudly displayed over Mr. DiGiacomo's desk at MIT.

"My tent at the festival was for industrial crafts, or crafts that people learn by on-the-job training," said Mr. DiGiacomo (various schools today offer courses on glassblowing, but Mr. DiGiacomo learned as an apprentice at MIT). Other artisans in his tent included a clockmaker, instrument maker, woodcarver and engraver. "All these people were unique, and all were very, very good at their crafts. They were all top-shelf people," he said.

The glassblowing exhibit proved to be one of the most popular. "Around 50-60 people came in every 10 minutes to watch what I was doing," said Mr. DiGiacomo, who conducted demonstrations from 10-5 every day, with two days off in the middle of the festival. "The ordinary person doesn't generally get to see a scientific glassblower at work; they usually only see the glassblowers at malls."

Consequently Mr. DiGiacomo was deluged with questions. "Number one," he said, "was 'What do you do at MIT?' Then I showed them examples of my work, and gave a demonstration." He also explained why a centuries-old craft is still practiced at the world's top university for high technology.

Back in his lab in the Department of Chemistry, Mr. DiGiacomo pointed to individual tubes, flasks and a few stranger



Glassblower Robert DiGiacomo in his lab at MIT.

—Photo by Donna Coveney

creations. To make a unique apparatus for a specific experiment, he said, "I have to put all these pieces together and make an integrated system. Every system is different, and has to be done on an individual basis." (Needless to say, as the only glassblower on the main campus—there is one other at Lincoln Lab—Mr. DiGiacomo is a busy man.)

Furthermore, he continued, many complicated glass shapes have to be made by hand, and sometimes a simple piece must be modified. Here he picked up an odd three-necked flask and pointed to the two new necks he'd added to the otherwise common piece.

Many of Mr. DiGiacomo's creations begin as simple glass tubes with diameters as narrow as a pencil or as wide as a grapefruit. In a quick demonstration to show some basic glass-blowing techniques, Mr. DiGiacomo pulled a small tube from a wooden cabinet, snapped it in half, and proceeded to mount the two tubes, facing

each other, on either end of a large bench lathe. When the lathe was turned on the tubes spun so quickly that they appeared to be standing still.

The magic began when he touched a blazing blow torch to the exposed ends of each spinning tube. Slowly the brittle glass began to melt, much like a plastic straw if you hold a match to its end, and Mr. DiGiacomo pulled off the excess in a thin ribbon that he twirled around a rod like a cotton-candy vendor.

After a few seconds he pressed one tube against the other, and suddenly a large globe of glass blew up like a balloon at the juncture between the two tubes. Mr. DiGiacomo had accomplished this by pressing a foot pedal to shoot compressed air into the piece. Carefully he pushed one tube toward the center of the still pliable balloon, creating an indented glass bulb.

To finish the demonstration, he flicked off the lathe and "blew out" a small hole in the top of the indented glass balloon by giving a tap to his foot pedal. Quickly he torched the end of a new tube and pushed it down over the hole. The molten glass hardened immediately, and the tube was attached to the bulb.

Finally, he "sealed," or closed off, the open end of the new tube—"one of the most difficult operations for a glassblower"—and the demonstration was over. The entire procedure took less than 10 minutes.

Not surprisingly, after similar demonstrations at the festival Mr. DiGiacomo was applauded every time he held up the finished piece. "People were amazed that you could blow two pieces of glass together and make it structurally sound," he said.

Though the festival in Washington is over and Mr. DiGiacomo is back in his lab, soon he will be traveling to Holyoke, Mass., where the festival will be repeated from Sept. 29-Oct. 2. Once again he will no doubt dazzle the crowds with quick bubbles and molten ribbons of glass, but "the best part," he says, "is saying 'I'm Bob DiGiacomo and I work at MIT.' Those three letters are so magical; people really take notice of that name."

Meeting to probe water issues

If Massachusetts presents in microcosm the nation's—and perhaps the world's—water and wastewater problems, can it lead in devising successful solutions?

Rapid development and the pollution generated by it threaten to overwhelm Cape Cod's water resources, and longtime neglect and procrastination have resulted in unprecedented damage to sea life in Boston Harbor. How can these threats be defused? and what lessons do they hold for the rest of the nation, and for the world?

Fifteen speakers, including principal actors in water-supply and waste-management controversies in Boston and Cape Cod, will discuss these questions at a two-day MIT Alumni Association-sponsored conference in Falmouth, Mass., on October 15 and 16.

Keynoters will be attorney Paul G. Garrity, who, as a member of the Massachusetts Superior Court, was instrumental in the legal challenges that led to creation of the Massachusetts Water Resources Authority; and attorney Paul E. Tsongas, former US senator, who, as chairman of the Governor's Commission on Environmental Operations, is the author of the controversial moratorium on Cape Cod development

Nominations open for Doherty Chair

Nominations are open for the Doherty Professorship in Ocean Utilization, a two-year chair that opens a way for nontenured faculty members to undertake marine-related research that will further innovative ocean use.

There are no restrictions on the area of research and any aspect of marine use and/or management may be addressed. The chair is open to all nontenured faculty without regard to department. The professorship was endowed by the Henry L. and Grace Doherty Charitable Foundation.

Each year one new faculty member is appointed to the chair which provides \$25,000 in annual support. Last year Nicholas Patrikalakis, assistant professor of ocean engineering, was named. He will continue

that will be the subject of a referendum on Barnstable County ballots in November.

Other speakers will include the principals in a controversy over Provincetown's water supply following pollution of its principal aquifer in nearby Truro, experts on Boston and Cape Cod clean-water resources, and specialists in wastewater treatment technologies.

The conference, scheduled for the Sheraton Falmouth Hotel, is jointly sponsored by the MIT Alumni Association and the MIT Club of Cape Cod. For more information call the MIT Alumni Association, x3-8242, Rm 10-110.

MIT and the sea

Interested in learning what current marine-related research is being performed at MIT? Pick up the free 1987-88 directory of *Marine Related Research at MIT*, now available at E38-300 or by calling X3-7041. The new directory, issued yearly by Sea Grant, summarizes each project, pinpoints major research objectives and lists the names of principal investigators.

his research in computer-aided design and manufacturing for marine systems this year.

Anyone wishing to be nominated should contact his or her department head for procedures and selection criteria. Department heads may submit one nomination every year. The deadline is November 28. Announcement of the new Doherty Professor will be made in the spring.

In addition, MIT Sea Grant encourages all interested Doherty candidates to respond to the 1989-90 call for proposals. Preproposals are due in the Sea Grant office by Friday, Oct. 7. Norm Doelling, Rm E38-300, x3-7041, has forms and guidelines for proposals.

Wolfe named Class of 1922 CD Professor

Jeremy M. Wolfe, associate professor of psychology in the Department of Brain and Cognitive Sciences, has been named to the Class of 1922 Career Development Professorship.



The professorship recognizes innovative and imaginative teaching by gifted young faculty members. Professor Wolfe teaches the large undergraduate subject, Introduction to Psychology, and is chairman of the interdisciplinary Program in Psychology. He is a member of the Committee on Curricula, the Committee on the Independent Activities Period (IAP) and the Steering Committee of the Cognitive Science Major. He has served on the committee to design an integrative curriculum in the liberal arts and was instrumental in establishing the psychology program for undergraduates.

The appointment was announced by Professor John M. Deutch, MIT provost. "I am confident that you will continue your outstanding educational and research career, and I trust this award of a development chair will assist you to that end," Professor Deutch said.

Professor Margaret L.A. MacVicar, dean for undergraduate education, said Professor Wolfe is "an unusual teacher: popular, effective, generous and consistent. Jeremy Wolfe enthusiastically contributes to every phase of the undergraduate program."

Professor Wolfe, who received the AB from Princeton University (1977) and the PhD from MIT (1981), focuses his research on a psychophysical approach to vision. His particular interests include binocular vision, visual adaptation and visual attention. He is a visiting assistant professor of ophthalmology at the Massachusetts Eye and Ear Infirmary of Harvard Medical School. He joined MIT in 1981 as a lecturer in psychology and became assistant professor in 1983 and associate professor in 1987.

Medical Department offers back program

The Medical Department Health Education Service will offer its "Take Care of Your Back" program for two weeks beginning Tuesday, Oct. 4, noon-1:30pm in Rm E23-297.

Led by Adele Smith, physical therapist in the MIT Athletic Department, the program is focused on prevention of back pain. Slides will be shown to illustrate proper body mechanics. Back strengthening exercises will be demonstrated and practiced. Participants should wear appropriate clothing for the exercises.

The fee is \$25 for students and members of the MIT Health Plan; \$30 for others. Advance registration is required and may be made by visiting or calling the Health Education Service, Rm E23-205, x3-1316.

Because many of the health education programs are offered more than once a year, a new category in the Institute Calendar—Health Education—will announce their start-ups and details. For example, the Stress Management Program is announced there this week. When new programs are offered, they will be announced in a small article as well.

Free booklet

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

The Handbook for College Admissions and Financial Aid is available by writing or calling the Association of Independent Colleges and Universities (AICUM), Suite 1224, 11 Beacon Street, Boston, 02108-3093; (617) 742-5147.

Flynn was omitted from tenure list

The name of Professor Suzanne Flynn was inadvertently omitted from the list of faculty members who were granted tenure, effective July 1.



Dr. Flynn, 38, associate professor of second language acquisition in the Department of Humanities, received a BA degree in anthropology from the University of Massachusetts/Amherst in 1972, an MS in English education from the University of Puerto Rico in 1974, and both an MA and PhD in linguistics from Cornell University, in 1980 and 1983 respectively.

She has established a national and international reputation as a linguist specializing in second language acquisition research. She has produced a substantial body of work and has started on a project that explores the role of various parameters of universal grammar in language acquisition. She also is involved in Project Athena working on the development of computer software and hardware programs to teach foreign students pronunciation contrasts in a new language.

She joined the MIT teaching staff as an instructor of English as a Second Language in 1981. She became assistant professor in 1982 and associate professor in 1987.

Beavers capture attention

By **ROGER F. CROSLY**
Sports Information Director

It lived up to the hype.

In the most publicized athletic event in the history of the Institute, the MIT Beavers rode the legs of junior tailback Shane LaHousse and rolled to a 29-7 victory over Stonehill College in the debut of NCAA Division III football Saturday.

The game, which had received extraordinary national and local publicity, was played before packed stands on a perfect fall afternoon. Representatives of two Boston television affiliates and numerous other broadcast and print media were treated to an impressive offensive ground display.

More than 40 members of the MIT Marching Band and an 11-woman squad of MIT cheerleaders contributed to a lively afternoon for an audience of about 1,000 that crowded the bleachers of the Henry Steinbrenner Stadium.

La Housse was the story Saturday. The 5'10", 175-lb. back ran wild over the Chieftan defense for 260 yards on 29 carries. LaHousse scored all the MIT touchdowns on runs of 29, 68, two and 61 yards. Both the total yards and the four touchdowns are MIT single-game records.

MIT opened the scoring in the first period with a safety. Stonehill punter Mike Ingles tracked down an errant snap in the end zone and was swarmed under by the Beaver defense.

In the second period the Beavers' ground game began to assert itself. LaHousse scored on runs of 29 and 68 yards sandwiched around a four-yard touchdown pass from Stonehill's Andy Morency to Kevin Webb. Mike Ahrens added the extra points on each of LaHousse's scampers.

LaHousse scored on a two-yard run in the third quarter. Sophomore fullback Garrett Moose (85 yards on the day) and senior quarterback Tim Day (65 yards) also added fuel to the Beavers' attack.

The fourth period brought one final burst from LaHousse's jets. He took a handoff around the left end and down the sideline. At the Stonehill 25, he cut back to the center of the field and raced untouched for his final score.

The Beaver defense was nearly as stingy as the offense was prolific. Stonehill quarterback Morency was able to pick up 156 yards passing with most of his completions

in the five-to-eight-yard range, but the Stonehill ground game was virtually nonexistent. The young Beaver defense held the Chieftans to only 25 total yards.

Sophomore inside linebacker Darcy Prather and defensive back Art Wang led the team with 11 and 12 tackles respectively. Wang added a broken-up pass attempt and Prather recorded a quarterback sack. Defensive back Fred Loh had two interceptions to stop Stonehill drives.

A quick look at the statistics reflects the Beavers' dominance of the contest. MIT had 18 first downs—17 of them on the ground to nine for Stonehill. The Beavers outgained Stonehill by 437 to 181 yards.

"This was typical MIT football," head coach Dwight Smith said. "We tried to loosen them up with the pass early in the game, and I guess from the way we were able to run, it worked."

"The crowd was a great motivating factor," LaHousse said. "It's great to play in front of this many people. I hope they come back in a couple of weeks."

The Beavers' next contest is Friday against Merrimack College at Greater Lawrence Vocational-Technical High School. The next home game will be Homecoming on October 15 at 1:30pm against Assumption College.

Alumna Liz Bradley was Olympic rower

Former MIT oarswoman Liz Bradley '83 was a member of the women's four-with-coxswain boat that competed—but lost—in the final heat in the Summer Olympic Games last Friday. Ms. Bradley rowed in the third seat.

Ms. Bradley is a graduate student pursuing a PhD degree in electrical engineering. She has rowed in the World Championships for the last two years, being a member of the United States eight-oared shell in 1986 and competing in the pairs event in 1987. Her pairs partner, Jennifer Corbet of Brown University, was also a member of the Olympic boat. Ms. Bradley has never received a medal in world competition, although the eight-oared shell of which she was a member took fourth place.

Ms. Bradley's parents have supported the MIT crew program by purchasing two four-seat shells. The shells are named after her grandparents, Helen and John Carlin.

MIT and the United Way: a volunteer profile

Last year the MIT community contributed more than a quarter of a million dollars to the United Way. This year's campaign began September 26 and will continue through November. But where do those dollars go? Who are we helping? You may be surprised. The list of beneficiaries includes kids, the homeless, battered women and working parents. These people are represented by almost 200 United-Way affiliated agencies.

The profile below is the first in a series on the people your dollars help. These articles are based on interviews with people at MIT who volunteer for the United Way or affiliated agencies.

For Evette Layne, assistant director of the MIT-Wellesley Upward Bound Program, volunteering for the Cambridge Community Center was "a natural progression. I've been involved with the Center since I was a tot," she said. "It's been in the community for a long time—it's something that my mother was involved in."

Established in 1929, "the CCC is a place where you can bring your whole family and find something to do," said Ms. Layne, who just completed a three-year term as a CCC board member and is currently chairing the membership committee. "It can foster and bring back a sense of family to those who may have lost that feeling," she said.

Sitting back in her chair, she ticked off some of the many CCC programs: after-school classes and day camp in the summer for kids, sports tournaments and beauty seminars for teens, and a variety of evening classes plus a parents' group for adults.

Ms. Layne thinks that the Center's programs for the elderly are particularly important. "Many times young people forget about the seniors of the community. It's not an active neglect; they just forget about them. To have something that highlights the elderly is most important."

Consequently the CCC puts on monthly lunches for seniors, which Ms. Layne says are very popular. "They look forward to coming out and getting together with their friends," she said. "For many it's the highlight of their month."

Last year, however, the Center suddenly found itself without a full-time cook. To save the lunch program Ms. Layne and other board members, all with full-time jobs, pitched in to cook



Evette Layne (left), an MIT employee who volunteers for the Cambridge Community Center, and Dawn Swan, executive director of the Center.

—Photo by Donna Coveney

and serve the lunches for several months. "I could see the appreciation that the seniors had for what was being done, and the effort we put into it combined with their excitement made it a very enjoyable time," she said.

The United Way helps make all of these programs possible. The Cambridge Community Center has an operating budget of approximately \$231,000; the United Way allocation for 1987 was \$74,600.

For those interested in helping out further, "we're always looking for volunteers," said Ms. Layne. If you'd like to get involved, call Dawn Swan, executive director of the CCC, at 547-6811.

—Elizabeth A. Thomson

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House, Sept 26 through Dec 31. **Heinrich Hertz: The Beginnings of Microwaves.** Replicas of the original apparatus used by Hertz to prove James Maxwell's theory of electromagnetism (1864). The instruments are on loan from London's Science Museum. Catalogue available for \$7.95 at Museum Shop. Through Dec 31. **Earth, Sea and Sky: Charles H. Woodbury, 1864-1940, Artist and Teacher.** Paintings, watercolors and drawings by Woodbury, MIT Class of 1886, is the largest retrospective exhibit of works by this master of nature's motion and opposing force. Through Oct 3. **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; \$2 donation requested.

Compton Gallery - Progetti Per Napoli. Architectural designs for Naples, Italy, focusing on the complex problem of change in a historic setting. Organized by the University of Naples Architecture Dept. Sept 30 through Nov 11. Co-sponsored by the MIT Museum, MIT Architecture Dept and Banco di Napoli. Gallery hours: Weekdays 9am-5pm, closed Saturdays.

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.

Egerton'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.**

OTHER EXHIBITS

Institute Archives and Special Collections - MIT: A Major Contribution to the Development of Modern Sanitary Engineering Practice. First in a series of three exhibits in commemoration of the Lawrence Experiment Station's 100th anniversary. 1904-05: **A Pivotal Year for MIT.** Chronicles alumni and staff reaction to the most serious of several attempts to merge Harvard and MIT. Hall exhibit cases in 14N, 1st floor.

Wellesley Events

Jewett Arts Center* - Entering the Picture. 19th & 20th Century photographs from the Wellesley College Collection including works by Atget, Kertész, Brandt, Cartier-Bresson, Abbott and Winogrand, Main Corridor Gallery, through Jan 8. **A Timely Encounter: Nineteenth-Century Photographs of Japan.** An exhibition of hand-colored

albumen prints by Western and Eastern photographers of 19th-century Japanese subjects, through Oct 30, Main Gallery.

Muddy Waters* - Japanese film directed by Imai, 1953, shown in conjunction with the Museum exhibition of Japanese photographs, Thurs, Sept 29, 4:15pm & 7:15pm, 377 Science Ctr.

Careers in Marketing* - Panel discussion, Wellesley Career Center Panel Discussion with Donna Davis Berman, Director of Marketing, Index Technology Corp; Susan Guba Fentin, marketing consultant; Suzanne Moot, V.P., Commercial Marketing, Shawmut Corp; Claudia Newhorn, Associate Product Manager, Personal Care Division, Gillette Co; Jill Wolfe, marketing research analyst, Hill, Holliday, Connors, Cosmopolis, Inc, Thurs, Sept 29, 7pm, Library Lecture Rm.

Concert* - Cellist Alexander Baillie performs Mendelssohn, Schubert, Brahms and Henze with Stephen Prutsman, piano, Sun, Oct 2, 8pm, Jewett Auditorium.

Auditions for The Hostage* - Wellesley College Theater auditions for play by Brendan Behan, Oct 3, 3-5pm, 7:30-9:30pm; Oct 4, 7:30-9:30pm of by appointment, 235-5895. Female roles cast from Wellesley student body.

No Turn on Red: America and Perestroika* - Lars Lih, assistant professor, Political Science, Wellesley Peace Studies Program Lecture, Wed, Oct 5, 7:30pm, Clapp Library Lecture Rm.

Understanding Correspondences Between Male Privilege and White Privilege Through Women's Studies Work** - Peggy McIntosh, associate director, Wellesley Ctr for Research on Women, Seminar, Thurs, Oct 6, 12-1:30pm., Cheever House, 828 Washington St.

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 5 through Sunday, October 23 to Calendar Editor Rm 5-111, before 12noon Friday, September 30.

—Here & There—

Two of three Leroy P. Steele Prizes awarded by the American Mathematical Society at its centennial celebration in August went to MIT faculty members, **Sigurdur Helgason** and **Gian-Carlo Rota**. Professor Helgason won the 1988 Steele Prize for Expository writing for his books, *Differential Geometry and Symmetric Spaces* (1962), *Differential Geometry, Lie Groups, and Symmetric Spaces* (1978) and *Groups and Geometric Analysis* (1984). Professor Rota won the 1988 Steele Prize for a Fundamental Paper for his paper "On the foundations of combinatorial theory. I. Theory of Mobius Functions."

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James Olivieri, who retired last year as chief of the Campus Police, received this year's President's Award from the International Association of Campus Law Enforcement Administrators for "his unselfish efforts in developing campus law enforcement personnel in Massachusetts and throughout the US and Canada."

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CLIPS AND QUOTES

—In an Op-Ed article in The Boston Globe, **Richard M. Valelly**, assistant professor of political science, questions the benefits of the US-Canadian Free Trade Agreement. "The pact has many good features, and its name suggests a worthy goal," he writes, but he adds, "Industrial policies and greater national

investment in exploiting America's potential comparative advantages in technology may prove far better for America in the long run...than building on the dependencies of our trading partners."

—Federal guidelines setting deadlines for the removal of asbestos may themselves create a health risk in some situations involving private individuals, small businesses and communities without the resources to hire qualified contractors, **Alan M. Ducatman**, chief of Environmental Medical Services, told the Sunday News in Manchester, N.H. "There are so few competent removers and so much demand that the cost has skyrocketed and people who need it are being driven to do things far more hazardous than they ever did before," he said. "They're removing it themselves... We should remove it in a planned, intelligent way that does not increase the danger. The way the regulations are now, we are unwittingly exposing far more people than before, because we're rushing."

—Time magazine quotes **Tomaso Poggio**, co-director of MIT's Center for Biological Information Processing, as being skeptical about neurocomputing, designing computers to mimic the brain's ability. "The only thing they have in common with the human brain is the word neural," he said. "Before trying to duplicate the human brain, scientists will have to learn far more about the brain than they already know."

—Charlie Ball



THE ARTS

OCTOBER AT MIT

September Reception Opens Compton's October Show

Progetti Per Napoli. Architectural designs for Naples, Italy, showing dilemmas of change in a revered historic city. Reception September 30, 5-7pm, for this MIT Museum exhibit, Compton Gallery off Lobby 10. Weekdays 9-5. 3-4444

6 Thurs

Sizzling Scarlatti Sonatas

Thursday Noon Chapel Concert. Jennifer Paul, harpsichord. 12:05pm, MIT Chapel.

List Center Party For Three New Shows
Reception—students are welcome—for the exhibitions listed below (7 Fri). 5-7pm, List Visual Arts Center on the entry floor of the Wiesner Bldg. (E15)



18 Tues

Vocal Recital II

Voices feature Jayne West, soprano and Karen Sauer, piano, in the second of this recital mini-series. 12:05pm, Killian Hall. 3-2906

"Goin' Fishing" Opens With Party

Goin' Fishing: Boston Fisheries 1900-1920 exhibit of photos, models, and equipment examining Boston's fishing industry. Opening reception, 5-7pm, followed by slide lecture: "Steam Trawlers in the NE Fishing Fleet: A Decade of Transition 1905-1915," Erik Ronnberg, model maker and nautical historian. 7pm, MIT Museum, 265 Mass Ave. 3-4444



19 Weds

Artist-in-Residence Speaks

Lecture by artist Carl Cheng. (See 7 Fri.) 7:30pm, Bartos Theater. 3-4680

Gropius Exhibit Lectures

"The Culture of the Weimar Republic: Light and Darkness," Dr. Richard Hunt; "Art in the

25 Tues

Voices III: Russian/Armenian Music

Voices Recital. Suzanne Ehly, soprano and David Witten, piano. Russian and Armenian music by Mussorgsky, Gomidias and Stravinsky. 12:05pm, Killian Hall. 3-2906

27 Thurs

Lute, Voice & Gambas

MIT Thursday noon Chapel Series: Glorianne Colver Jacobson, lute; Michael Colver, voice; Alice Robbins and Carol Lewis, gambas. 12:05pm, Chapel. 3-2906

27-29 Thurs/Sat

A Winter's Tale Continues

See 20-23 above.

31 Mon

Ghosts, Gremlins & Spooks

In its annual Halloween Extravaganza, the MIT Concert Band, John Corley, director,

1 Sat

Guest Artist Series

To begin the season this series brings the Manhattan String Quartet—"national treasure"—to perform Schubert's Quartet in Eb, Op. 125; Shostakovich's Quartet No. 5; Debussy's Quartet in G Minor. 8pm, Kresge. 3-2906



7 Fri

List Center Opens: Three Exhibitions

Nancy Spero This major feminist artist, based in New York, featured in her first major US exhibition—paintings, mixed-media drawings, collages and handprints.

Carl Cheng Visual Impressions of an Invisible Sculpture. Santa Monica artist Carl Cheng, in residence here during October.

Richard Bolton The Bear in the Marketplace: Anticommunism and Patriotism in Recent American Advertising.

All three in the List Center Weekdays, noon-5, weekends 1-4. 3-4680

8 Sat

MIT Chamber Players

Marcus Thompson, director. Great works from the chamber music repertoire performed by MIT musicians and their visiting professional guests. 8pm, Killian Hall.

13 Thurs

Quartet in Chapel

The Mannheim Quartet performs Quartets of Mozart, Hayden and Viotti. 12:05pm, MIT Chapel. 3-2906

13-15 Thurs/Sat

Students Direct Plays

MIT Dramashop student-directed plays. Informal critique and coffee hour. 8pm, Kresge Little Theatre. 3-2877

14 Fri

Brass in the Sunshine

MIT Brass Ensemble, Richard Given, director. 12pm, Hayden Library Bldg. Courtyard. Rain location: Killian Hall

16 Sun

New Music from Down Under

To celebrate Australia's Bicentennial, the new music ensemble, Terra Australis, based out of New York, presents a concert. The eight piece ensemble plays works by Australian composers. 3pm, Killian Hall. 3-2906

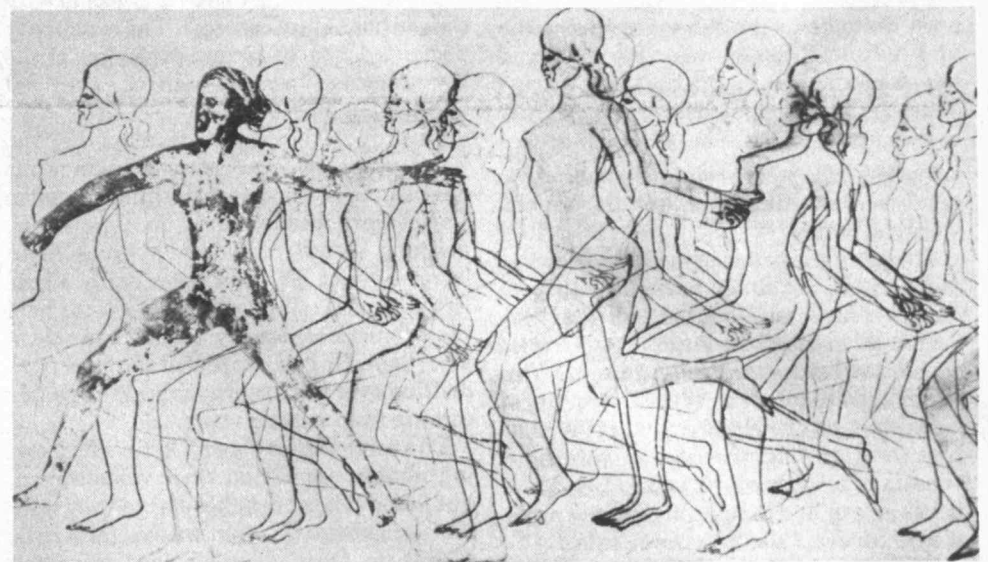
Artist Looks at Ads

Richard Bolton presents an informal gallery talk related to his exhibit (see 7 Fri above). 4pm, List Center, Wiesner. 3-4680

Weimar Republic: The Bauhaus, Beckmann, and Nolde" Dr. Anneliese Harding. (See "All Month" below.) 7pm, MIT Museum. 3-4444

Spero Speaks

Feminist Nancy Spero leads a gallery talk about her work. (See 7 Fri above.) 7pm, List Center, Wiesner. 3-4680



20 Thurs

Eclectic Quartet

MIT Chapel Concert. Real Eclectic String Quartet ("RESQ"). 12:05pm, Chapel. 3-2906.

20-23 Fri/Sun

Winter Comes Early

A Winter's Tale. Shakespeare Ensemble at MIT, directed by A. Brody. 8pm, Sala de Puerto Rico. \$6, \$4. 3-2903

21 Fri

Brass In Lobby 7

MIT Brass Ensemble plays at noon in Lobby 7. 3-2906

22 Sat

MIT Symphony Concert

With David Epstein, conductor, the MIT Symphony Orchestra presents its first concert of the new season. Paul Marleyn, cello. 8:30pm, Kresge. Tickets: \$1 at the door. 3-2906

23 Sun

Brass in Killian This Time

MIT Brass Ensemble plays a Sunday afternoon concert, 2pm, Killian Hall. 3-2826

goes trick or treating with the unusual acoustics of Lobby 7. Musicians in costumes play for an hour...music chosen for its sound effect potential in this unusual space. 6pm, Lobby 7. 3-2906

All Month

MIT Museum Exhibits:

In Gratitude and Admiration

A Celebration of Walter Gropius. Irreverent, playful and affectionate birthday cards sent to Gropius on his 60th and 70th birthdays, from important 20th century artists.

Goin' Fishing

Boston Fisheries 1900-1920. Photographs, models, and equipment examining Boston's fishing industry. (See opening events on 18 Tues.)

Heinrich Hertz

The Beginning of Microwaves. Replicas of the original apparatus used by Hertz to prove James Maxwell's theory of electromagnetism (1864). MIT Museum, 265 Mass Ave. Hours: Tues-Fri 9-5, Weekends 10-4. 3-4444

Five Days left: See MIT's Woodbury

Only five days remain to see the MIT Museum's comprehensive exhibition—termed "exhilarating"—of MIT's own great artist, Charles Woodbury, Class of 1886. Final day, Sunday, October 2.

All events are free except where prices are noted.

4 Tues

Singers in Killian Hall

Vocal mini-series debuts today, the first recital featuring Laura Palladino, soprano, and Stephen Steiner, piano. Bizet, Brahms, Mozart, and Barab. 12:05pm, Killian Hall, Hayden Library Bldg. 3-2906



Urgent need seen for increased biomedical funding

By **FEDERICO WELSCH**
Harvard-MIT HST

Mary Lasker, biomedical research lobbyist *par excellence*, is quoted in the recent book "Building a Healthy America" (edited by Terry Lierman and published by Mary Ann Liebert, Inc.) as saying, "It is my tax money; I have the right to help to determine how it is spent." Her statement inspired this column.

Biomedical research, which over the last few decades has contributed so substantially to the increase in the quantity and quality of life for us all, is heading towards a serious crunch in this country. This is so in spite of its many friends in Congress. The upcoming crisis is caused by lack of long term planning and by yearly appropriations based on piecemeal consideration of available research opportunities.

Our national commitment to alleviate human suffering has been flagging for two decades now. Lately, preoccupied with large federal budget deficits, we seem to have abandoned it. At a recent meeting, "Medicine for the 21st Century," we concluded that a healthy biomedical research enterprise would require \$14 billion (in 1987 dollars) by the year 2000 at the National Institutes of Health (NIH). Currently, the (1988) appropriation for the NIH is only \$6.67 billion.

We Americans have failed to communicate to the international community our intent of being second to none in combating disease. Neither have we let the world know that a significant portion of our research capability will work on major diseases that affect Third World nations. Whoever aspires to lead our nation after

the next election has to do both, so we can maintain US pride and world respect.

Forty-five to fifty percent of the peer-reviewed approved research applications should be funded by the NIH, but the agency's budget restricts funding to 33%, and that at arbitrarily reduced levels. The optimum average length of NIH funded research grants is—we all agree—five years, but the agency awards them for only 3.7 years. The percentage of applications to the NIH from investigators 35-years-old or younger has fallen from 26.1% in 1979 to 13.4% in 1986. Are young investigators a disappearing breed?

The number of doctoral degrees in the sciences and engineering awarded to Americans—per thousand 30-year-olds in the population has fallen by 50% from 1970 to 1985. Fewer pre- and postdoctoral trainees were funded by the NIH in 1986 (10,382) than in 1969 (13,888). For 1989 the National Academy of Sciences (NAS) recommends the funding of 13,500 biomedical training positions (12,150 at the NIH alone).

But the present budget authority for training does not allow for the necessary growth, even at poverty level stipends of \$6,552 per year for predoctoral and \$15,996 for postdoctoral trainees. Neither the number of training positions nor the stipend levels are designed to attract the best American young minds into research careers. Any surprise, therefore, that two-fifths of all postdoctoral positions in biomedical and behavioral research are filled by foreign nationals? (American level stipends and living conditions are enticing to scientists from Third World and Iron Curtain countries!)

We also limit access to research careers through too few and too poorly paid positions at a time when: 1) research opportunities are more plentiful than ever; 2) the fledgling US biotechnology industry has to compete with academia for well-trained personnel; 3) a substantial number of our college and university faculty will retire in the early 21st century; 4) our high schools report a widespread shortage of competent science and mathematics teachers; 5) our students exhibit a disturbing lack of achievement in the quantitative skills required to become the next generation of scientists and engineers; 6) the world has shrunk, thanks to new communication and transportation systems, and is becoming more technology oriented every day; and 7) we have to worry about being competitive in international markets.

The Government-University-Industry Research Roundtable of the NAS states that "there is cause for concern about the future adequacy of the science and engineering talent pool." The prescription for making science unattractive for Americans carries with it seeds of destruction. If it were the result of conscious planning it would be considered unpatriotic. If, after seeing the existing warning signs, the policy were to be willfully continued, it would border on the criminal.

Unfortunately, we have "saved" not only on developing the brain power of the future, but we also have let our equipment become outdated and many of our research facilities become obsolete. The penny-wise, pound-foolishness of the past is coming back to haunt us. A renewed commitment to biomedical (and other civilian) research

and development is needed. We will either have to pay for it now, or through lost opportunities in the international marketplace later.

Eli Ginzberg of Columbia University has stated: "The way a nation approaches the matter of education and of research and research funding is a reflection of its total scale of values." The antidote for the current prescription for the demise of the American biosciences, and of civilian R&D in general, lies in larger investments for our future. Civilian R&D, and in particular biomedical research, must once again receive the highest priority in the competition for available federal funds.

In the mid-sixties we spent 5% of the health dollar on research; now it is 3%. In the mid-sixties the Federal Government supplied two-thirds of the biomedical research and development dollars; today it supplies half. As stated in the recent NAS report *Nurturing Science and Engineering Talent* [available from the NAS, 2101 Constitution Ave., NW, Washington, D.C. 20418; (202) 334-3486] "The advance of science and technology is essential to the health of the nation—essential to the quality of life to economic stability and national security." Our Federal Government has the obligation to make the necessary investment.

(Federico Welsch, MD, PhD, research development officer for the Harvard-MIT Division of Health Sciences and Technology, is leaving to become associate director for international affairs of the National Cancer Institute. This piece appeared in *Genetic Engineering News* in June and is reprinted here with permission.)

Graduate student finds mysterious deep-ocean glow

(continued from page 1)

the course of dissecting shrimp which had been brought to the laboratory from the Mid-Atlantic Ridge (between Bermuda and the Azores), she found peculiar organs beneath the white patches on the shrimps' transparent shells. She also discovered nerves—perhaps the equivalent of optic nerves—connecting the organs to the shrimps' brains.

Though the organs did not have lenses—and so were not likely to be able to form images—Ms. Van Dover believed that they looked otherwise like large eyes. Despite skepticism among their colleagues, Ms. Van Dover and Joseph Cann of the University of Newcastle in England (now at WHOI) hypothesized that the organs were light sensors of some kind. "It looked to me like it was an eye, and I set about trying to prove it was an eye," Ms. Van Dover said.

"If hot springs glow, then the shrimp would be able to use the organs to lead them to the glow and, hence, to food," Ms. Van Dover speculated. "Once near the springs, they could use the organs to avoid swimming into the very hot part of the flow."

Ms. Van Dover persuaded Ete Szuts at the Marine Biological Laboratory in Woods Hole to run spectrophotometric assays of the organs for visual pigment, and he did find a pigment very similar to that in human eyes. If the shrimp organs were true light receptors, what then was their source of illumination? Among the possibilities: luminous bacteria living near hydrothermal vents, luminous predators, or the hot springs themselves.

Last July, Ms. Van Dover became a member of an interdisciplinary group of scientists, headed by University of Washington oceanographers, aboard the WHOI research ship *Atlantis II*. The ship brought the Alvin submersible to the Juan de Fuca Ridge, some 7,200 feet beneath the surface of the Pacific, 180 miles west of Vancouver, British Columbia.

Dr. John Delaney, Professor of Oceanography at the University of Washington and lead scientist for July's *Atlantis II* cruise, had invited Ms. Van Dover to participate in the cruise. She had suggested using a sensitive CCD electronic camera to investigate the hypothesized source of illumination at the hydrothermal vents.

The new electronic camera, made by Marine Imaging Systems of Cape Cod, was to be used for systematic mapping of the hot spring area at Juan de Fuca. The camera, highly sensitive to extremely low light lev-

els, enables scientists to map much larger areas of the sea floor than is possible with conventional film cameras. The sensitivity permitted 5 to 20-second exposures of the hydrothermal vents—without artificial light.

On July 26 the camera detected the "Ms. Van Dover glow," as Professor Delaney has dubbed the newly discovered phenomenon. The camera was mounted on Alvin's bow, pointing directly forward. Making Alvin hover 30 feet off the bottom with all its lights turned off, pilot Dudley Foster held the submersible steady against the side of a hot vent. He had to prevent the craft from drifting over the hazardous scalding water coming from nearby vents.

The researchers aboard Alvin saw glowing images appear on their video screen, but found it hard to believe what they were seeing. Though the light was too faint to be visible to their unaided eyes, repeated camera exposures on two different hot springs convinced them that the glow was real. As Alvin rose to the surface, they signaled that the glow had been found.

The discovery dive occurred on the last day of the three-week oceanographic cruise, and made the traditional shipboard celebration on the journey back to Seattle especially happy. The discovery was also no doubt encouraging to Ms. Van Dover, who soon after the voyage passed the general qualifying examinations for her doctorate.

The cause of the glow is still a mystery, but researchers are focusing on two prime possibilities. It may be simply "black body radiation"—the normal thermal emissions that any body at that temperature possesses—or it could be light emission from chemical "redox" reactions that occur when the chemically "reduced" vent solution mixes with oxygenated water. Follow-up dives by Alvin, now underway (late August), are partially intended to determine the cause of the glow by using filters on the camera to determine the light's spectrum.

Also left unanswered: Are there organisms at those great depths—bacterial or otherwise—which rely on the hydrothermal vent glow for photosynthesis? Currently, scientists believe that life near hydrothermal vents is supported almost entirely by chemical energy provided by compounds coming from the vents. "If photosynthesis occurs at all at those depths, it would have important evolutionary implications," said Ms. Van Dover. "It would mean that a hitherto unsuspected mechanism for sustaining life could have existed



Light recorded by a highly sensitive electronic camera glows at the opening of a hot-water vent on the seafloor. The image is a 20-second exposure taken with the electronic camera at a distance of 18 inches from the vent with no illumination from the submersible.

deep in the oceans early in the history of life."

Ms. Van Dover's work is supported, in part, by the "Ocean Ventures Awards" fund that is administered by WHOI's Education

Office. July's cruise by *Atlantis II* and Alvin was sponsored by the National Science Foundation, Washington Sea Grant, and the Office of Naval Research.