Massachusetts Institute
of Technology

TECH TALK

May 17, 1989
Volume 33 Number 32

Faculty meeting

A regular meeting of the faculty will be held today (Wednesday, May 17) at 3:15pm in Huntington Hall (Rm 10-250). In addition to several actions normally taken at the May meeting, agenda items include:

—A motion to endorse the proposed list of members for the Faculty Advisory Committee on the Presidential Search by Professor Frieden.

—Remarks on the recent Congressional hearings on academic misconduct by President Gray and Provost Deutch.

—Report of the Committee on Undergraduate Admissions and Financial Aid by Professor Stolzenbach.

Global change

A symposium on Global Change: Processes and Prospects will begin this morning (Wednesday, May 17) with a welcome from President Gray, followed by a keynote address by Dr. Robert M. White, president of the National Academy of Engineering. Dr. White received SM and ScD degrees from MIT.

Members of the community are welcome at the symposium which begins at 8:30am. It is sponsored by the Industrial Liaison Program and chaired by Dr. Malcolm A. Weiss of the Energy Laboratory. See further details on page 3.

Family weekend

The Alumni/ae Association is currently looking for students and other members of the MIT community who would like to help plan a Family Weekend October 20 and 21 for the parents of all undergraduate students.

The Family Weekend will include lectures, demonstrations and tours of MIT during the day, with music and drama performances in the evenings. Special events for younger brothers and sisters are also being arranged.

If you would like to help plan the event this summer, call Marcia Hartley, manager of Parents Programs for the Alumni/ae Association, at x3-0743.

Picture book

Copies of the 1989 Members of the Faculty picture book, a publication identifying active full, associate and assistant professors at the Institute, has been published by the MIT Communications Office. The last picture book was published in 1972.

Faculty will receive books in the mail. Department headquarters are scheduled to receive copies for their use. A limited number of additional copies are available for department headquarters and administrative offices. Orders for the book can be placed by leaving a voice mail message at x3-6695 with the following information: name, department, phone and room numbers, and number of books requested.

Please do not call Graphic Arts regarding the sources of photographs for the book. All inquiries regarding photos should be made through the phone number listed above.

Construction to begin on Rotch Library

Construction is set to begin at the end of May on alterations and an addition to the Library of Architecture, Planning and Art, Paul F. Barrett, director of Physical Plant, has announced.

The project consists of alterations to the existing Rotch Library on the first and second floors of Building 7 and construction of a 17,500 square foot addition. The addition will alleviate overcrowding and allow for acquisitions over the next decade.

The addition will be directly east and abutting the north wing of the Rogers Building (7), extending the entire length of the wing, approximately 110 feet. It will extend outward toward Building 11 some 30 feet. While the new structure connects to Building 7 on its west and south sides, it will have a separate structural system, imposing no load on Building 7.

The entrance to the library will remain in its present location on the second floor of Building 7. Renovated space will house the public service areas and administrative and staff work areas. Most of the space in the addition will be used for book stacks.

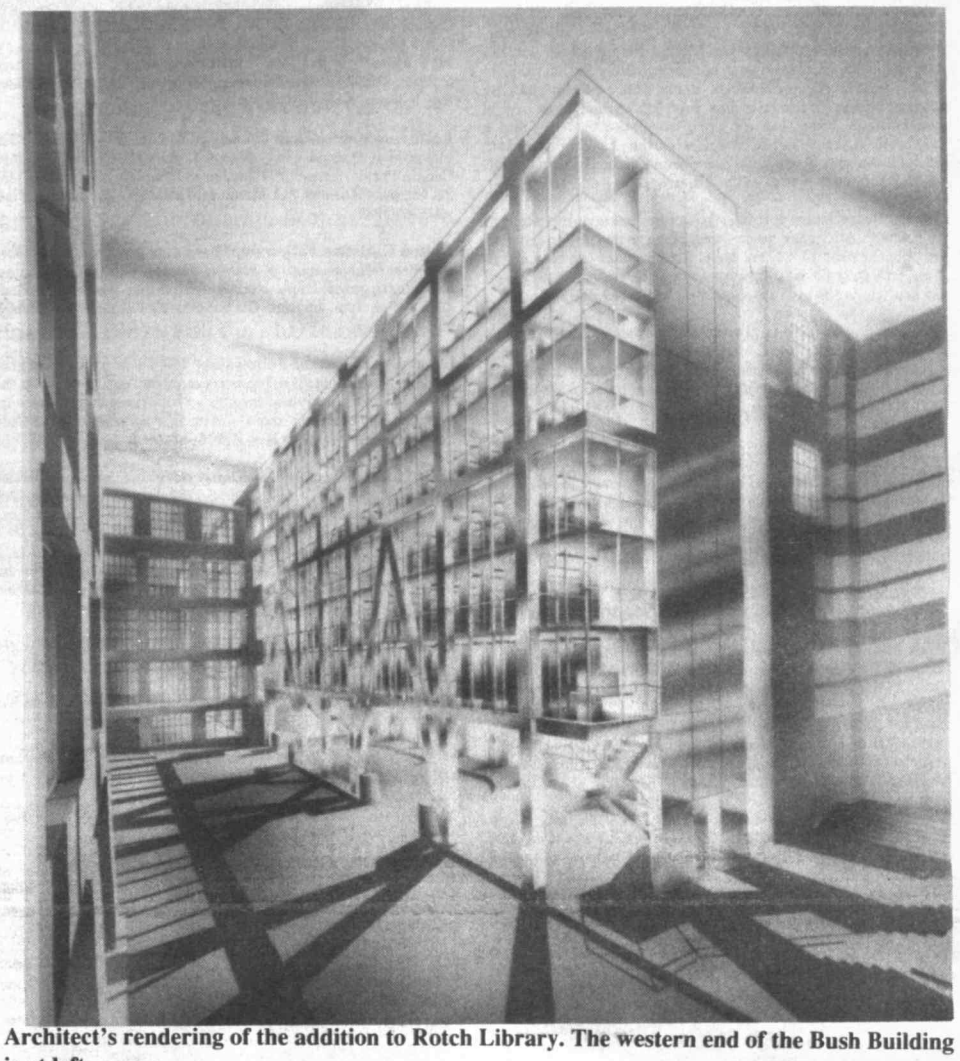
The new structure will have six floors, each capable of sustaining a very heavy book load. Only the existing second floor of Building 7 and the second floor of the addition will be at the same level. The upper floors of the addition will be separated from Building 7 by a six-foot lightwell.

The roofs of the existing and new buildings will almost match. In order to minimize overall height, use of internal space and foundation work, all floors will be suspended from massive roof girders. An elevator, accessible only from within the library, will serve the new book stack floors.

The lowest floor of the addition will be about 17 feet above ground level to permit vehicular traffic in the Building 3-7 courtyard.

Foundation work is scheduled to begin the week of May 22 and will not prevent use of the shipping dock or parking in the Building 3-5 courtyard. When steel is erected later in the summer, there will be periods when access will be suspended because of operational and safety considerations. Users of these facilities will be notified of restrictions in advance.

The architect for the facility is Schwartz/Silver Architects and the construction manager is the George B.H. Macomber Co., both of Boston. The target completion date for the construction is August 1990.



Architect's rendering of the addition to Rotch Library. The western end of the Bush Building is at left.

Baltimore, Imanishi-Kari speak in 'electric atmosphere' in D.C.

A Personal Perspective

By ALFRED G. KILDOW

(Editor's Note: Mr. Kildow is an assistant to the director of the Whitehead Institute and was in Washington for the Congressional hearings.)

The authors of a scientific paper under attack for the last year by a powerful subcommittee of the Congress had their turn at the witness table May 4, and were followed a few days later by officials of MIT and Tufts involved in reviews of the paper.

The paper in dispute was the product of a classic collaboration between two separate laboratories, that of former MIT Assistant Professor Thereza Imanishi-Kari of the MIT Cancer Center, and that of MIT Professor David Baltimore at the Whitehead Institute, whose postdoctoral researcher David Weaver, now at the Dana-Farber Cancer Institute, was the paper's first author. Dr. Baltimore is Director of the Whitehead Institute and professor of biology at MIT. Dr. Imanishi-Kari has since moved to Tufts.

The paper reported interesting results concerning the action of immune system genes in transgenic mice, research that is being replicated and extended in other laboratories in classic scientific fashion, according to documents and sci-

(continued on page 8)

No fraud or misconduct, Deutch tells Dingell

(Provost John M. Deutch spoke in Washington on May 9 to the House Subcommittee on Oversight and Investigations of the House Committee on Energy and Commerce. The topic was the Congressional investigation into research at MIT—supported by the US Department of Health and Human Services—which was publicized in a 1986 article in the journal Cell. Also speaking to the panel of the House Committee chaired by Rep. John D. Dingell (D-Mich.) was Dr. Gene Brown, Dean of the School of Science, and Dr. Herman Eisen, Professor of Immunology in the Department of Biology. A condensation of Professor Deutch's statement follows.)

We are pleased to be here to answer questions of the Subcommittee concerning procedures at MIT to address questions of alleged academic misconduct and how these procedures were applied in the matter of research undertaken at MIT leading to the article published in the journal Cell [45, 247 (1986)] by David Weaver, Moema Reis, Christopher Albanese, Frank Costantini, David Baltimore and Thereza Imanishi-Kari.

As Provost and Chief Academic Officer of MIT, I am responsible to President Paul E. Gray for all academic programs, both education and research and, in particular, I am the individual responsible for implementing the policies and procedures of the Institute which concern allegations of academic fraud in the conduct of research...

We recognize the importance of being and of being perceived to be responsible custodians of public funds and to carry out our research and education programs in a manner which is both understood and supported by the public, elected officials in Congress, and the federal sponsoring agencies. At the most fundamental level, realizing the benefits of the scientific enterprise for society is only possible if there is broad public understanding and support for how science functions.

There is little doubt that the US university research system which has been so enormously productive, especially in basic biomedical sciences, and which is envied throughout the world, could not continue without such public understanding and support. It would be a tremendous loss for this nation if misunderstanding about how science functions would lead to a lessening of Congressional confidence or support or new regulations which might impair the scientific enterprise.

We also acknowledge and appreciate the support that scientific research receives from the Chairmen & Members of the Energy and Commerce Committee...

We believe that Congress, universities, and federal agencies which sponsor

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INSTITUTE NOTICES

*** – Open to public**
**** – Open to MIT Community only**
***** – Open to members only**

Announcements

Serials in the MIT Libraries, 33rd Edition** – Microfiche listing (published twice a year) of approximately 24,000 titles includes information on holdings, dates, call numbers and title changes. This edition contains over 1,000 new titles and is published in 2 sections: an alphabetical list (8 fiche), and a keyword index (8 fiche). *Prepayment required.* Price: $20; $5/MIT students & staff. To order send check, payable to MIT to MIT Libraries, Office of the Director, Rm 14S-216.

Tennis Court Reservations – Outdoor tennis courts adjacent to Amherst Alley may be reserved. Reserve one day in advance by phoning x3-2914 9-11am daily. Reservations can be made in person at the courts by signing up on reservation sheet posted on the tennis shack. This sheet will be posted daily at noon.

Hosts to International Students Program – MIT Women's League program to host foreign students coming to MIT for the first time. Provide a welcome, occasional hospitality and friendship. All financial and academic problems handled by specific MIT offices. Info/volunteer forms: Kate Baty, 861-6725 or Pam Daveta, x3-3656.

MIT Language Conversation Exchange** – Medical Dept program to assist members of the MIT community to practice a language with a native speaker. Applications accepted throughout the year. To exchange English or another language and be matched with someone with your interests, call the secretary of the Language Conversation Exchange, x3-1614.

MIT Student Furniture Exchange** – MIT Women's League store, Tues/Th, 10am-2pm, 25 Windsor St (N52), x3-4293.

Free Museum of Science Admission for MIT Students – With MIT student ID, provided by Mass Beta chapter of Tau Beta Pi, the National Engineering Honor Society. Reduced admission to special exhibits.

Arts Hotline – Recorded information on all art events at MIT may be obtained by dialing x3-ARTS. Material is updated every Monday morning.

Nightline – a student-run campus hotline** open every evening of the term, 7pm-7am. If you need information about anything or you just want to chat, give us a call. We're here to listen. x3-8800.

Club Notes

MIT Student Television Channel 36** – Seeks people interested in programming the cable television network. Info: Eric McDonald, x5-7461 dorm.

MIT Radio Society and UHF Repeater Association Monthly Ham Exams** – All classes, Novice to Extra, May 24, June 21, July 19, Aug 23, Sept 20, Oct 18, Nov 22, Dec 20, Rm 1-150. Reservations requested 2 days in advance. Contact Nick Altenbernd, 437-0320. Exam fee: $4.50. Bring copy of current licence (if any), 2 forms of picture ID and completed form 610 available from FCC, Quincy, MA, 770-0423.

MIT/DL Bridge Club* – Duplicate bridge, Tues, 6:30pm, Student Ctr Rm 407. ACBL masterpoints awarded; come with or without partner, newcomers always welcome. Handicap game, 3rd Tues every month. Info call Gary Schwartz, x8-2459 Draper, or Mark Dulcey, 247-2300. Admission for regular games: $1/students, $2/non-students.

MIT Student Bridge Club* – Duplicate games Mon, Thurs, Sat and Sun and teams following 7:30pm, usually at Student Ctr (see posters). Lessons, 7pm, if required. Refreshments. Info: Bo-Yin, x5-9865 dorm or David, x5-7522 dorm.

MIT Chess Club* – Anybody interested in chess, whether novice or expert, is invited, Sat, 2pm, Rm 5-232. Info: Fred, x5-6493 dorm.

MIT Go Club* – Meets every Wed, 5-7pm, Rm 24-612 (ESG Lounge). Info: John Cox, x3-7887 eves.

MIT Entrepreneur's Club* – Regular meetings, Tues, 6pm, Rm 66-144. Club members present new idea; support source for undergraduates with business interests. Info: Doug Ling, x3-0757 or Richard Shyduroff, 876-2271.

MIT Science Fiction Society* – The world's largest open collection of science fiction books and magazines is located in Student Ctr Rm 473. Meetings, Fri, 5:30pm. Info: x8-5126.

Hunger Action Group** – Meets Tues, 7pm, Baker Master Suite Lounge. Volunteers at soup kitchens, Boston Food Bank; sponsors forums, films addressing hunger- and development-related issues. Contact Susmitha, x5-8528 dorm or Irene, x5-8492 dorm.

COCA (Committee on Central America)* – Meets at least once a month to plan activities relating to events in Central America. Info: Charlie Welch, 783-1668 eves/messages.

Amnesty International MIT Group** – Meets about twice a month to plan activities. Info: Richard Koch, x3-7826.

MIT Table Tennis Club* – Competition and training for all levels from beginner to advanced, Fri, 8-10pm; Sat, 6-9pm, DuPont T-Club Lounge. Info: Albert Tam, x3-2211 or x5-9866 dorm.

MIT Outing Club* – Camping, cycling, climbing, canoeing, cabins. Meets 1st Mon of month, 6pm, W20-461. Rental hours, M/Th, 5-6pm, W20-461. Also, see our bulletin board in "Infinite Corridor" next to Athena. Info: Dave Campbell, x5-9623 dorm.

MIT Soaring Association* – Weekend Soaring – Learn the exciting sport of soaring. We fly from the Mansfield airport every weekend and some holidays (weather permitting). Mansfield is 45 minutes south of Cambridge, off Rt 95. Student membership: $175; typical flight: $16. Contact: Cathy Keller, x0814 Linc or 327-3193 eves.

MIT Nautical Association** – Sailing Pavilion open every day, 9am-sunset. Free basic sailing classes, M/Th, 5:15pm. Membership cards on sale at Cashier's Office: $15 students, $35 staff/faculty, $45 alumni.

MIT Hobby Shop** – Complete supervised facilities for woodworking and metalworking, Rm W31-031, M-F, 10am-6pm; Wed, 10am-9pm. Fees: $15/term students; $25/term community. Info: x3-4343.

MIT Aikido Club** – Non-competitive martial discipline, meets M-F, 5:30pm, DuPont Exercise Rm. Beginners always welcome. Info: Mitch Hansberry, x8-1272.

MIT Judo Club** – Meets M/Th, 5:30-7pm, Dupont Gym Wrestling Rm. Info: Donna Duffy, x3-5773 or 661-9469.

MIT Wu Tang Martial Arts Club** – Learn Northern Chinese kung fu. Long fist and praying mantis styles, short sabre and sword. Meets T/Th, 8-10pm; Sat, 9am-12noon, Burton Dining Hall. Info: Matt Cordery and Paul Filmer, x3-1911.

MIT Karatedo Doshinkan Club* – Learn self-defense and increase your health. We train in classical (non-competitive) Okinawan-Japanese karate, and seek new members. Beginners encouraged to come check it out. MWF, 4:30-6pm, W31-225 Dance Studio. Info: Jim, x3-0472.

Religious Activities

The Chapel is open for private meditation 7am-11pm daily.

Tech Catholic Community* – Roman Catholic Masses: Sats, 5pm, Suns, 10am & 5pm, MIT Chapel. Tues & Thurs: 5:05pm (school days only), MIT Chapel. Fri, 12:05pm, MIT Chapel. Info: x3-2981.

MIT Hillel* – Fri, May 19: *Conservative-Reform Services,* 5:30pm; *Orthodox Services,* 6pm, Walker 50-010; *Shabbat Dinner,* 6:45pm, Kosher Kitchen.

Lutheran Ministry and Episcopal Ministry** – Weekly Service of Holy Communion – Wed, 5:10pm, MIT Chapel. The Rev. Connie Parvie, former MIT Lutheran Chaplain will preach May 21. Supper follows at 312 Memorial Drive. For further info, call x3-2325/2983.

United Christian Fellowship** – Large group meetings. Join us for worshipful singing, prayer, sharing and Bible teaching, and small group Bible studies during the week in various dorms, Fri, 7pm, Student Ctr Mezzanine Lounge. Info: Tracy, x5-9688 dorm.

Graduate Christian Fellowship** – Come join other grad students, faculty and staff in learning about and growing in the Christian faith. Activities open to both Christians and those interested in learning more about Christianity. Info: Curt Bronkhorst, x3-4414 or Roz Picard, x3-7314.

MIT Islamic Society* – Daily prayers, Ashdown House (basement), 5 times a day. Call x5-9749 dorm, for schedule. Friday prayer, Ashdown House 1-1:30pm, Khutba starts at 1pm, congregation at 1:20pm.

MIT Vedanta Society* – Meditation and Discourse on the Bhagavad Gita, Swami Sarvagatananda, minister, Ramakrishna Vedanta Society, Fri, 5:15pm, MIT Chapel.

Christian Science Organization at MIT* – Weekly Testimony meetings, Thurs, 7pm, MIT Chapel.

Lincoln Laboratory Noon Bible Studies* – Tues & Thurs, Kiln Brook III, Rm 239. Annie Lescard, x2899 Linc.

Morning Bible Studies – Fri, 7:30-8:30am, L-217. Ed Bayliss, x3456 Linc.

Noon Bible Study* – Every Wed, Rm 1-132, bring lunch. Ralph Burgess, x3-8121. (Since 1965.)

MIT Bible Study Group* – The Economy of God, a look at God's eternal purpose to dispense Himself into man based on the revelation of the Bible, Fri, 8pm, Student Ctr Rm 407. Singing, prayer, Bible reading, fellowship.

MIT Campus Crusade for Christ* – Fridays, 7:17pm, Marlar Lounge, Rm E37-252, TGIF weekly meeting of MIT Campus Crusade for Christ. We "thank God it's Friday" every week with singing, biblical input, discussion and fun. Info: x5-9153 dorm.

International Opportunities

MIT-Japan Science and Technology Program. A unique opportunity to science and engineering students to spend a year working at a major Japanese company or laboratory. Students are trained in Japanese language and culture at the Program's expense before being placed in Japan. Placement is tailored to the student's background and experience. Travel to/from Japan and living expenses will be covered. For further information, call Patricia Gercik, x3-3142, Ctr for International Studies, MIT-Japan Science and Technology Program, Rm E38-656.

Student Jobs

There are more job listings available at the Student Employment Office, Rm 5-119.

***Special Note:** The Student Employment Office has many "one time only" jobs. Many students find these jobs a good way to earn money fast.*

Off Campus Non-Technical
Seeking enthusiatic people to participate as counselors in a cooperative household, with live-in option in exchange for the challenge of group living, and supervised mental health experience and training. Duties include: house coverage 2 nights/wk, staff and house meetings, and one-on-one relationship with residents. Info: Chuck Zymaris, Executive Director, Wellmet Project, Inc, 99 Bishop Allen Dr, Cambrige, 02139. Telephone: 491-2377.

Summer: Sales and Production – join our summer crew of college students for fun and profit selling funny rubber stamps at Fanueil Hall or making them at our dowtown factory. Hours: part ime and full time available. Contact: Sheryl at INKADINKADO, 105 South Street, Boston 02111. Telephone: 426-3458.

Summer: A group of Japanese students will be coming to MIT for an intensive English program, which also includes an extensive sight-seeing itinerary. Approximately four students are needed as tutors and/or guides. Itinerary includes L.A, New York, Washington D.C, and Boston. Program is from 7/28-9/2 and 9/2- 9/2. Must have a valid driver's license. Staff's room, board, and plane fares are paid for. Necessary qualities include patience, a cheerful personality, responsibility, and attention to detail. Salary: $1,075 for guides, $1.575 for tutors and guides. Those interested in applying should leave, at the Student Employment Office, their name, phone number and address to be reached during the next two months.

Off Campus Technical
Programming Full-time programmers needed to provide technical support services for leading C programming tools. Knowledge of or interest in learning C is required. Familiarity with MS-DOS required; UNIX helpful. Courteous telephone skills and helpful attitude required. Hours: full-time, flexible. Wage: negotiable. Contact John Whitman for interview: Oakland Labs, 675 Massachusetts Ave, Cambridge 02139. Telephone: 491-7311.

A Boston-affiliate of a leading West Coast venture (seed capital) firm seeks and individual to assist in identifying and researching emerging state-of-the-art technologies around which new companies may be formed. Prefer technology generalist with proven research/analysis skills, knowledge of software, AI, multimedia, lasers, materials, etc. Mostly library/telephone research. Hours: initially 10 hrs/wk. Wage: negotiable. Contact: Scott, 11 Webster St, Arlington, MA 02174. Telephone: 648-6985.

Summer: Programmer familiar with MAC toolbox, C on the MAC, and Hypercard. Programmer needed to continue development of search programs for ancient texts. This application will be used by non-computer specialists, so user interphase design is also important. Hours: 40+ hrs/wk in summer, flexible hours during academic months. Wage: $12.50/hr. Contact: Elli Mylonas, Dept of the Classics, Harvard University. Prefers to be contacted through electronic mail. User name: mylonas@husc4.harvard.edu. Telephone: 495-9025.

Summer: General Scanning, Inc offers a summer engineering internship. The student should be course VI-1 or VI-3 and have a solid understanding of 6.003 and 6.004, experience with Assembly level and/or C programming, and experience with 6.114, 6.115, 6.111 (desirable but not necessary). Summer project will deal with digital control of laser scanning systems using DSP microprocessors. Hours: 40/wk. Wage: $450-$520/wk. Contact: Christine Roux, Personnel Representative, Human Resources. Telephone: 924-1010, x105.

On Campus: Non-Technical
Summer: Accounting office for Graphic Arts needs a student. Must be good with figures, have good handwriting, be able to data process, use a calculator, and speak well. Hours: full-time in summer, part-time during spring term. Wage: $6.25/hr. Contact: Phyllis Cerrone, N42. x3-4765.

Students wanted to sell tickets in Lobby 10, May 22-June2, 9 a.m.-5 p.m. for the June 8th celebration of "Tech Night at the Pops." Hours: split shifts available. Wage: $5.85/hr. Contact: Susan Downey, x3-8233.

UROP

***MIT and Wellesley students** are invited to join with faculty members in pursuit of research projects of mutual fascination. New Summer projects are now posted on the bulletin boards located in the main corridor and in the Undergraduate Education Office. Faculty supervisors wishing to have projects listed should send project descriptions to the UEO. Questions? Contact UEO at x3-7909, Rm 20B-141.*

Imaging, Simulation, and Animation of Self-Assembling Materials. Student wanted to learn/develop computer graphics image simulation and animation relevant to microsopical imaging of novel electronic and biomaterials that automatically arrange themselves into desired geometries. Work will encompass use of Silicon Graphics workstations, video animation equipment and Cray supercomputers for aid in the interpretation of actual specimen microstructure via their electron microscope images. The candidate should have Fortran, C, and Unix programming skills as well as an interest in the physics of materials. An interest and knowledge of darkroom photography will be an asset. For more information contact Prof Ned Thomas (13-5050; x3-6901) or Dr. Jayesh Bellare (by e-mail at jayesh@jade.mit.edu). For references see Nature 334, 598-601 (1988) and Comm. of the ACM, 31, 648-661 (1988) and visit the exhibit "Getting to the Surface, Mathematics of Soap Films and Bubbles" at the MIT Museum.

Biotechnology. This project is concerned with concentration, diafiltration, and fractionation of proteins, polysaccharides, etc. from the complex mixture with the help of membrane technology. The UROPer will get a chance to work on a relatively new rotary configuration used for this purpose as well as some of the analytical techniques like protein analysis and FPLC. Prefer sophomore or junior in the Dept of Chemical Engineering/Chemistry/Biology. Contact: Dr. G. Agarwal, x3-8167, Rm 16-018. Faculty supervisor: Prof Charles Cooney.

Poverty in Boston. This project will collect and analyze data concerning the amount and distribution of poverty in Boston. Considerable data collection and coding will be involved as well as analysis of the data base which is created. Contact: Prof Paul Osterman, E52-586, x3-2667.

Database Management. Student needed for a summer project which involves writing a database management system for planning international shipments. The work will be performed on campus. Prior knowledge of DBMS development tools desired but not required. Work can be performed for credit or PAY. Contact: Yosef Sheffi, 1-163, x3-5316.

Molecular and Developmental Biology. This project involves DNA sequencing and techniques to determine temporal and spatial expression of cytoskeletal proteins during epithelial differentiation in the mouse. Although this project is for the summer, opportunities exist for independent research during the academic year. Previous lab experience is preferred, but motivation and willingness to work hard is most important. Contact: Robert Ezzel (Whitehead 651, x8-5190/5206). Faculty supervisor: Dr. Paul Matsudaira (Whitehead 629, x8-5188).

Mass General Hospital – Off Campus. An opportunity exists for a computer programmer to join a research laboratory at Massachusetts General Hospital working on the action of anesthetics on excitable membrane proteins. Minimum experience: 1 year undergraduate course in computer science. Special courses: computer programming. Equipment Used: Macintosh (mainly) and Apple II Computers. MIT supervisor needs to be found to be considered UROP. Contact: Keith W. Miller, D.Phil., 726-8985.

Project Athena. Project Athena has available a number of UROP positions for this summer to develop applications for MOTIF, a new user interface development package from the Open Software Foundation. MOTIF provides the look and feel of Microsoft windows for UNIX workstations supporting the X Windows system. Our goal will be to design and build a number of applications to test the feasibility of MOTIF as an Athena user interface package. Applicants should be familiar with Athena, have good C-programming skills, and a desire to make Athena a more user friendly environment. A knowledge of the X-toolkit is desirable. Contact Dan Geer (geer@athen, x3-0155) to schedule an interview.

Ethical Issues in the Work Life of Engineers and Scientists. Student needed to assist with the design and development of this new context course. Responsibilities will include abstracting articles, surveying the academic and business communities and entering material in a bibliographic file. Student should be at least a junior by fall and have a demonstrated interest in this subject. Student should also be familiar with literature searches. Contact: faculty supervisor Caroline Whitbeck, x3-1631, E40-223.

Ordinary Cells in Unusual and Adverse Environments. Conventional non-sporulating bacteria such as E. coli enter into a dormant state when growth in a rich medium seizes. This growth arrest is not due to a simple exhaustion of nutrients. Overcrowding is somehow sensed by the cells and leads to interesting morphological changes and also prevents neighboring colonies from merging. We will explore the life of a cell under low water-, high-end-product conditions of stationary state, employing a hydrophobic environment as an experimental model. Previous laboratory experience is required. Summer. Faculty supervisor: Prof Kim Lewis, Biology, 16-229, x3-0542 (office), x3-5109 (lab.pp).

Langer, colleague cited for patent

Professor Robert S. Langer of chemical engineering and Abraham A. Domb, a former postdoctoral associate in Professor Langer's lab, were named joint finalists in IPO Foundation's 1989 Inventor of the Year Award for a patent they coauthored on a treatment for brain cancer.

The patent was awarded to Professor Langer and Dr. Domb, who is now with Nova Pharmaceutical, for small, biodegradable, plastic wafers implanted into the brain after surgery for brain cancer to dispense an anti-cancer drug in the area of the tumor. The drug is released on a controlled time-release basis at concentrations many times greater than would be possible through traditional cancer therapy. Furthermore, since the polymer wafer completely erodes, additional surgery to remove it is not necessary.

The 20 finalists for the Inventor of the Year award were selected from 70 nominations. Besides Professor Langer and Dr. Domb, they included the scientists behind "Simplesse," a protein substitute for fat and cream, and the drug "Rogaine," the first product approved by the FDA for treatment of baldness. The overall winner, announced last month, was the team of scientists who patented a product to dissolve blood clots in heart attack victims.

The IPO Foundation is a nonprofit association in Washington, D.C., that deals with legislative issues concerning patent, trademark and copyright owners.

AARP meets May 23

Dr. Linda Buchwald, head of neurology at Mount Auburn Hospital and a member of the Medical Department staff, will speak at the May 23 meeting of the MIT-Cambridge Chapter of AARP.

Her talk, "My Memory is Aging," will begin promptly at noon in the Twenty Chimneys Lounge of the Student Center. Following discussion, there will be a brief business meeting at which officers and the board will be selected for the coming year. The meeting will conclude with lunch featuring baked schrod at 1pm.

Reservations for the luncheon (at $10/person) are due in the AARP Office, Rm 20A-023 by Friday, May 19.

Cable Television Schedule

MIT Cable Television serves the MIT campus. For connection and programming information, call x3-7431.
This schedule is subject to change. For up-to-date information, call Randy Winchester, x3-7431.

Thursday, May 18
Channel 8:
7-11pm – All 6.013 Demos and "Electric Fields and Moving Media"

Friday, May 19
Channel 8:
7-11pm – All 6.013 Demos and "Electric Fields and Moving Media"

Saturday, May 20
Channel 8:
7-11pm – All 6.013 Demos and "Electric Fields and Moving Media"

Sunday, May 21
Channel 8:
7-11pm – All 6.013 Demos and "Electric Fields and Moving Media"

Monday, May 22
Channel 8:
9am-5pm – Live coverage of the MIT VLSI Research Review.
7-11pm – All 6.013 Demos and "Electric Fields and Moving Media"

Tuesday, May 23
Channel 8:
7-11pm – All 6.013 Demos and "Electric Fields and Moving Media"

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Symposium to honor Forrester

A symposium on system dynamics will be held Tuesday, May 23, to honor the founder of the field, Professor Jay W. Forrester, on his retirement July 1 from MIT. It will be held at 3pm in the Bartos Theater of the Media Lab on the lower level of Building E15.

Dr. Forrester, Germeshausen Professor of Management at the Sloan School of Management, is widely recognized for his contributions to the fields of engineering and management.

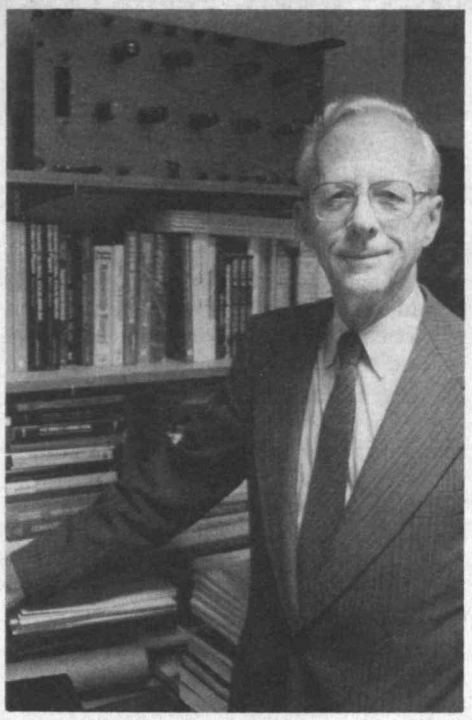
He was instrumental in launching the computer revolution with his patent for digital core memory, and he played a leading role in the design and construction of one of the world's first high-speed computers, Whirlwind I.

In the 1950s, he founded the science of system dynamics, which uses comprehensive simulation models to study complex socioeconomic systems.

Professor John D. Sterman of the management school has organized the symposium, which will focus on the current applications and future of system dynamics.

Among the participants will be Dr. Barry Richmond, the founder and president of High Performance Systems, Inc., who will speak on the many successful efforts to use system dynamics in high schools throughout the country.

Other speakers will include Dr. Henry Weil, president and managing director of Pugh-Roberts Associates, who will talk about his company's work in applying system dynamics to corporate planning and strategy, and Dr. Dennis Meadows, director of the Institute for Policy and Social Science Research at the University of New Hampshire. He directed the "Limits to Growth" project while at MIT and he will discuss the use of system dynamics in public policy, especially environmental and global issues.



Professor Forrester

Soviet science is meeting focus

The state of Soviet science and technology and its impact on politics and culture in that nation will be the focus of a two day conference at MIT on May 19-20 in E51-329.

More than a dozen specialists from universities in the United States and Canada will explore such topics as the conflict between new information technologies and traditional Soviet censorship, and the changing image of technology in Soviet art and literature.

The conference is the culmination of an eight-year project on Soviet science and technology directed by Professor Loren Graham of MIT's Program in Science, Technology and Society (STS), and Dr. Mark Kuchment of Harvard's Russian Research Center. The conference is sponsored by STS. Its sessions are open to the community.

The project has been a collaborative effort involving scholars from 13 universities who met regularly at MIT to present research on the social dimensions of Soviet science and technology.

During the first four years of the project Soviet emigre scientists gave reports on what it is like to be a scientist or engineer in the Soviet Union. This portion of the project was funded by a grant from the Ford Foundation and led in 1984 to a conference at the Smithsonian Institution in Washington.

The second half of the project, funded largely by the National Endowment for the Humanities, is devoted to the social and humanistic dimensions of science and technology in the Soviet Union. Topics explored include the political impact of personal computers, debates over human biology and conservation, the social status of engineers, controversies over biomedical ethics and political ideas presented in Soviet science fiction.

The conference will begin at 9am on Friday, May 19, and continue until Saturday noon.

Sessions and those chairing them are:

Communications Technologies and Computers, Anthony Oettinger, Harvard; Special Dimensions of Biological Sciences in the USSR, Everett Mendelson, Harvard; Engineers, Big Technology and Soviet Society, Leon Trilling, MIT; Philosophical Dimensions of Soviet Science and Technology, Loren R. Graham, MIT; Science and Technology in Soviet Literature and Art, Catherine Chvany, MIT; What Is It Like to be a Scientist or Engineer in the Soviet Union? Mark Kuchment, Harvard.

liver the keynote address.

The conference cochairmen are Dr. Malcolm A. Weiss of the Energy Laboratory, Professor Thomas H. Lee (Phillip Sporn Professor of Energy Processing, Emeritus) of the Department of Electrical Engineering and Computer Science, and Professor Daniel Roos (Japan Industry Professor of Engineering) of the Department of Civil Engineering and Director of the Center for Technology, Policy and Industrial Development.

Conference to probe global changes

The study of global change is fraught with large uncertainties and complex interactions between humankind and nature. Today (May 17) and tomorrow, experts from MIT and elsewhere will tackle the challenge of global transformation in a two-day conference at MIT on "Global Change: Processes and Prospects."

The symposium is sponsored by the MIT Industrial Liaison Program and is being held in Kresge Auditorium.

Some of the questions that the conference will address: How do terrestrial, oceanic, and atmospheric processes interact? How are they perturbed by human activities? What global environmental changes will occur and how confident can we be in their prediction? What options exist for dealing with impending global change?

Speakers will address the global carbon dioxide cycle, atmospheric chemistry, global energy use, climate modeling, policy perspectives, and impacts of change on agriculture, forests, oceans, and hydrology.

President Paul E. Gray will provide an introduction to the conference and Dr. Robert M. White, president of the National Academy of Engineering, will de-

Tai Chi talk/demo

Jane Edwards of the Women's League will give a talk and demonstration on Tai Chi exercise Wednesday, May 17, noon-1:30pm in the Emma Rogers Room (10-340).

The talk is part of an ongoing series on Women's Health Issues sponsored by the Women's League. This is the last talk of the 1988-89 season.

Tai Chi is an ancient Chinese art that focuses on health improvement, relaxation and stress reduction, concentration and meditation, as well as self-defense. Ms. Edwards taught Tai Chi in England for many years, where she organized a club that has since developed into the British Taoist Tai Chi Society.

The talk is free and open to all members of the MIT community.

5 faculty named to CD Chairs

Five young faculty members have been appointed to career development professorships by Provost John M. Deutch. They are:

Keck Foundation Chair

Christopher G. Atkeson, assistant professor of motor control in the Department of Brain and Cognitive Sciences, has been named to hold the W.M. Keck Foundation Assistant Professorship in Biomedical Engineering for two years.

Dr. Atkeson

The chair was established by a grant from the Keck Foundation. W.M. Keck, founder of Superior Oil, established the foundation in 1954.

Professor Atkeson focuses his research on motor learning in biological and artificial systems. Theories are tested by implementing them on robots and measuring involvement during human motor learning.

He holds the AB in biochemistry and the SM in applied mathematics, both from Harvard (1981), and the PhD in brain and cognitive sciences from MIT (1986).

Professor Atkeson, an Alfred P. Sloan Research Fellow, 1989-91, received the NSF Presidential Young Investigator Award, 1988-94, an NSF Engineering Initiation Award, 1987-89, a Whitaker Health Sciences Fund Doctoral Fellowship, 1984-86, and an NSF graduate fellowship, 1980-83.

With C.H. An and J.M. Hollerbach, he is the author of the book, *Model-Based Control of a Robot Manipulator* (MIT Press, 1988).

Class of 1956 Chair

Associate Professor Daniel E. Hastings of the Department of Aeronautics and Astronautics has been named to hold the Class of 1956 Career Development Professorship for two years.

Dr. Hastings

The chair was established by the Class on its 25th reunion to support exceptionally promising young faculty committed to closely coupling teaching and research.

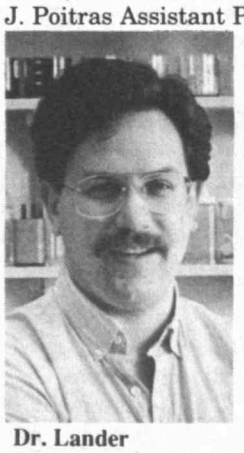
Professor Hastings' teaching and research is in the area of spacecraft-environmental interactions and advanced space propulsion. He has developed a new subject in this area. He also teaches rocket propulsion and space gas dynamics.

Professor Hastings, who holds the BA from Oxford University (1976) and the SM (1978) and PhD (1980) from MIT, was a research scientist at Oak Ridge National Laboratory from 1981 until joining MIT in 1985.

He serves as an adviser to MIT's Second Summer Program, is a member of the advisory board of the Office of Minority Education and is an undergraduate adviser, a member of his department's graduate committee and was the faculty adviser to the AIAA chapter at MIT.

Poitras Chair

Arthur D. Lander, MD, PhD, of the Department of Brain and Cognitive Sciences, has been selected to be the Edward J. Poitras Assistant Professor of Human Biology and Experimental Medicine for a period of two years.



Dr. Lander

Dr. Lander holds the BS from Yale (1979) and the PhD and MD from the University of California, San Francisco (both 1985). Until 1987 he was a postdoctoral fellow at Howard Hughes Medical Institute, Center for Neurobiology and Behavior at Columbia University College of Physicians and Surgeons. He joined MIT in 1987.

He focuses his research on the study of the growth and guidance of nerve fibers in the developing brain.

Latham Family Chair

Associate Professor H. Earl Ruley of the Department of Biology and the Cancer Research Center has been named to hold the Latham Family Career Development Professorship for a two-year term.

Dr. Ruley

The chair was established in 1985 by a gift from Allen Latham Jr. and his wife, Ruth Nichols Latham.

Mr. Latham and the four Latham children hold eight degrees from MIT among them. Mr. Latham is founder and chairman of Haemonetics Corp. of Braintree, which develops, manufactures and sells systems used for the preparation of clinically useful quantities of blood platelets from donors for the support of patients undergoing intensive cancer chemotherapy.

Professor Ruley's research focuses on the analysis of oncogene function, including the physiological circuitry of the interactions among oncogenes and growth factors in malignant transformation, and the involvement of oncogenes in atherosclerosis.

He received the BA in anthropology from Stanford University (1974) and the PhD in bacteriology and immunology from the University of North Carolina (1980).

He was a postdoctoral fellow at the Imperial Cancer Research Fund, London, in 1980-82 and the Cold Spring Harbor Laboratory in New York, 1982-83. He was a staff investigator there until joining the MIT faculty in 1984. That same year he was selected as one of America's 100 brightest scientists under 40 by Science Digest.

KDD Chair

Assistant Professor David L. Tennenhouse of the Department of Electrical Engineering and Computer Science has been named to hold the KDD Career Development Professorship in Communications and Technology for a two-year term.

Dr. Tennenhouse

The chair was established in 1983 by the Kokusai Denshin Denwa Co., Ltd., of Tokyo.

Professor Tennenhouse's research is in the systems aspect of telecommunications. His present work is concentrated on the design of an advanced (broadband) network architecture and the development of high resolution (HDTV) workstations and applications.

He holds the BASc and the MASc (1977, 1981) from the University of Toronto and the PhD (1989) from Darwin College, University of Cambridge.

American Academy elects 5 from MIT

Five members of the MIT faculty were among 83 nominated as new Fellows of the American Academy of Arts and Sciences at its meeting last week. They are:

Dr. Robert R. Shrock, professor emeritus of geology in the Department of Earth, Atmospheric and Planetary Sciences.

Dr. Kenneth N. Stevens, Clarence J. LeBel Professor of Electrical Engineering in the Department of Electrical Engineering and Computer Science.

Dr. Robert A. Weinberg, professor of biology in the Department of Biology.

Dr. Judith J. Thomson, professor of philosophy in the Department of Linguistics and Philosophy.

Dr. Kenneth L. Hale, Ferrari P. Ward Professor of Modern Languages and Linguistics, in the Department of Linguistics and Philosophy.

No fraud or misconduct in 'Cell' case, Deutch tells Dingell

(continued from page 1)

academic science, share a common purpose in making research effective.

We believe that our policies and procedures for investigating alleged academic misconduct are reasonable and that they were reasonably applied in this case. However, we are prepared to consider suggestions of how this process might be improved in the future based on the experience in this case or on other considerations.

On the basis of information currently available to us which includes the results of the MIT inquiry performed by Professor Eisen and the NIH Review Panel, neither President Gray nor I see any reason to believe that academic fraud or misconduct was committed in this case.

How scientific research is conducted at MIT

The quality of the education and research which MIT provides is assured primarily through the process of selecting individuals through appointment and promotion who have professional integrity and a proven record of producing significant results which lead to new understanding.

The integrity of research results is determined by a process which involves the broad scientific community. The test of a new theory or experiment is made by presenting results to the external peer community through publications, grant applications and scientific conferences.

The more important or novel a new result appears, the greater will be the scrutiny which it receives from the scientific community. Error in science, in contrast to fraud, plagiarism, and intentional misrepresentation, is frequent. It is inherent in the enterprise that the individual scientist has a great incentive to avoid error because of the resultant loss of reputation in the scientific community.

I do not believe that the accuracy of scientific results can effectively or practically be improved by imposing a separate validation system implemented either by the host university or the sponsoring agency. The most effective mechanism remains the critical and prompt review undertaken by peer colleagues scrutinizing published results. No university can or should warrant the accuracy of the research which is undertaken by the faculty and research staff. It can and should warrant that it will provide an environment that promotes research of the highest quality and integrity.

Collaboration between independent groups is a frequent and growing practice in science. It is a valuable and necessary feature of modern science because specialization of knowledge, techniques and facilities permit research to be undertaken and advances realized in a way that would be absolutely impossible if collaboration was not practiced...

The present case provides an excellent example in combining the skills of several laboratories in order to study the development of immune function in transgenic mice. In such collaborations, it is not possible to expect that each member of the individual participating groups has the expertise to evaluate critically all the work of the project. Indeed it is precisely the absence of a wide enough individual range of knowledge which motivates the collaboration. The criterion for authorship is that each individual contributed significantly to some aspect of the research. The validity of the results of the collaborative research are evaluated by each group employing their own expertise to compare new results to known information. Errors which remain will be discovered by other groups if the research is consequential to other scientists.

It is important to stress that there is an enormous difference in science between error and fraud. I believe that error in science is frequent and an inevitable aspect of the search for new knowledge. In contrast, I believe that fraud or the intentional misrepresentation of data to support results (whether true or not) is infrequent. Scientific fraud is absolutely unacceptable within the scientific enterprise because, if present, it will set back the progress of science enormously by the additional burden it places on verifying results.

It is inconceivable that any university would protect an individual, no matter how distinguished, if that person were known to have participated in an act of scientific fraud.

This process of scientific research whether carried out within a single group or in a collaboration is both exciting and demanding... The individuals who are involved in modern science are ambitious and often feel the stress of the system. This intense competitive atmosphere is one of the strengths of US science.

And, understandably, this stress can and does lead to instances where co-workers can come to believe that they have not been fairly treated, if for example, they believe work has not been properly acknowledged, or an alternative interpretation has not been properly considered or acknowledged.

For this reason, it is important for a research university to have in place a fair and effective system for resolving scientific disputes. As I have mentioned, these disputes can be of several kinds and can involve various combinations of participants: faculty, staff, and students. I will tell you that it is often the case that the dispute is complicated by failures in human communication and is seldom easy to sort out.

Policies and Procedures for dealing with academic fraud

I attach to this statement a copy of Section 3.80 of MIT's Policies and Procedures entitled "Procedures in Dealing with Academic Fraud in Research and Scholarship." This is the policy which was in effect in 1985 and still is for dealing with academic fraud or unethical behavior in research or scholarship.

I believe the MIT policy conforms adequately to the proposed regulations [53 FR 36347] governing the "Responsibilities of Public Health Service Awardee and Applicant Institutions for Dealing With and Reporting Possible Misconduct in Science" [42 CFR Part 50]...

There is a two-stage process for the investigation of allegations concerning academic misconduct. In the first stage, a supervisor is responsible for determining whether or not there is a reasonable basis for suspecting academic misconduct. In a case involving a faculty member, research or postdoctoral staff, if the supervisor finds a basis for suspecting academic misconduct the issue proceeds to a determination, in consultation with the provost, of whether probable cause exists.

If the Provost agrees that there is probable cause, the Provost will, after consultation with the officers of the faculty, appoint a fact finding committee of inquiry from outside the department or laboratory. This committee of inquiry reports its deliberations and conclusions to the Provost who decides upon appropriate action.

The Provost is also responsible for reporting significant evidence of scientific fraud to the research sponsor which is expected to be taken after the decision to appoint a committee of inquiry. The policy statement makes clear the need to carry out investigations promptly, confidentially and with sensitivity to all parties involved.

Additionally, the policy statement includes the recognition that "MIT should take reasonable steps to protect those who have honorably raised concerns about fraud." This statement reflects the policy of the Institute, stated explicitly in the Grievance Procedures discussed in the next section, "that individuals will not be reprimanded or discriminated against for initiating an inquiry or complaint."

In sum, we believe strongly that we must guard against retaliation against members of the community who honorably believe it necessary to speak out with some complaint. We make every effort to establish both an atmosphere and management direction to assure that once a dispute is resolved, the person bringing the complaint can remain in the academic community without prejudice or harassment.

Policies and Procedures for dealing with grievances

I attach a copy to this statement of Section 3.24 of MIT Policies and Procedures which describes "Complaint and Grievance Procedures for Those Who Work and Study at MIT." Most disputes at MIT do not involve allegations of academic fraud; indeed most complaints involve quite different issues ranging from charges of harassment to objections about decisions leading to promotion and tenure... We believe that these procedures and the implementing practices compare very favorably with those in place at any other academic institution.

A key feature of this policy is that it provides for several pathways for a person who believes he or she has been unjustly treated to bring forward a complaint. In addition to bringing the complaint to the attention of the immediate supervisor, the complaint may be raised with the appropriate personnel officer, through consultation with faculty officers or with either of two Special Assistants to the President.

One of these Special Assistants, Dr. Mary Rowe, has acted for more than sixteen years as our community ombudsman. She is available to any individual who has a concern to give informal and confidential advice about alternative mechanisms for pursuing a complaint. . . The successful functioning of an ombudsman depends critically on the reputation of that individual to be objective and to maintain confidentiality about all discussions with those who seek counsel.

Dr. Deutch

How MIT responded in the case of the Cell article

In late May, 1986, Professor Gene Brown, our Dean of Science, was asked by Dr. Rowe to talk with Dr. Margot O'Toole about concerns Dr. O'Toole had about an article in Cell. Shortly thereafter, Brown met with O'Toole. In this conversation, O'Toole told Brown that she disagreed with the interpretation of certain data in a recent Cell article co-authored by Assistant Professor Thereza Imanishi-Kari. Brown told O'Toole that he would ask a senior colleague to review her concerns about the Cell paper, and asked Professor Herman Eisen to conduct this review. Eisen is the senior immunologist in the Biology Department, respected for his sense of fairness and impartiality, and he knew the persons involved.

In a day or two, Eisen telephoned Dr. O'Toole and invited her to visit him that weekend. Eisen met with O'Toole for about two hours. O'Toole appeared upset to Eisen, and he had some difficulty in understanding her concerns about the Cell article. He suggested that she put her concerns in a memo which she agreed to do.

In the course of this first meeting, O'Toole showed Eisen several xerox pages of what she described as data from experiments done in connection with the Cell article and which she said did not support one of the conclusions in the article. Eisen wondered aloud with her whether she thought fraud was involved. With some emphasis, she said she was not suggesting that.

O'Toole thereafter delivered her memo of June 6th which detailed her concerns about certain statements in the Cell article. Eisen reviewed that memo and arranged for a meeting on June 16th of himself, O'Toole, and the Cell article co-authors Weaver, Imanishi-Kari and Baltimore, to review the issues raised in O'Toole's June 6th memorandum.

That meeting and Eisen's consideration of the issues are reflected in his memorandum written the next day. A copy of this memorandum has been supplied to the Subcommittee. Its conclusion was:
"I do not think that I or anyone else present at the meeting felt that Margot O'Tool[e]'s disagreements were frivolous. They are indeed based on pretty carefully thought out ideas of the limitations of the analytical methods. On the other hand, it is difficult to see that even with these shortcomings that the high frequency of idiotype-positive Igs with transgenic mice can be a reflection of what happens in normal C57BL mice. Nor does it seem too likely that virtually all of the hybridomas that were producing Id+, ostensibly u^a minus Ig may also have been expressing low (and overlooked) levels of the transgene's products.

"These kinds of disagreements are, of course, not uncommon in science, and they are certainly plentiful in Immunology. The way they are resolved traditionally, and effectively, is by publishing the results and having other laboratories try to repeat and evaluate them. The wonderful transgenic mice that have been prepared for this study are indeed being provided freely to other laboratories, and so within a reasonable period of time we should know the extent to which the authors' interpretations are correct or incorrect. If they are incorrect and require revision, then so be it. This is the way science operates; and in fact it is the kind of contentiousness seen in this dispute that helps drive the science 'engine'."

Eisen's review of O'Toole's concerns led him to conclude that the BET-1 reagent used in one line of experiments was difficult to use and does not react exclusively with a particular antibody as was implied in a part of the Cell article. In the process of learning more about BET-1, Eisen spoke with experts on this reagent (including Dr. William Paul of the NIH, whose laboratory developed BET-1) and learned that while BET-1 does not have the capacity to react exclusively with the particular antibody, it did have ability to identify the antibody with sufficient specificity to support the conclusion reached in the Cell article.

Eisen also learned that the actual BET-1 experimentation was difficult to perform correctly (as Professor Imanishi-Kari had explained to him), and that inconclusive experiments were not uncommon. On December 30, 1986, Eisen detailed his findings in a written report to the Chairman of the Biology Department, Dr. Maury Fox. In that report he said:
"My conclusion is that O'Toole is correct in claiming that there is an error in the paper; but it is not a flagrant error. The sentence that says the uB allotype bound only to the anti-uB antibody should have said that 'the uB allotype bound strongly to the anti-uB antibody but also cross-reacted weakly with the anti-uA reagent.' The correction would be too minor to rate a letter to the journal; it certainly does not warrant a retraction, especially because the paper contains a substantial body of other data that is clear and impressive.

"The other issues raised by O'Toole, which are largely matters of interpretation and judgement, are best dealt with by allowing the scientific process to take its course. Other laboratories are trying to extend the findings. In this way we will know if the interpretations are right or wrong."

A copy of this report was provided to the Subcommittee. . . Dean Brown had discussed with me his intention to ask Professor Eisen to review this matter. At the conclusion of the review, I concurred in the judgment that the issues raised did not imply misconduct and that the review did not require a report to the NIH.

MIT has a vital stake in the integrity of its research. Any suggestion of misconduct in that research is viewed with con-

(continued on next page)

Leaders for Manufacturing Honors 19 Faculty

Who We Are — Why We're Here

As the '89 academic year draws to a close, the *Leaders for Manufacturing* program is completing its first year and rounding out the all-star team of nineteen faculty *(following pages)* who will be guiding it through the next four years. Evolved over the last five years from discussions between Massachusetts Institute of Technology faculty, administrators, and industry leaders about how MIT can help improve American manufacturers' competitiveness in the global market, the *Leaders* program officially began in the spring of 1988. Today, it is a partnership between MIT's Schools of Engineering and Management and eleven major American manufacturing firms: Alcoa, Boeing, Chrysler Motors, Digital Equipment, Eastman Kodak, General Motors, Hewlett-Packard, Johnson & Johnson, Motorola, Polaroid, and United Technologies Corporation.

The program is a five-year educational/research experiment to discover and codify the principles that should be taught and practiced by future manufacturing firms. Problems in current US practice are described at length by M.L. Dertouzos, R.K. Lester, and R.M. Solow in their book, *Made in America* (released early this month), which summarizes the recent MIT Commission on Industrial Productivity's findings and recommendations:

"Most of [America's huge current account] imbalance is generated by trade in manufactured goods.... The fears of economic decline are surely linked to larger doubts about the nation's ability to retain its influence and standing in the world at large.... In such areas as product quality, service to customers, and speed of product development, American companies are no longer perceived as world leaders, even by American consumers. There is also evidence that technological innovations are being incorporated into practice more quickly abroad, and the pace of invention and discovery in the United States may be slowing.... There is only one way to improve the trade balance while simultaneously maintaining a high and rising standard of living at home. It is by improving the productive performance of the American economy."

A few years ago, MIT began seriously to address that issue. The resultant *Leaders* program is one of the Institute's most ambitious recent initiatives in terms of the depth and breadth of participation within the university and its industrial partners, the nature of their interactions, and their goals: essentially inventing the future. The complexity of the task requires new relationships between university and industry, management and engineering. Five Engineering departments, to date — Aeronautics and Astronautics, Chemical Engineering, Electrical Engineering and Computer Science, Materials Science and Engineering, and Mechanical Engineering — are participating with the School of Management.

The Governing Board, comprising senior executives of the eleven *Leaders* partner companies and senior administrators from MIT's two schools, meets approximately quarterly to determine program policy. Shown clockwise around the table from speaker (David Staelin) are H. Kent Bowen, Donald Rosenfield, Harold Edmondson (Hewlett-Packard), Joseph Oldfield (Polaroid), Richard Dauch and Francois Castaing (Chrysler), David Wormley, John Cassidy (United Technologies), Charles Fletcher (Alcoa), John Matson (Johnson & Johnson), Jack Rittler (Kodak), William Beckenbaugh (Motorola), Gerald Elson (General Motors), Thomas Tobey (Boeing), and Lester Thurow. By the window, from left, are Jack Kerrebrock, Douglas Braithwaite (Digital Equipment), and Gerald Wilson.

—Photo by Bradford Herzog

Leaders for Manufacturing Mission Statement

The purpose of the *Leaders for Manufacturing* Program is to identify, discover, and translate into practice the critical factors that underlie world-class manufacturing in a way that:

- attracts potential leaders with a global perspective and develops them to bring about world-class manufacturing
- establishes and verifies a new set of principles and practices for manufacturing
- stimulates new and innovative modes of operation for academia and industry
- achieves a high level of cooperation between academia and industry to integrate the technical, managerial, human, and organizational dimensions of manufacturing
- establishes ongoing collaborative processes for problem identification, discovery, and knowledge transfer

What We're Doing

Developing Manufacturing Leaders

The manufacturing-related disciplines and business functions now generally recognized as key to changing the nation's economic well-being have not attracted the best talent recently because of a perceived lack of career potential. Dean Lester C. Thurow cites a report in *Fortune* magazine last year indicating that only 4% of those now heading American firms reached the top through a career in manufacturing.

To acknowledge the importance of manufacturing to industry and society, the *Leaders* program is funding some of MIT's top faculty to consider and creatively address issues identified by MIT and some of this nation's major manufacturing firms, drawing upon the Institute's strong tradition of close interaction with industry.

The *Leaders* program views manufacturing in a broad, integrated sense, not as a compartmentalized function. Dean of Engineering Gerald L. Wilson emphasizes that "the program focuses on the entire process, from product design through distribution. It's bringing teams of people together, not simply building devices and systems. *People are a key element.* Instead of 'throwing a product design over the wall' to a manufacturing department, we want production people to be whispering over designers' shoulders, 'But it won't work that way...'" A key role for MIT is thus to produce graduates who know how to serve as change agents to bring this about. Its first highly gifted, motivated, well-educated graduates enter the job market next spring.

Establishing Manufacturing Principles and Developing a Curriculum

The *Leaders* faculty and industrial participants seek to build a set of underlying principles for manufacturing by verifying known principles and creating new ones. The *Leaders* faculty intend to document their findings in texts and a curriculum other universities will want to adopt, and work with industry to pave more accessible roads to the top from corporations' manufacturing-related functions.

The conventional view of manufacturing as a set of separate activities practiced by "seat-of-the-pants artists" is but one of many common precepts in academia and industry the program is challenging. In 1988, the *Leaders* program sponsored a visit to Japan for many *Leaders* professors to give them first-hand information about successful manufacturing methods and better acquaint them with how differently engineers and managers process the same information and observations. As a result, management perspectives and vocabulary are cropping up in the engineering professors' discussion, and vice versa.

The program is also scrutinizing the nature of manufacturing research in universities. The complexity of the manufacturing problem demands an interdisciplinary, practice-driven approach to research requiring synthesis skills rather than a more traditional, single-discipline approach that involves primarily analytical skills. To effect change in the traditional culture, Deans Thurow and Wilson have awarded appointments to faculty in a wide range of disciplines, and management and engineering faculty are now jointly supervising *Leaders* company research projects.

How We're Doing It

The Leaders Professors

The Institute is honoring nineteen outstanding faculty in a wide range of disciplines with *Leaders for Manufacturing* chaired term professorships. These faculty are the program's key intellectual and leadership resources, and critical links to industry practitioners. In selecting its professors, the program considered not only relevant intellectual interests and expertise, but a willingness to commit the required time and energy to tackle the difficulties of integrating disciplines in nontraditional research. The faculty have demonstrated abilities to galvanize colleagues, students, and industrial collaborators around research and teaching issues, and will be tremendous resources in developing and teaching principles, methods, and practices for truly competitive world-class manufacturing. They are the leading lights of 50 Institute faculty actively involved in the program at this time who are participating in either the Fellows' projects or an on-campus *Leaders* research program that encourages interdisciplinary research and collaboration.

Leaders Professor David Staelin alleges that "manufacturing is of great interest today not only because of its increasingly apparent economic importance, but also because technological developments over the past several decades have been focused elsewhere, resulting in a tremendous opportunity for innovation. This innovation must combine both technological and nontechnological issues, a partnership which MIT is uniquely qualified to lead."

Junior Faculty

Recognizing that new ideas often emerge from young faculty with fresh perspectives, the program is supporting 16 junior faculty through untargeted grants and specific research awards. These faculty have backgrounds that should promote interdisciplinary research and teaching in manufacturing. For example, Professor Rebecca Henderson joined the Sloan School last September with a doctorate in business economics from Harvard University and an SB degree in mechanical engineering from MIT. Professor Stuart Brown in the Department of Materials Science and Engineering earned a doctorate in mechanical engineering from MIT as well as an MBA from Stanford. And Professors Stephen Eppinger and Karl Ulrich joined the Sloan School last September soon after receiving doctorates from MIT's Mechanical Engineering Department.

Professor Marcie Tyre, who holds MBA and doctorate degrees from Harvard Business School, asserts that "the *Leaders* program is one of the main reasons I'm at MIT. It provides a fantastic opportunity for someone such as myself who's interested in combining empirical field work with theory in studying technological change in manufacturing. As a behaviorist, I have a strong set of colleagues at Sloan; the *Leaders* program broadens my scope by allowing me to work with technologists and scientists at MIT and in the partner companies."

The Students

The focus of the *Leaders for Manufacturing* educational program is its students. These include very highly qualified Research Assistants working on projects at MIT or with company project teams, and a select group of Manufacturing Fellows. The Fellows have excellent credentials in an engineering discipline and a strong aptitude for broadening their careers with corporate leadership responsibilities. The first class contains 20 Fellows; the class entering this June will contain 32. The

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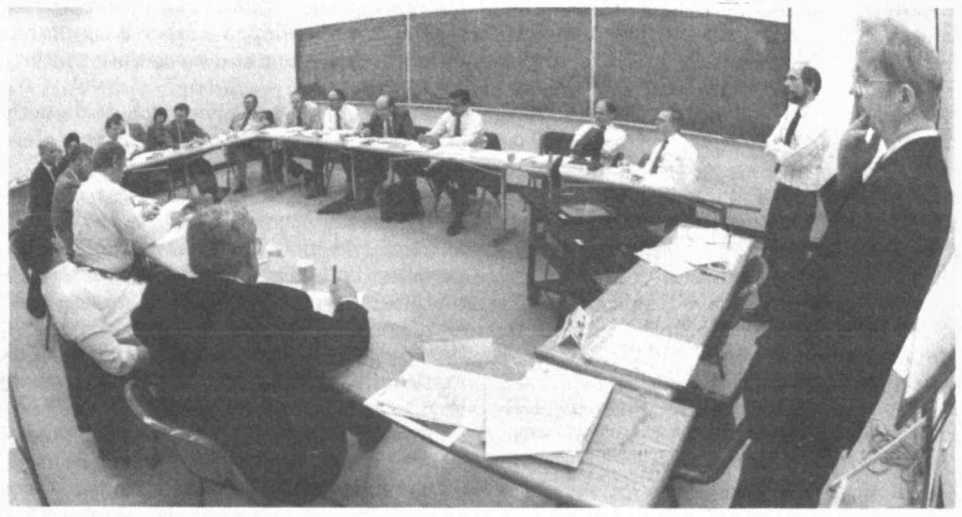


The Operating Committee, comprising manufacturing executives from the partner companies and several senior MIT faculty, meets six times yearly to discuss and direct the implementation of the Governing Board's recommendations. Shown clockwise around the table from right foreground are James Moore (Kodak), Jack Rittler (Kodak), Douglas Braithwaite (Digital Equipment), Thomas Tobey (Boeing), Herbert Ahrens (Polaroid), Gerald Elson (General Motors), Sara Beckman (Hewlett-Packard), H. Kent Bowen, Joseph Baclawski, Charles Fletcher (Alcoa), Harry Cook and Frank Plonka (Chrysler), Thomas Lee, Harsh Manglik (United Technologies), Donald Rosenfield, Thomas Magnanti, and Rick Herbert (Kodak)

—Photo by Bradford Herzog

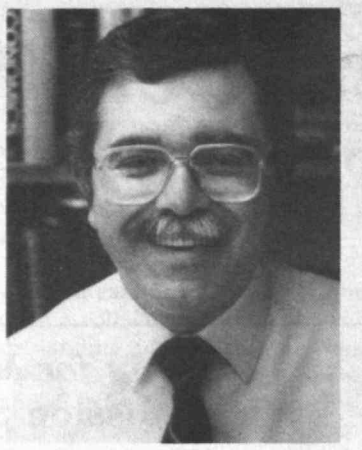
—Photo by MIT Graphic Arts

Haruhiko Asada, Associate Professor of Mechanical Engineering, is also currently director of the Center for Information-Driven Mechanical Systems.

Professor Asada received his BS (1973), MS (1975), and PhD (1979) degrees in mechanical and precision engineering from Kyoto University, Japan. He worked at Carnegie-Mellon University's Robotics Institute from 1980 to 1982, and was an associate professor at Kyoto University from 1985 to 1989.

The focus of Professor Asada's research has been robotics and intelligent control applied to manufacturing automation. He invented direct-drive robots, used extensively in the US and other countries. His research has emphasized integrating mechanical design with control system design for high-performance machine design. Recent research focuses on high-level control of robots and electromechanical systems capable of planning their motion by interpreting a given task goal and sensor signals.

Professor Asada is an active member of the ASME Dynamic Systems and Control Division and of the IEEE Robotics Society. He has received four best paper awards, including the O. Hugo Shuck Best Paper Award from the American Control Council. He is also a member of the Japan Association of Mechanical Engineers and the Society of Instrument and Control Engineers. He co-authored the books *Robot Analysis and Control* and *Direct Drive Robots*.



—Photo by Bradford Herzog

Gabriel R. Bitran, Nippon Telephone &Telegraph Professor of Management and current head of the Management Science area in the School of Management, is also executive vice president of the Production and Operations Management Group of the Institute of Management Sciences. In addition, he is an area editor of the journal *Operations Research* ; associate editor of the *International Journal of Production Planning and Control*, the Brazilian *Journal of Operations Research*, and *Revista Latino-Ibero-Americana de Investigacion Operative;* and editor of the *Production and Operations Management* newsletter.

Professor Bitran earned BS (1969) and MSc (1972) degrees in industrial engineering from the Escola Politecnica of the University of Sao Paulo, Brazil, and SM (1974) and PhD (1975) degrees in operations research from MIT.

He teaches manufacturing, service sector operations, and operations research. His research interests lie in the field of operations management in manufacturing. Professor Bitran's main research area is production and manufacturing management; he is currently examining the optimization of manufacturing and engineering processes for the semiconductor industry and the impact of job release procedures on assembly-line balancing.

Professor Bitran has consulted with companies in the computer, semiconductor, electronics, telecommunications, steel, and automotive industries, and has published numerous articles on a wide variety of topics in operations management.

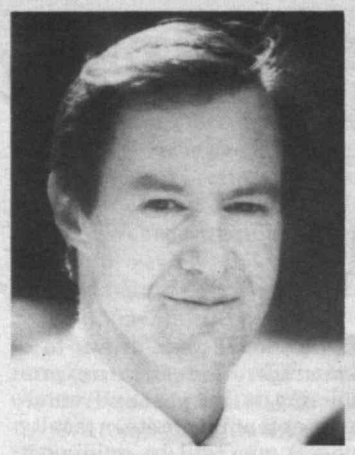
—Photo by MIT Graphic Arts

Thomas W. Eagar, Professor of Materials Engineering, is also acting head of the department during the spring and summer of 1989.

After earning SB (1972) and ScD (1975) degrees from MIT, Professor Eagar worked as a research engineer with Bethlehem Steel Corporation before joining the MIT faculty in 1976. He spent a sabbatical in 1984-85 with the US Office of Naval Research in Tokyo studying materials processing, manufacturing, and technology transfer and development among Japanese industry, universities, and national laboratories. In the spring of 1988, he participated as a student in the MIT Sloan School Program for Senior Executives.

Professor Eagar teaches fabrication, materials processing, and thermodynamics. His research concentrates on fabrication of a wide range of materials important to the automotive, aerospace, shipbuilding, and electronic materials industries. His interests include the welding and joining of metals, ceramics, and composites, particularly their underlying physics and chemistry. His recent efforts include development of braze and solder alloys for ceramics, resistance spot welding, and laser welding of automotive body sheets.

Professor Eagar has received the Champion H. Mathewson Gold Medal of AIME and the Charles H. Jennings Award of the American Welding Society. Since coming to MIT, he has written or contributed to approximately 100 papers and has received and applied for nine patents.



—Photo by Bradford Herzog

Stephen C. Graves, Professor of Management Science, is also currently editor of the *Handbook on Logistics of Production and Inventory* (to appear in late 1989) and department editor of *Management Science;* he was until recently associate editor of *Management Science* and *Operations Research*, and functional area editor of *Interfaces*.

Professor Graves earned AB (1973) and MBA (1974) degrees from Dartmouth College and MS (1976) and PhD (1977) degrees from the University of Rochester, after which he joined the MIT faculty. In 1982-83, he spent a sabbatical as Visiting Professor at the Shanghai Institute of Mechanical Engineering.

He teaches operations management and mathematical programming; his primary research interests are the design and control of manufacturing and distribution systems. A typical approach involves specification of a mathematical model for a problem, empirical validation and parameter estimation for the model, and development of algorithms to exercise the model for decision support or for a tradeoff or diagnostic study. Recently he has investigated safety stock policies, finite loading methods, and interplant coordination for production planning.

Professor Graves has written or contributed to over 30 papers. He has consulted in the areas of logistics and distribution for such organizations as General Motors Research Laboratories, W.R. Grace, GTE Research Laboratories, and Eastman Kodak.

—Photo by Bradford Herzog

Thomas A. Kochan, Professor of Industrial Relations in the School of Management, is head of the school's Behavioral and Policy Sciences Area.

Professor Kochan earned BS (1969), MS (1971), and PhD (1973) degrees from the University of Wisconsin. From 1973 to 1980, he was on the faculty of the School of Industrial and Labor Relations at Cornell University. He also served one year as consultant to the Secretary of Labor in the Department of Labor's Office of Policy Evaluation and Research. He has served as third-party mediator, factfinder, arbitrator, and consultant to labor-management committees and groups, and to the US and Canadian departments of labor.

Professor Kochan has developed and taught a masters-level core course on human resource management and industrial relations, emphasizing the integration of human resource strategies and policies with firm competitive and technology strategies. He teaches a similar course in the school's Senior Executive Program.

He has researched topics related to industrial relations and human resource management in the public and private sectors. Recent books include *Worker Participation and American Unions: Threat or Opportunity*; *Challenges and Choices for American Labor*; *Human Resource Management and Industrial Relations*; and *The Transformation of American Industrial Relations*, which received the 1988 annual award from the Academy of Management for best scholarly book on management.

—Photo by MIT Graphic Arts

Paul A. Lagace, Associate Professor of Aeronautics and Astronautics, is also co-director of the Technology Laboratory for Advanced Composites, chairman of the Scientific Advisory Board for American Composite Technology, and editorial advisor for the *Encyclopedia of Composites*.

After earning SB (1978), SM (1979), and PhD (1982) degrees from MIT, he joined the faculty. He teaches mechanics of materials and structures to graduates and undergraduates, emphasizing composite materials (particularly those applicable to the aerospace industry) and structures. He has also developed a laboratory course on manufacturing and composite materials.

Professor Lagace's research deals with the fracture, longevity, and damage tolerance of composite materials and their structures. Specific areas addressed include interlaminar stresses, resultant delamination, and manufacturing methods to suppress such; sensitivity of composite materials to notches; impact, damage resistance, and residual strength of composites; and the application of composite materials to aerospace and automotive structures.

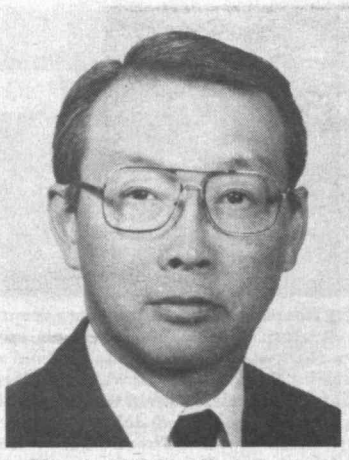
Professor Lagace has written or contributed to approximately 30 papers, and edited one book. He is a founding member of the American Society for Composites and a member of the Materials Advisory Board of the Committee on Marine Structures of the National Academy of Sciences, the Executive Committee of the ASTM Committee D30 on High-Modulus Fibers and Their Composites, Tau Beta Pi, and Sigma Xi.

—Photo by Bradford Herzog

Stuart E. Madnick, Professor of Management Science and Information Technologies, heads the School's Information Technologies courses and is associate editor of *ACM Transactions on Database Systems*.

Professor Madnick earned SB (1966), SM (1969; electrical engineering, management), and PhD (1972) degrees from MIT. His current research focuses on connectivity among information systems to attain strategic advantage and improve effectiveness. Of particular concern is logical connectivity, whereby semantic meaning is captured and processed so information can be exchanged between various functions or organizations despite their possibly different assumptions about the information. Many concepts used in CMS and VM/370 on IBM mainframe computers emerged from the work of Professor Madnick and colleagues.

Professor Madnick is a founding member of IEEE's Technical Committee on Database Engineering and MIT's Center for Information Systems Research, and recently co-chaired the International Conference on Very Large Databases. His text, *Operating Systems*, has been adopted by over 100 colleges and universities worldwide. Subsequent books deal with software project management, computer security, and strategic uses of information technology. Professor Madnick has published over 150 technical papers and articles, and was awarded the Departmental Teaching Award for his instruction in the theory and application of modern computer-based information technologies. He has been consultant to IBM, Honeywell, Lockheed, and AT&T.



—Photo by MIT Graphic Arts

James W. Mar, Jerome Clarke Hunsaker Professor of Aerospace Education, heads the Aeronautics and Astronautics Department's Division of Structures, Materials, and Aeroelasticity, co-directs the Technology Laboratory for Advanced Composites and the Space Engineering Research Center, directs the Space Systems Laboratory, and chairs the FAA Independent Technical Oversight Group on Aging Aircraft.

He earned SB (1941), SM (1947), and ScD (1949) degrees from MIT, worked for a few years as an engineer, then served in the US Navy. His research interests include advanced filamentary composite materials, large space structures, aeroelasticity, fracture, fatigue, damage tolerance, and design for longevity.

Professor Mar has served on the NASA Space System Technology Advisory Council, the Air Force Studies Board, and the NASA Aeronautics Advisory Council. He has also been consultant to the Federal Aviation Administration, the US Air Force, and the US Department of Defense. Previously, he was Chief Scientist of the US Air Force and a member of the Scientific Advisory Board of the US Air Force, the National Materials Advisory Board, and the Aeronautics and Space Engineering Board, and served on a blue-ribbon panel for improving aircraft safety.

Professor Mar is a Fellow of the American Institute of Aeronautics and Astronautics, and a member of the National Academy of Engineering.

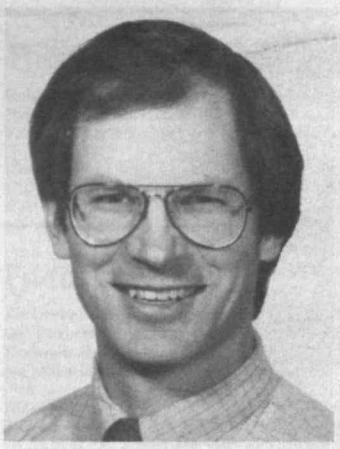
—*Photo by MIT Graphic Arts*

Timothy G. Gutowski, Alcoa Associate Professor of Mechanical Engineering, also directs the MIT-Industry Composites and Polymer Processing Program and heads manufacturing curriculum development for the Laboratory for Manufacturing and Productivity. In addition, he is on the editorial advisory boards of the *Journal of Thermoplastic Composites*, the *Encyclopedia of Composites*, *SAMPE Journal*, and *Composites Manufacturing*, and is editor of a new volume, *The Manufacturing Science of Composites*.

He earned a BS (1967) degree from the University of Wisconsin, an MS (1969) from the University of Illinois, and a PhD (1981) from MIT. He has worked as a senior consultant for Bolt, Beranek, and Newman, Inc., and taught mechanical engineering as a Peace Corps volunteer. Earlier, he was a staff engineer with a structural engineering firm in Illinois.

He teaches materials processing, manufacturing, mechanics, system dynamics, and design, and has developed graduate courses in composites processing and the fundamentals of manufacturing processes. His research focuses on understanding, controlling, and simplifying the manufacture of composite structures; he is particularly interested in how engineering and science can be used to support manufacturing decisions.

Professor Gutowski has written over 65 technical articles, papers, and books, consults with a number of major US industrial firms and startup companies, and has developed several innovative processes.



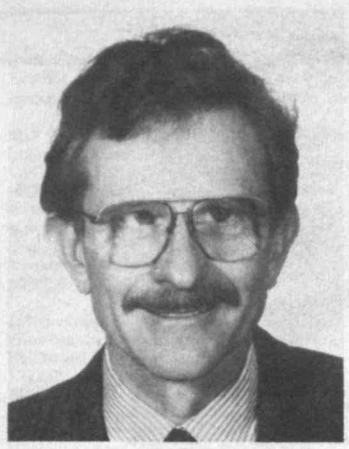
—*Photo by MIT Graphic Arts*

David E. Hardt, Associate Professor of Mechanical Engineering, is director of the Laboratory for Manufacturing and Productivity. As such, he has initiated a program integrating manufacturing and design, and developed a coherent graduate curriculum in manufacturing.

Professor Hardt received a BSME (1972) degree from Lafayette College, and SM (1974) and PhD (1978) degrees from MIT. He teaches control, design, mechanics, and manufacturing subjects, and developed a graduate course on automatic control in mechanical manufacturing processes. He participates in undergraduate curriculum reviews, and supervises graduate manufacturing curriculum revisions.

His research concentrates on modelling and control of batch manufacturing processes, and integration of manufacturing and design. His metal-forming control research includes roll bending and straightening processes, and general die-forming processes; he also developed a general closed-loop control strategy for sheet-forming processes. He is collaborating with other MIT faculty in controlling fusion welding processes.

As chairman of the Dynamic Systems Division Technical Panel on Manufacturing in the American Society of Mechanical Engineers, Professor Hardt has organized and edited two symposia volumes on modelling and control of manufacturing processes, and one for the International Federation of Automatic Control. He has also served on panels and committees of the National Research Council relating to automated welding and manufacturing research strategies.



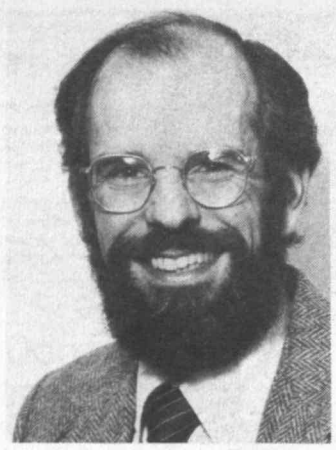
—*Photo by MIT Graphic Arts*

John B. Heywood, Professor of Mechanical Engineering, is also director of the Sloan Automotive Laboratory, Co-ordinator for Transportation Programs in MIT's Energy Laboratory, and an editorial advisory board member of the *International Journal of Vehicle Design*, *Progress in Energy and Combustion Science*, and *Combustion and Flame*.

He received a BA (1960) from Cambridge University, and SM (1962) and PhD (1965) degrees from MIT, after which he served on the Central Electricity Generating Board in the United Kingdom before joining the MIT faculty.

His research interests include engines, combustion, thermodynamics, and fluid mechanics. Current research focuses on the design and operating characteristics of internal combustion engines and their fuel requirements. He is studying automotive technology, the impact of regulation, and issues relating to design and manufacturing in the automotive industry.

Professor Heywood has published over 100 technical papers and three books; *Internal Combustion Engine Fundamentals* was published last year. He holds an ScD degree from Cambridge University for his publications, and is a Fellow of the Institution of Mechanical Engineers and the Society of Automotive Engineers. He has also received the Ralph R. Teeter and Arch T. Colwell Merit awards, is a member of Sigma Xi, and has consulted for the US government and such organizations as AVCO, Bendix, and Cummins.



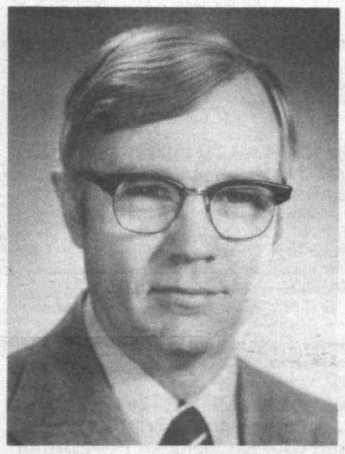
—*Photo by Calvin Campbell*

John G. Kassakian, Professor of Electrical Engineering, is also Director of the MIT/Industry Power Electronics Collegium and Associate Director of the Laboratory for Electromagnetic and Electronic Systems.

He received SB (1965), SM (1967), EE (1967), and ScD (1973) degrees in electrical engineering from MIT. Between 1969 and 1971, he served in the US Navy, and in 1975 was Senior Staff Scientist at Gould Laboratories.

Professor Kassakian's research focuses on electronics applied to energy conversion and control. He has emphasized understanding and overcoming technical obstacles to the more effective and extensive application of power electronics, especially at very high frequencies.

Professor Kassakian is an active member of the European Power Electronics Association and the founding president of the IEEE Power Electronics Society. He has also served as president of the Power Electronics Council and chairman of the Applied Power Electronics Conference. In 1976, he was awarded the Carl Richard Soderberg Assistant Professorship; in 1984, he received an IEEE Centennial Medal; and in 1987, he received the IEEE William E. Newell Award. He has been a consultant to such companies as A.D. Little, Inc., Chrysler Corporation, Digital Equipment Corporation, and General Mills, Inc. He is a member of Tau Beta Pi, Eta Kappa Nu, and Sigma Xi, and is a Fellow of the IEEE.



—*Photo by MIT Graphic Arts*

Robert B. McKersie, Professor of Industrial Relations, co-directs the Industrial Relations section and chairs the faculty committee for the Sloan Fellows Program.

He earned his undergraduate degree from the University of Pennsylvania, served in the Navy, then received MBA (1956) and DBA (1959) degrees from Harvard Business School. He joined the Graduate School of Business faculty at the University of Chicago and was dean of the New York State School of Industrial and Labor Relations at Cornell before coming to MIT.

Professor McKersie's recent research focuses on productivity, particularly in the automotive and transportation industries. He continues to research strategies used in different industries (particularly automotive and transportation) to produce more effective organizations. Prior work dealt with labor management, particularly bargaining activity.

Recently, Professor McKersie organized a conference for the Center for Transportation Studies to examine transformations in the airline, railroad, and trucking industries. He has served on several Presidential Commissions, is a member of the National Academy of Arbitrators, and will serve as president next year of the National Industrial Relations Research Association. He has co-authored the books *A Behavioral Theory of Labor Negotiations*; *Pay, Productivity, and Collective Bargaining*; and the award-winning *The Transformation of American Industrial Relations*. He is a member of Tau Beta Pi.

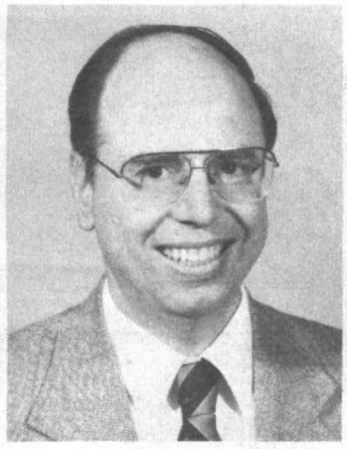
—*Photo by MIT Graphic Arts*

Warren P. Seering, Professor of Mechanical Engineering in the Systems and Design division, serves on the editorial boards of *The International Journal of Robotics and Computer-Integrated Manufacturing* and *Machine Vision and Applications*, among others.

After earning BS (1971) and MS (1972) degrees from the University of Missouri at Columbia and a PhD (1978) from Stanford University, Professor Seering joined the MIT faculty.

His research focuses on machine design and the role of computation in machine performance, particularly in the areas of dynamics, vibration, system design, and artificial intelligence. His work centers around use of computation to extend the performance of machines, particularly robots. He is conducting research on model-based control schemes for flexible arms and on directing machines to respond to sensed inputs, and is developing a structure for computer programs capable of designing mechanical systems.

Professor Seering has served as consultant on robotics and automation to the US Office of Technology Assessment, NASA, and numerous companies. He has received the Harold E. Edgerton Award, the Ralph R. Teeter Educational Award from the Society of Automotive Engineers, special commendation from the Trustees of the Lincoln Arc Welding Foundation for contributions to design education, and numerous awards for design projects. He has written or contributed to approximately 85 publications.



—*Photo by MIT Graphic Arts*

David H. Staelin, Cecil H. Green Professor of Electrical Engineering, chairs the EECS Area III (Computers, Electronics, and Systems) and serves on the Steering Committee for the IEEE Committee on US Competitiveness.

He earned SB (1960), SM (1961), and ScD (1965) degrees from MIT, then joined the faculty. His teaching and research involve combinations of signal processing and electromagnetics, including remote sensing, video image processing, radio and optical astronomy, and manufacturing; he has published more than 70 papers on these subjects. Previous developments include passive microwave techniques for observing Earth from space, and methods for processing video images. Recent projects involve the mathematical basis of the Taguchi method, generic system characterization for fault recognition, and materials-forming and measurement processes.

Professor Staelin was principal investigator for two NASA spaceflight instrument programs that led to passive microwave sensors currently on weather satellites, and is a co-investigator for other spaceflight experiments. He has served on Comsat's Technical Advisory Committee, been director of the Environmental Research and Technology Corp., and chaired the National Academy of Science Committee on Radio Frequencies and the MIT Commission on Industrial Productivity's Consumer Electronics Working Group. He co-founded PictureTel Corp., a video codec manufacturing firm, and was its chairman for three years. Professor Staelin is an IEEE Fellow

—*Photo by MIT Graphic Arts*

George Stephanopoulos, Joseph R. Mares Professor of Chemical Engineering, is director of the Laboratory for Intelligent Systems in Process Engineering. He serves on the editorial boards of *AIChE Journal*, *Computers and Chemical Engineering*, and *AI in Engineering*.

After receiving the Diploma of Chemical Engineering (1970) from the National Technical University of Athens, he earned an ME (1971) from McMaster University, Canada, and a PhD (1974) from the University of Florida. He served on the faculty at the University of Minnesota, then taught at the National Technical University of Athens before joining MIT.

Professor Stephanopoulos has taught, researched, and worked with industry on such issues as product and process design and development, operations, and control of processing systems. He has carried out work in process analysis, design and optimization theory, design of process control systems, planning and scheduling of process operations, design of integrated industrial complexes, and interaction between design and operations. Recent work has focused on using computer science and technology for the reformulation and expanded solution of problems in process engineering.

Professor Stephanopoulos has received the A.P. Colburn Award for Research (AIChE) and the C. McGraw Award for Research (ASEE). He has written more than 120 papers and four books, including *Chemical Process Control: An Introduction to Theory and Practice*.

—Photo by MIT Graphic Arts

Robert J. Thomas is Associate Professor of Organization Studies and Industrial Relations at the School of Management.

After receiving a BS (1974) from the University of California at Santa Cruz, and MS (1977) and PhD (1981) degrees from Northwestern University, he served on the faculties of the University of Michigan, Ann Arbor, and the Carroll School of Management at Boston College.

Professor Thomas teaches organizational design, organizational behavior, industrial relations, and comparative (international) industrial relations. His research has focused on the causes and consequences of technological change in agriculture and industry; he is most interested in how organizations make decisions about new technology — particularly new production technology. Currently, he is being sponsored by the National Science Foundation to study decision-making around new technology in manufacturing organizations and analyze the relationship between technology selection and implementation, to better understand how choices made early during technological change might better anticipate the problems of implementation.

Professor Thomas is a member of the American Sociological Association, the Academy of Management, and the Industrial Relations Research Association. He has received the ASA's Rose Monograph Series Award and Boston College's Faculty Research Award. His publications include 24 papers relating to technological change and the books *Citizenship, Gender, and Work* and *Manufacturing Green Gold*.

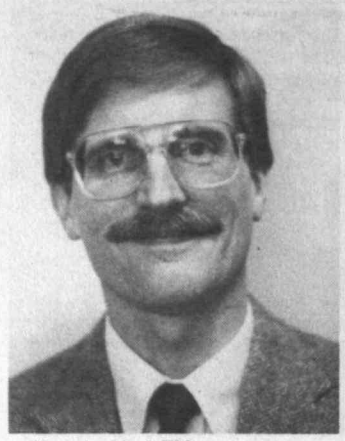
—Photo by MIT Graphic Arts

James M. Utterback, Associate Professor of Engineering, is also US editor of *Research Policy* and an editorial board member of the *IEEE Transactions on Engineering Management*.

Professor Utterback earned BS (1963) and MS (1965) degrees in industrial engineering from Northwestern University, and a PhD (1968) from the Sloan School. He has held faculty positions at Indiana University, Harvard Business School, and Chalmers University.

His teaching has focused on the innovation process, economic and other influences on manufacturing process change, interactions between research, development, and engineering activities and manufacturing operations, and the transfer of new product developments into manufacturing. His research has focused on the process of technological innovation in US and international firms.

Professor Utterback is one of the founding faculty of MIT's Management of Technology Program, directed the Industrial Liaison for five years, and served on the National Academy of Engineering Panel on the NSF Experimental R&D Incentives Program. He has written or edited three books and 50 publications on the process of technological innovation and factors that influence innovation, including corporate behavior and government policy; twice he has received IEEE Prize Paper Awards. His most recent book, *The Dynamics of Innovation in Industry*, will be published in 1989. Professor Utterback is a member of IEEE and Sigma Xi.



—Photo by Mark Wilson

Roy E. Welsch, Professor of Statistics and Management Science in the School of Management, is also co-director of the MIT Statistics Center and director of the MIT Center for Computational Research in Economics and Management Science.

Professor Welsch received the AB (1965) from Princeton University, and MS (1966) and PhD (1969) degrees from Stanford University, after which he joined the MIT faculty. Here, he teaches data analysis and applied statistics, and is developing a new course on quality control and experimental design.

He is widely recognized for his pioneering work on regression diagnostics, robust estimation, multiple comparisons procedures, nonlinear modeling, and statistical computing. He is currently involved with research on robust quality control methods, credit scoring models, diagnostics for checking model and design assumptions, expert systems for data analysis, and statistical graphics.

Profesor Welsch served as Senior Research Associate at the National Bureau of Economic Research, where he participated in developing the Troll econometric and statistical modeling system. He has written more than 70 articles on statistical and data analysis, and co-authored the book, *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity*. He is a Fellow of the Institute of Mathematical Statistics, the American Statistical Association, and the American Association for the Advancement of Science.

How We're Doing It

(continued from page 1)

Fellows' past experiences include strong indicators of their abilities to both lead and cooperate in teams; they have broad perspectives and intend to make a career in manufacturing. Fellows are awarded full tuition and a monthly stipend for the 24-month duration of their studies.

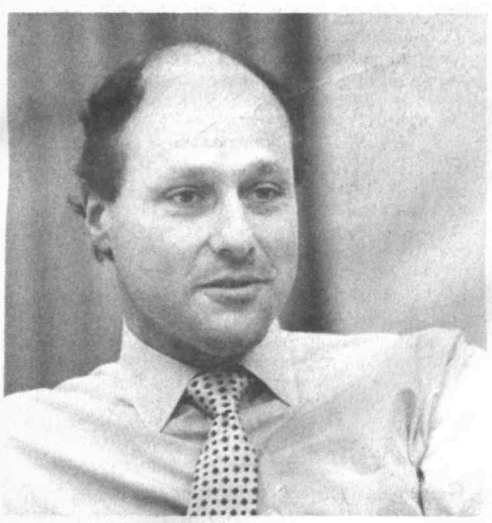
Students are educated to deal effectively with management *and* engineering issues; the program emphasizes teamwork, systems optimization, the management of change, and learning by doing. In addition to coursework, Fellows gain six months' on-site experience at a partner company, working under faculty and industry supervision on "real-life" problems deemed by the Fellow, his or her thesis advisors, and company representatives to be worthy of a thesis.

At the end of two intensive years of study and research culminating in a single thesis, each Fellow is awarded two masters degrees: one in management, the other in engineering. The program thus provides an alternative path through MIT for a number of students that will increase as the program matures: the program eventually will graduate up to 40 Fellows each year and directly support up to 50 other students in related research at any given time.

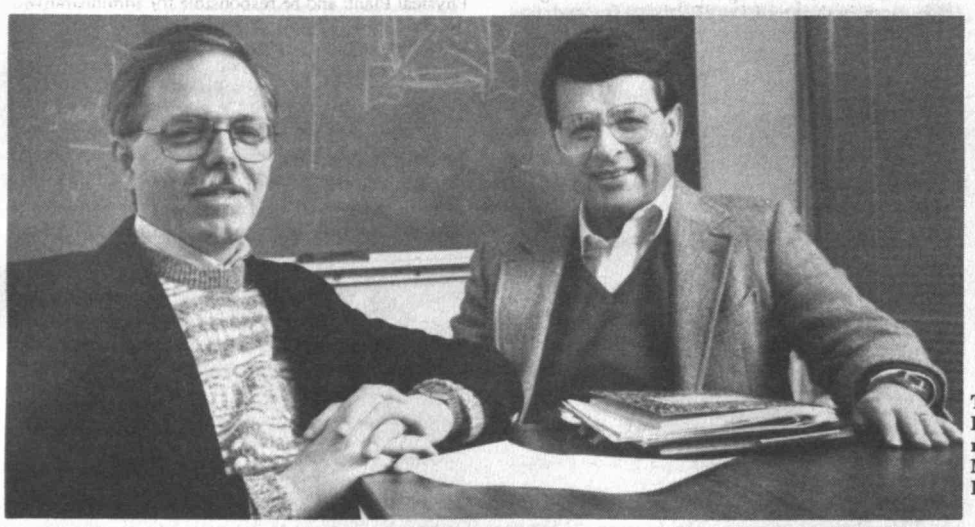
MIT-Industry Interactions

The *Leaders* program offers broad, in-depth opportunities for interaction between MIT faculty, students, and industry. High-ranking partner company representatives comprise the majority membership of the program's Governing Board, which sets policy, and the Operating Committee, which implements the Board's recommendations. Engineers and managers from the companies also help design the curriculum and lecture or attend the twice-weekly Pro-Seminar course, one mechanism for on-campus interaction between Fellows, faculty, and partner representatives.

Other notable MIT programs that address manufacturing and foster collaboration with industry include the Center for Advanced Engineering Study, the Laboratory for Manufacturing Productivity, the Materials Processing Center, and the Management of Technology program.



—Photo by Bradford Herzog



—Photo by L. Barry Hetherington

The *Leaders* program is managed by Dr. Donald B. Rosenfield, and directed by Professors Thomas L. Magnanti (George Eastman Professor of Management Science) and H. Kent Bowen (Ford Professor of Engineering). (shown left to right)

The Fellows' Perspective

At a dinner they arranged last month to welcome the new Manufacturing Fellows, the twenty first-year Fellows offered the following words of advice:

"Don't eat, don't sleep."

"Make sure you get out of here for at least a couple of hours a week — go sailing, go into Boston, go anywhere; it's crucial for maintaining the intensity you need."

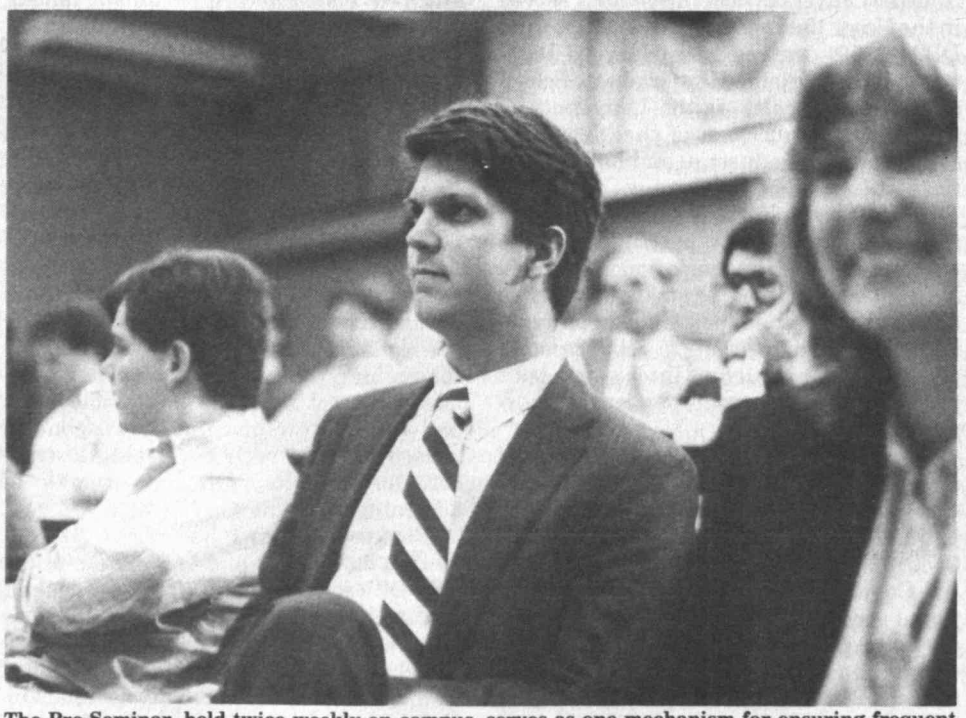
"Use this first summer to get back into the swing of things; the first time a professor wrote an integral sign on the board, I just gasped: I'd not integrated or differentiated anything in six years! It's tough, but it does come back to you."

When asked about transformations they can see in themselves as a result of the program, one first-year Fellow, Richard Krueger, volunteered that he's much more relaxed now: "I got through kinetics!" More seriously — or perhaps just as seriously — he notes that he's "more aware of what things to look for, both wrong and right, in a plant situation. And I'm even more excited about going into manufacturing now, having visited all the plants we did — the field is really all-encompassing; it has something for everyone."

Rich says he's in the *Leaders* program because he likes to make things and wants to make an impact. Wayne Firsty seconds that sentiment. Wayne entered the *Leaders* program after earning two BS degrees (in computer science and finance) from the University of Pennsylvania. He worked for two years as a management consultant with Booz Allen & Hamilton, then spent a year as a gold and silver options trader on Wall Street. Thinking back on his former positions, he asks, "when you went home after work, what did you have to show for it except reports and account statements?" He's making a career change to "create tangible assets."

David Wenstrup, a newcomer, adds that there's just a lot that's important in manufacturing that needs to be studied. And Cathy Strosser, a new Fellow from General Motors, expresses particular concern that her generation's children will have a lower quality of life than their international competitors unless changes are made in the manufacturing field; she wants to be a part of that change.

As Rich says, there's something for everyone.



The Pro-Seminar, held twice weekly on campus, serves as one mechanism for ensuring frequent interaction of the Fellows with faculty and partner company representatives. Shown in foreground, from left, are *Leaders* Fellows Thomas Black, Dean Vlasak, and Christine Shipp.

—Photo by Wayne S. Firsty

THE INSTITUTE CALENDAR

May 17- May 28

*Open to the public
**Open to the MIT community only
***Open to members only

Events of Special Interest

Global Change: Processes and Prospects** – Industrial Liaison Program Symposium, May 17, 8:30-12:30pm and 2:30-5:15pm; May 18, 8:30-11:45am and 1-4:15pm, Kresge Auditorium.

Seminars and Lectures

Freshmen are encouraged to attend departmental lectures and seminars. Even when these are highly technical they provide students one means to learn more about professional work in a department and field.

Wednesday, May 17

Land Valorization and Public Policy in Latin American Cities** – **Peter Ward,** Special Program for Urban and Regional Studies Luncheon Seminar, 12:10-2pm, Rm 10-400. Call x3-5915 for advance reservations.

Motion of Micro-Organisms** – **Dr. Timothy J. Pedley, University of Cambridge,** Dept of Applied Mathematics and Theoretical Physics Guest Lecture, 1-2:30pm, Rm 1-242.

Vibroimpact Motions of the Internal Elements of Nuclear Reactions* – Dr. A.I. Menyailor, Institute for Problems in Mechanics, Moscow, Dept of Mechanical Engineering Applied Mechanics Seminar, 3pm, Rm 5-234.

Determinants of Toeplitz Matrices and Pade Approximation** – **Doron Lubinsky, University of Witwatersrand/Univerisity of South Florida,** Dept of Mathematics Numerical Analysis Seminar, 4pm, Rm 4-163. Refreshments served, 3:30-m, Rm 2-349.

Effect of Non-Condensible Gases on Steam Condensation under Natural Convection Conditions* – Abdel Dehbi, Dept of Nuclear Engineering Reactor Engineering Doctoral Seminar, 4pm, Rm 24-121.

Imperative for New and Improved HVAC Equipments* – Prof Arthur Bergles, Dept of Mechanical Engineering, Rensselaer Polytechnic Institute, Troy, NY, Dept of Architecture Building Technology Seminar, 4-5pm, Rm 1-114.

Intuitive Approach to Karmarkar's Algorithm and Recent Developments in Linear Programming** – **Robert M. Freund, MIT Sloan School of Management,** Operations Research Ctr Seminar, 4pm, Rm E40-298. Coffee and cookies follow.

Benazir Bhutto's Election and Current Political Developments in Pakistan* – Dr. Ijaz Gilani, chairman, Pakistan Institute of Public Opinion (Islamabad), Ctr for International Studies Seminar, 4-5:30pm, Rm E38-615.

Governing Without Democracy in Mexico City* – Peter Ward, Fitzwilliam College, Cambridge University, Ctr for International Studies Institutional Perspectives on Third World Development Seminar, 4-6pm, Rm E38-714.

Galaxies in the Mist: Prospects for Witnessing the Formation of Large Systems* – Prof Hyron Spinrad, University of California, Berkeley, Ctr for Space Research Seminar, 4:15pm, Rm 37-252. Refreshments served, 3:45pm.

Thursday, May 18

Cold Fusion Confusion* – Prof Ronald G. Ballinger, MIT Dept of Nuclear Engineering and Materials Science and Engineering, Sigma Xi Lecture, 8pm, Rm 34-101.

Resistance in Afghanistan: A Political-Military Analysis* – Dr. Ijaz Gilani, chairman, Pakistan Institute of Public Opinion (Islamabad), Ctr for International Studies Seminar, 4-5:30pm, Rm E38-714.

Friday, May 19

An Inventor's Guide to Venture Capital: How to Analyze the Business Prospects for You and Your Ideas* – Scott T. Jones, Rothschild Ventures, Inc, MIT Technology Licensing Office Seminar, 10-11:30am, Rm 6-120.

Identification of Periodic Parameter Variations from System Response to Random Excitation* – Prof M.F. Dimentberg, Institute for Problems in Mechanics, Moscow, Dept of Mechanical Engineering Applied Mechanics Seminar, 3pm, Rm 3-343.

L Band Satellite Polarimetry* – Dr. Larry R. Krumpholz, MIT Lincoln Lab, Plasma Fusion Ctr Seminar, 4pm, Rm NW17-218.

Monday, May 22

Free Energetics of Protein Interactions – Bruce Tidor, Dept of Chemistry, Harvard University,** Whitehead Institute Seminar, 12noon, Whitehead Auditorium.

Biased Hypermutation and RNA Editing in Measles Virus – Roberto Cattaneo, PhD, University of Zurich, Institute for Molecular Biology,** Whitehead Institute Seminar, 4pm, Whitehead Institute Auditorium.

Tuesday, May 23

Planning Next Year's Agenda – Dr. Sarah Pallas,** Women's Postdoc Group Seminar, 12noon, Rm 10-340.

Thursday, May 25

Origin on the Genetic System: A Progene Hypothesis – Dr. A. Alstein, Institute of General Genetics, USSR Academy of Sciences, Moscow,** Dept of Biology Special Seminar, 12noon, Rm 16-135.

Friday, May 26

Design of Artificial Subsurface Cracks for Hot Dry Rock Energy Extra Extraction – Prof Hiroyuki Abe, Dept of Mechanical Engineering, Tohoku University, Japan,** Civil Engineering/Mechanical Engineering Special Applied Mechanics Seminar, 4pm, Rm 1-350.

Adaptive Optics for Near-Diffraction-Limited Astronomical Observations* – Brett A. Spivey, Thermo-Electron Technology Corp, Plasma Fusion Ctr Seminar, 4pm, Rm NW17-218.

Films

Film Festival* – Community Fellows Program featuring films and videos by former Community Fellows, Sat, May 27, 10am-5pm, Bartos Theater. Fee TBA. Also – Discussion "Image, the Media and Community Development."

Community Meetings

Alcoholics Anonymous (AA)** – Meetings every Tues, 12-1pm; Thurs, 12-1pm, Rm E23-364. For info call Sarah, x3-4911.

Al-Anon** – Meetings every Fri, noon-1pm, Health Education Conference Rm E23-297; every Tues, noon-1pm, Rm 1-246; and every Mon, 12-1pm, Lincoln Lab School House (P-Bldg). The only requirement for membership is that there be a problem of alcoholism in a relative or friend. Call Sarah, x3-4911.

Alcohol Support Group** – Meetings every Wednesday, 7:30-9am, sponsored by MIT Social Work Service. For info call Sarah, x3-4911.

Co-Dependents Anonymous (CoDA)* – Meetings every Thurs, 6:30-8pm, Rm 66-144. Info: Sarah, x3-4911.

Narcotics Anonymous* – Meetings at MIT, every Mon, 1-2pm, Rm E23-364 (MIT Medical Dept). Call 569-0021.

Overeaters Anonymous (OA)* – Meets Thurs, 1-2pm, Rm E23-364. On requirement for membership is the desire to stop eating compulsively. Info: Sarah, x3-4911.

MIT Faculty Club** – Mon-Fri, buffet luncheon, noon-2pm. Info: x3-4896, 9am-5pm daily.

MIT Cambridge Chapter of American Association of Retired Persons*** – Luncheon Meeting, May 23, "My Memory in Aging" – Dr. Linda Buchwald, head, Neurology Dept, Mt Auburn Hospital; 12noon; 1pm lunch, Student Ctr Twenty Chimneys. Reservations required for the luncheon, x3-7914.

Integrating Microsoft Word and PageMaker** – Microsoft Word (for the Macintosh) User Group Meeting, May 17, 12noon, Rm 10-105.

MIT Wives' Group** – **Morning Group: May 17** – Arnold Arboretum Tour, 9:15am; **May 24** – Mt Auburn Cemetary, 9:15am; info: Shantini Ratnathican, 484-5498 or Roswitha Koppe, 643-8025. **Afternoon Group: May 17** – "Women's Jobs: Where Women Work and Why," Erin Hynn, graduate student, MIT Political Science Dept, 3-5pm, Student Ctr Rm W20-491. Babysitting provided Rm W20-407; **May 24** – Annual Picnic for Wives' Group members, their husbands, children and friends, 12-2pm.

Working Mothers Support Group** – Meets every other Tuesday, 12-1:30pm (drop in any time), Rm 4-175. Next meetings: May 30, June 13. An ongoing support group that meets to discuss parenting-related issues in a casual atmosphere. Info: Janette Hyde, x3-4290.

Women's Health Issues: Tai Chi and Exercise – Jane Edwards, Tai Chi/Connections instructor,** MIT Women's League discussion and demonstration of exercise techniques to improve health, Wed, May 17, 12-1:30pm, Rm 10-340.

Lunch Hour Exercise** – Women's League program to gently and thoroughly exercise, relax and connect all parts of the body and mind. "Keepfit," Tai Chi, yoga. Wear loose clothing. $4/session. Info: Jane Edwards, instructor, 247-9698 or Pam, Women's League office, x3-3656.

Informal Embroidery Group* – MIT Women's League Group meets, May 24, June 14, 10:30am-1pm, Rm 10-340. Tea and coffee served. Summer schedule: June 28, July 12 & 26, Aug 9 & 23, Killian Court. In case of rain, Rm 10-340.

MITAC

MITAC, the MIT Activities Committee offers discount movie tickets for General Cinema ($3.50) and Showcase ($3.50). ***Please Note:*** *Due to the recent purchase of USA Cinema by another cinema chain, USA Cinema tickets are no longer available.* Tickets are good 7 days a week, any performance.

Tickets may be purchased at MITAC Office, Rm 20A-023 (x3-7990), 10am-3pm. Mon through Fri. Tickets are sold in Lobby 10 and Lobby E18 on Fridays, 12-1pm. Lincoln Lab employees may purchase tickets in Rm A-263 from 1-2pm, Tues thru Fri only.

Check out our table of discounts for dining, musical and cultural events available to you through MITAC.

Daytrip to Sandwich, Mass. Sat, June 2 Visit glass museum, Shaker round barn at Heritage Plantation; luncheon at Daniel Webster Inn; $28.50/pp. Bus leaves West Garage at 9am, returns approx. 6pm. Reservations in MITAC Office.

Daytrip of Newport Mansions. Sun, June 4. Visit The Breakers and Rosecliff, free time after noon for shopping, etc; $22/pp. Bus leaves West Garage at 9am, returns approx. 6pm.

Tech Night at the Pops. Thurs, June 8, Symphony Hall. Sponsored by the Alumni Association; tickets are $20 and must be purchased by May 25; available in 20A-023.

New York City Weekend. Sat-Sun, June 10-11. A limited number of spaces available for the round-trip bus fare *only* (does not include lodging), $27/pp.. Bus leaves West Garage 7am June 10, returns approx. 11pm June 11. Make reservations in the MITAC Office.

Whale Watch. Sat, June 17. Bay State Cruises, leaves Commonwealth Pier at 9am, returns approx. 3pm, $15/pp.

An Afternoon at Tanglewood. Sun, July 9. Morning at Stockbridge, afternoon at Tanglewood for Mozart, $26.50/pp. Bus leaves West Garage at 8:30am, returns approx. 6:30pm.

Talbot House Weekends Available July 7-9, 14-16, August 11-13, lodging (dorm style) and meals $50/pp. Reservations must be made by June 30. MIT ID required for each room.

The City Books are Here. Only $1 each. Super discount coupon books.(* Coupons valid through June 1, 1989.)

Council for the Arts Museum Passes. On campus, there are 10 passes employees may borrow for free admission to the Museum of Fine Arts. To check on availability, call the MIT Libraries, x3-5651. At Lincoln Lab, passes are available in the Lincoln Lab Library, Rm A-150.

PLEASE NOTE: Museum of Science tickets *no longer available.* Due to the recent revamping of the Museum of Science Corporate Discount Ticket Program, the $1 discount tickets are no longer available.

Important! To avoid disappointment, purchase tickets and make reservations early as we are limited by ticket availability and transportation. All MITAC events and ticket purchases are non-refundable due to the non-profit nature of our organization.

Social Activities

Japanese Lunch Table** – Every Tues, 1pm, Walker Rm 220. Bring bag lunch and speak Japanese with native speakers. All levels welcome.

Movies

For the latest Lecture Series Committee movie and lecture information, call the LSC Movieline, x8-8881.

Twins* – Lecture Series Committee Movie, May 18, 7 & 10pm, Kresge. Admission: $1.50, MIT/Wellesley ID required.

Working Girl* – Lecture Series Committee Movie, May 19, 7 & 10pm, Kresge. Admission: $1.50, MIT/Wellesley ID required.

Cocktail* – Lecture Series Committee Movie, May 20, 7 & 10pm, Kresge. Admission: $1.50, MIT/Wellesley ID required.

Music

For recorded information on upcoming concerts and lectures call the MIT Music and Theater Arts Concert Line, x3-9800. Updated weekly.

Whitehead Institute Concert* – Brian Johnston, Mark Ptashne and Akemi Masuko play Schumann, Shostakovich and Beethoven, Thurs, May 18, 12noon, Whitehead Auditorium.

Advanced Music Performance* – Wilson Hsieh (G), viola, student of Marcus Thompson, Fri, May 19, 12:05pm, Killian Hall. Works of Telemann, Vieuxtemps, Bach, Shostakovich.

Interactions: Computer Music at the Cube* – Interactive performance systems developed at the Media Lab, Sun, May 21, 8pm, Media Laboratory Experimental Media Facility (The Cube). Works by Tod Machover, Jean-Claude Risset, and Robert Rowe. With New York New Music Ensemble, Robert Black, conductor. Tickets: $10, $5/MIT.

Theater

The Three Spinners* – The Loon and Heron Repertory Company musical adaptation of the classic Grimm Brothers' tale, Sat, May 20, 2pm, Kresge Auditorium. Fund-raiser to benefit the MIT Children's Ctr. Tickets: $5/adults; $3.50/children.

I Sing the Body Electric **by Walt Whitman and *Action*** **by Sam Shepard,** MIT Community Players Experimental Multi-Media Presentation exploring two artists' views on the human condition, May 25-27, Kresge Little Theater. Admission free. Info: 720-5770.

Dance

MIT Dance Workshop** – Beth Soll, director. Modern Dance Classes: Beginning, M/W, 3:30-5pm, DuPont T-Club Lounge. Intermediate, T/Th, 5:30-7pm, Walker Rm 201; Composition/Improvisation, Tues, 3-5pm, T-Club Lounge.

MIT Folk Dance Club* – weekly dancing-Sun, International Dancing, 7:30pm, Student Ctr Sala de Puerto Rico; Tues, Balkan and Western European Dancing, 7:30pm, Student Ctr Rm 407; Wed, Israeli Dancing, 7:30pm, Student Ctr Sala de Puerto Rico. Info: x3-3655.

Aerobics Classes** – MIT Dance Club, M/W/F, 6-7pm, Dupont Gym Dance Studio. Beginners welcome. Info: Julia, 492-1369.

Rhythmic Gymnastics Classes for Women** – MIT Women's League classes, Thurs, 12-1pm, Rm 10-340. Info: Helena, 596-2396 eves.

Yoga* – ongoing classes in traditional Hatha and Iyengar style. Beginners: Mon, 5:10pm, Rm 10-340; Intermediate/Advanced: Mon, 6:30pm, Rm 10-340. For information call Ei Turchinetz, 862-2613.

Exhibits

LIST VISUAL ARTS CTR

Erik Bulatov: Paintings. First American showing of this Soviet painter who layers Constructivism, Socialist Realism and language into large-scale paintings. Through July 2. **James Coleman: Inspection.** Irish artist in residence to create a slide-tape installation intertwining crime-romance with examination of the photograph as an objective representation of past and present realities. Through July 2. **Beverly Pepper: An Autobiography in Form.** Part of an on-going series exploring 20th Century sculpture through the work of artists represented by a major work in the MIT Permanent Collection. Through July 2. Hours: Weekdays, 12-6pm, Weekends, 1-5pm. Closed holidays.

THE MIT MUSEUM

MIT Museum Bldg (N52) – Graphic Madrid. Architectural drawings by students from the University of Madrid School of Architecture representing both analytical studies of architecture and a panorama of Madrid. Through July 9. **Chung-Shin Lee: Korean Paintings.** Oriental ink paintings by contemporary artist Chung-Shin Lee, internationally acclaimed artist. Through July 2. **Getting to the Surface: Mathematics of Soap Film and Soap Bubbles.** Dazzling computer-generated images representing the first discovery in more than 200 years of a new complete minimal surface: includes 2 epoxy models and a videotaped interview with mathematician David Hoffman. Through June 15. **Microscapes: The Hidden Art of High Technology.** Color photographs taken with the aid of a microscope focus on advanced developments in microelectronics software and lightwave communications. Through June 11. **Holography: Types and Applications.** Changing exhibit demonstrating the uses of this three-dimensional imaging medium. Works include scientific, medical, technical, and artistic imaging drawn from the work of the Spatial Imaging Group at MIT's Media Laboratory, ongoing. **Light Sculptures by Bill Parker, MIT '74.** Changeable, touchable plasma sculptures by the artist who developed this medium, ongoing. Hours: Tues-Fri 9am-5pm. MIT Museum closed to the public on Mondays; Open 12-4pm Sat-Sun; $2 donation requested.

Compton Gallery – Stopping Time. Photographs, instruments, memorabilia documenting Harold E. Edgerton's invention and use of the strobe light, Through Sept 15. 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.

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

Corridor Exhibits

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

WIESNER STUDENT ART GALLERY

OTHER EXHIBITS

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

Wellesley Events

Jewett Arts Center* – On the Boards: Drawings by 19th-Century Boston Architects. Through June 11.

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, May 24 through Sunday, June 4 to Calendar Editor Rm 5-111, before 12noon Friday, May 19.

(continued from previous page)

cern. We do not require anyone suspecting misconduct to assume the burden of formally alleging misconduct before proceeding. In this case, there has been some suggestion that such a burden was placed on Dr. O'Toole as a condition of our inquiry. But our inquiry went forward in conformance with our policy of investigating suspicion of fraud even though Dr. O'Toole chose not to characterize her concerns as involving anything but differences in scientific interpretation. Our self-interest in our reputation as a leading research university required (and requires) that the integrity of our research be our first priority. We believe that priority guided our actions in this case. But it is also important that others, including this Subcommittee, perceive our priorities and policies as being correct and effective.

In conclusion, the history of this case impresses upon me once again, the importance for Academic Science to explain how research is conducted in the university environment. The Academic Community and other legitimate participants in the scientific enterprise must be able to discuss serious issues without a sense of confrontation. Unquestionably, the issue of how science deals with allegations of misconduct will continue to be a matter of public interest. MIT intends to continue to work toward improving public understanding of how basic research functions and to be responsive to legitimate concerns about these activities.

AARP meets May 23

Dr. Linda Buchwald, head of neurology at Mount Auburn Hospital and a member of the Medical Department staff, will speak at the May 23 meeting of the MIT-Cambridge Chapter of AARP.

Her talk, "My Memory is Aging," will begin promptly at noon in the Twenty Chimneys Lounge of the Student Center. Following discussion, there will be a brief business meeting at which officers and the board will be selected for the coming year. The meeting will conclude with lunch featuring baked schrod at 1pm.

Reservations for the luncheon (at $10/person) are due in the AARP Office, Rm 20A-023 by Friday, May 19.

Soccer camp returns

Know any kids who'd like to go to soccer camp this summer? The MIT-Brazil Soccer Camp is currently accepting applications for its 1989 program, July 17-28, for girls and boys ages six through 16.

The two-week program, which stresses the individual development of each player, meets weekdays from 8:45am-4pm at MIT's Briggs Field. Camp activities are taught by qualified instructors. Campers will also have the opportunity to see videotapes of professional Brazilian soccer players at work.

The registration deadline this year is July 10. For more information and a registration form, call x3-7393 or 247-0841.

CLASSIFIED ADS

Tech Talk ads are intended for personal and private transactions between members of the MIT community and are not available for commercial use. The Tech Talk staff reserves the right to edit ads and to reject those it deems inappropriate.

INSTRUCTIONS: Ads are limited to one (of approximately 30 words) per issue and may not be repeated in successive issues. All must be accompanied by full name and extension. Persons who have no extensions or who wish to list only their home home telephones, must come in person to Rm 5-111 to present Institute identification. Ads using extensions may be sent via Institute mail. Ads are not accepted over the telephone.

MIT-owned equipment may be disposed of through the Property Office.

Deadline is noon Friday before publication.

For Sale

Chst frzrs, 8 c.f & 13 c.f, $75 & $99 or bst. Dave, x3-5121 or 729-2203 eves.

Fender Champ 12 tube guitr amp, all Class A stages, reverb, ovrdrv, US made, w/spare tubes, schematic, usd by Cinderella & othr groups, nw, askg $200. Tugrulbey, x5-6764 dorm.

CD playr, as is, plays fine, won't scan, $75 or bst; RCA VCR, as is, $50 or bst; wh vinyl roll-up blinds, 2/$10; child gate, $5; bl Pullman-sz suitcase, $15; prices nego. Lucy, x3-2744.

Mving sale: desk chr w/castrs, $20; stacking bkcase w/glss drs, $40; sm stdy desk, solid wd, $50; pr of rcking comfy chrs w/footrst, $80; lrg sofa, barely usd, $300. Homero, x3-2843 or 566-0770.

Fridge, $95; lrg suitcase, $50; crckr pot, $10; blndr, $10, all in gd cond. Jo, x5-9653 dorm.

Stereo, $50; 10-spd M's bike, 21" frame, exc cond, $90. Call 547-2245.

IBM PC, 256K bytes RAM, 2 360K bytes diskette drvs, mdm cnnctn, IBM monochrome hi qlty txt mntr, Star SG-10 prntr (dot matrx nr lttr qlty), $1,200 or bst. Call x8-2239 Draper or 749-0892.

Kimball piano, spinet sz, exc cond, $1,000 or bttr. Call x3-2381 or 576-6982.

Magnavox 13" colr tv w/remote (nw) & MIT cabl convrtr, $250. Adrian, x5-8929 dorm.

Pan Am Airline tckt: LA-Boston, 1-way, 6/10, $75. Call x5-9711 dorm.

Oak desk, brss handls, 6 drwrs, ok cond, v strdy, $100; twin mttrss & bx spr, mtl frame, v gd cond, $25; Smith Cornoa elctrc typwrtr, $50; typwrtr tbl, $20. Constance, x3-4563 or 666-3144.

Boston-LA plane tckt, 1-way plane tckt, 5/24, $100. Bernard, x5-8869 dorm.

Peugeot 10-spd bike w/U-lock, $90; for IBM: Multimate 331, orig w/all documntatn, $35. C.Y., x5-8461 dorm.

Emergncy generatr, 3KW, 120V, 25A, 60Hz & sep gas eng, $40; 5-pc US glf set, $75. Nichols, x5486 Linc.

Magnum ATR 6000 rowng mach, $40. Gail, x3-1791.

M's 10-spd bike, $65; tstr ovn, $15; glf clbs w/bag, $55; foot lckr, 30x17x13", $15; Sunbeam mixmstr, $10; suitcases, $5; nw coppr chafing dsh, $15; framd pix, $5-up; instnt safety care seat, $5. Call x3-3175 or 332-8251.

DR tbl, seats 8, $80; 4 chrs, $60; desk tbl, $30; lmp, $5; tstr, $10; stool, $25; phone, $10. Suzanne, x3-0879 or 354-6388.

Nr nw, Sears Kenmore hvy duty wshr/dryr, wh, dlx mdls, 9 mos old, mving mst sell, $600. Randy, x3-3384 or 484-4058.

Tbl lmp, 20"H, 8" base dia w/raisd pastel colrd pttrn on wh bckgrnd & wh shade, $20; wh ceramic Xmas tree w/lite, 12"H, $15. Rosalie, x8-1201 Draper.

Nrly nw, lrg carpet; dbl futon w/covr, cnvrtbl, wden frame & set of drwrs, nd to sell by June. Call 776-8885.

Sanyo 19x19x34" fridge, $95 or bst. Call x5-9239 dorm.

Vehicles

'72 VW Bus, 15K on rblt eng, no rst, jst passd inspctn, mny nw parts, int grt, rns fine, $750 or bst. Rob, x3-4004 anytime.

'77 Toyota Corolla, 2-dr, 5-spd, nw trs, brks, cltch & batt, $500. Call x4511 Linc or 246-4925.$fl

'78 VW Rabbit, 2-dr std, exc cond, hi mi, $300. Jake, 232-9330.

'78 Buick mid-sz V6 wgn, 92K provbl mi, fine mech cond, prkd in Kresge lot, $650 or bst. Call x3-2228 or 244-4181 eves.

'82 Nissan 310GX, 95K, 2-dr htchbck, red, sunrf, ltl rst, nds brk rotr, rear bumpr, $1,000. Lane, x3-8695.

'82 Toyota Corolla, 4-dr wng, 63K, avlbl 6/15, askg $2,750. Marc, x3-4808.

'82 Renault Fuego Turbo, 2-dr htchbck, 5-spd, a/c, AM/FM 4 spkrs, red, 46K, perf cond, no accidnts, nw trs, mst sell, lving US, $3,000 or bst. Carlos, 494-8187.

'83 Chevette, jst 32K, exc cond, nw brks & muff, 1 ownr, cass & radio, $1,900. Davi, x3-8005 or 494-8718.

'83 Renault Le Car (eg 5 GTL, 1400cc), 56K, AM/FM, 22mpg, no rst/dents, reliabl, rcrds, $1,300. Call x3-4899 or 734-9866.

'84 Chevy Citation, 2.5L, mint cond, auto, ps, pb, a/c, NADA bk valu $3,400, sell for $2,995 or bst. Mario, x8-4715 Draper or 324-3516 aftr 5pm.

'84 Olds Cutlass Supreme , 4-dr, clth int, a/c, rear dfrst, tilt whl, exc cond, in/out, $3,600 or bst. Mark, x3-7049 aftr 4pm.

'85 Mazda GLC, 4-dr, 58K, exc cond, $3,300 or bst. Prof Yue, x3-6823.

'86-1/2 Ford Escort wgn, dk bl, 5-spd, 1.9 eng, a/c, ps, pb, styld whls, pwr mirror, digtl clck, inter wiprs, AM/FM quad stereo, 36K, $4,500. Gabriela, x3-7001 or 332-7776 eves.$fl

'88 Suzuki Samurai, grt cond, 16.2K, lt bl, sft top, fun car, $5,000. Ben, x3536 Linc or 894-8856 aftr 5pm.

'88 S-10 Blazer Tahoe, loaded, full spare, w/mag, $12,700. Dennis, x3-4765 or 396-6201 eves.

Housing

Summr sublt: 3BR apt, nxt to Hrvd campus in quiet nbrhd, June, July, Aug, $900/mo. Todd, x3-4175.

Hyannis Cape Cod condo, sleeps 4, indr pool, whrlpool, restrnt & bar, br nw convrsn, 8/12-19, $990, nr beaches & ferries. Call x8-7083 or 876-1760, lv mssg.

Lexington hm, avlbl 8/1 for 1 yr, spacious, furn, 4BR, 2-1/2b, nw ktchn, DR, LR & stdy, on lrg secluded lot, carpeting, hdwd flrs, lrg rms, quiet st, nr Rts 128 & 2 & public trnsprtn, $2,000/mo+ utils. Call 862-1776 eves.

Arlington, lrg fully furn hse, perf for fmly w/chldrn, quiet nbrhd, conv to trnsprtn & schools, avlbl for 1 yr (somewhat flxbl) strting 7/89, $1,600/mo. Nina, x3-5636.

Summr rntl: Victorn in Truro, 10 rms, baths, piano, patio, sep wing w/loft, tv, space & priv for 1-7 ppl, wlk to beach, $700-740. Steve, x3-4148.

Acton, by ownr, qlty 1BR condo at Pine Hill, nw appliancs & carpt, tennis cts, pool, $95,800. Call x5431 Linc or 508-263-2984.

Inman Sq, 25 min wlk to MIT, 20 to Hrvd, 15 to Ctrl, lrg 3BR apt, $825/mo+ utils, strting 6/1, no fee. John, x3-5271.

VT, nr Woodstock, lux 3-lvl twnhse, 2100 s.f, 3BR & loft on golf course, lake tennis, pool, all conveniences, sauna & jacuzzi in unt, summr & fall rntls. Call x3-1662.

Lakefrnt camp, No VT, btfl secluded wded area, 1BR, LR, bath, ktchn, deck, gas fridge, stv, electrc genratr, swim, canoe, hike, $500/wk, ideal for nature-lving cpl 1 chld. Call x3-1783 or 354-4551.

Boston, Charles River Park (acrss Longfellow Bridge to MIT), 2 spacious BR in 3BR lux apt, exc locatn, all amenties, $450 inc ht & a/c, avlbl 6/1. Call 720-2761.

Bass River, Cape Cod, 4BR mod hm, 3 blcks to ocean beach on Nantucket Sound, avlbl 7/8-22, 8/26, $650/wk. Stanley, x3-4288 or 643-0771.

Summr rntl: farmhse in the Berkshires, avlbl 8/5-26, modrnzd, 5BR, ducks, chckns, geese, locatd btwn Northampton & Tanglewood, fmly pref, $500/3 wks. Marilyn, x3-9420 or 508-635-0993.

Studio apt, Davis Sq on Red line, $500 inc utils & lndry, sk prsn to hlp w/bed & brkfst on wkends for rent rebate, up to $200/mo. John, x8-5326 or Michael, 625-8847.

Back Bay, 1BR condo, wlkng distnc to MIT, 615 s.f, frplc, prkg, $150,000. Call 236-1095.

Camb apt, nr Porter Sq, BR, LR, ktchn, bath, fully furn & eqppd, grdn, $750/mo inc utils, avlbl 6/1-8/31, poss xtnsn for fall. Earle, x3-4877 or 876-7821.

Belmont summr sublt, lrg BR, priv bath in shard hse, 15 min to Hrvd Sq, by T, no smokng, avlbl 6/1-9/1, $375/mo. Joel, x3-0312 or 489-3018.

Camb, wlk to MIT, furn 1BR, quasi bsmnt, BR v sunny, off-st prkg, $675. John, 864-7725.

Cape Cod rntl, lvly 2BR hse, fully furn & eqppd, 1/2 mi to beach in S. Chatham, avlbl selctd wk July & Aug. Phyllis, 285-4360.

Camb, 2BR condo, wndrful views, 1 mi frm Tech & Kendall Sq, btwn Hrvd & MIT, spacious, lots of closets, w/w, D/D, a/c, balcny, rfdck, sauna, lndry, storage area, cvrd prkg avlbl, $149,000. Phil, x8-4403 Draper or 576-2548.

Cape Cod, Aug rntl, Falmouth (Woods Hole area), 1 acre, 2BR, frplc LR, ktchn, DR, 2-car grg, wlk on priv rd to priv beach, $2,600 or bst. Alvin, x3-3580 or 332-6222.

Wanted

Cln, quiet, married cpl w/2 young chldrn sks apt/hse w/yrd & storage to rnt or lease. Call x2088 Linc or 391-5769 eves.

Mt/city bike, microwv ovn, sm fridge at rsnbl prices. John, x3-5368 day/night.

Camera, Nikon FA or F3; also lenses or accessories. Call x5-7342 dorm.

Passngr to Erie, PA, free ride, lv 6/9, 10 or 11, retm 6/16, 17 or 18 any date conv to ridr, travl on NY Thruway thru Buffalo, sense of humor a mst. Rasheed, x3-6750/3095 or 262-4016, lv mssg.

Roommates

Belmont, spacious, quiet, safe apt to shr w/1M & 1F, at end of dead-end st, w/bck yrd, pets ok. Call 489-3376, lv mssg.

Cambridgeport, attrctv spacious furn hm to shr, LR, DR, well-eqppd ktchn, yrd, bsmnt, W/D, BR & stdy avlbl, $850/indivdl or $1,000/cpl inc utils & clning. Anne, x3-5094 or Nancy, 497-6624.

2 rms in group hse in Inman Sq, $320 or $370/mo, avlbl 6/1, prkg, no smoking. Call 625-4669 or 625-0558.

Boston, Charles River Park, 12 min wlk to MIT, shr 3BR w/2 quiet pros M/F, lux apt, grt locatn, 23rd flr views, $450 inc ht & a/c, avlbl 6/1. Call 720-2761.

Summr sublt, Belmont, 2F, 1M grad stdnts sk rmmate for lrg 4BR apt, 2b, lounge, DR, sunrm, prch, mod ktchn, dshwshr, W/D, garage, avlbl 6/1, $300+ utils. Anne, x3-6397 or 484-4058 (machine).

Wollastan/Quincy area, wlking distance to red line, 2BR, hdwd flr, tennis courts, 10 min wlk to beach, $385/mo, dep req'd. Joan, 479-8810.

Summr sublt, 6/1-8/31, 1BR in 3BR apt, Porter Sq, exc cond, furn, 1 blck to T & Star Mkt, $300/mo. Peter, x3-6379 or 623-5517 eves.

Obituaries

Frederick C. Fahnley

Frederick C. Fahnley, 80, a supervisor in the Superintendent's Office, died February 18. He retired in 1974 after 18 years of service at the Institute. He is survived by his wife, Alice V. Fahnley, and a son, Frederick C. Fahnley, Jr., both of Marco Island, Fla.

Wilfred C. Gabriel

Wilfred C. Gabriel, 71, a houseman at Housing, died last December 20. After his retirement in 1986, Mr. Gabriel moved to Costa Rica. He had worked at MIT for 17 years. He leaves his wife, Violet Gabriel, and daughter, Amalia Gabriel, both of Brooklyn, NY.

John Hatziliades

John Hatziliades, a custodian in Physical Plant until his retirement in 1983, died January 29. He was 70, and had worked at MIT for 10 years. Mr. Hatziliades, who lived in Arlington, leaves his wife, Maria Hatziliades, and a son, George Hatziliades.

Donald T. Hubbard

Donald T. Hubbard, 67, who retired in 1982 as a supervisor in Housing, died April 23. He had worked at MIT for 16 years. A resident of Raynham, he leaves an aunt, Rose Melanson, of Raynham and a step-sister, Pauline Kryzak.

Walker S. Kupfer, Jr.

Walker S. Kupfer, Jr., a member of the technical staff at the Center for Space Research, died March 17. He had worked at MIT for 11 years until his retirement in 1973. A native of Burlington, he leaves his wife, Diane D. Kupfer, a daughter, Sarah Diane, and a son, Jonathan, all of Burlington. He was 77.

Robert Reynolds

Robert Reynolds, a patrol officer in the Campus Police, died March 3. He was 66 and had worked at the Institute for 16 years until his retirement in 1987. A resident of Wakefield, Mr. Reynolds is survived by his wife, Ingeborg Reynolds.

Ernest Ritchie

Ernest Ritchie, a mail worker in Physical Plant, died February 26. He retired in 1983 after 15 years at MIT. He lived in Cambridge, and is survived by his wife, Helen Ritchie. Mr. Ritchie was 70.

Alexander Ross

Alexander Ross, 92, a shop helper at Lincoln Lab, died February 16. He had worked at Lincoln for eight years until his retirement in 1963.

Albert Schmider

Albert Schmider, 61, a technician at Lincoln Lab, died April 9. He had worked at Lincoln for 32 years. Mr. Schmider lived in Dracut, and is survived by his wife, Joanne.

Lisa Sgrosso

Lisa Sgrosso, 75, an assistant operator at Lincoln Lab, died March 7. She had worked at Lincoln for 27 years until her retirement in 1984. A native of Lexington, she leaves two sons: Frederick Sgrosso, and Dante Sgrosso, an employee at Lincoln.

Summr sublt/perm, avlbl 6/1, Arl-Camb line, nr T & bus, btfl hse, 4BR, prch, huge ktchn, 2b, prkg, quiet nbrhd, fully furn, no smkrs, shr w/2F grad stdnts, $333+ utils. Carolyn, x3-0950 or 643-0439.

Mthr & 12 yr old sk rmmate to shr 3BR Kendall Sq duplx, own rm, 1-1/2b, fully appliancd ktchn, lndry, bck prch, yrd, dshwshr, $425 or $475 w/wo utils. Pat, x3-8112 or 547-1762 eves.

Lost and Found

Lost: dk bl Wilderness Experience backpack, in 13-5101. John, x3-8302 or x5-9793 dorm.

Miscellaneous

Exprt editng & wrd prcssng, IBM PC, 12 yrs MIT exp, live on campus. Marie, x3-3490 or 547-1311.

Alumnus receives Luce scholarship

The Luce Foundation has awarded one of its 1989-90 scholarships to Robert J. Spinner, a member of the MIT Class of 1984 who will graduate this spring from the Mayo Medical School in Rochester, Minn.

The award enables recipients to live and work in Asia or Southeast Asia in the fields in which they have trained.

Mr. Spinner was one of three applicants from MIT nominated for the annual Luce scholarships last December. His selection as a Luce scholar was announced by Professor Myron Weiner, director of the Center for International Studies and the MIT Luce Scholarship liaison.

Mr. Spinner received the SB in humanities and science from MIT and then spent a year at Oxford University, which awarded him a Master of Studies in Greek and Latin literature in 1985. He has been selected as the Schilling Scholar in each of his four years at medical school.

Mr. Spinner plans to spend the year of his Luce award in surgical rotations at a major teaching hospital in South Asia.

New classes at LIS

For the first time in its 86-year history, the Lowell Institute School will offer summer classes this year, Dr. Bruce D. Wedlock, school director, has announced.

Courses planned are AutoCAD-I, AutoCAD-II, Computer Literacy and PC Operations. Courses will run for seven weeks, with most meeting two evenings each week. Courses will begin May 22 and July 10.

Descriptive flyers and applications are available in the LIS Office, Rm E32-105, or by calling x3-4895.

Computer graphics

Will the computer—now a primary design and production tool in graphics—become a valued assistant, capable of learning from its human mentor?

Professor Muriel Cooper, a distinguished graphic designer, addresses that question in an essay on "Computers and Design" in the latest issue of the Walker Art Center's journal Design Quarterly, published by the MIT Press. Professor Cooper is a member of the faculty at the Media Laboratory and cofounder of the Visible Language Workshop.

Copies of Design Quarterly are available for $8 at the MIT Press Bookstore in Kendall Square.

Paul Shaffer

Paul Shaffer, 83, who was on the sponsored research staff at Draper Labs, died January 15. He lived in Silver Springs, Md, after his retirement from Draper in 1971. He had worked at Draper for 26 years. Mr. Shaffer is survived by his daughter, Marsha Haggard.

Ferdinand Sullivan

Ferdinand Sullivan, who worked as a houseman in Housing for 26 years, died February 23. He retired in 1973. A resident of Brookline, Mr. Sullivan is survived by his wife, Ellen. He was 80.

Evelyn Wiggin

Evelyn Wiggin, a retired cashier in the Comptroller's Accounting Office, died March 20. She had worked at MIT for 14 years. Ms. Wiggin lived in Somerville, and is survived by her daughter, Joan. She was 77.

George S. Williams

George S. Williams, a custodian in Physical Plant, died March 6. He retired in 1967 after 19 years at MIT. He lived in Brighton, and is survived by a daughter, Sonia Williams. Mr. Williams was 92.

Joseph Zeidman

Joseph Zeidman, 79, a locksmith for Physical Plant, died January 20. He worked for MIT for 12 years until his retirement in 1974. Mr. Zeidman lived in Brockton, and leaves his wife, Jean Zeidman.

THE ARTS

■ Art Sparks: Soviet Artist featured

An MIT exhibition by Soviet painter Erik Bulatov has been discussed extensively by the Boston Globe's Robert Taylor. Bulatov's first solo exhibit in this country is at the MIT List Visual Arts Center in the Wiesner Building.

Formerly more widely known in the West than in his native Moscow, Bulatov has emerged under glasnost as one of the most important Russian painters. The large powerful canvases at the List Center speak of the personal vision he kept alive during the USSR's repressive years.

Following are Bulatov quotes excerpted from Taylor's interview, conducted through an interpreter: "Our social world is saturated by ideology. It smothers the space of our humanity and tries to prove that nothing else exists. . . I see the space of a painting as a corridor uniting two other spaces. The social space in which the spectator and myself dwell —this is the space in front of the painting — and a second space existing behind the canvas."

This exhibition is open weekdays noon-6, weekends 1-5. 3-4680.

■ Show for kids/parents

A musical adaptation of the classic Grimm Brothers' tale, *The Three Spinners*, will be performed by the Loon and Heron Repertory Company in a fund-raiser to benefit MIT's Technology Children's Center (TCC).

THE LOON AND HERON THEATRE

This story celebrates the determined and spirited "girl who would not spin." A blend of music, action, costumes and sets, it has been described as a colorful and imaginative presentation that usually pleases both children and adults. In Kresge Auditorium, at 2pm, Saturday, May 20. Admission: $5 adults, $3.50 children. Information: 3-3950 or 232-1715.

The TCC has sites in both Eastgate and Westgate, now serving about 75 families. It is open to all MIT children from 2 3/4 through 5 years of age. For information on fees and other details: 3-5907.

The Loon and Heron Theatre — logo illustrated here — is a professional touring company which has been based in Brookline for the past 11 years.

China Altman, editor. Karen Sklut, production.

■ INTERACTIONS: New music genre celebrated as musicians and computers perform three world premieres, a spring concert in "The Cube"

A distinctive new type of music will be celebrated with new works from three of the "computer music" world's most innovative composers, in concert in The Cube of the Wiesner Building, 8pm, Sunday, May 21.

This program will feature the new genre of live computer created music arising out of interactions between computers and musicians.

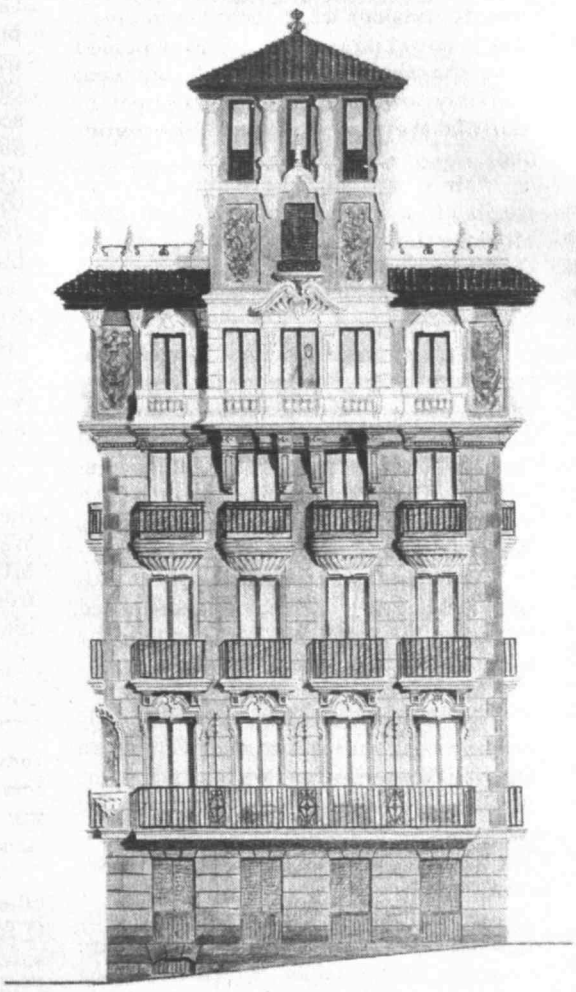
Composer Tod Machover's *Toward the Center* will use "hyperinstruments," to be performed by the New York New Music Ensemble, conducted by Robert Black. This ensemble was described by the New York Times as "perhaps the best new music group in the country." Machover is known for his computer music opera *Valis;* he is on the faculty of the Media Lab and is director of the Experimental Media Facility (The Cube).

Etudes, a composition for computer driven Yamaha piano, is actually a duet for one pianist, written by Jean-Claude Risset while composer-in-residence at the Media Lab this year. Risset was the first director of computer music at IRCAM (the Institute for Music and Acoustical Research) founded in Paris in 1975 by composer/conductor Pierre Boulez.

The third premiere, *Flood Gate*, was written by Robert Rowe, a PhD candidate at the Media Lab who has worked as a researcher in the U.S., Holland and France. The piece is a trio for violin, piano and a computer, to be performed by a computer with violinist Nancy Cirillo of Boston Musica Viva, and pianist Sandy Herbert, who has appeared with Underground Composers and with ALEA III.

This concert continues the "New Musical Resources" concert series sponsored by Music and Theater Arts of the School of Humanities and Social Science and the Music and Cognition Group of the Media Lab. Admission: $10 general, $5 students, seniors. Information: 3-7418.

Above, one of the new designs for computer music created by Chris Wilson of MIT's Graphic Arts Service



■ Visit Madrid at MIT

Above, one of the drawings from the Graphic Madrid exhibition now on view at the MIT Museum, 265 Mass Ave, at the Front Street corner near the Necco Factory and the Bicycle Workshop. Free to MIT ID, open every day but Monday. 3-4444.

Baltimore, Imanishi-Kari speak in 'electric atmosphere' in D.C.

(continued from page 1)

entific papers introduced into evidence.

The work, published in 1986 in the journal Cell, was challenged by a graduate student, Charles Maplethorpe, and a postdoctoral researcher, Margot O'Toole, in the Imanishi-Kari Lab. They worked with two NIH scientists who have a reputation for writing up cases of scientific fraud, Walter Stewart and Ned Feder. A year ago, the case found itself propelled by Stewart and Feder before a hearing of the Oversight and Investigations subcommittee of the House Energy and Commerce Committee, chaired by Rep. John Dingell (D-Mich).

At that first hearing, charges were made by O'Toole, Stewart and Feder—and by Peter Stockton, a subcommittee staffer. The drama was played out in the press and a panel of immunologists was appointed by the NIH to conduct a review—the third following reviews at Tufts and MIT. All scientific reviews reached the same conclusion: no fraud or misrepresentation, the central thrust of the paper was sound, and although there were errors, all were within the usual bounds of scientific publication. The Tufts and MIT reviewers had not seen a need for corrections; the NIH review, conducted under the close scrutiny of the subcommittee and the press, asked for corrections, which were submitted to the journal.

About 10 days before the May 4 hearing, the authors learned (from a chance remark by a newspaperman in California) that the U.S. Secret Service had for the past nine months applied "forensic analysis" to the laboratory notes. The newspaperman warned California scientists that the Secret Service findings would shock and surprise those who had called the subcommittee's actions an unwarranted attack on science.

Six days before the hearing, the authors got a fragmented, oral briefing on the Secret Service findings and found them not surprising at all. The information would have been willingly supplied by the authors had anyone asked. For example, a photographic expert scrutinized one of the figures in the paper and discovered that it was a composite photograph. Composite photographs of this sort are the rule, rather than the exception, in molecular biology. The composites are seldom identified as such because the audience for such illustrations—molecular biologists—can readily identify them.

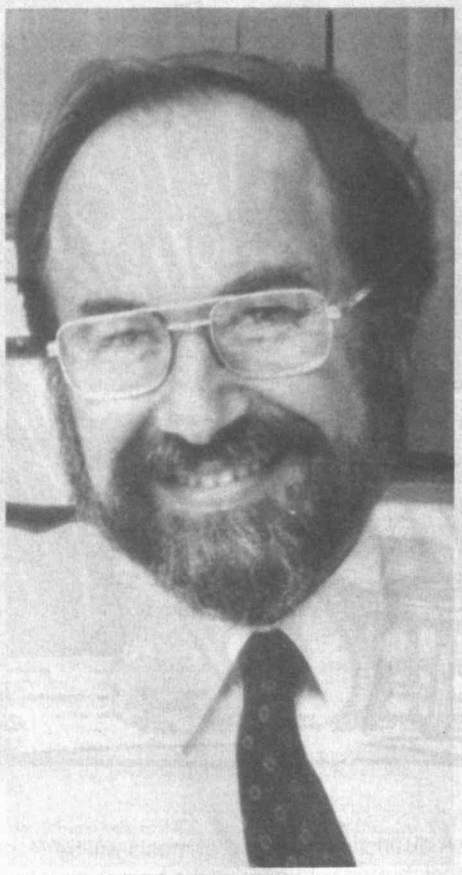
The atmosphere was electric on May 4 in Washington. The line outside the hearing room stretched endlessly. A large number of those in line were well-known scientists, many from MIT, others from across the country. Most were responding to an alert from Professor Phillip A. Sharp, Director of the MIT Cancer Center, who had written to his colleagues that the subcommittee's attack on Dr. Baltimore was an attack on all science.

Following tough opening remarks from Chairman Dingell, the NIH review panel and NIH Director James B. Wyngaarden were pressed by the subcommittee on their ruling that no fraud or misrepresentation was found. They held firm.

Then it was the Secret Service's turn. In arguments difficult to fathom, the agents showed with photos and charts and overlays that dates had been changed on laboratory notes from Professor Imanishi-Kari and that some data from 1986 in her notes had been transcribed before some data from 1984—all of which she readily acknowledged.

By the time the authors got their turn, it was 4 o'clock, everyone was exhausted and the daily newspaper reporters among the 20 or so journalists covering the hearing had long since filed their stories, based largely upon the Secret Service testimony.

Dr. Baltimore went first and point by point rebutted his attackers, observing that neither Stewart nor Feder was an immunologist "and neither was qualified to understand the science." He said they had based their attack on just 17 pages of data—from more than a thousand—and that some of the 17 pages "had to do with failed experiments, something that isn't unusual in science." He said they began a



Dr. Baltimore

campaign to "discredit me, my work and to obtain evidence to support their faulty conclusions.

"This is a classical case of verdict first, evidence later," he said.

Dr. Baltimore also told the Congressmen that at a recent public conference Stewart had made a "loathsome comparison of scientific fraud, of which he accuses me, to the Nazi Holocaust."

The last witness was Thereza Imanishi-Kari. It was after 6 o'clock, but hardly anyone had gone home. She quietly and clearly apologized and acknowledged to the subcommittee that her notetaking was "not neat," but she protested that since they are her notes and she is the one who has to read them, she takes care to be sure they can be understood—by her.

'I have lupus'

She appealed to the subcommittee that, since three reviews had concluded no wrong doing, she be allowed to return to her work. Then she asked the Congressmen to consider what "possible motive I might have had to cheat." She explained that the challenged research can lead "directly toward a cure for (the) potentially fatal disease. . . lupus." She continued:

"Mr. Chairman, I have lupus. My sister died from lupus. That was in my mind all along that I could help provide insight that might lead to a cure for this disease." Chairman Dingell banged down his gavel, declaring a recess.

In his summation, Rep. Dingell took "umbrage" with Baltimore for asserting that he had been accused of fraud; for indicating that subcommittee staff behaved "in a fashion worthy of Hitler;" and for rejecting an opportunity to cooperate with the subcommittee staff over the Secret Service findings.

Then his gavel descended and Dr. Baltimore, who had earlier stood up and asked to respond, rose again. "Mr. Dingell," he said, "might I respond? Please?"

Mr. Dingell: "You may."

Dr. Baltimore tore a page from his briefing book and waved it at Chairman Dingell: "I was charged with fraud by Mr. Stockton." Stockton was seated at the chairman's left and flushed noticeably.

Mr. Dingell: "I'd like to see that statement."

Dr. Baltimore: "You are welcome to it. It is right here." He handed a clerk a story from the Boston Globe, which headlined the sensational accusations of Stockton, who termed the work "fraud (or). . . misrepresentation" and said that Congressman Dingell had decided in advance that the MIT and Tufts reviews of the paper were "piss poor."

Dr. Baltimore then went on to document Stewart's Holocaust comparisons and to complain that, while the authors declined to cooperate with the staff over the Secret Service findings, the authors were given very little information, what little they were given was confusing, and they had no time to consider it before the hearing.

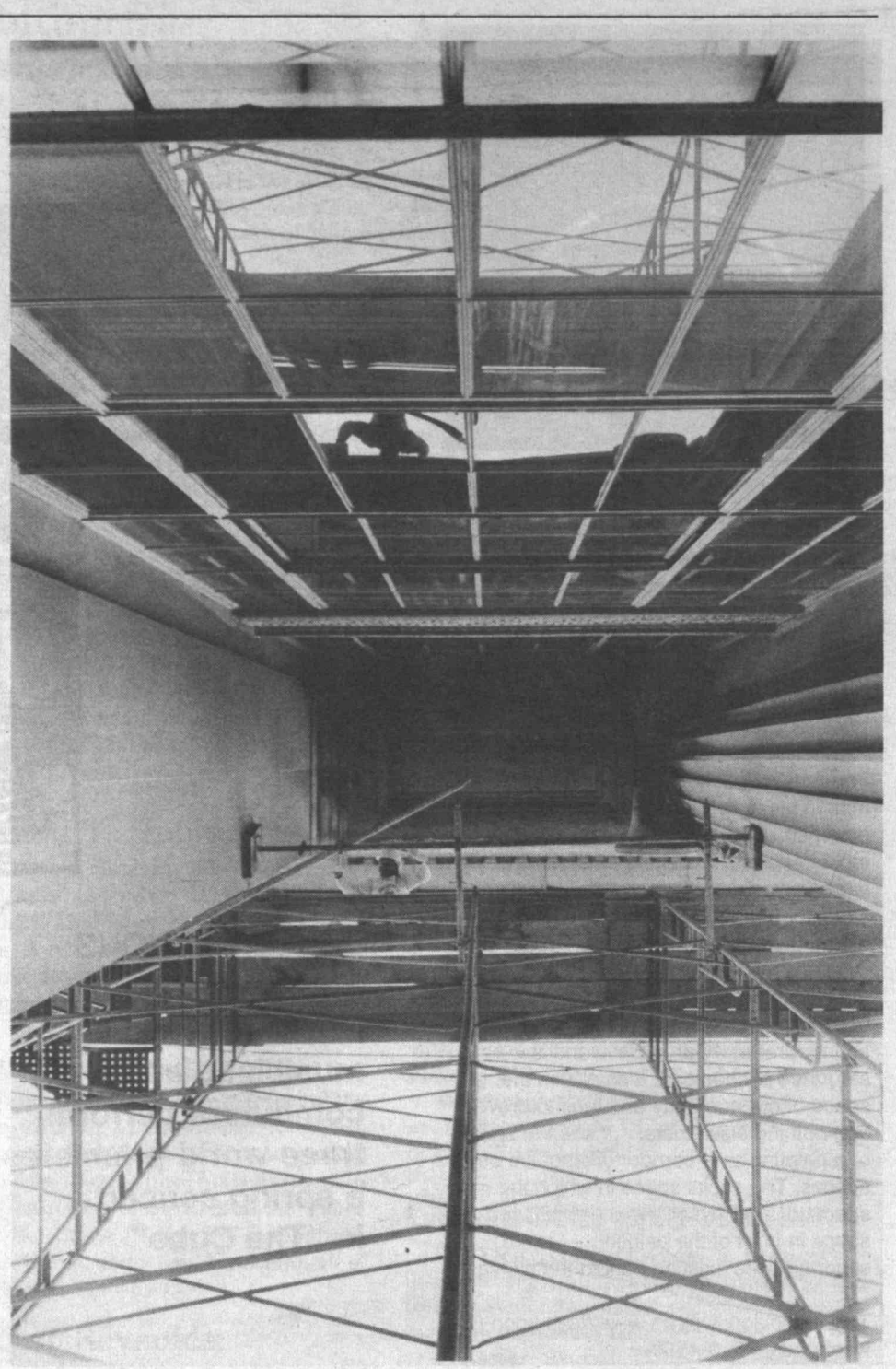
Atmosphere changes

By May 9, when the MIT and Tufts officials were to testify, along with Dr. O'Toole, the atmosphere had changed considerably. The tension seemed gone. Tufts Professor Henry Wortis did most of the talking for Tufts and seemed to answer all questions about the Tufts review with precision. For MIT, most questions were directed to Professor Herman Eisen, who had conducted MIT's review and, like Wortis, had little difficulty responding to the adequacy of his review.

School of Science Dean Gene Brown and Provost John Deutch also testified for MIT and at hearing's end, Professor Deutch and Rep. Dingell were grinning at each other and clasping hands at the chairman's desk. The congressman had earlier described Professor Deutch as "an old friend and adversary" from Energy Department hearings, during the days when the MIT Provost was an official there.

And where was Professor Baltimore while the Congressional proceeding that had consumed most of his time for more than a year was winding down? He was a continent away, preparing to deliver a major address. His topic: AIDS research. It is a topic clearly more to his liking than Congressional hearings.

But Professor Baltimore may find that his AIDS research must be put off a bit longer. Responding to new accusations by Dr. O'Toole, the NIH review panel has been instructed to conduct another review of the paper. It will be the fourth.



Workman scales scaffolding outside Building 3. ***—Photo by Donna Coveney***

This week in sports

Senior MIT lacrosse midfielder Dave Chang, a 5'6" 130-lb. native of Lexington, Mass., recently capped his MIT career with several record breaking performances. Chang established an MIT single season scoring record by tallying 78 points, and set a single season mark of 33 assists. Chang's 1989 performance also earned him the career assist record (81 points). Chang's 167 total points (87 goals-81 assists) place him second on the all-time MIT scoring list. Another senior midfielder, Pat Nee of Riverside, Ct., set the career goal scoring record on his very last shot in a recent win over Nichols. Nee finished his four years with 102 goals and 42 assists for 144 points and fourth on the all-time MIT scoring list.

The MIT golf team recently defended the Engineers Cup with a victory over RPI, WPI, Carnegie-Mellon, and New York Tech. MIT trailed New York Tech until No. 5 man, freshman Thor Iverson, shot an 84 to defeat his NY Tech counterpart by three strokes to give MIT the match. Senior captain Chris Craig was medalist for the Engineers with a 77. The wins gave MIT a 13-9 record and marked the 16th consecutive season the Engineeers have had a non-losing record.

MIT baseball coach Fran O'Brien recently gained his 200th career victory with a 4-1 win over Salve Regina College. The win put the Engineers into the ECAC Division III Playoffs for the first time ever. Following a first round loss to Salem State College, the Engineers record stands at 17-12.

Junior Boniface Makatiani of Kenya won the New England Championship in the 400 meters last weekend and became the seventh MIT athlete to qualify in an individual event for the NCAA Division III Championship May 24-27 at North Central College in Naperville, Ill. The Engineers have also qualified two relays for the championships.—Roger F. Crosley