

EARLY-MORNING WORKOUT—One of the MIT Women's Fours is on the river practicing as the sun comes up. The hard work paid off in last weekend's Head of the Charles race. Women's crew coach Mayrene Earle said the team had the best finish since 1982, and rowed "with great poise." For complete results see Sports, page 4. **Photo by Donna Coveney**

MEYER STUDY

Environment, Economy Are Not Foes

By Elizabeth A. Thomson
News Office

A new MIT study has found that strict environmental regulations and controls do not hurt economic growth in contrast to the beliefs and consequent policies of both the Reagan and Bush administrations.

"The 1980s marked the...entrance of the 'environmentalism hurts economic prosperity' thesis into federal policy-making...Yet there has been surprisingly little rigorous research to substantiate it," wrote Professor Stephen M. Meyer of political science in a study released October 5 titled "Environmentalism and Economic Prosperity: Testing the Environmental Impact Hypothesis."

So Professor Meyer set out to con-

clusively determine the validity of this thesis. Specifically, he ranked the 50 US states by "breadth and depth" of environmental programs, then compared environmental rank with five different indicators of economic growth (gross state product, total non-farm employment, construction employment, manufacturing labor productivity and overall labor productivity). The data were analyzed with graphs and statistical tests.

"This is the first study to look at each of the states and try to understand what's going on across the nation with respect to environmental policies and economic growth," Professor Meyer said.

He found that during the Reagan New Federalism era, 1982-89, "states with stronger environmental policies did not experience inferior rates of economic growth and development compared to states with weaker environmental regulations." In fact, he wrote, during that period "the environmentally strong states [the first 17 in the ranking] outperformed the environmentally weak states [the last 18] by substantial amounts." (The 15 states in the middle of the ranking were defined as environmentally moderate. Among the New England states MA, ME, VT, and CT were ranked environmentally strong; NH weak, and RI moderate.)

Professor Meyer further noted that "the most dramatic difference [between environmentally strong and weak states] was in construction employment," which grew by about 53 percent among environmentally strong states from 1982-89 but declined by 1.4 percent among weak states. This is an important economic indicator "because it reflects future business plans," Professor Meyer wrote. If industries were unduly burdened by environmental regulations they might be expected to plan moves to—and build new plants in—states with weaker environmental policies. The data refute that this happened.

Professor Meyer took the study one step further by comparing "gains and losses in economic growth between the periods 1973-80 and 1982-89 as a function of state environmental rank."

Such an analysis could catch whether states that loosened environmental controls in the 80s showed greater economic growth in that decade than in the 70s, when many controls were still federally mandated. Conversely, it could also show whether states that remained environmentally strong in the 80s showed no change in inter-decade economic growth, a decline, or less economic growth than their environmentally weak counter-

(continued on page 8)

CRC RESEARCH

Chemical May Hold Key to Alzheimer's

By Robert C. Di Iorio
News Office

A single mechanism involving a brain chemical may underlie the known abnormalities that characterize Alzheimer's disease and hold the key to possible treatment, researchers working at MIT have reported.

Their article in the October 9 issue of the journal *Science* suggests that treatment using drugs which act like or increase the amount of the brain chemical acetylcholine might slow the onset of Alzheimer's. The devastating brain disease, which causes dementia and leads to death after 6 to 10 years of steady mental decline, affects about 4

million people in the United States, most of them elderly.

The *Science* article was written by Roger M. Nitsch, Barbara E. Slack, Richard J. Wurtman and John H. Growdon. All are connected with the MIT Clinical Research Center, which is directed by Professor Wurtman, and with the MIT Department of Brain and Cognitive Sciences. In addition, Dr. Growdon is the Program Director of the Alzheimer's Disease Research Center at Massachusetts General Hospital's Department of Neurology where Dr. Nitsch is a research fellow.

The research was supported by grants from the National Institute of Mental Health and the National Institute on Aging.

ANNUAL REPORT

President Calls For Merit-Based Funding

Federal funds for scientific research and facilities should be awarded to research universities primarily on the basis of merit, the president of MIT said in his annual report released today (Oct. 21).

The 1991-92 Report of The President is included as a special section of MIT Tech Talk today

"Although we must recognize legitimate concerns such as geographic distribution," said Dr. Charles M. Vest, "it is not in the interest of the country to cut off the tops of its mountains to fill in the valleys."

"We and our colleagues must continue to press for federal support of the full cost of programs, and to press for merit as the prime determinant of grants, contracts, and facility funding," Dr. Vest said.

He added: "Surely the wisest policy for the country cannot be random selection for awards, based on the location of schools in particular congressional districts, and funded with monies removed from the already stressed resources of programs and agencies."

"The great public and private insti-

tutions must be maintained. They are magnets for the best thinkers and researchers, and their facilities and graduate schools are the peaks of excellence to which students from schools and colleges all over the country aspire and matriculate.

"The set of these institutions is dynamic, with new universities moving into the ranks the old-fashioned way—by hard work and good ideas."

Dr. Vest said proper allocation of government support is especially important at a time when America's research universities are faced with "fiscal constraint and social uncertainty."

"We are experiencing a deep sense of frustration because never in our history has the field of intellectual challenge and opportunity or the need for our services to the nation and the world been so great," he said. "Yet never in recent decades have we experienced such fiscal constraint or sensed such a fall from grace with the public and the government."

"We are not in crisis," he said, "but we are in a precarious state, one that may be more difficult to grasp and respond to than crisis."

(continued on page 8)

Friedlaender Dies at 54

Professor Ann Fetter Friedlaender, a noted economist who was the first woman academic dean at MIT, died Monday, Oct. 19, at Beth Israel Hospital. Dr. Friedlaender, who had been ill with cancer for several years, was 54 years old.

Dr. Friedlaender held dual appointments in two MIT departments as the Class of 1941 Professor of Civil Engineering and Economics. She was an authority in the field of public finance, with a specialty in transportation studies.

Dr. Friedlaender also had been the first woman to head an MIT academic department, serving as head of the economics department from January, 1983, until her appointment as dean.

As the first woman to head one of MIT's five schools, she served as Dean of the School of Humanities and Social Science from 1984 to 1990.

She was deeply involved in a reassessment of the undergraduate program, playing a leading role in bringing about curriculum changes that strengthened

the humanities, arts and social science core requirement for graduation while also establishing a minor in those areas.

Her successor, Dean Philip S. Khoury, said that Dr. Friedlaender "contributed enormously to strengthening the profile of the humanities faculty by ensuring many excellent appointments at the junior and senior level and by enhancing the stature and reputation of the humanities within MIT and in the wider academic world."

"Under Dean Friedlaender's lead-

(continued on page 5)

IN BRIEF

FACULTY MEETING

A regular meeting of the faculty will be held today (Wednesday, Oct. 21) at 3:15pm in Huntington Hall (Rm 10-250). Agenda items include:

—Introduction of the CUP Resolution enabling minors in disciplines other than HASS by Professor Rosalind Williams.

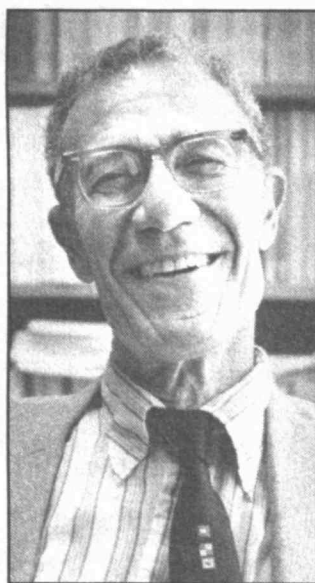
—Final report on the Campaign for the future by Vice President Strehle.

—Status of the antitrust litigation by Vice President Simonides.

HALLOWEEN PARTY

The Medical Department's annual show of artwork by children whose parents are members of the MIT Health Plans will open with a Halloween party this Sunday, Oct. 25. The party will be held from 2-3:30pm in the atrium of Building E23. It is open to all, and will feature music, balloons, games, and refreshments. Come in costume!

Mr. Interlocutor



Nobel laureate and Institute Professor Robert Solow will be the interlocutor at the Institute Colloquium beginning at 4:15pm today (Wednesday, Oct. 21) in Kresge Auditorium. A panel of 10 will explore issues of intellectual integrity on campus and in careers to be followed by smaller discussion groups in departments. The colloquium is open to all members of the community.

Student Notices

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

ANNOUNCEMENTS

Career Services and Preprofessional Advising Recruitment Presentations**—Oct 21: *Los Alamos National Lab*, 7-9pm, Rm 4-159. *J.P. Morgan Co.*, 6:30-8:30pm, Rm 4-163. *Teradyne*, 5-7pm, Rm 4-149. *MIT Lincoln Lab*, 4:30-6:30pm, Rm 4-153. **Oct 22:** *Andersen Consulting*, 5-7pm, Rm 4-163. *Cardiac Pacemakers*, 6-8pm, Rm 4-159. *PRC*, 6:30-8:30pm, Rm 4-149. *Arco Chemical*, 7-9pm, Rm 4-153. **Oct 26:** *Lehman Brothers*, 5-7pm, Rm 4-153. *Proctor & Gamble*, 5:30-7:30pm, Rm 4-163. **Oct 27:** *Intel Corporation*, 5-7pm, Rm 4-149. *IBM*, 10am-3pm, Lobby 13. **Oct 28:** *Merck & Company*, 6-8pm, Rm 8-105. *Toshiba Corp.*, 6-8pm, Rm 4-163. *American Management System, Inc.*, 7-9pm, Rm 4-149. *Bell Atlantic*, 7-9pm, Rm 4-153. *First Boston*, 7-9pm, Rm 4-159. **Oct 29:** *Mercer Management Consulting, Inc.*, 4:30-6:30pm, Rm 4-149. *Goldman Sachs*, 6:30-8pm, Rm 4-163.

Ski in Vermont. Talbot House, MIT's retreat located near Woodstock, VT, is a cozy place for a weekend or weekdays in the country. Activities like skiing, hiking, and horseback riding are available this winter. The House accommodates groups of 15-27 people. Deadline for submitting applications for staying at Talbot House in December is Oct 30, with confirmations made in November. Deadline for applications for January is Nov 20, with confirmations made in December (please keep in mind competition is high for IAP). For more information and an application contact Sarah, x3-4158, e-mail <stom@mit>, W20-549.

A Safe Ride**—Call 253-2997 for a free ride within MIT boundaries. Service operates Sun-Wed 6pm-3am; Thurs-Sat 6pm-4am. Guide to shuttle stops available.

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.

MIT Student Furniture Exchange**—If you have a great imagination, a sense of humor, very practical needs, a shoestring budget, a sense of adventure, the Furniture Exchange is the place for you. We have tons and tons of stuff right now! Great bargains, used furniture and more, Tues/Th, 10am-2pm, 25 Windsor St (MIT Museum bldg, 1st fl). Donations welcome. x3-4293.

Language Conversation Exchange**—Internationals and Americans are invited to participate in this program which matches persons interested in practicing a language and getting to know someone from another country. Presently, there is a need for English partners to fill continued requests of internationals wanting to practice and improve their English. Native French, Spanish and Italian speakers also needed for English speakers wanting to practice these languages. Sponsored by the Wives' Group, call x3-1614 for more information.

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

RELIGIOUS ACTIVITIES

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

Baptist Student Fellowship at MIT**—Meet for supper on Tuesdays at 5:15pm at 312 Memorial Drive, then move to the chapel across the street for worship at 6pm. Call x3-2328 for more information.

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

Graduate Christian Fellowship**—We invite you to join us. Open to believers and seekers, GCF is a group of graduate students, faculty, and staff who desire to know God better and reflect the love and presence of Jesus Christ. Weekly meetings in Student Center, DR 1&2, Thursdays at 6pm. We also have Bible studies and a Faith & Technology Roundtable. Info: Andrew Parris x3-2319.

Christian Science Organization**—Meets Thursdays at 7:30pm in the Chapel. We'll share thoughts about God, hear testimonies of Christian healing and read from the Bible. All are welcome! Call x3-8797 or <lnorford@eagle.mit.edu> for further information.

MIT Hillel**—Oct 21, 28: Israeli Folk Dancing, 7:30, Lobby 13. Oct 23, 30: Torah & Chocolate Class, 12pm. Shabbat Services, Conservative: 5:45pm, Rm 50-010; Orthodox, Rm 50-007. Shabbat Dinner: 6:45pm. **Oct 30:** Grad Student Shabbat Dinner, 7pm, Ashdown West Dining Rm. **Oct 31:** Orthodox Services, 9am, Rm 50-010. More info: x3-2982.

MIT Korean Baptist Student Koinonia (KBSK)**—Friday Night Bible Study and

Fellowship 7-8:30pm, Private Dining Room #3, 3rd floor of Student Center. Everyone is welcome, refreshments provided. For more information contact Chris Pak x3-9342 or 876-8594.

Lutheran-Episcopal Ministry at MIT**—Wednesday worship, 5:10pm, MIT Chapel, followed by supper and conversation across the street at 312 Memorial Drive. Contact Rev. Susan P. Thomas x3-2325 or Rev. Scott Paradise x3-2983.

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

MIT Muslim Students Association**—5 daily prayers in the prayer room, Ashdown House (Bldg W-1) west bsmt. *Friday congregation:* 1:10-1:45pm in Ashdown House (Bldg W-1) west bsmt. Info: x8-9755.

MIT Vedanta Society*—Meditation and discourse on the Bhagavad Gita with Swami Sarvagatananda, MIT Religious Counselor and Head, Ramakrishna Vedanta Society of Boston, every Friday at 5:15pm in the MIT Chapel.

GRADUATE NOTICES

Graduate Student Council**—Oct 22: Full council meeting, 5:30pm, Walker Memorial Rm 50-222. Everyone is welcome, soda & pizza provided.

Graduate Dept. Telethons**—Help raise financial support for your department by calling graduate alumni/ae. Oct 22: CE, OE. Oct 26-28: Sloan. Oct 29: PH; Nov 2: AR, DUSP, CRE; Nov 4: EECS, TPP; Nov 5: CM, NU; Nov 9: MLON. Sponsored by the Graduate Alumni/ae Program. All telethons are 6-10pm in Rm 10-105. Free dinner, T-shirts, prizes. Call x3-8184 to register.

OPPORTUNITIES

Harry S. Truman Scholarship Award. For current juniors interested in a career in government or related public service. Contact Leslie Torrance, E51-210, x3-4965. Deadline: **Oct 30, 1992.**

International Research and Exchanges Board Grants for Students and Faculty Members. Awards available for language and research programs in various disciplines in Central and Eastern Europe, the states of the former Soviet region, and Mongolia. Depending on the program, the deadlines are **Nov 1** (for most programs), Dec. 15, Feb 1, Feb 15. For more information consult brochures at the International Scholars Office, Rm 4-105.

National Science Foundation (NSF) Graduate Research Fellowships for Academic Year 1993-94. (NSF Graduate Fellowships and NSF Minority Graduate Fellowships). Three-year graduate fellowships which are awarded for study and research leading to master's or doctoral degrees in the mathematical, physical, biological, engineering, behavioral and social sciences, and in the history of science and the philosophy of science. Stipend is \$14,000 for a 12-month tenure with a cost-of-education allowance of \$7,500 in lieu of tuition and fees. Information and requirements available in the Dean of the Graduate School Office, Rm 3-138. Deadline for application (Part 1): **Nov 6.**

Howard Hughes Medical Institute (HHMI) Predoctoral Fellowships in Biological Sciences for 1993-94. Sixty-six fellowships will be awarded for full-time study toward a Ph.D. or Sc.D. degree in biological sciences. For students who have completed less than one year of graduate study toward M.S., Ph.D., or Sc.D. degrees. Fellowship awards are for three years with extension possible, annual stipend \$14,000 and \$12,800 annual cost-of-education allowance. More information and applications are available in the Dean of the Graduate School Office, Rm 3-138. Deadline: **Nov 6.**

Kathlyn Langford Wolfe Awards in Materials Science, Humanities, and the Arts. \$1000 Undergraduate Award and \$1000 Graduate Award. To be awarded upon completion of an imaginative and significant project combining research in materials and humanities or in materials and the arts. For further information contact Prof. Linn Hobbs, Rm 13-4062, x3-6835; Prof. Arthur Kaledin, Rm E51-118, x3-4144; Prof. Heather Lechtman, Rm 16-401, x3-2172. Preliminary project deadline: **Nov 11.**

Winston Churchill Scholarship. Provides financial support for students pursuing graduate studies in science, engineering, and mathematics at Churchill College, Cambridge University. MIT Program Advisor: Dean Isaac Colbert x3-4846. Applications available in the Graduate School Office. Deadline: **Nov 13, 1992.**

Natural Sciences and Engineering Research Council of Canada (NSERC) International Fellowships in Canadian Universities for 1993-94. These awards are available to recent non-Canadian doctoral graduates of universities outside Canada for research in any field in the natural sciences and engineering. Further information and applications available from Jackie Sciacca, Dean of the Graduate School Office, Rm 3-134A. Deadline: **Nov 15, 1992.**

BF Goodrich Collegiate Inventors Program for 1993. Open to any student enrolled full-

time in a college or university in the U.S. Categories: (1) Utility: invention of a new and useful process, machine, manufacture or composition of matter, or product; (2) Design: New, original and ornamental design for an article of manufacture; (3) Plant: Development of a new and distinct breed or variety. Program winners each receive \$5000 cash prize, advisors receive \$2500 cash prize. Entry forms available in the Technology Licensing Office in Rm E32-300, contact person: Dave Krone.

INTERNATIONAL

MIT Language Conversation Exchange**—This service assists members of the MIT community to practice a language with a native speaker and get to know someone from another country. Call x3-1614 for more information.

MIT-Japan Program. A unique opportunity for MIT science, technology and management students to spend a year in Japan working at a major Japanese company or laboratory. Training, placement, travel and living expenses are covered by the Program. Call Patricia Gercik x3-3142, Rm E38-754.

STUDENT JOBS

There are more job listings available at the Student Employment Office, Rm 5-119. 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. A trainable student is needed to perform software testing. Must have a technical background. Previous software testing experience required. Salary: \$6.50 per hour. Contact: Alan Pham, 787-2792.

Off Campus, Non-Technical, Clerical. Person needed to assist in preparation of textbook. Must know how library is set up for library research. Salary: \$6.85/hr., 6-8 hrs/wk. Contact: Wayne Straitman, 792 Tremont St. East, Boston, (617) 226-8821.

Off Campus, Non-Technical, One-Time. People are needed to conduct a phone survey. Work to be done on Nov. 9-12th. Salary: \$8/hr. Contact: Susan Omarzu, 482-1211 ext. 481.

Off Campus, Technical, Programming. Programmer needed with experience in assembly, BASIC, C, and Robotics. Grad student preferred. Please call between 9am -1pm. Contact: Peter Tobai, 986-1778.

VOLUNTEERS

The MIT Public Service Center has compiled the following volunteer opportunities.

Blade for AIDS. For all you rollerbladers, the Hospice at Mission Hill (HMH) is sponsoring "Blade for AIDS," a 4-mile in-line skate fundraiser on October 24 at 10am. HMH is the only Medicare-certified inpatient hospice in the country for persons with AIDS. Registration for the skate begins at 9am at the Hatch Shell and skating is on Storrow and Memorial Drives. Contact: Blade for AIDS, 523-1843.

City Year Serve-A-Thon. City Year, an organization dedicated to improving Boston and Cambridge, is sponsoring "Serve-A-Thon," a one-day public service extravaganza. Join 7,000 other volunteers on October 24 for a day of community service, fundraising, and fun. Contact: Mike McCrystal, 451-0669

Haunted House. The Massachusetts Easter Seals Society is presenting a haunted house to benefit individuals with disabilities. All proceeds from entrance fees will be donated. Come enjoy the haunted house or volunteer as a tour guide, staff the admissions table, act as a ghost, or be an animated corpse. The haunted house will be open from October 22-31. Contact: Kristine Kelly, 482-3370.

UROP

The UROP Office invites MIT and Wellesley students to join with faculty members to pursue research projects of mutual appeal. For detailed information on procedures, please read the participation section of the UROP 1992-93 Directory, available September 3 at 7-104 and 20B-140. Please read the Fall 1992 Guidelines for current information.

Pertinent information is posted regularly on the UROP bulletin boards in the infinite corridor near 3-103, and in the UROP Office, 20B-140.

Faculty supervisors wishing to have projects listed may send brief descriptions to 20B-140. Call x3-7306, or e-mail to urop@athena. Listings are posted on the UROP bulletin boards in the infinite corridor and in the UROP Office, as well as in Tech Talk.

X-Windows Programmer Wanted. Environmental Applications. Qualifications: Athena experience; familiarity with advanced graphics concepts; DEC 5000 hardware experience preferred. Ideal UROP opportunity. Part-time. Compensation Negotiable. Professors: Dennis McLaughlin and David Marks. Contact Greg Council. E-mail: <gregc@athena.mit.edu>, 48-208, x3-1969.

UROP Opportunity X-Ray Astronomy. I'm looking for a student interested in physics and/or astronomy and familiar with UNIX to

help me interpret galaxy images obtained from the ROSAT X-ray astronomy satellite. Knowledge of the Interactive Reduction and Analysis Facility (IRAF) software would be extremely helpful but is not necessary. Other projects, possibly leading to senior thesis work, may follow. Contact Dr. Mark Bautz at x3-0023, room 37-521, or <mwb@space.mit.edu>.

UROP Position Available. Develop a visualization code for existing 2-D data on solar cell arcing. Code will interface with a generalized visualization program to produce results. Must have Fortran or C programming skills and experience with UNIX. Experience with computer graphics helpful. Minimum 10 hours/week commitment. Contact: Renee Mong, 33-475, x3-4233, <mong@ikarus.mit.edu>.

Gender and the Environment. Work with the Women's Studies Program to create a bibliography on gender and the environment. Independent library research to edit and update a bibliography will be the main task of this UROP. Interest in Women's Studies and/or environmental issues required. Contact: Sandy Martin, Women's Studies, 14E-316, x3-8844.

Environmental Regulation and Management in the Automobile Industry. The International Motor Vehicles Program is looking for one student to assist us in current research this semester on two different projects. One project would be looking at the state of environmental regulation on automobile emissions and fuel efficiency world wide and industry responses to these regulations. The other project would be looking at environmental regulations affecting automobile assembly plant operations, and assisting in the administration of a survey of these assembly plants. Work would involve directed library research, phone calls to government and industry resources, synthesis of the material that is researched, and some administrative support tasks. Hours are flexible. Please call Sandra Rothenberg at 253-2467 for more information.

Soils Laboratory. Work in soils laboratory performing lab tests and data reduction. Mechanical inclination a plus, but not necessary. No prior experience necessary. 10-12 hours/week, flexible schedule. Contact Dr. J.T. Germain, Rm 1-343, x3-7113.

CABLE

Frequent schedule updates now appear on TechInfo. For more information about cable at MIT, call Randy Winchester at x3-7431, Room 9-050, e-mail: randy@mit.edu; tv-messages@mit.edu, x3-9383, E19-722E.

Oct 21: Channel 8, 4:15-6pm—Live coverage of the MIT Colloquium: "Success and/or Honesty: In Here, Out There."

Oct 26: Channel 8, 4-5:30pm—Live coverage of the MIT EECS colloquium: "The Future of Energy Transmission on the US Electric Power Grid: Switching to Silicon," Marija Ilic, MIT, EECS, LEES.

Oct 27: Channel 8, 4-5:30pm—Live coverage of the MIT VLSI seminar: "VLSI Design in Disk Drive Electronics," Simeon Aymelglu, AT&T Bell Laboratories, Allentown, PA.

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Crimewatch

The following incidents were reported to the MIT Campus Police Department October 2-15:

Oct 2: Stolen items-Bldg 9, paper cutter \$100; Bldg 13, backpack \$40; Bldg 56, compact disc player \$200; Albany garage, '87 Chevy.

Oct 3: Stolen items-Sailing pavilion, backpack \$150; Bldg 56, bicycle \$240; Bldg 41 lot '79 Olds stolen; Danforth St., '87 Jeep stolen.

Oct 4: Stolen items-duPont locker room 1) wallet \$30; 2) wallet \$20; Bldg 56, backpack \$50; Bldg 16, backpack \$140; Bldg 56, radio \$120.

Oct 5: Stolen items-Bldg 9, bicycle \$250; Bldg 54, backpack \$111; Bldg 13, jacket \$50; Recovered stolen back pack minus \$71.

Oct 6: Bldg 26, bike stolen \$419; Student Center, wallet \$20; Bldg E40, computer disc \$5; male arrested for larceny of backpack and other related charges from Bldg 54; Bldg 36, bike stolen, \$400.

Oct 7: Audrey St. '84 VW stolen; Bldg 13, annoying phone calls; Student Center, wallet \$10.

Oct 8: Bldg 5, tennis racket \$120; Student Center, briefcase \$700.

Oct 10: Baker, indecent exposure; East Campus, past larceny of jewelry \$1,500.

Oct 12: East Campus, annoying phone calls; Bldg E10, larceny of personal property \$85.

Oct 13: male arrested on Memorial Drive for attempted larceny of a motor vehicle; Student Center, bike parts stolen \$300; female arrested for trespassing after notice; Bldg 2, bike stolen \$400.

Oct 14: Albany parking lot, car window damaged; at approximately 9:15 pm, two armed robberies occurred on Albany Street in the vicinity of NW12. Four students were robbed in two separate incidents. In each incident, three male assailants approached the victims and demanded their money at gunpoint. This incident is under investigation by Cambridge Police.

Oct 15: male arrested for trespassing and other related charges in the West garage; duPont locker room wallet stolen \$30; Nu Delta, bike stolen, \$250.

AT SLOAN SCHOOL

Bertsimas Awarded First Brooks Chair

Associate Professor Dimitris Bertsimas (Operations Research) has been named to the first E. Pennell Brooks '17 MG Professorship in Management at the Sloan School.

The Brooks chair was established this fall to honor the first dean of what was then called the MIT School of Industrial Management. Penn Brooks served as dean from 1952 to 1959. He died in 1991 at the age of 96.

Dr. Bertsimas received the Brooks chair at a celebratory luncheon held at the MIT Faculty Club on October 8, a few days after his 30th birthday. All four Sloan deans who succeeded Brooks—Howard Johnson (1958-66),



Bertsimas

William F. Pounds (1966-80), Abraham Siegel (1980-87), and Lester C. Thurow (1987-)—were there, as were 30 friends and family of the late dean, including his daughter and son and three grandsons; Eli Shapiro, Alfred P. Sloan Professor of Management Emeritus, who served as associate dean during Brooks's deanship; and Patricia Carey, who had been Brooks's secretary during the years he served as dean.

Professor Bertsimas works in two general problem domains—queueing theory and combinatorial optimization. In queueing, his research applies to the design and operation of manufacturing systems, transportation and telecommunication networks, and customer service systems. He has developed efficient computational algorithms for analyzing the steady state and transient

behavior of multi-server queueing systems. He has generalized Little's Law, the fundamental relationship between the length of a queue and the waiting time in a queue. Currently he is developing an analysis of queueing networks based on the idea of queueing laws, and algorithms to schedule and route jobs within a queueing network.

In the field of combinatorial optimization, Dr. Bertsimas has conducted pioneering work on the probabilistic analysis of combinatorial models and algorithms. Combinatorial optimization problems arise in many decision-making contexts including scheduling, manufacturing and logistics, and are notoriously difficult to solve. Consequently, the optimization community often relies upon approximate solution procedures, such as solving a continuous approximation to the discrete problem. He has been able to assess the degree to which this type of approximation scheme and other types of heuristics approximate the combinatorial optimization model. Current research focuses on applications to classroom scheduling, and yield management and dynamic scheduling for airlines.

"Dimitris Bertsimas is truly representative of what we would like the Sloan School to be about," said Deputy Dean Stephen Graves at the announcement of Bertsimas's appointment. "His work is distinguished by its creativity and depth of analysis, and by the extraordinary range of topics to which it contributes." A 1985 graduate of the National Technical University of Athens, Dr. Bertsimas joined the Sloan faculty in 1988, the year he received the PhD degree in Operations Research and Applied Mathematics from MIT.

Paula Cronin

A REMINDER

Antitrust Order Restricts Intercollegiate Actions

MIT employees are reminded that they are subject to a federal court order which restricts intercollegiate actions.

The order, initially published in MIT Tech Talk September 3, was a result of the ruling by District Court Judge Louis Bechtle of Philadelphia that the scholarship practices of MIT and the Ivy League were commercial in nature and violated federal antitrust laws.

MIT is appealing the case. The formal notice to appeal will be filed soon, the appellate brief itself will be filed in January, and the case is expected to be heard sometime in the spring in Philadelphia by a panel of three judges of the Third Circuit Court of Appeals.

Vice President Constantine B. Simonides, in a memo to the Academic Council, the Faculty Council and the Administrative Council, said that while the appeal is pending, the order remains in effect.

"Therefore, it is important that we all understand and comply with the order. Within MIT, each senior officer is responsible for informing the staff in his or her areas of the contents of the Judge's order and for assuring that we respect its terms..."

"Paraphrased, it prohibits any person affiliated with MIT from participating in any intercollegiate arrangement which may have the tendency to affect the determination of the price to be paid by a prospective student, including any adjustments of the price..."

"It is not clear the extent to which Judge Bechtle intended his order to apply beyond intercollegiate agreements on financial aid and exchanges of budgetary information," he said. If employees have any question whether any of their interactions with other in-

stitutions might violate this order, they are urged to check with their senior officer before participating.

The judge's order of September 2 exempts activities authorized in the 1992 Higher Education Reauthorization Act (Section 1544 of Public Law No. 102-325, 106 Stat. 448), which allows colleges to agree among themselves to award non-federal aid only on the basis of financial need and voluntarily to adopt "defined principles of professional judgment for determining student financial aid."

The 1992 law doesn't allow colleges to "discuss or agree with each other on the prospective financial aid award to a specific common applicant for financial aid."

The full text of Judge Bechtle's order is as follows:

"And now, to wit, this 2nd day of September, 1992, it is ordered that judgment is entered in favor of the United States and against Massachusetts Institute of Technology.

"Except for the provision of § 1544 of Public L. No. 102-325, 106 Stat. 448, Massachusetts Institute of Technology and its agents, employees, and representatives, are enjoined from entering into, being a party to, maintaining or participating in—directly or indirectly, on a case-by-case basis or otherwise—any combination or conspiracy which has the effect, or the tendency to affect, the determination of the price, or any adjustment thereof, expected to be paid by, or on behalf of, a prospective student, whether identified as tuition, family contribution, financial-aid awards, or some other component of the cost of providing the student's education by the institutions to which the student has been admitted."

Dibner Dedication is Thursday

Workmen recently placed the head of 16th century astronomer Copernicus atop its pedestal in the garden of the Dibner Institute for the History of Science and Technology, which will be formally dedicated tomorrow (Thursday, Oct. 22).

The newly established Institute and its Burndy Library, located at 38 Memorial Drive, are fronted by a garden designed by Talitha Fabricius, a landscape architect in the Planning Office. The garden symbolizes the shape of the solar system first described by Copernicus—the heliocentric sphere—when he postulated a sun-centered universe in 1543. In addition to the bronze head, which comes from the former Burndy Library garden in Norwalk, CT, the new garden contains a bronze sundial at its center, with trunnion supports braced at the bottom by two entwined dolphins.

The equation of time, represented by the curve on the bronze-embossed plaque, converts apparent time (i.e. what is read on the sundial) to mean time. An additional, constant cor-

rection converts mean time to standard time (i.e. what clocks indicate)—in the



case of the Dibner garden, an adjustment of 14 minutes, 55 seconds.

The Burndy Library, which serves as a scholarly resource for the Dibner Institute, is one of the world's premier

private collections of historical scientific books, manuscripts, scientific instruments and works of art. It was relocated to MIT by the Dibner Fund, headed by David Dibner, son of the library's founder, Bern Dibner, to make it more accessible to scholars. The library will be open to members of the MIT community and the public at times to be announced.

Ms. Fabricius, the garden designer, gave careful consideration to the garden design: "We thought it would be appropriate to have the shape of the terrace somewhat reminiscent of the shape of the solar system," she said, adding that the garden has other symbolic circular shapes. It also includes a bluestone terrace and paving; four teak benches; eight solid classical urns to mark the edge of the garden; kousa dogwood trees that frame the walkway to the main entrance; an undulating row of rhododendrons; boxwoods that border the terrace and broadleaf evergreens. "It's designed to have greenery all year round," Ms. Fabricius said. Photo by Donna Coveney.

WIDER CONCERNS

Course I Adopts New Name

Civil Engineering, known as Course I at MIT, has changed its name to the Department of Civil and Environmental Engineering. The Executive Committee of the MIT Corporation approved the name-change proposal in the spring and MIT's 1992-93 course catalog is the first to carry the new name.

"The name change is a reaffirmation of the directions taken by the department over the last 20 years," said Professor Rafael Bras, head of the department. "Civil engineers in their traditional role as people-servers and developers of the infrastructure of progress also have the responsibility for the environment they mold," he said.

The Department of Civil and Environmental Engineering deals with the fate and transport of pollutants, the remediation and containment of environmental damage, the development of environmentally sensitive structures, the impact of transportation on environmental quality and the response of the construction industry to environmental regulation. The department also pursues the opportunities, technologi-

cally and otherwise, that environmental concerns present to the civil engineering profession and the construction industry in particular.

The Department of Civil and Environmental Engineering offers two different bachelor's degrees: Civil Engineering, and Environmental Engineering Science. Presently more than 140 undergraduates and 290 graduate students are enrolled in the department under the supervision of 40 faculty members. More than \$8 million of research complements and supports the educational endeavor.

The department and its faculty provide leadership and expertise to many

Institute interdisciplinary initiatives. Some of these are the Center for Transportation Studies, the Center for Environmental Health Sciences, the Center for Global Change Science, the Center for Technology, Policy and Industrial Development, the Technology and Policy Program, MIT/Woods Hole Oceanographic Institution Joint Program and the Program in Environmental Engineering, Research and Education. The latter, a School of Engineering initiative, is directed by Professor David H. Marks, former head of the department. The current head, Dr. Bras, the William E. Leonhard Professor of Engineering, assumed department leadership in July.

President Issues Report

(continued from page 1)

Dr. Vest listed some of the challenges and opportunities facing the nation's research universities. He said they must:

Lead the revolution in molecular biology and advance the promise of biotechnology; come to understand the workings of the human brain and the nature of intelligence; bring the highest quality of minds to assessing and ameliorating humankind's effects on the earth's environment; secure the advances of computers and communications technology in the information marketplace for the social good; better understand organizations and businesses and how to make them more effective in building vital and sustainable economies; combine the aesthetic and technical in the design of the physical environment and in the creation of more livable cities; and renew the liberal, visual and performing arts that in such large measure define what it is to be human.

Universities must do all this, Dr. Vest said, while facing declining rates of revenue increases and a general decline in the climate for support of higher education.

"New tasks, new roles and new responsibilities—but no new corresponding revenues—have become a familiar situation in academe," he said.

As one example, he noted that the operating revenue of private, doctoral-granting institutions has grown from roughly \$12 to \$23 billion in constant dollars in the last 20 years. The most dramatic change in the source of these

funds, he said, is that the federal government supplied nearly 30 percent 20 years ago, but only about 18 percent today.

He said that MIT, while in a stronger financial position than many universities, nevertheless has had modest budget deficits the past three years and faces increasing deficits in future years unless action is taken.

He said that forces on the MIT budget—currently at about \$1.1 billion—"have reached a critical point, one that requires concerted Institute-wide action if we are to remain excellent and rebuild some flexibility to do the things that we believe to be important."

He said MIT would seek to bring its budget into balance through increased revenues and reduced costs, always remembering "our mission is not a financial one" but "one of teaching, research and service."

White House Official To Speak Today

Dr. Eugene Wong, associate director for industrial technology in the White House Office of Science and Technology Policy, will speak at MIT at 2pm Wednesday, Oct. 21, in Rm 4-163. His topic will be Technology Policy and Presidential Technology Initiatives.

The event, open to the community, is sponsored by the Laboratory for Information and Decision Systems' Center for Intelligent Control Systems.

Fellowships Awarded

The MIT Industrial Performance Center has awarded three dissertation fellowships to doctoral students pursuing research on problems of industrial productivity and performance. The three Fellows and their projects are:

Rosemary Batt (Sloan School), "Technology, Work Reorganization, and Productivity Growth in Telecommunications."

Lynn McCormick (urban studies), "The Restructuring of Chicago's Small Firm Metalworking Industry: Vertical or Horizontal Production Networks?"

Diego Rodriguez (economics), "Organizational Strategies in Biotechnology: Theory and Evidence."

A second competition will be held this fall for fellowships beginning in January 1993. Qualified students in any discipline who are pursuing research toward a doctoral degree in fields related to the objectives of the Industrial Performance Center are eligible. Application deadline is November 1.

For more information contact Betty Sheridan, E40-421, x3-5714, email: <bbs@eagle.mit.edu>.

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 about 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 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. Faxes will not be accepted.

All extensions listed below are campus numbers unless otherwise specified, i.e., Dorm, Linc, Draper, etc.

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

Deadline is noon Friday before publication.

FOR SALE

National Geographic back issues 1977-1990 complete and in exc cond, \$80. Call Linc x3634 or 861-8242.

Nikon FA: up to 1/4000 sec shutter sp, full-range manual, aperture & shutter sp priority, program exp modes, more, nr mint cond, \$299; lens: nw Vivitar 28-85mm, \$99. Subhendu x5-9897.

Books: Insight Into Personal Computers, MIT in Perspective; CB ski pants w/bib (used 3x), mauve/pink suede jacket, both best offer; roof ski rack, \$40. Lisa x3-6002.

Arts & crafts, holiday gifts, Xmas wreaths, pine cone trees, glass ornaments, dry flower arrangements, must see these unusual gift ideas. Lisa 666-9576.

Membership in the IHPVA, the Int'l Human-Powered Vehicle Association, includes subscriptions to HPV News and Human Power, \$25. Application form from Dave Wilson x3-5121.

Double futon frame, maple, finished, w/double futon & cover (cover worth \$60), both in exc cond, \$175 or bst. Call x3-1916 or 508-655-6296.

Lrg chest of drawers, white, \$75; med chest drawers, white, \$55; corner desk w/l drawer & chair, white, \$50; 5-drawer file cab, \$65; 2-drawer file cab, \$45; cherry coffeetable, \$65. Call x3-6081.

Matching 4 & 3 seater sofas, 100% wool upholstery, blue, Scandinavian, \$250 ea; corner table, \$65; 2 sidetables, \$45 ea; coffeetable, all teak, \$75. Offers welcome. Call x3-3175 or 332-8251.

Raccoon fur coat, sz 20, \$1700. Call 617-489-0925 lv mssg.

ADC 9-band stereo equalizer w/sound stage expander, new \$150, sell for \$70 or bst. Ed 547-3048.

Toro Rake-o-Vac leaf & debris blower/vac, exc cond, \$30. Call 643-4276.

Matching black wicker couch & chair, v gd cond, pd \$900, ask \$150 or bst; like new sofa bed mattress, \$10. Call x3-6299 or 776-8909.

Vertical plan file ("Alpia"), new, 17"x30"x46", hold up to E-sz drawings, \$175. Susan x8-9131 or 617-837-2270.

Double stainless steel sink w/faucets & spray, in 6' countertop, \$75. Call 484-0802 bef 9pm.

Sony 5-disc CD player, pd \$280, remote, like new, \$140 or bst; Sherwood AM/FM stereo dig tuner, memory & presets, pd \$130; like new, \$50 or bst. Draper x8-4409 or 776-6384.

Macintosh SE 2/40 (2 megs memory, 40 meg int hd dr), 1200 baud modem, software, grt cond, \$650. Mark x3-3865.

Ice skates, white, childrens sz 11 and girls sz 4; roller blades, black, boys sz 5, \$10/ea. Pat, Linc x1050.

Borland Paradox 4.0, brand new, unopened, unregistered, street price is \$500+, buy it from me for only \$400. Call 617-825-0931.

Magnavox TV, 12", B&W, exc cond, \$40. Call x3-2720 or 508-372-1152.

Dancing shoes, black leather Capezio character oxfords, M's sz 8, W's sz 7 1/2 (fits M's 9, W's 8), like nw, barely worn, \$30/pr. Mary x3-2348, 8:30am-3pm.

ANIMALS

Adorable baby lovebirds to good homes only, peach-faced green/yellow pied, ready by mid-Nov, \$95/pair. Lori x3-3074 or 666-5828.

5 abandoned cats, 3M & 2F, approx 1.5 yrs old, nd gd homes, they are friendly. Andrea x3-5831.

4 black M kittens, 7 wks old, 3 short-haired, 1 long-haired, looking for gd homes. Valori x3-8108.

4-yr-old spayed Yorkshire Terrier nds gd home. Joel, Linc x3835.

VEHICLES

1980 Volvo 240DL, 4-cyl, auto, AM/FM, body gd, some surface rust, gd for a safe 2nd/3rd car, \$1500 or bst reas offer. Mark, Linc x5575 (Haystack) or 508-649-2272.

1983 Ford Escort, tan, 4-sp, \$550. Call dorm x5-9863, lv mssg.

Sports at MIT

CREW

MIT crews turned in excellent performances in the recent Head of the Charles Regatta. The Engineers were led by the varsity heavyweights winning the Men's Club 8 Division by rowing the three-mile course in 15:33.73. MIT won by a two-second margin. The Women's Club 4 entry placed second of the 41 boats in the competition (19:25.79), while the Men's Club 4 placed fourth in its competition. Director of Crew Stu Schmill coxed his boat to a second-place finish in the Masters 4 with coxswain, while varsity heavyweight coach Gordon Hamilton placed fourth in the Masters Double and novice women's coach Sue Foight was a member of the fifth place crew in the Lightweight Women's 4.

VOLLEYBALL

MIT junior volleyball player Coleen Kaiser was recently named to the All-Tournament team at the Eastern Connecticut State University Invitational Tournament. Kaiser is a setter from Barneveld, WI. This is the third all-tournament team to which Kaiser has been named this season.

FOOTBALL

MIT football receiving records continue to fall at the hands of Roddy Trantum. Trantum caught nine balls in a 19-21 loss to Stonehill on Saturday. The nine catches

broke his own single-season record of 42 catches which he had set in 1991. He also broke the MIT career record for receiving yardage by upping his total to 1,518 yards. Trantum, a senior from Chatsworth, GA, broke the record of 1990 graduate Anthony Lapes. Sophomore quarterback Alix Sgouros has tied the Institute record for pass attempts in a season. Sgouros has thrown the ball 145 times thus far in 1992. Sgouros is from Fairfield, CT. Inside linebacker Nolan Duffin has twice been honored in the last two weeks. Duffin was named to the Eastern College Athletic Conference New England Division III Weekly Honor Roll for his play in a 12-31 loss to Westfield State. Duffin, a junior from Burke, VA, was also named co-defensive player of the week in the Eastern Collegiate Football Conference for his play in the Stonehill game.

SOCCER

The MIT women's soccer team's 10 wins in 1992 tie the squad for the most number of wins in a single season. The 1991 team also won 10 games en route to a 10-6 record.

Attila Lengyel of the MIT men's soccer team had an enormous day last Saturday. Lengyel scored all four of MIT's goals in a 4-1 victory over Western New England college. Lengyel is a junior forward from Bolton, CT.

Roger Crosley

1983 Nissan Stanza, 4-dr hatchbk, 4-sp, sunrf, ps, pb, a/c, AM/FM/cass, 100K hwy, recent clutch & muffler, reliable, \$1500 or bst. Zhen x3-0717 or 491-6883.

1985 Buick Century sdn, low mileage, nds some work, \$1200 negot. Bonnie 233-5808.

1985 Nissan ST pickup, 5-sp, 4WD, AM/FM, sunrf, bucket seats, 38K, exc cond, always gar, \$4400. Call x3-6809 or 508-358-4698.

1986 Nissan Sentra, grey, 2-dr, 5-sp, AM/FM/cass, 61K, gd cond, \$1,500 or bst. Michael x3-7747.

1986 Mitsubishi Tredia, auto, 4-dr, AM/FM/cass stereo built-in, gd cond, 65K, works well, \$1600. Dawn x3-4906 or 825-9182.

1986 Oldsmobile Cutlass Calais, auto, a/c, AM/FM/cass, 2-dr, 81K, \$2100. Call 738-0784 eves.

1987 Carpice Classic sta wgn, mint cond, 78K, 8-cyl, pw, ps, new batt & trs, ask \$4000 or bst. Lee x3-6397 or 494-5290.

1987 Jeep Cherokee, 4WD, V6, 4.0L, a/c, pb, ps, AM/FM/cass, red w/tan int, exc cond, 70K, kept in garage, \$7800. Call 431-1562.

1987 Honda CRX (5 spd.), exc cond, low mileage, a/c, AM/FM/cass, chapman, nw trs; \$4,000 or bst. Lisa 322-7402, lv mssg.

1987 Toyota Tercel sta wgn, 5-sp, 4WD, 50K, Am/FM/cass, sunrf, roof rack, exc mech cond, minor int damage, \$4500. Ernie, Linc x7808 or 508-369-4825.

1988 Jeep Cherokee, a/c, AM/FM/cass, 4.0L, std, ext tr, hitch, brush bar, dr lts, fog lamps, allow whls, roof racks, exc cond, 38K, orig ownr, \$10,000. Mark x3-4107 or 603-483-1029.

1988 Toyota Corolla SR5 coupe, black, a/c, Am/FM/cass, pwr sunrf, 5-sp, 65K, exc cond, \$5500 or bst. Eric 395-5631.

HOUSING

Cambridge: charming single-fam home for sale, 2BR, 2b, study, light, beams, skylt, built-ins, lovely setting 2-car prkg, between Inman & Kend sqs, \$179,000. Call 868-4408 bef 10pm.

Cambridge: 2BR apt for rent, MIT owned bldg, Mass Ave nr Hvd Sq, prkg avail, must be affiliated w/MIT, eat-in ktchn, hdwd flr, avail Nov 1, \$753/mo. Steve or Rachel 497-7044.

Cambridge: furn 1BR apt in beaut refurb old bldg, walk to MIT or 50 steps to Mass Ave, bus, quiet safe nrhrd, \$700/mo. Call x3-7857 or 354-5557.

Cambridge: 1BR, mod sunny, w/w, d/w, disp, fridge, a/c, prkg, ht, hw, encl garden, yd, 15 min walk from MIT, nr bus & T, sec dep & last mo w/ lease, avail 11/1, \$800/mo. Call 876-3983.

E. Cambridge: condo for sale by ownr, Thomas Graves Landing, lrg, luxury 1BR, overlooking canal & Charles, garage, balcony, pool, more. Janet x3-8242 or 508-875-5168 eves (pref).

Caribbean hilltop house, slps 4, 2BR, 2b, spectacular vws, privacy, close to beaches, winter vacancies. Alfred 646-8618.

Concord: furn 4BR, 1.5b house, a/c, d/d, w/d, hdwd flrs, fpic, gar, centrally located, family nrhrd, nr schools & train, \$1900/mo+, first/last, option to buy. Call x3-6465 or 508-369-2307.

Everett: 5-rm apt, 3rd fl, 1 min to bus, 10 min to MIT by car, quiet, safe nrhrd, no pets, avail Nov 1, \$550/mo+. James Maloney x3-6353 or 508-664-3838.

Florida: beaut beachfront condo for sale in Panama City, lux resort located on secluded peninsula, 2BR, 2b, 2 priv gulfvw balc, fully equipped. Call 964-5012.

Lawrence: own a 2-fam home for less than renting, 5 & 5 rms, move-in cond, quiet area of owner occ homes, separate utils, \$99,900. John C., Linc x0829.

Malden: 5-rm apt, lg spac K, LR, porch, deck, remod bath, laundry, reffrig, quiet, pking, nr T, avail now. Call 324-7687 lv mssg.

Newton Corner: 2BR, 5th fl, mod condo, a/c, outr pool, saunas, balc, indr garage, on T & express bus, conv to Hvd Sq/MIT buses, ht/hw incl, avail immed, \$995/mo. Call 617-923-1333 bef 10pm.

Loon Mt/Lincoln NH: avail Oct, Nov, Dec, reasonable rates wkdy/wknd, 2BR, 2b, riverfront condo, slps 6, tennis, pool, clubhse on premises. Art x3-8395 or 472-8551.

Loon Mt: winter rental, long or short term, 2BR, 2b, loft, slps 8, all athletic facilities, shuttle to ski area. Call x3-2772 or 396-4221 eves.

South End: 1BR apt avail for sub-rent month of Nov, close to T & downtown, safe nrhrd, \$750. Call x3-6081.

Watertown, E: top location, 8-rm late Victorian, bright, spacious, mint cond, 2-car garage, \$285K. Call 924-8357.

WANTED

Seek cabin or other vacation rental during Xmas holidays, up north or western MA, for 2 adults, doesn't need to be near skiing. Annie x3-7036.

Clean, lrg 5-rm, 2BR apt wanted in 2-fam in Melrose, Stoneham, Arlington, Lexington, no lead, hdwd flrs, w/d hook-up, storage, prkg, mod ktchn & bath, 12/1 occup. Call 321-3746.

Wanted: IBM compatible PC (XT or AT) w/ serial port. Sooyong x3-3772 or <gemma@cidmsvrer.mit.edu>.

Experienced upholsterer needed to make slipcovers for 6' sofa, salary negotiable. Call 876-0302 afr 11:30am.

Wanted: pressure-type baby gates to fit average doors. Hannah x3-7654.

Professor w/family sks furn home to let in Newton or Brookline for sabbatical semester Jan-June 1993. Call 604-272-5627 or 604-271-6262.

Participants for research study on growth & development in 9-11 yr-old non-overweight girls, involves 1 overnight visit to Clinical Research Ctr, \$50 pay, parental consent req. Call x3-3097.

ROOMMATES

Lexington: seeking 1 hsmate to shr 3BR hse in v nice section of Lexington, rent #385/mo + 1/3 utils. Bob, Linc x2826 or 617-863-1041.

Somerville: Porter Sq, rm avail in 3BR apt Nov 1, 2.5 miles from MIT, 1500' from T sta, rent \$317/mo+. Eric x3-8207.

CARPOOL

Carpool drivers needed to go from Londonderry/Derry, NH to MIT. Meet at Londonderry park-and-ride at 7:50am, lv MIT at 5pm. Dave x3-2763.

LOST AND FOUND

Found: Eyeglasses in case in Bldg 36-472 (photocopy room). Call x3-6836.

MISCELLANEOUS

Need music for your function? Group specializes in light jazz of a listening nature. Ideal for cocktail parties and background music. Gil Graham 721-0490.

Editing, word processing, IBM WP, many years MIT experience. Call x3-3490 or 547-1311, both phones on campus, answ. mach.

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11. I certify that the statements made by me above are correct and complete.

KENNETH D. CAMPBELL, Publisher

Friedlaender Dies at 54

(continued from page 1) ership," he said, "the School of Humanities and Social Science has been a much more active contributor than ever before to the overall educational and research mission of the Institute."



Professor Friedlaender

MIT Chairman Paul E. Gray, who served as president when Dr. Friedlaender was dean, said: "Professor Friedlaender provided distinguished leadership of sustained effectiveness to the School of Humanities and Social Science at a time of rapid change. She reorganized the Humanities Department, introduced the Writing Requirement and undertook a comprehensive review, restatement and implementation of Institute requirements in the Humanities, Arts, and Social Sciences. She changed the nature of undergraduate education at MIT and her influence will be felt for years to come by many generations of students. All of us who had the good fortune to work with her have been enriched by her friendship and her supportive, insightful collegiality. Her death leaves a great emptiness, both personal and institutional."

When Dr. Friedlaender stepped down as dean to return to teaching and research in the Department of Economics, the then provost, Professor John M. Deutch, described her as "one of the best deans to have graced MIT in its history," adding, "She is a person of enormous wisdom and her accomplishments for the school have been just as enormous."

During her tenure as dean, Dr. Friedlaender took the lead in undergraduate curriculum reform by sponsoring the restructuring and rejuvenation of the Humanities, Arts and Social Science distribution system and its new minor program. She also sponsored the highly successful Burchard Scholars Program for undergraduates who excel both in the humanities, arts and social science and in engineering and science.

In her reach across both the undergraduate and graduate curriculum at MIT, she sponsored her school's freshman experimental unit, the Integrated Studies Program, and she helped to establish MIT's first new doctoral program in 15 years, the PhD program in the History and Social Study of Science and Technology.

Dr. Friedlaender, a native of Philadelphia, received a BA in economics from Radcliffe College in 1960 and a

PhD in economics from MIT in 1964. She was a Fulbright Lecturer in 1964-65 at Svenska Handelshogskolan in Helsinki, Finland. Between 1965 and 1974 she was lecturer, assistant professor and professor in the Department of Economics at Boston College. She was a visiting professor in the MIT Department of Economics in 1972-73 before being appointed professor of economics and civil engineering in 1974.

Professor Friedlaender has served on committees and boards of a number of public and professional organizations, among them the American Economic Association, the National Bureau of Economic Research, the National Science Foundation, the Rand Corporation and Conrail.

She has been a member of the boards of several professional economics journals and she has written or coauthored seven books and monographs. The most recent include *Freight Transport Regulation: Equity, Efficiency and Competition in the Rail and Trucking Industries*, with Richard Spady (MIT Press, 1981); and *Government Finance*, with John F. Due (7th Edition, Richard D. Irwin, 1981). She and Dr. Spady also wrote *Approaches to Controlling Air Pollution* (MIT Press, 1978).

Dr. Friedlaender, a resident of Newton, leaves her husband, Stephen, an architect; two sons, Lucas and Nathaniel, and a brother, Alexander L. Fetter, professor of physics at Stanford University.

CARLOS S. BRANCO

Carlos S. Branco, 66, of Burlington, an electrician in Physical Plant from 1979 until his retirement last year, died on October 3.

Mr. Branco is survived by his wife, Phyllis Oliveira Branco; two daughters, Paulette Branco of Epping, NH, and Charlene McCarthy of Billerica; a son, Edward Branco of Burlington, and four grandchildren.

FREDERICK C. FRICK

Dr. Frederick C. Frick, 74, of Lexington, died on September 10. Dr. Frick was assistant to the director of Lincoln Laboratory from 1955 until his retirement in 1979.

He leaves his wife, Angela Ellis Frick; a son, Frederic C. III of Denver, CO; a daughter, Kelly Richards of Decatur, GA; and four grandchildren. Remembrances may be sent to the Cary Memorial Library, Lexington, 02173.

JOHN J. HUTCHINSON

John J. Hutchinson, 83, of Cambridge, a retired assistant supervisor in the Superintendent's Office, died on October 4. He worked at MIT from 1942 until 1974.

Survivors include his daughter, Mary Dargan of Somerville; three sons, John J. Jr. and Donald E. of Salem, and George E. Hutchinson of Cambridge, 12 grandchildren and seven great-grandchildren. Memorial contributions may be made to Matignon High School, Cambridge, 02140.

WALTER SCIARAPPA

Word has been received of the September 9 death of Walter Sciarappa, 56, of Malden, following a long illness. Mr. Sciarappa had worked at Graphic Arts since 1965. He leaves his wife, Sandra, and daughters Ann T. McCarthy and Catherine Murray.

Recent UNCED To Be TCS Focus

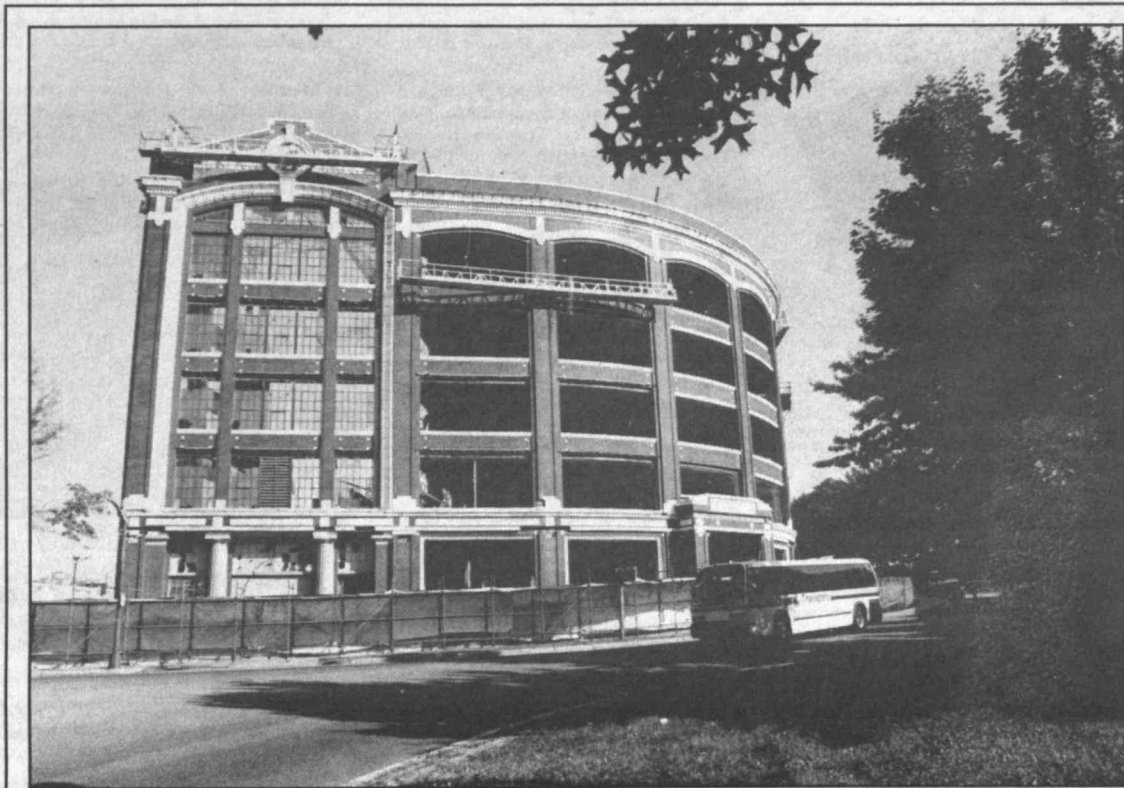
Gerard Piel, founder of Scientific American, will be the speaker at an October 27 Technology and Culture Seminar event at MIT, "Unsaid at UNCED: The Realities Behind Rio." UNCED refers to the recent United

Nations Conference on the Environment and Development. Mr. Piel will speak at 4pm in Rm 9-150.

Respondents will be Professor Paul R. Krugman of the Department of Economics and Institute Professor Philip Morrison of the Department of Physics.

The moderator will be Professor Nazli Choucri of the Department of Political Science.

Mr. Piel will focus his remarks on UNCED's Agenda 21 which was drafted to address population growth in the South and the rate of consumption in the North.



RESURRECTION—The former Ford plant on Memorial Drive near the Boston University Bridge is being extensively renovated by MIT in a \$10-to-\$12-million project which will restore an historic structure to productive life. The anchor tenant, Lifeline Systems, Inc., which will occupy 100,000-square-feet of the building's 180,000-square-feet of rentable space, employs 275 people in the production of medical alert systems and expects to be hiring more workers. The 76-year-old building, constructed for Ford Motor Co., was designed for "vertical" manufacturing—adding parts as cars moved from floor to floor. Erland Construction of Burlington was low bidder on the MIT project. Members of Local 40 of the United Brotherhood of Carpenters and Joiners have demonstrated and handed out leaflets at the work site and outside MIT's main entrance because Erland does not restrict itself to using only union subcontractors. To date, seven subcontracts have been negotiated by Erland and four of them are with union firms, said MIT Senior Vice President William R. Dickson. Mr. Dickson said that in the last 15 years 98.6 percent of the \$150 million in construction at MIT has been done with union labor.

Photo by Donna Coveney

300 Attend Raustein Memorial

More than 300 MIT community members attended a memorial service October 9 for Yngve K. Raustein, the Norwegian student murdered September 18 on Memorial Drive.

His parents, Elmer and Inghild Raustein, and his brother, Dan-Jarle Raustein, 18, from Os, Norway, attended. They were escorted to the Bartos Theater service by President Charles M. Vest and Mrs. Vest.

It was announced that MIT has established an academic prize in Yngve Raustein's name to be awarded yearly to the student who demonstrates the greatest improvement in Unified Engineering, part of the Department of Aeronautics and Astronautics' curriculum.

In welcoming remarks, Robert M. Randolph, associate dean for student affairs, said the community had come together "knowing that grief shared is grief more easily borne. . . ."

Kjell A. Skartseterhagen, pastor for Norwegian students in America, read the 142nd psalm in Norwegian. Dean Randolph suggested using Mr. Raustein's native language "to remind us that Yngve was a visitor among us."

President Vest said communications he has received about Mr. Raustein "have given me a powerful sense of a remarkable young man—one who gave us much during his short time with us. . . ."

The president said the university seeks to improve safety, but the greatest security comes "from our caring for

one another, from our seeking out and holding on to the threads of our common humanity." He said he was "astounded and grateful at the grace with which Elmer and Inghild Raustein have reached out to the people of MIT and Cambridge. If they can do it, if they can show us such compassion, surely we can show it to each other."

Mr. Raustein expressed gratitude to MIT for arranging the service and inviting the family. He told of "an overwhelming wave of sympathy and care" from MIT and also "from families in

Cambridge and other places in the Boston area. All this has been of great relief and help to us. That Yngve's friends and acquaintances here, and that also strangers, really care, as if they were our best friends, has touched our hearts every day. All this has clearly shown us that Americans are caring and warm people, and that violence and evil is the utmost exception. . . . Yngve was very proud of being a student at MIT, and we were very proud of having a son studying at this famous university. . . . To him, this was a dream coming true. . . ."



Elmer Raustein, father of slain MIT junior Yngve Raustein, addresses the crowd assembled at the memorial service held for his son. Photo by Donna Coveney

Brain Chemical May Hold Key to Alzheimer's Disease

(continued from page 1)

related in this way: 1) there is damage to certain acetylcholine-releasing neurons, and 2) this leads to a reduction in acetylcholine release, and in the breakdown of APP to harmless fragments and, correspondingly, to an increase in the formation of fragments that can form amyloid.

The body deals with APP in one of two ways. One way yields harmless fragments, causes no problems, and is stimulated by acetylcholine, the researchers said. Their paper is the first to describe this stimulation function.

The other way APP is metabolized results in insoluble rock-like fragments that the body can't get rid of.

"It is well known that acetylcholine is especially deficient in brains of people with Alzheimer's disease," said Professor Wurtman, MD, in commenting on the paper in Science.

"So we speculated that, because of this

deficiency, APP metabolism takes place in a way that yields the fragments which go to make amyloid," Dr. Wurtman said.

Dr. Nitsch said that because there are few amyloid deposits in healthy brains, "we figured that the harmless processing pathway of the amyloid precursor prevails under healthy conditions, and that in Alzheimer's disease there may be a shift towards the processing pathways which yield the fragments from which amyloid is made."

To test whether neurotransmitters, whose chief function is to permit communication among nerve cells in the brain, promoted processing of the amyloid precursor, the research team cultured human cells which contained both the human amyloid precursor and the human neurotransmitter receptors for acetylcholine.

Stimulated neurotransmitter receptors secreted 4 to 5 times more amyloid precursor products than unstimulated cells, the researchers report.

"The effect was very fast, as it happened within minutes after stimulation of the neurotransmitter receptors, suggesting that the biochemical mechanism necessary for cleavage and secretion is readily turned on by the activated neurotransmitter receptors," Dr. Nitsch said.

"This observation showed for the first time that neurotransmission and amyloid precursor processing are related biochemical events," he went on, saying that the results suggested a novel function of neurotransmitters: "They can control cleavage and secretion of a protein, which, if unchecked, can yield dangerous amyloid fragments."

"The results of this study suggest potential ways to treat Alzheimer's disease using drugs to prevent the buildup of amyloid in the brain. One possible approach might be the use of drugs designed to enhance normal amyloid processing. . . . Another strategy would be drugs that inhibit amyloidogenic processing," he said.

It's a Fact

In 1903 Lydia G. Weld became the first woman to receive an engineering degree from MIT, the SB in naval architecture and marine engineering.

Institute Calendar

sored by the Center for Electromagnetic Theory and Applications, 5pm, Rm 26-310.

Genius: The Life and Work of Richard Feynman*—James Gleick, author, New York City. Program in Writing and Humanistic Studies Writers Series, 8pm, Rm 10-250.

FRIDAY, OCTOBER 23

Fracture Scaling Parameters of Inhomogeneous Microstructure in Composite Structures*—Dr. Doug Cairns '87. Materials and Structures Seminar, 11am, Rm 33-206.

Energy and Environment Strategy for First and Third Worlds*—Prof. Meredith W. Thring, Professor Emeritus, Queen Mary College, Univ. of London. Department of Chemical Engineering and Energy Laboratory Joint Seminar, 11am, Rm 66-110.

Engineering Enzymes for Nonnatural Environments: Improved Biocatalysts for the Chemical and Biotechnology Industries*—Dr. Frances Arnold, California Institute of Technology. Chemical Engineering Department Seminar, 3pm, Rm 66-110. Reception 2:45pm.

Design Research/Design Practice in European and Japanese Universities and Industry*—Dr. Daniel Whitney, Draper Laboratory. Mechanical Engineering Colloquium, 3-4pm, Rm 3-270.

Cooling the Greenhouse: Realistic Options to Reduce Methane Emissions*—Prof. Robert C. Harris, Univ. of New Hampshire. EAPS Department Lecture Series, 4pm, Rm 54-915. Refreshments, 3:30pm, Ida Green Lounge.

Collective Thomson Scattering Investigations of Collisional Laser Plasmas*—Prof. Stewart M. Cameron, UC Davis. Plasma Fusion Center Seminar, 4pm, Rm NW17-218. Refreshments.

MONDAY, OCTOBER 26

Forces on Slender Bodies Moving Through a Fluid*—Prof. Raymond G. Cox, McGill Univ. Fluid Mechanics Seminar Series, 4-5pm, Rm 5-234.

The Future of Energy Transmission on the US Electric Power Grid: Switching to Silicon*—Marija Ilic, MIT, EECS, LEES. MIT-EECS Colloquium Series, 4-5pm, Rm 34-101. Refreshments, 3:30pm.

Parsons Lab Research: Interactions with the Center for Environmental Health Sciences*—Prof. William Thilly, MIT. Ralph M. Parsons Laboratory for Water Resource and Hydrodynamics, Monday Seminar Series, 4pm, Rm 48-316.

Hurricane Propagation*—K. Emanuel, MIT. Applied Mathematics Colloquium, 4:15pm, Rm 2-105. Refreshments, 3:45pm, Rm 2-349.

TUESDAY, OCTOBER 27

X-Ray Lasers*—Greg Shimkaveg, Lawrence Livermore National Laboratory. Seminar on Modern Optics and Spectroscopy, sponsored by the George R. Harrison Spectroscopy Laboratory, Research Laboratory of Electronics, Schools of Science and Engineering, Plasma Fusion Center and Industrial Liaison Program, 11am-12pm, Rm 37-252. Refreshments following.

Mixed-Layer Modeling I: What Doug Lilly Told Us*—Christopher Bretherton, Univ. of Washington. The 2nd of seven Houghton Lectures on Marine Boundary Layer Clouds and Climate, sponsored by the Center for Meteorology and Physical Oceanography, 3pm, Rm 54-427.

Unsaid at UNCED: The Realities Behind Rio*—Gerald Piel, Founder of Scientific American. Respondents: Phil Morrison and Paul Krugman. Moderator: Nazli Choucri. Technology and Culture Seminar, 4pm, Rm 9-150. More info: x3-0108.

VLSI Design in Disk Drive Electronics*—S. Aymelogu, AT&T Bell Laboratories. VLSI Seminar Series, 4pm, Rm 34-101. Refreshments, 3:30pm.

Technical Challenges and Opportunities in the Heating, Ventilating and Air-conditioning Industries*—Dr. M.R. Hogan, Carrier Corp. Sponsored by the Gas Turbine Laboratory, Dept. of Aeronautics and Astronautics, 4:15pm, Rm 31-161. Refreshments, 4pm.

Infrared Polarimetry in B216: Straight Through Magnetic Fields*—Dr. Alyssa Goodman, Univ. of California, Berkeley. Astrophysics Colloquium, 4:15pm, Rm 37-252. Refreshments, 3:45pm.

After Public Art*—Krzysztof Wodiczko, MIT. Department of Architecture Lecture, 6:30pm, Rm 10-250.

WEDNESDAY, OCTOBER 28

Scattering and Polarization in Fiber-Optic Ring Resonators*—Ray Carroll, Draper Laboratory. EECS/RLE Seminar Series on Optics and Quantum Electronics, 11am-12pm, Rm 34-401B.

How Much is Too Much?*—William Kaufmann, Senior Fellow, The Brookings Institution; MIT. DACS Technology, Defense and Arms Control Seminar, CIS, 12-

2pm, Rm E38-714. Bring a bag lunch; beverages provided.

The Mediterranean Outflow*—Molly Baringer, MIT/WHOI Oceanography Sack Lunch Seminar, 12:10pm, Rm 54-915.

Thermal Hydraulic Modeling of Space Nuclear Thermal Propulsion Systems for Operational Control Strategies*—Jonathan Witter, NED Reactor Physics and Engineering Seminar, 2-4pm, Rm 24-115. Nuclear Engineering Department Doctoral Seminar.

The Physics and Engineering Upgrade of the MIT Research Reactor*—Santiago Parra, MIT. NED Reactor Physics and Engineering Seminar, 2-4pm, Rm 24-115. Nuclear Engineering Department Doctoral Seminar.

Coupled Vibration-Dissociation Kinetics in Non-equilibrium Shock Heated Flows*—David A. Gonzales, U. Texas at Austin. Fluids Seminar, 2pm, Rm 33-206.

The Emperor and Emperor-System in the Construction of Japanese National Identity*—Herbert Bix, Reichauer Institute, Harvard Univ. The Political Uses of History, 4pm, Rm E38-615.

Refugee Aid and Development in Central America*—Jennifer Otsea, UNHCR. The Inter-University Seminar on International Migration, CIS, 4pm, Rm E38-714.

Post-Laser Ablation of Polymers and Biological Tissue*—Vasan Venugopalan, Graduate Research Asst., MIT. Thermal Science Seminar, Dept. of Mechanical Engineering, 4pm, Rm 5-234. Refreshments, 3:45pm.

Critical-Taper Mechanics of Fold-and-Thrust Belts on the Earth and Venus*—Prof. F.A. Dahlen, Princeton Univ. EAPS Department Lecture Series, 4pm, Rm 54-915. Refreshments, 3:30pm, Ida Green Lounge.

THURSDAY, OCTOBER 29

Anutomation for the New ATC System*—Dr. William D. Carson, Vice President, Air Traffic Control, IBM. Flight Transportation Laboratory, 2-3:30pm, Rm 37-252.

Mechanism of Intake Valve Deposit Formation: Effects of Gasoline Quality*—Dr. Katsuyuki Ohsawa, Toyota Central Research and Development Laboratories, Inc. Sloan Automotive/Reacting Gas Dynamics Laboratories, 4-5pm, Rm 31-161.

Cancer as a Disease of DNA Organization and Dynamic Cell Structure*—Prof. Donald S. Coffey, Dept. of Urology, Johns Hopkins School of Medicine. Sponsored by the Division of Toxicology and Department of Chemistry, 4pm, Rm 6-120. Reception 3:30pm, Rm 6-120 lobby.

Helioseismology*—Prof. Pawan Kumar, MIT. Physics Colloquium, 4:15pm, Rm 10-250. Refreshments, 3:45pm, Rm 26-110.

FRIDAY, OCTOBER 30

Role of the Kinetochores in Chromosome Movement During Mitosis*—Tony Hyman, Univ. of California/SF. Dept. of Biology Cell and Molecular Biology Seminar, 12pm, Whitehead Auditorium.

RF-Plasma Deposited Thin Films to Control Proteins at Interfaces*—Dr. Buddy Ratner, Univ. of Washington. Chemical Engineering Department Seminar, 3pm, Rm 66-110. Reception 2:45pm.

Strings, Ropes, and Infrasonic Resonances, With Applications to Underground Taverns*—Dr. William T. Plummer, Dir. of Optical Engineering, Polaroid; and Senior Lecturer, MIT. Mechanical Engineering Colloquium, 3-4pm, Rm 3-270.

FILMS & VIDEO

Jewel in the Lotus*—Oct 22: Video presentation of this documentary on the building of the award-winning Baha'i temple of India. Sponsored by the MIT Baha'i Association, 7:30pm, Rm 4-270. Refreshments.

COMMUNITY INTEREST

AARP*—Oct 27: This month's program, entitled "Health Care America," will consist of a presentation of the present status of AARP's plan to provide health care for everyone. Prospective new members especially welcome. 4:30pm, Twenty Chimneys Lounge, Stratton Student Center. More info: x3-7914.

Alcoholics Anonymous (AA)*—Meetings every Tues, 12-1pm; Thurs, 12-1pm, Rm E23-364. For info call Alice, 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 Bldg 1218, Family Support Ctr. The only requirement for membership is that there be a problem of alcoholism in a relative or friend. Call Alice, x3-4911.

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

Cancer Support Group*—Meetings every Thursday, 12-2pm, Bldg E51. For those with

acute and chronic forms of cancer. Sponsored by the MIT Medical Dept. For information about weekly luncheon meeting, call Dawn Metcalf, Social Work Service, x3-4911.

Co-Dependents Anonymous (CoDA)*—Meetings every Thurs, 6:30-8pm, Rm 66-156. Info: Alice, x3-4911.

DOS Tech Partners*—Oct 22: DOS Tech Partners will be looking at Desk View X this month. 12-1:30pm, Rm E40-302, The Visitor's Center (this month only). Info: Gail Garfield Neuman x3-0878.

Drop-In Playgroup*—Ongoing, daily, Mon-Fri, 9:30-11:30am, Westgate Function Room. Sponsored by the MIT Child Care Office.

MIT Gay, Bisexual, and Lesbian Employees (GABLES)*—Come to discuss and work on issues ranging from harassment to domestic partner policies. Join us for social lunches and events. For meeting info, call Stephen, x3-6736. To sign up for the staff lesbian e-mail lists, send e-mail to <gables-request@athena.mit.edu>.

Infant-Toddler Child Care Briefing*—Oct 29: Introductory discussion for expectant parents, those considering their first child, and those new to MIT or to child care. Preregistration required, call x3-1592. Led by Kathy Simons, Co-Administrator, MIT Child Care Office. 12-1:30pm, Rm 4-144.

Informal Embroidery Group*—MIT Women's League, 10:30am-1:30pm. Upcoming dates are: Oct 21, Nov 4, 18, Dec 2, 16. Meets in the Emma Rogers Room 10-340. Info: x3-3656.

Kundalini Yoga Classes*—Beginners welcome, bring something on which to sit. Meets Fridays Sponsored by the VSG (Vegetarian Support Group). More info: Andy Rothstein x3-2276 or <adrothst@athena>.

Microsoft Word (for the Macintosh) User Group*—Oct 21: Coordinated by Information Systems. Topic: File Sharing. 12-1pm, Rm 12-182. For more info contact Phyllis Crierie, x3-0736.

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

New Overeaters Anonymous (OA)*—Meets Friday, 12-1pm, Rm E23-364. Only requirement for membership is the desire to stop eating compulsively. Info: Alice, x3-4911.592 or x3-1316.

Parents Anonymous*—Ongoing meetings weekly on Wednesdays, 12-1pm. For those who would like ongoing support in dealing with the challenges of parenting. Led by Joanne Dougan, M.Ed., private practice, Boston. Sponsored by the Child Care Office. Contact Parents Anonymous at 1-800-882-1250 or Rae Simpson, Administrator, MIT Parenting Programs, Rm 4-144, x3-1592.

Parenting Discussion and Support Group*—Oct 26: The Twin Experience. First meeting, 12-1:30pm, Rm 20A-019. Discussion led by adult identical twins for parents of twins and all others interested in sharing experiences about twins. Led by Jill-Beth Seenev, MIT Child Care Office, and Jana Sweeney, Computer User Support Specialist, Massachusetts Dept. of Revenue. Sponsored by the MIT Child Care Office.

Parenting Workshops*—Oct 26: School Information Fair. An opportunity to rowse and select materials on many public and private elementary schools in the Cambridge-Boston area. Preregistration necessary. Contact Kathy Simons x3-1592. Co-sponsored by the Harvard Child Care Advisor, Harvard-Radcliffe Child Care Council, and Harvard University Center for Parenting. 7:30-9pm, Soldier's Field Park Common Room, Harvard Business School. Oct 28: Helping Your Child Be Successful in School. Leader: Diana Townsend-Butterworth. 12-1:30pm, Rm 6-233. All workshops sponsored by the MIT Child Care Office. More info: x3-1592.

Playgroups*—The MIT Wives Group, now with the cosponsorship of the MIT Child Care Office, sponsors and provides ongoing support for informal mother-child playgroups, currently in Arlington/Somerville, Belmont/Watertown, Lexington, Somerville, and Cambridge/Boston. Prospective members contact Wives Group, Rm E23-376, x3-2916. Resources and consultation: Kathy Simons, Rm 4-144, x3-1592.

Tai Chi*—Oct 21: Beginning class starting, will meet Wednesdays 5-6pm in Rm 10-340. Tai Chi is an ancient Chinese system for mental, physical, and spiritual health, no age or physical requirement. Info: Elizabeth x3-4724.

Technology Children's Center*—The only childcare center on the MIT campus has spaces available in all of its programs at Eastgate (half-day and full-day) for children ages 2 yr 9 mo to 5 yr 6 mo. Information: Olga Slocum, Director, x3-5907.

MIT Toastmasters*—Upcoming meeting: Oct 23: An organization that helps people improve and practice their public speaking skills. 12:14-1:30pm, Rm E19-220. Sponsored by MIT Personnel Office.

Wives' Group*—Oct 21: "Getting the Medical Care You Need—How to Find and Use it Effectively." Dawn Metcalf, Social Worker,

MIT Medical Dept. Meetings are from 3-4:45pm, Rm 491 Student Ctr. Babysitting in Rm 407. All women in MIT community welcome. Info: x3-1614.

Women's League Original Wall Hanging Competition*—In celebration of its 80th year, the MIT Women's League announces a competition for a wall hanging to be permanently placed on the west wall of the Emma Rogers Room (Rm 10-340). Members of the MIT community are invited to create an original wall hanging made of fibers, threads, and/or fabrics reflecting the Women's League celebration of 80 years as an integral part of the MIT community. \$1500 purchase award for the winning entry. For entry forms and specifications write to Wall Hanging Competition, Rm 10-342, and enclose a self-addressed stamped envelope.

Working Mothers Support Group*—Ongoing participant-led meetings monthly on the first Thursday of each month, 12:15-1:30pm, Rm 18-592. For all working mothers in the MIT community. No preregistration required. Cosponsored by the Child Care Office and the MIT Medical Dept. Contact Debbie Levey, volunteer coordinator for the group, x3-7112.

Working Parents Support Group*—Ongoing meetings weekly on Tuesdays, 12:30-1:30pm. For all working parents in the MIT community. Discussion of issues in parenting and the demands of balancing work and family. Led by Jackie Buck, Social Worker, MIT Medical Department. Cosponsored by the Child Care Office and the MIT Medical Dept. Preregistration required, call x3-4911.

Yoga*—Ongoing yoga classes. Beginner's Hatha, 5:15-6:30pm. Intermediate Iyengar Style, 6:30-8pm, Rm 10-340. Sponsored by the Women's League. For more information contact Ei Turchinetz 862-2613.

HEALTH EDUCATION

A New Perspective on Stress Management*—Oct 27-Nov 24: Five sessions in stress management led by an expert from the Mind/Body Medical Institute. Tuesdays, 5:30-7pm. Fee: \$45. Call x3-1316. Sponsored by the MIT Health Education Service.

A Breath of Fresh Air*—Monthly noon-hour reunion and relapse prevention sessions for graduates of the From Smoker to Non-Smoker workshop. No fee. No registration. Call x3-1316 for dates, rooms, times. Sponsored by the MIT Health Education Service.

Divorce Support Group for Students*—A support group for students whose parents have recently separated or divorced. Led by experienced group therapists. For information about joining this group please call Marcia Yousik, C.S., or Elizabeth Engelberg, Psy.D., at x3-2916. Sponsored by the Psychiatry service of the Medical Dept.

Nursing Mothers' Support Group*—First Tues of each month, 10-11:30am and third Wed of each month, 4-5:30pm, Rm E23-297. No fee. No registration. Call x3-2466 for details. Sponsored by the MIT Health Education Service.

Childbirth Preparation*—Early Pregnancy, Lamaze Childbirth Preparation, and Lamaze Review classes are offered to patients of the MIT Medical Department's Obstetrics Service. Call x3-1316 for details.

Tape Time for Health*—A free video loan program. Topics include birth, parenting, baby care, smoking cessation, etc. Visit the Health Resources Center to borrow a tape or call x3-1316 for a list of titles available.

MITAC

Ticket locations and hours: Tickets may be purchased at the MITAC Office, Rm 20A-023 (x3-7990), 10am-3pm Monday-Friday (except the third Monday of each month when MITAC is closed for inventory). Lincoln Lab sales in Rm A-218, 1-4pm Thursday and Friday. Further details on events are included in MITAC's monthly flyer. To avoid disappointment, make reservations and purchase tickets early. Because MITAC is nonprofit, refunds are not available.

MITAC, the MIT Activities Committee, offers discount movie tickets for General Cinema (\$4/each), Showcase and Loews Cinemas (\$4.25/each, not valid the first 2 weeks a movie is released). Tickets are good 7 days a week, any performance.

The Two Revolution Tour: Minute Men to Mill Workers*—Nov 7: A visit to the Minute Man National Historical Park in Lexington and the Lowell National Historic Park in Lowell. Bus leaves Hayward Lot at 8:30am/leaves Lexington Green at 9:00am; returns to Hayward Lot approx. 5pm/Lexington Green approx. 5:30pm. Tickets (which include round-trip bus and museum admission) are \$11.50/adult; \$10.50/seniors; and \$9.50/child (6-16); \$8.50/children under 6. Purchase tkts. by October 21st.

Weekend Journey to Washington, DC*—Nov 7-11: Trip includes 4 nights' lodging at the Omni Shoreham Hotel; 2 guided day tours (4 hours each) of Washington; 1 guided night tour of Washington; a VIP tour of both the White House and Congress; admission to Mount Vernon; all taxes, gratuities, and baggage handling; and bus. \$289/pp/dbl. occu-

(continued on page 8)

The Arts

The Arts Page is produced by the Office of the Arts in collaboration with ARTSNET. Lynn Heinemann, writer; Susan Cohen, designer; Mary Haller, editor. E15-205; 253-4003.

The Boston Globe Book Festival

Ruth Perry, Professor of Literature and Director of Women's Studies, will be a panelist in a free 1992 Boston Globe Book Festival program. "A Tribute to Women's Literature" will take place on Friday, Oct. 23 at 6:15pm in the Rabb Lecture Hall of the Boston Public Library. Professor Perry has written *The Celebrated Mary Astell: An Early English Feminist*.

Also on the panel are Paul Brooks, author of *The House of Life, Rachel Carson at Work*; and Elinor Lipman, author of *The Way Men Act*. Moderator will be Gail Galdwell, Boston Globe Book Editor.

Lecture: "Genius"

James Gleick, whose biography of the physicist Richard Feynman, *Genius*, has just been published by Pantheon, will present a lecture of the same name on Thursday, Oct. 22. Sponsored by the Program in Writing and Humanistic Studies as part of its Writers Series, the lecture will take place at 8pm in Rm 10-250. Information: 253-7894.

The former New York Times science reporter and editor of metropolitan news remains a regular contributor to the New York Times Magazine. His best-selling first book, *Chaos: Making a New Science*, was nominated in 1987 for both the National Book Award and Pulitzer Prize in general fiction. Mr. Gleick also collaborated with the late photographer Eliot Porter on the 1990 book, *Nature's Chaos*. In 1989-90 Mr. Gleick was the McGraw Distinguished Lecturer at Princeton University.

Wolfe Award Deadline

The Department of Materials Science and Engineering and the School of Humanities and Social Science have announced project deadline dates for the Kathlyn Langford Wolfe Award in Materials Science, Humanities, and the Arts. The prizes of \$1,000 each will be awarded to one undergraduate and one graduate student upon completion of "an imaginative and significant project combining research in materials and humanities or in materials and the arts." The project may take the form of laboratory research, a research paper, an exhibition, or a work of art.

The deadline for preliminary project proposals is November 11, 1992. Follow-up proposals are due January 4, 1993 with a final submission due by April 23, 1993.

The award was established in 1983 by the late Lester Wolfe '18 in honor of his wife, integrating his scientific interests with their joint avocation for art.

For further information concerning guidelines for appropriate projects, contact a member of the Award Committee: Professor Linn Hobbs, 253-6835; Professor Arthur Kaledin, 253-4144; Professor Heather Lechtman, 253-2172.

Professor Muriel Cooper Honored

Muriel Cooper, Director of the Visible Language Workshop and Professor of Visual Studies in the Media Arts and Sciences Section will be awarded the Robert P. Gersin Design Excellence Award at a reception at the Massachusetts College of Art today (October 21).

Professor Cooper is the first to receive this award, established by the Design Insight Foundation to honor a Massachusetts College of Art alumnus/a for "design and professional contribution in the fields of product, interior, packaging, graphic and exhibit design."

Professor Cooper first came to MIT in 1952 as director of the Institute's newly-formed Office of Publications (now Design Services). She later became the first art director at the MIT Press, where she worked for seven years. During that time she designed over 500 books, 150 of which received awards.

While teaching at Mass College of Art Professor Cooper realized that her students lacked an understanding of the mechanics of printing. With Ron MacNeil she began teaching a course at MIT, "Messages and Means," which addressed the relationship of design principles to technology. They later co-founded the Visible Language Workshop whose early work heralded the development of 'desk top publishing.'

In a 1988 interview for Plan, the publication of the MIT School of Architec-



ture and Planning, Professor Cooper said "When Nicholas [Negroponte] invited me to attend his first summer session on computer graphics, it became clear to me that there were going to be some very serious changes in communication. ...It was clearly the start of a whole new era."

She affirms that she "continues to be challenged by the new design issues raised by a rapidly evolving sophisticated graphical computational environment in which static and dynamic information is intertwined with interaction."

As a classmate of Mr. Gersin at Mass College of Art, Professor Cooper feels especially honored at being the first recipient of the award. "Our visions of design as a model of thinking and research were deeply embedded and I hope this award will stand as a model for young designers in a changing world."

'Works by Juliet Kepes'

The lyrical and often whimsical works of painter, sculptor, and graphic artist Juliet Kepes are currently on view at the MIT Museum. The exhibition features her book illustrations and drawings and paintings of birds and animals. An untitled example of her work in tempera can be seen at right.

Born in England, she studied art in London and Brighton before moving to the United States in 1937 with her husband, Professor Gyorgy Kepes, founder of MIT's Center for Advanced Visual Studies. A graduate of the Institute of Design in Chicago, she has enjoyed a varied career in the fields of display design, fashion, advertising, textile design, and interior decoration.

Juliet Kepes has written and illustrated numerous children's books, three of which have been included in the New York Times Ten Best Books of the Year list. Her book, *Five Little Monkeys* received the 1952 Caldecott Award in children's literature.



MEZZO-SOPRANO PAULINA STARK guest stars with the MIT Symphony Orchestra in a concert on Saturday, Oct 24 at 8:30pm in Kresge Auditorium. The MIT Symphony Orchestra will be led by guest conductor David Commanday, director of the Greater Boston Youth Symphony Orchestra. The program includes Verdi's *Overture to La Forza del Destino*; Ravel's *Scheherazade*; Beethoven's *Symphony No. 3 ("Eroica")*. Admission: \$1 at the door. Information: 253-2826

'This is Winter': Contemporary American Composers

■ MUSIC

For recorded information on upcoming concerts call the MIT Music and Theater Arts Concert Line, 253-9800. Updated weekly.

Live Jazz—Oct 21, Oct 28. Charles Muddy Pub, 8:30-10:30pm. 21 or older—bring ID. 253-5050.

Chapel Concerts—Oct 22: Music of the World TBA. Oct 29: Elizabeth Reian Bennett. Shakuhachi, Japanese bamboo flute. 12noon, MIT Chapel.

MIT Concert Band Annual Halloween Concert—Oct 28: John Corley, director. 6pm, Lobby 7. Information: 253-2826

First Annual Roy Lamson Memorial Concert—Oct 29. To celebrate its 20th Anniversary, the Council for the Arts at MIT presents a mini-festival of MIT jazz bands. Anniversaries abound as the MIT Festival Jazz Ensemble turns 30 and Mark Harvey's Aardvark Orchestra turns 20. The MIT Festival Jazz Ensemble, directed by James O'Dell, was organized in 1962 by Herb Pomeroy, who conducted the group for 22 years. The Aardvark Jazz Orchestra is a concert ensemble committed to exploring new sounds in contemporary music, principally the original compositions of trumpeter/composer Mark Harvey, lecturer in jazz studies at MIT. Roy Lamson, a Professor of English and a founding member of the Council for the Arts, was an ardent champion of the arts and humanities at MIT over a long career. A talented clarinetist, he was also a founding member of The Intermission Trio. He explained his philosophy, stating, "We want to encourage the student artists at MIT to develop their own talents in preparation for a life-long involvement with the arts." The concert is at 4pm in Kresge Auditorium. 253-2372

New England Philharmonic Orchestra—Oct 30. Jeffrey Rink, conductor; David Deveau, piano soloist. 8pm, Kresge Auditorium. Liszt's *Totentanz*.

MIT Chamber Orchestra—Oct 31. Steven McDonald, director. Britten's *Serenade for tenor, horn and strings* (Soloists: Martin Kelly, tenor; Greg Warren, horn); Schubert's *Symphony No. 3*. 8pm, Kresge Auditorium.

MIT Women's Chorale. New members may join until Oct 29. All women of the MIT community, including wives, students, and staff welcome. 7:45pm, Rm 10-340. 625-2941

MIT Guild of Bell Ringers. Change ringing on hand bells. Beginners always welcome. Will also ring for special occasions. Call Ken, 253-7194 or 784-6114. Meets Mondays, 6:30pm, Rm 1-375

■ THEATER

Ruddigore—Oct 30-Nov 1; Nov 5-7. MIT Gilbert and Sullivan Players. 8pm; 2pm matinees October 31 and November 7. Student Center Sala de Puerto Rico (opposite 77 Mass Ave). Tickets: \$9, \$7 students/seniors/MIT Community, \$5 MIT/Wellesley students. Information/reservations: 731-2091.

Theater Arts Student Workshop Production—Oct 29-31. TBA. 8pm, Kresge Rehearsal Rm B (84 Mass Ave). Student produced/directed. Information: 253-2877 or 253-4720

■ SPECIAL LECTURES

"After Public Art"—Oct 27. Dept of Architecture lecture by newly appointed Visual Arts Program faculty member Krzysztof Wodiczko, internationally-known creator of politically-based public art. 6:30pm, Rm 10-250. Information: 253-4411

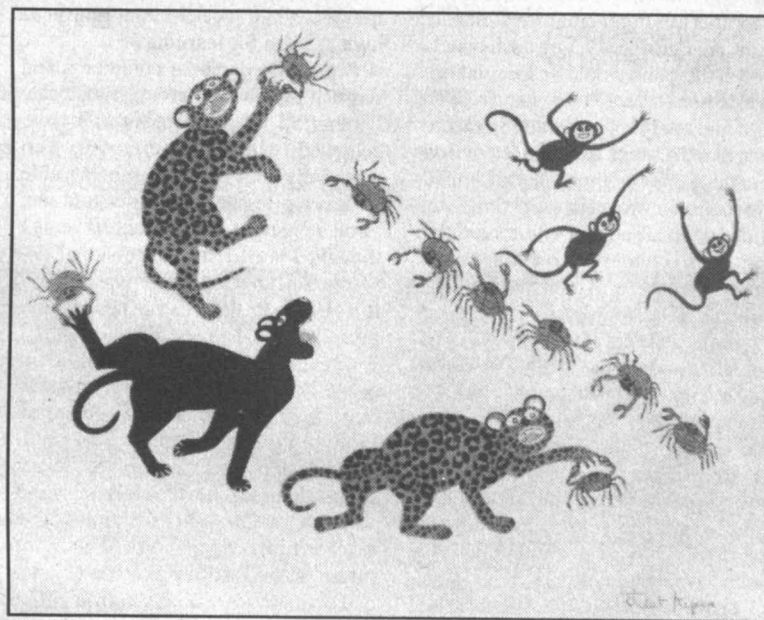
■ EXHIBITS

List Visual Arts Center (E15): *Ann Hamilton: aleph*. Ann Hamilton has created a site-specific installation which contains, among other things, 35,000 books. *Michiko Kon*. Black and white photographs of unnatural nature by Japanese woman photographer. *This Just In... Recent Additions to the Collection*. Exhibit presents artwork recently added to MIT's permanent collection. All exhibits run through Nov 22. Hours: Weekdays 12-6, weekends 1-5. 24-hr Hotline, 253-4680.

MIT Museum Bldg (N52): *Photograms: 1918 to the Present*. Examines the development and use of the photogram. Through Jan 3. *Works by Juliet Kepes*. Works of painter, sculptor, and graphic artist, Juliet Kepes. Through Dec 30. Tues-Fri 9-5, Weekends 1-5. 253-4444

Compton Gallery—*Hurt Dance: Photography of Endurance Athletes by Peter Moriarty*. Scheduled to coincide with the "Head of the Charles" Regatta, Moriarty's photographs capture the lyrical and stressful aspects of being an endurance athlete. Through Dec 18. (Enter 77 Mass Ave. Weekdays 9-5. Information: 253-4444)

Wiesner Student Art Gallery—*Distortions*. Paintings by Akhtar Badshah (G). Through November 2. Funded by the Council for the Arts at MIT. Stratton Student Ctr 2nd floor. 253-3913.



MIT on Disc: 'Go On', 'Bákona'

Videos have yet to be produced for MTV, but MIT music makers have been memorializing their performances in compact disk format with alarming frequency these days.

The MIT Festival Jazz Ensemble's newly released CD "Go On" is available at both MIT Museum Shop locations: the Student Center and the Museum building at 265 Massachusetts Avenue; CDs are also available from the MIT Music Office (14N-207) at a cost of \$8 for MIT students, \$9 for others, and \$10 for orders that require postage and handling. Requests should be sent, with name, address, phone number, and check made out to MIT, to Edmund Jones, 14N-207.

The Logarithms, MIT's male student *a capella* group, also released a CD this year. "Together in Bákona" is available at the MIT Museum Shop for \$8.95. What is bákona? According to the Logarithms handbook, it is either "1)

a small uncharted Pacific isle or 2) slang for bacchanal."

David Deveau's first CD, "David Deveau Plays Liszt" was released on the Centaur label earlier this year. Deveau, a lecturer in music at MIT, earned high praise from the Boston Globe's Richard Dyer who wrote, "[he] plays with generosity of feeling and with a tone that is consistently beautiful no matter what the hazards are, and he surmounts those hazards with such sovereign ease that you don't even notice that they are hazards."

Professor Marcus Thompson has also recorded a CD, also for Centaur, which is now in the production stage and will be released shortly. His portion of the programme is Bartók's *Viola Concerto* and Ernest Bloch's *Suite for Viola and Orchestra*, which was recorded with the Radio Orchestra of Ljubljana (Yugoslavia) under the direction of Paul Freeman.

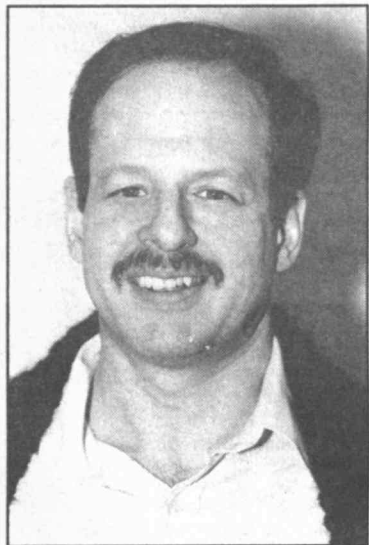
Environment, Economy Are Not Foes, Study Says

(continued from page 1)

parts. All of these findings would be consistent with the environmental impact hypothesis, or the idea that environmental controls hurt economic growth.

Here again, however, the results say no. Professor Meyer found that for three of the five economic indicators environmentally weak states showed considerably less economic growth in the 80s than the 70s (inter-decade growth in overall productivity rose slightly for weak states; manufacturing labor productivity stayed about the same for all three categories of states).

Professor Meyer also found that "the states with higher environmental ranks systematically outperformed those with lower environmental ranks" across the two decades.



Professor Meyer

Results for both variations of the study appear to refute the environmental impact hypothesis. However, Professor Meyer noted that even the most seemingly unambiguous results can sometimes be explained by other factors, so he explored three other possible explanations.

"One... is that the results are driven by 'big state' economies," he wrote. To find out he conducted two other analyses on inter-decade economic growth; in one he used only data from the 25 smallest states (gross state products under \$40 billion), in the other only data from the 41 states with gross state products under \$80 billion ("thus excluding only the really uncharacteristic

economies" such as those of California and New York).

He found that, once more, the results for both analyses refuted the environmental impact hypothesis.

"Another possible explanation... might be the changing economic context," Professor Meyer continued. "That is, changing fiscal, energy, regulatory, and [other] policies [during the time periods studied] may simply [have] swamped the negative effects of environmentalism on the economy."

He concluded, however, that "the argument that one cannot observe the harmful economic effects of environmentalism because they are lost in the noise of contemporary economic trends... is an argument that concedes the triviality of the environmental impact hypothesis from both a substantive and a policy perspective."

Professor Meyer also explored whether characteristics peculiar to one or more groups of states might account for the results. For example, he found that among the environmentally weak states several are energy-producing, such as Texas, Louisiana, and Alaska. "It is possible that the boom/bust cycle that rolled through the energy sector in the 1970s and 80s may account for their poor showing—regardless of their relative environmental status," Professor Meyer wrote.

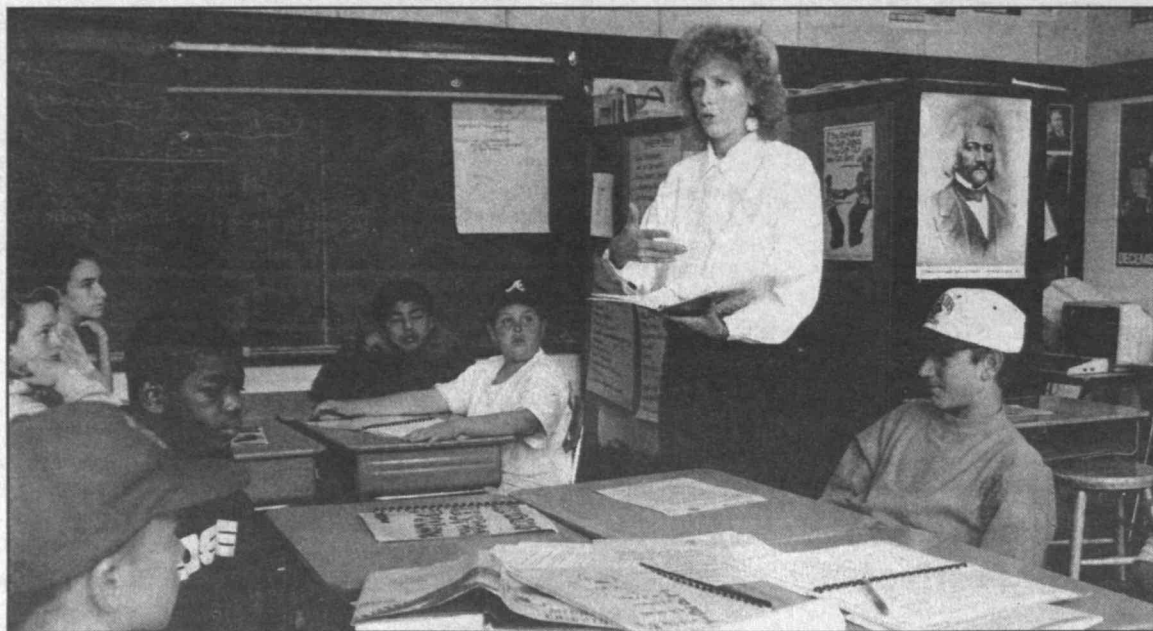
He found, however, that when these states were removed from the analysis the results did not change. He also explored a statistical phenomenon linked to group characteristics that might have affected results, but again found nothing to change the study's conclusions.

Overall, Professor Meyer wrote, the data not only refute the environmental impact hypothesis, but also reveal "a clear and consistent positive relationship between the states' environmental efforts and their economic performance."

He stressed, however, that "while these results may tempt the reader to infer that environmentalism stimulates economic prosperity, any such conclusion at this point would be speculation." He concluded: "It is clear from the data and analyses presented in this report that the states can pursue environmental quality without fear of impeding economic prosperity. For those who continue to argue that environmentalism hurts economic growth and prosperity the burden of proof now clearly falls on their shoulders."

Professor Meyer's study was conducted through the MIT Project on Environmental Politics and Policy, a new program directed by Professor Meyer that "focuses on the politics of natural resource and environmental policy-making at federal, state and local levels." The study was funded by the MIT Provost's Humanities and Social Science Fund.

Professor Meyer notes that he will be teaching an undergraduate course on environmental politics and policy next spring.



SUMMER SCHOLAR—Kathy Greeley, one of 52 teachers who participated in the MIT Summer Teacher Institute, is back in front of her class at the Graham and Parks school in Cambridge. Photo by Donna Coveney

RENEWAL EFFORT

Self-focus Was Aim of Teacher Institute

By Elizabeth A. Thomson
News Office

Some teachers were resistant, but the designers of the first MIT Summer Teacher Institute were firm: throughout the three weeks of the program the 52 participants from Cambridge and Boston schools were asked not to develop lesson plans from what they were learning or otherwise work on curricular materials for their students.

A program for teachers with no apparent applications for kids? Exactly, say Leon Trilling, Alan Dyson and Christopher Craig, the designers of the Institute.

"We wanted them to focus on themselves," explained Mr. Dyson, T.I.D.E. Senior Education Specialist at MIT (Dr. Trilling is a professor in aeronautics and astronautics; Mr. Craig is a technical instructor in the Integrated Studies Program). "We said to the teachers: this is going to be a professional development effort. We want you to spend the next three weeks rekindling your own passion for learning."

Based on personal comments and those in papers teachers submitted earlier this fall, the program seems to have achieved its goal. "One teacher who was really angry about not being able to develop lesson plans later told me, 'You were right. For the last 10 years I thought I was doing professional development, but in fact I was always thinking about the kids and never about myself,'" Mr. Dyson said.

Developed through the MIT Council on Primary and Secondary Education, the Summer Teacher Institute brought together roughly equal numbers of elementary and junior/senior high-school teachers from Boston and Cambridge (the one exception was a teacher from Orange, MA. The organizers of the Institute extended a special invitation to teachers from her high school because they were impressed by their work: 14 of their students were participants in the State Science Fair this spring hosted by MIT).

Most of the participants are math or science teachers, a few teach English and social studies, and many teach bilingual classes or vocational education. Mr. Dyson also noted that in selecting people for the program, "we looked for a full range of teachers—those who were passionately involved and those who were burned out."

To get teachers thinking about their own professional development, the Summer Institute revolved around intense research on a topic everyone could relate to: how a city works. Specifically, 10 groups of five to six teachers each studied different topics in either transportation or water management.

The idea was to help them relearn or polish the skills needed to explore complicated topics. "I think that teachers should continually go through the experience of learning for themselves," said Mr. Dyson, who was once a science teacher himself. "All of the things that teachers expect of children they don't allow themselves

to do. They don't have time."

The program's focus on the city, furthermore, gave the teachers many examples of how a consumer's needs are met by science and technology, and also of how politics can affect the end result. These relationships, say Dyson and Trilling, are important for the general public to understand, hence the importance of increasing teachers' awareness of them.

So the teachers participating in the Institute went on field trips to places like the Cambridge Water Works, listened to talks by experts on transportation and water, and attended hands-on workshops. They also brainstormed with each other in the 10 small groups to explore a given topic. For example, one of the "water" groups studied water transportation networks and eventually came up with six different areas of research including the installation of pipes and how water moves in the home.

To facilitate brainstorming sessions, each small group also included an MIT undergraduate and a "mentor." These last two sets of people were critical to the program, Professor Trilling said. Undergraduates helped teachers get around MIT, participated in discussions, and recorded what was said on lap-top computers using "mind-mapping" software that resulted in schematics, or webs, of each group's ideas.

As a result, said Mr. Dyson, during a lively discussion on, say, pipes and the water-delivery system, "the student could create a diagram of what was said, then give each teacher a copy and say, 'does this represent your ideas?'" He noted that webs are better than lists because "lists don't show how ideas are interrelated."

Mentors were equally important. "We defined them as people who knew a bit more about water or transportation than the teachers, but not too much more," Professor Trilling said. "Someone who knew too much more might have overpowered the group."

For example, he said, Paul Levy, former director of the Massachusetts Water Resources Association (MWRA) and now a visiting lecturer in urban studies and planning, was asked to be a mentor, but not in water. "Paul's reaction was, 'Great. I always wanted to know how the brakes work on an MBTA trolley,'" Professor Trilling said.

Other mentors included Vanessa Martin, who received the SB in mechanical engineering from MIT in 1986 and now works for Polaroid in community relations, and Carol Schildhauer, a librarian in the Barker Engineering Library. "Vanessa has a very good science/technology background and was interested in looking at [water and transportation] issues," said Professor Trilling, while "Carol is quite knowledgeable about electronic searches and databases, and introduced people in her group to experts at MIT on the group's topic."

Over the first two weeks of the program, each group produced and presented a report on their topic complete with webs, research notes with refer-

ences, and other materials like pertinent newspaper articles. During week three, teachers went out on their own to explore a particular area of interest related to how a city works. They were asked to submit a journal of how they spent the week, webs of their work, and two short papers describing plans for continued professional development over the year and accomplishments to date.

Kathy Greeley, who teaches seventh- and eighth-grade language arts and social studies at the Graham and Parks school in Cambridge, spent her third week exploring the Charles River. In one of the papers Ms. Greeley wrote for the Summer Institute, she made the following observations about the program and how it affected her:

"I approached this course with excitement and some trepidation, not being a science-type, and have been pleased to have certain doors open up to me that I did not expect.

"I have learned a lot about water delivery systems... [but] while I am glad to have this knowledge, I feel that the most important growth is in how I see the world around me. I am thinking a lot more about how things work, about whether or not I can figure something out by observing, tinkering, playing with it. I am also a lot more aware of the massive infrastructures that keep life going in the city. I notice where the sewer covers are, and I have just noticed markings for each water and gas pipe that go into every house and building on the street..."

Over the third week of the program Ms. Greeley made several visits to places like the Charles River Dam and the Charles River Museum. "I am often too busy to get out to places like that so I appreciated having a good excuse to go," she wrote. "I have lived in Cambridge for 17 years and had never even known there was a dam and certainly knew little about how the river has been shaped and molded to meet the needs of the people."

The Summer Institute also gave Ms. Greeley new perspectives on her teaching. "In the coming year," she wrote, "I plan to give students more time to... really focus on developing a greater understanding of our own city and the neighborhoods within. I think that the work we did on water not only gave me a fairly thorough understanding of the current (and past) water-delivery systems, but also provided a model for exploring new territories."

The MIT Summer Teacher Institute was supported by the Pew Charitable Trusts and the Engineering Coalition of Schools for Excellence in Education and Leadership (ECSEL).

The following organizations supported the program with people and expertise: the MIT Integrated Studies Program, the MIT Libraries, the MIT Museums, the MIT Sea Grant College Program, the MIT Program in Science, Technology and Society, the Boston and Cambridge Public Schools, the Central Artery Tunnel Project, the MBTA, the MWRA, Polaroid Corporation and Wheelock College.

Stressed Out?

A five-session series on stress management will begin Tuesday, Oct. 27. An expert from the Mind/Body Medical Institute will help participants identify stress factors and learn techniques for overcoming stress. The fee is \$45 for the five-session program.

For further information, call x3-1316.

(continued from page 6)

Le Grand David and His Spectacular Magic Company—Nov 15:** At the Cabot St. Theatre (Beverly, MA), 3pm. Tickets are \$9/adult (reg. \$10); \$7/child (reg. \$8, 11 & under), and must be purchased by Oct. 28th. Recommended for ages 4 and above.

■ SOCIAL ACTIVITIES

Two Steppin' with GABLES at MIT—Oct 24:** An evening of country and western dancing. A kickoff fund-raiser for GABLES (Gay, bisexual, and lesbian employees and supporters at MIT), 7:30pm-12am, Student Center Rm 491.

MIT Singles over 35—Group** meets in the Faculty Club Lobby lounge 5:30-7pm every Friday evening. For more information call Mary Anne x3-3293 or Charlotte x3-4738.

Chinese Lunch Table. Meets Fridays 12-2pm. Bring your own lunch and come meet some Chinese friends at MIT. All Chinese-speaking people are welcome. Organized by CSSA (Chinese Students and Scholars Association).

Japanese Lunch Table. Meets Tuesdays at 1pm in Rm 407 and 491 in the Student Center. Bring a lunch and talk with native Japanese speakers. All Japanese speakers, especially beginners, are welcome. Call x3-2839.

La Table Francophone. Meets Tuesdays at 1pm in Walker Memorial Dining Room.

■ MOVIES

Admission to below Lecture Series Committee Movies is \$1.50, and MIT or Wellesley identification is required. For the latest Lecture Series Committee movie and lecture information, call the LSC Movieline, x8-8881.

Oct. 23: Batman Returns [PG13], 7 & 10:30pm, Rm 26-100; You'll Never Get Rich, 7:30pm, Rm 10-250. **Oct. 24:** Mississippi Masala [R], 7 & 10pm, Rm 26-100. **Oct. 25:** D.O.A. [R], 7 & 10pm, Rm 26-100. **Oct. 30:** JFK [R], 7pm, Rm 10-250; 10pm, Rm 26-100. **Fahrenheit 451**, 7:30pm, Rm 6-120. **Oct. 31:** The Handmaid's Tale [R], 7 & 10pm, Rm 26-100.

Send notices for Wed., October 28 through Sunday, November 8, 1992 to Calendar Editor Rm 5-111, before 12 noon Friday, October 23.

Massachusetts Institute of Technology



Report of the President 1991-92

"A slow sort of country!" said the Queen. "Now here, you see, it takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that!"

Lewis Carroll, *Through the Looking Glass*

Excellence in an Era of Change and Constraint

America's research universities are faced with a central challenge—to retain and enhance excellence in a time of fiscal constraint and societal uncertainty. We are experiencing a deep sense of frustration because never in our history has the field of intellectual challenge and opportunity or the need for our services to the nation and the world been so great; yet never in recent decades have we experienced such fiscal constraint or sensed such a fall from grace with the public and the government. We are not in crisis, but we are in a precarious state, one that may be more difficult to grasp and respond to than crisis.

But respond we must, because this is a time in which we at MIT and our colleagues around the country should solidify and expand our roles as leaders in this increasingly complex world. We must define new disciplinary futures and invent new intellectual pathways to understanding the physical, biological, economic, and artistic universes. It is a time in which we must do our part in shaping the future.

The challenges before us are great. We must:

- continue to lead the revolution in molecular biology and advance the promise of biotechnology;
- come to understand the workings of the human brain and the nature of intelligence;
- bring the highest quality of mind to assessing and ameliorating humankind's effects on the earth's environment;
- secure the advances of computers, communications technology, and the information marketplace for the social good;
- combine the aesthetic and the technical in the design of the physical environment and in the creation of more livable cities;
- renew—through our unique intellectual and creative environment—the liberal, visual, and performing arts that in such large measure define what it is to be human.

Leadership and Management

University presidents, provosts, deans, department heads, laboratory directors, and other academic administrators rightfully understand their tasks to be to lead and serve, rather than to manage in a narrow sense. Universities are not, and must never become, simply businesses. Our essence and our human purpose run far deeper than that. Nonetheless, leadership for the 1990s requires an understanding of rapidly shifting conditions, opportunities, and resources. The human resources of America's research universities are truly extraordinary, but our fiscal resources are dwindling in real value. I believe that the times require of us uncommon attention to financial and organizational planning and, indeed, management. This attention must come not only from administrators, but also from faculty and staff throughout the academic community. We must all act concertedly, and with wisdom and dispatch, if we are to serve our societal purposes.

America's research universities are faced with a central challenge—to retain and enhance excellence in a time of fiscal constraint and societal uncertainty ... We are not in crisis, but we are in a precarious state, one that may be more difficult to grasp and respond to than crisis.

Forces

The budgets of American universities have been affected for the last several years by opposing forces. On one side we are faced with declining rates of revenue increases and a general decline in the climate for support of higher education. Dominant factors include the concern of students and their families about college costs, a leveling trend in federal resources for education and university research, and a loss of national will to address the broad spectrum of the country's educational needs.

On the other hand, we are faced with increasing costs, expectations, and obligations. The cost of what we already do is rising, and there is an escalation in what we expect of ourselves and what society expects of us.

One of the fastest growing components of most campus operating budgets has been student financial aid. The combination of rising tuition, rapidly declining federal scholarships and grants, and more

recently, the effects the national recession on family incomes has rapidly accelerated the need for financial aid. Federal grants to students have declined in real value by a factor of two since 1980. As recently as 1975, 70 percent of federal student aid was in the form of scholarships and 25 percent was in the form of loans. Following the trend of so many other things in our society, by 1991, only 31 percent of federal student aid was in the form of grants, while 66 percent was in the form of loans.

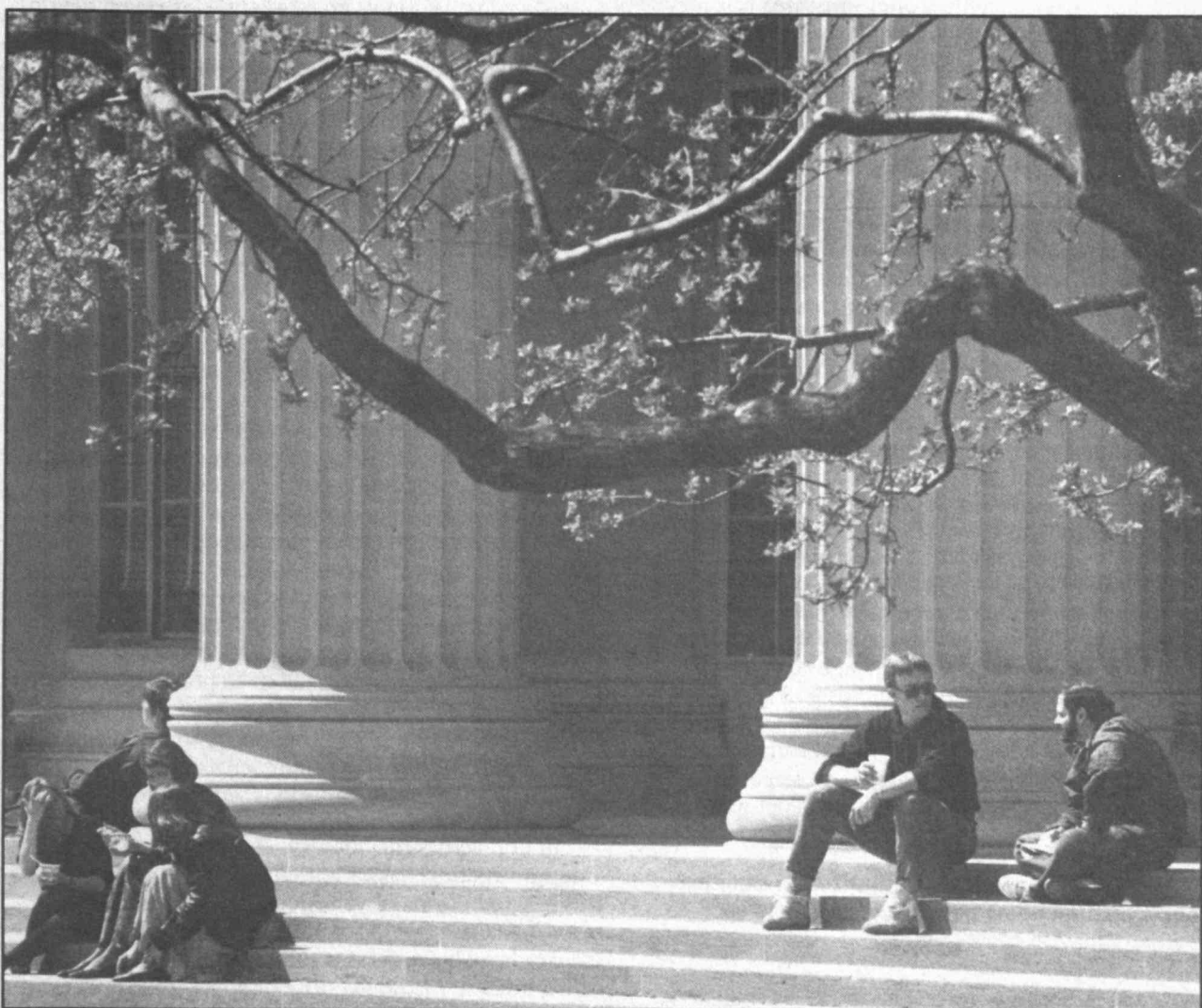
At MIT, 45 percent of MIT's student aid came from the federal government in 1975, compared with 31 percent in 1991. In 1975, the federal government provided 19 percent of scholarship grants at MIT, while the Institute provided 67 percent. By 1991, the federal portion had dropped to 11 percent, while MIT provided 81 percent. The reduction in the level of federal support, and the shift from grants to loans, have significant financial consequences that have been borne by the Institute.

Research universities are subjected to strong market forces associated with hiring new faculty members of the highest quality. Salary competition is pervasive, and the costs that universities are expected to bear in order to start the research career of a new faculty member in many branches of science and engineering are measured in hundreds of thousands of dollars. In many fields, the bidding for faculty members has included the promise of greatly reduced teaching loads—a trend that we must resist.

Establishment of a healthy and vigorous research environment is often very expensive. Major costs include modern equipment and instrumentation and the associated technical support staff.

During the past decade, the revolution in information technology has brought with it an indispensable but very costly budget line that hardly existed theretofore. Microcomputers and workstations, campus network infrastructures, and the corresponding staff to manage and maintain information systems have become pervasive and essential features of university campuses. The demand for increasing capacity, speed, and sophistication has accelerated rapidly. This revolution has expanded greatly the breadth and complexity of educational and research topics with which we can deal. Yet these advances are costly. It is already common for 2 or 3 percent of a campus operating budget to be associated with information technology.

Libraries, even in their most traditional form, have been sources of particular cost escalation. The cost of acquisition, storage, and preservation of scholarly books and journals has grown rapidly during the last decade or two, and most libraries have also had to carry the capital investment in automa-





Bradford F. Herzog

tion of many of their records and functions. As we have moved into new optical and electronic forms of information storage, libraries have tended to add to, rather than replace, traditional printed materials. Every campus library has been engaged in cutting back on the numbers of its journal subscriptions and book acquisitions. Yet during the last two decades journal subscription rates have often risen by many tens of percents in a year.

Not surprisingly, there is a rather large litany of regulatory and legal matters, as well as social mandates, that have caused costs to grow very rapidly on campuses. Issues of campus safety, access for the disabled, substance abuse monitoring, financial aid eligibility of students, conflict of interest matters, investigations of research misconduct, environmental regulation, the compliance reporting associated with affirmative action, matters of sexual harassment, and a variety of personnel issues in an increasingly litigious society are but a few of the many and substantial costs that are of relatively recent origin.

New intellectual trends, especially the growing importance of organizing to conduct highly interdisciplinary research and education, tend to bring new organizational overhead with them. The formation of new laboratories, centers, and institutes is sometimes encouraged by research sponsors, and is often believed to be necessary, in order to conduct many interdisciplinary activities. These new organizations often require new space, as well as additional staff and services.

The past two decades have brought an expanded societal role for many of our colleges and universities. We all share a responsibility to be more reflective of the rapidly changing racial and ethnic makeup of our nation, and a need to make all career paths fully accessible to minorities and women. In addition, institutions have increasingly assumed, or had thrust upon them, various roles in the economic development of their states or regions. The daunting problems facing primary and secondary education have led many universities to undertake a variety of active roles in the improvement of K-12 systems and curricula.

Finally, there are many new services that we have either taken on, or very much wish we could better assist with, as socially responsible employers. These services reflect the changing nature and economic characteristics of the families and careers of our faculty and staff. Matters such as health care, child bearing, child care, housing and retirement, not to mention care of the elderly, all impose new or rapidly growing costs or potential costs upon our institutions.

New tasks, new roles, and new responsibilities—but no corresponding new revenues—have become a familiar situation in academe.

A National Perspective

Academia today exemplifies the adage that misery loves company. Last year, nearly 85 percent of the nation's colleges and universities reported that securing adequate financial support was one of their three most serious challenges. During 1990-91, 45 percent of our colleges and universities announced mid-year budget cuts. This was not a one-time anomaly; 57 percent implemented mid-year cuts during 1991-92. The budgets of public universities, because they are subject to the variations and changing priorities of state legislatures and administrations, tend to fluctuate more rapidly and over a wider range than those of private institutions. But the basic financial trends of both types of institutions are depressingly similar, and the private institutions have fewer options available to them for the long range amelioration of their financial problems.

To put higher education's revenues into some historical perspective, we must examine both how the levels and sources of revenue have changed and also how the use of those revenues has varied. The total operating budgets of all public and private doctoral-granting universities grew in constant dollars by 109 percent, from \$31 billion to \$65 billion during the last 20 years. More than doubling operating budgets in 15 years hardly seems like austerity, so why are we sensing such constraint? The answer seems to be twofold: we are taking on more tasks and we are teaching more students. Enrollments have grown (99 percent in public institutions and 50 percent in private institutions) during the last twenty years, continuing to grow monotonically even during the years in which the number of 18-24 year olds in the US declined by more than 20 percent.

The operating revenue of private, doctoral-granting institutions has grown from roughly \$12 billion to around \$23 billion in constant dollars during the last twenty years. The most dramatic change in the source of these funds is that the federal government supplied nearly 30 percent twenty years ago, but only about 18 percent today. The fraction of operating revenue (26 percent) derived from tuition and fees has increased slightly during this period, while that arising from endowment has remained constant at about 9 percent. During this period, the fraction of operating revenues derived from auxiliary activities, including hospitals and federally funded research and development centers, has increased substantially, from 29 percent to 40 percent. The trends for public universities are similar, but, of course, they have a high dependence on state support (approximately 40 percent across all such schools, but with wide variations among them).

Tuition across the country, especially that of private universities, has rather consistently followed the ups and downs of variations in the consumer price index (CPI), but for 15 years the annual increases have been greater than the CPI. This is because the cost of the majority of goods and services needed by universities—such as scholarships and

fellowships, books and journals, faculty and staff salaries—tends to rise more quickly than the CPI. Hence, while general inflation has been a primary driver of tuition, the specific costs borne by tuition have grown even more rapidly. It should be noted that while the tuition of the major private universities grew by nearly 300 percent from 1976 to 1991, its real growth, i.e., growth adjusted for inflation, was 55 percent. Interestingly, the contribution of tuition to the operating budgets of these universities grew by only about 3 percent during the past 15 years.

MIT's Budget

How is MIT's budget faring in the current climate? The simple answer is that we are in a stronger position than many of our sister institutions, but that the forces on our budget have reached a critical point, one that requires concerted, Institute-wide action if we are to remain excellent and rebuild some flexibility to do the things that we believe to be important.

Our situation differs somewhat from that of most research universities. Because of our focus on science and engineering, and the consequent dependence on federal funding, we are particularly sensitive to government policy and budgetary changes. On the positive side, our historically strong relations with the private sector are important and growing assets.

To examine our current situation, note that we have only three primary sources of revenue—tuition, federal and industrial research funds, and private support, including gifts and investment income.

Tuition rates are set annually at the Institute's discretion, but obviously must reflect the realities of the nation's economy, the corresponding need to supply financial aid, and our desire to remain accessible to bright students regardless of their family's financial situation. While tuition will continue to grow somewhat, MIT has begun to slow its rate of growth; this year's increase was 6.5 percent, the second lowest increase in 20 years.

New tasks, new roles, and new responsibilities—but no corresponding new revenues—have become a familiar situation in academe. ... the forces on our budget have reached a critical point, one that requires concerted, Institute-wide action if we are to remain excellent and rebuild some flexibility to do the things that we believe to be important.

Federal research support is earned by the efforts, innovation, and high intellectual quality of MIT's faculty, but it also depends on the congruence of our goals with those of the federal government and is subject to the shifting nature of the federal/university partnership. Research support at MIT has nearly leveled out during the last two years.

Private support is received in the form of gifts, grants, and bequests from alumni, alumnae, and friends of the Institute and from foundations and corporations. The development of private support requires considerable concerted effort and stewardship, and ultimately is a function of our institutional quality. Donations to MIT have increased very substantially during the five years of the *Campaign for the future*, and our endowment has grown from \$1.2 billion to \$1.6 billion in market value over that period, while total invested funds have increased in market value from \$1.4 billion to \$1.95 billion.

The state of the budget is crystallized when we set tuition levels and, of course, when we balance costs and revenues. Flattening research income, despite the increase in private support, has left us in a position in which there is nearly a direct relationship between annual tuition increases and the magnitude of faculty and staff salary increases. This is not a healthy circumstance. I believe that we must constrain the rate at which tuition grows, but also that we must retain our ability to pay the salaries and wages required to retain and appropriately reward faculty and staff of the highest quality. This dilemma must be resolved.

MIT's endowment grows through the receipt of gifts and the investment of its funds. During the period of the *Campaign for the future*, we have done well by both measures. For example, we have been able to create 58 new full professorial chairs and 33 career development professorships. Each year we spend a portion of the interest earned by the endowment equaling between 4.5 and 5.0 percent of its principal. Of course, on the average, the endowment earns more than this, but by policy we plow the difference back into the principal of the endowment so that it will grow at least at the rate of inflation. In this way, we maintain the purchasing power of the endowment over time so that, for example, professorial chairs and student fellowships retain their value in perpetuity.

America's research universities must respond to these changing conditions, but more importantly, have a responsibility to help shape policies and programs in the national interest.

There are two key measures to consider when we attempt to balance our operating budget—the *deficit* and the *operating gap*. The operating gap is the difference between our expenditures and directed revenues such as tuition, research funds, fees for service, and most endowment income. This gap must be filled by discretionary resources in the form of annual unrestricted gifts, grants, and bequests. If the addition of these discretionary resources still does not bring our available resources to the level of our expenditures, we are left with a deficit. For the past 15 years, the operating gap has averaged around \$5.7 million, but for the last three years this gap has ranged between \$9 million and \$13 million. The deficits between 1976 and 1988 were very modest, averaging nearly zero, with small surpluses in a few years. In 1989 and 1990, deficits grew to around \$4.5 million. In 1991 we were able to bring it down to \$300,000, but only because there was an unexpectedly large amount of unrestricted gifts and bequests received that year to fill the operating gap. In 1992 our deficit grew to \$6.3 million.

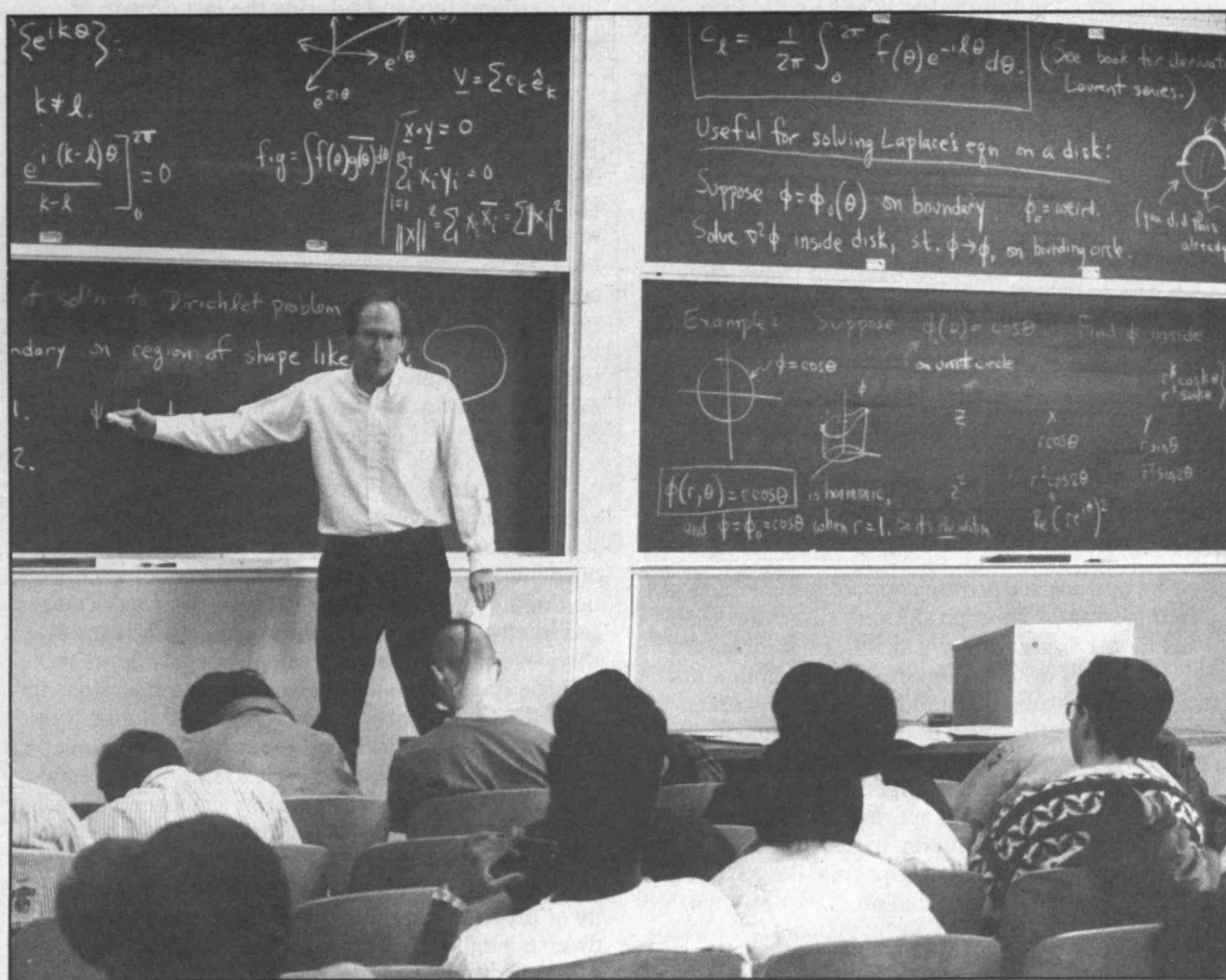
The result of recent budgetary pressures, therefore, has been that our annual deficit has been running at about \$5 million and is projected to increase further. This is troubling. Despite the fact that this is less than one percent of the campus operating budget, it is clear to all who have observed the federal deficit that, if unchecked, its effect will grow over time and leave an unfair penalty for the Institute in the downstream years. In my view, however, it is the development of a decidedly substantial, structural operating gap of at least \$10 million that is of the most serious concern. The use of much of our annual, unrestricted gift income to fill the operating gap represents a loss of flexibility to fund new initiatives, to seed innovative educational and research projects, and to ameliorate our growing financial aid burdens. It also does not bode well for the appropriate compensation of faculty and staff if this situation is left unchecked.

Growth

A recent examination of the growth of faculty, students, and staff at MIT over the last 15 years indicated that in many ways our trends are similar to those of other major research universities around the country, although in one important measure, faculty size, we are somewhat distinct. We have maintained an essentially constant faculty headcount during this period while many other institutions expanded. Currently, we have 966 assistant, associate, and full professors, 73 percent of whom are tenured. The discipline of maintaining this constant faculty size, I believe, has lessened the depth of financial pressures at MIT relative to that at some universities, but it has not eliminated them.

MIT's undergraduate enrollment has stayed essentially stable at 4,300, while our graduate enrollment has grown by almost 1,000 to 5,200—during this period.

As at virtually every other research institution, there has been an increase in staff during this 15 year period, especially during the first few years. Administrative, support, and service staff have increased roughly 7 percent, from 3,699 in 1976 to 3,976 in 1991. Why? This growth was the result of



Brooks Kraft

such factors as an increase in services required by faculty for their research and educational activities, a 70 percent growth in the headcount of other academic staff,* the increasing bureaucratic overhead required to conduct sponsored research programs and to comply with the upward spiral of federal regulation, the establishment of a pervasive computing environment, the establishment of a major organization for fund raising, and the development of a comprehensive medical department. Simply put, we have grown in complexity in response to enhanced internal needs and expectations and to externally imposed requirements. Unfortunately, many of these new tasks have not brought with them new revenues.

It is fair to say that by far the bulk of growth of administrative, support, and service staff has been driven by academic needs. Indeed, the size of the staff on the administrative side of the house (i.e., those reporting to the vice presidents) is at virtually the same level (2,200) as in 1976, having grown slightly and then been reduced in the early 1980s. The administrative, support, and service staff in the academic sectors (schools, departments, and laboratories), however, has grown by 16 percent—from 1,481 to 1,721—during this period, reflecting the increasing need and demand for academic support services. Similarly, research staff increased in headcount by 47 percent—from 650 to 953. Each of these additions has been a conscious, local decision, ultimately agreed to through the deans or directors and the provost.

Revenue Enhancement

There are only two ways to bring a budget into balance—increase revenues or cut costs. In my view, both are called for at the present time. In examining both options we must always remember the obvious—our mission is not a financial one; it is one of teaching, research, and service. Our revenues are only the means to an end, and the structure of our budget should be a direct reflection of our substantive goals and aspirations.

I am confident that the excellence of our faculty and students and the quality and innovative nature of faculty activities will assure that our federal research support will remain strong. But there are two caveats. First, by small step upon small step, federal agencies are backing away from paying the full costs of the programs that they sponsor, including research and fellowships. Second, the directions of federal research policy are in flux as a natural consequence of the end of the Cold War era and because of the advent of new concerns associated with issues such as the environment, health care, and industrial competitiveness. America's research universities must respond to these changing conditions, but more importantly, have a responsibility to help shape policies and programs in the national interest.

There are many object lessons and reasons for optimism in recent MIT initiatives. Let me cite two—the Leaders for Manufacturing Program and the MIT Japan Program. Leaders for Manufacturing is an innovative master's level program designed and implemented in close working partnership with several US manufacturing firms to educate a new breed of managers and engineers equipped with a broad, integrated understanding of manufacturing and management science, technology, and organization in a contemporary, international context. The MIT Japan Program provides a number of MIT undergraduates with in-depth Japanese language training, combined with education in Japanese culture, history, and business practice, and places them, upon graduation, as interns in Japanese industrial and research organizations. These students then return to the US with a detailed working knowledge and understanding of Japanese practices and techniques, as well as with the general benefits of international acquaintances and cultural experiences. Both of these programs respond to a clear national need; both are conducted in a world-class manner; and both have created very substantial new revenue streams for operations and student support, because the importance and effectiveness of the investment have been made clear to corporations and to the government. It also should be noted that both are primarily educational activities.

We should move forward with confidence that programs conceived with excellence, educational innovation, and long-term economic and social relevance will still find appropriate partners and sponsors. These partners and sponsors should come increasingly from the private sector, but it would be unrealistic to imagine that this will to a major extent replace federal funding. It remains a necessary function of the federal government to support the advanced education and research on which the future so directly depends.

We and our colleagues must continue to press for federal support of the full costs of programs, and to press for merit as the prime determinant of grants, contracts, and facility funding. Academic earmarking has reached the extraordinary level of nearly a billion dollars in the new federal budget—more than was contained in the total of budgets during the previous decade. Although we must recognize legitimate concerns such as geographic distribution, it is not in the interest of the country to cut off the tops of its mountains in order to fill in the valleys. Surely the wisest policy for the country cannot be

*Other academic staff includes instructors, technical instructors, lecturers and senior lecturers, adjunct faculty, visiting faculty, postdoctoral fellows and associates, senior research scientists, visiting scientists, coaches, and medical staff.

random selection for awards, based on the location of schools in particular congressional districts, and funded with monies removed from the already stressed resources of programs and agencies. The great public and private institutions must be maintained. They are magnets for the best thinkers and researchers, and their facilities and graduate schools are the peaks of excellence to which students from schools and colleges all over the country aspire and matriculate. The set of these institutions is dynamic, with new universities moving into its ranks the old fashioned way—by hard work and good ideas.

Having said this, the clear prognosis remains that the rate of growth of federal funds is being attenuated and the number of universities capable of productively conducting high-quality research and education is expanding. Substantial growth in overall research funding is therefore unlikely in the near term.

The outlook for private support is something of a mixed message. Through the very successful *Campaign for the future*, we have significantly increased MIT's level of private support. Our alumni, alumnae, as well as our staff and faculty, have worked very hard and effectively to make this happen. We must meet the challenge of continuing the momentum generated by the campaign. Resource development will need to become more deeply ingrained in the MIT culture. Continuing to increase the level of private support will be a strong challenge, but one that I have confidence we can meet.

The other side of private support, of course, is that the real value of our endowment depends on the performance of the market and the quality of our investment strategies. Our track record is good, but it also appears to most observers that returns will not be as great in the coming years as those that were possible during the last decade. Thus, major expansion of private support is somewhat problematic.

... the only way to assure that we maintain excellence and have the flexibility to strike out in exciting new intellectual directions, to be a high quality employer of faculty and staff, and, above all to meet our responsibilities to our students and the nation, is to do less, do different things, or gain efficiency. In my opinion, we must do all three.

Learning Institutions

We cannot assume that the resources of universities in general, and of MIT in particular, will grow significantly in the years immediately ahead. Thus, the only way to assure that we maintain excellence and have the flexibility to strike out in exciting new intellectual directions, to be a high quality employer of faculty and staff, and, above all to meet our responsibilities to our students and the nation, is to do less, do different things, or gain efficiency. In my opinion, we must do all three. Indeed, there is no choice. We must be as open to new ways of thinking about how we operate and how we teach as we are to new lines of research and scholarly inquiry.

Universities must thoughtfully and continuously review and prune their programs and organizations in addition to creating new ones as times and intellectual frontiers change. Similarly, we must continuously review and renew the services that we provide to our faculty and students. Only in this way can we assure the excellence of what we are and what we do.

I am fond of quoting Frederick Terman, an MIT alumnus who became engineering dean and provost at Stanford. When once asked whether he wanted his university to be a teaching institution or a research institution, he replied that it should be a learning institution. Today, universities must also be learning organizations in the sense developed by Peter Senge of the Sloan School of Management: organizations that come to understand and react wisely to the opportunities and constraints they face. We must study the work of our own management scholars and we must learn from the substantial transformations of industries and other organiza-

tions around the world during the last decade or two.

The MIT Ad Hoc Faculty-Administration Committee on Indirect Costs and Graduate Student Tuition, for example, has proposed an MIT Quality Initiative to adopt the principles and lessons of Total Quality Management (TQM) within the Institute. I would use the term 'adapt' rather than 'adopt,' because we are a university, not a manufacturing or commercial service organization. However, the results of quality initiatives in a variety of settings have been so substantial that we cannot afford not to commit ourselves to serious exploration, experimentation, and implementation of these concepts and techniques.

In fact, there are three major areas in which such activities are already underway. First, the entire Information Systems group has for several months been studying and planning full-scale implementation of a TQM program to improve their service to the Institute community and to gain efficiencies in their operations. Second, campus departments that provide human services, ranging from Admissions to the MIT Press, and from Personnel and Public Relations to the Medical Department, have been meeting and working with external and internal experts to develop an approach to quality management that is appropriate for the MIT culture and that merges with their Building on Differences program—a program designed to enhance productivity and the quality of professional life in an organization of highly diverse individuals. Third, a faculty initiative resulted in a major grant from the IBM Corporation that made possible a week-long seminar in their facilities that was attended by 50 faculty members and 25 staff and administrators from MIT in early September. The opportunity for this cross section of the Institute community to study and plan together how to enhance the excellence of all that we do as an institution was extraordinary. We shall build upon the momentum developed by this group.

It is my belief that we must increasingly consider and operate MIT as an integrated organization. Our faculty, students, and staff must act more as a seamless community. Despite the fact that we must always be an environment in which individual achievement and disciplinary excellence are fostered, we must pay increasing attention to integrated activity and teamwork. In research and education, new approaches to teamwork and interdisciplinary problem solving are flowing naturally from the complexity of many of the most interesting areas of modern research and scholarship. Similarly, institutional complexity and constraint require that we approach our administrative support activities with greater communality of purpose and explicit cross linkage.

We must in these and many other ways seek to improve the quality and efficiency of our support services. But these efforts must also touch the heart of what we do—teaching and research. Are we teaching the right courses in the right way? Do we maintain archaic approaches to classrooms and labo-

ratories? Are we making the appropriate use of the very information technologies that we develop here? Is the information flow among faculty, students, and administrators designed to enlighten or to generate entropy? Can we gain greater efficiency in the more mundane of our duties in order to free time and resources for the really important aspects of academia? Do we have too many committees? Do we have the proper balance of formal and informal contact with our students? Are research proposals prepared in such a way that faculty can concentrate on their essence and quality rather than the bureaucratic details? Do we communicate effectively with the public, the government, the business world, and our alumni and alumnae? Are there redundancies in our operations? Do we consciously determine where we should cut back in order to make new programs possible? Do we maintain the proper balance of teamwork and individual activity? Do we allow responsibility to be exercised and decisions made at the levels where knowledge and understanding are greatest? Do we strike the congruence between the goals and needs of the Institute as a whole with those of individuals within it? Do we plan for, and invest our intellectual and financial resources in the future, or squander them on issues of the moment? Do we learn and improve as an organization as well as individually?

Ensuring the Future

Our times are times of change and uncertainty... and promise. In four decades, we have moved from an era in which the United States produced over half of the world's gross product to one in which we produce just over 20 percent. It is a world in which challenges of energy, environment, and human survivability are becoming paramount. It is a world in which idealism and concern for our fellow men and women have become rare commodities.

And yet, it is a world in which our understanding of the basic nature of life and of the physical universe is expanding exponentially. It is a world in which the integration of knowledge across seemingly disparate disciplines is producing startling new insights and intellectual directions. It is a world in which the range of temporal and physical scales with which engineers and scientists can operate has become vast beyond belief. It is a world in which the blending and cross currents among men and women of different races and cultures can give rise to new synergies for the advancement of civilization.

It is a world in which we at MIT can and must dream of new futures. And as we do, we must cherish those values that have made us great. We must demand excellence. We must celebrate both the solitary, iconoclastic scholar and the multi-disciplinary group. We must value both abstract thought and practical application. We must treasure both the diversity of our community and the communality of our deeply rooted values. We must, in sum, hold to a vision of MIT that draws on the best we have and the best we are, and that gives to the world the full measure of our talent and imagination.



L. Barry Hetherington

These are the things that are at stake as the economic and societal underpinnings of the American research university, and of MIT in particular, shift and change. These changes must be met with a clear-headed view of financial realities. We must be both prudent and farsighted, and we must act carefully but decisively to shape our finances, our activities, and our organization in order to retain and enhance the excellence that is so critical to a vibrant future for ourselves and for our fellow men and women.

Charles M. Vest
October 1992

In Special Recognition

This eventful year saw a number of changes within the faculty and staff of MIT, including the appointment in June of a new Dean of the School of Architecture and Planning.

He is Professor William J. Mitchell, who came to MIT from his post as Director of the Master in Design Studies Program at Harvard University Graduate School of Design. Prior to his association with Harvard in 1986, he was on the faculty at the University of California at Los Angeles, where he was Head of the Architecture/Urban Design Program from 1980 to 1986. A native of Australia, he was educated at the University of Melbourne, Yale University, and the University of Cambridge. His scholarly interests include computer-aided design and urban planning, and he has been active in professional activities related to these interests.

Professor John de Monchaux concluded his term as Dean of the School of Architecture and Planning after almost 11 years in that role. Professor de Monchaux remains at MIT as a professor in the Departments of Architecture and Urban Studies and Planning. During his tenure as dean, Professor de Monchaux contributed to the leadership of the Institute in a wide range of matters, with a particular interest in the physical appearance of the campus. In his School, he has provided exemplary leadership in effectively addressing the urgent problems of financial aid, academic computing, affirmative action, and space.

This past year, the Provost announced a major reorganization in the administration of undergraduate education and academic support under which those activities, as well as graduate education, now report directly to the Provost.

Professor Sheila E. Widnall was named Associate Provost with responsibilities in several areas, including federal relations, international education, academic integrity, and faculty retirement, promotion and tenure policies. Dr. Widnall, Abby Rockefeller Mauze Professor in the Department of Aeronautics and Astronautics, has spent considerable time in Washington as a member of the National Academy of Sciences' Panel on Scientific Responsibility and the Conduct of Research and as past president of the American Association for the Advancement of Science.

Professor Arthur C. Smith, who had been Dean for Student Affairs or acting dean since July 1990, was appointed Dean for Undergraduate Education and Student Affairs. His expanded responsibilities include curriculum support, ROTC, UROP, and the writing requirement. Dr. Smith, professor of electrical engineering, former graduate officer in the Department of Electrical Engineering and Computer Science, and former chairman of the faculty, has long been an effective advocate for the Institute's students.

Resources used in preparing the president's essay included the Caspar Database of the National Science Foundation; *Science and Engineering Indicators*, 1991 Edition, National Science Board; *Science and Technology in the Academic Enterprise: Status, Trends and Issues*, October 1989; *Higher Education in a Changing Economy*, edited by K. H. Hanson and J. W. Meyerson, American Council on Education, 1990; *Inflation Measures for Schools and Colleges, 1991 Update*, Research Associates of Washington; *Higher Education Revenues and Expenditures, Institutional Data FY1990*, Research Associates of Washington; *Trends in Student Aid 1982-1992*, College Board; *Campus Trends 1992*, edited by Elaine El-Khawas, Higher Education Panel Report Number 82, July 1992, American Council on Education.



The Lamp, Exxon Publications

Under a new program named for the late Margaret L. A. MacVicar, MIT's first dean of undergraduate education—to honor her untiring efforts at MIT and nationally to enhance undergraduate education—six outstanding teachers were named MacVicar Faculty Fellows.

Professor S. Jay Keyser, who has been Associate Provost for Educational Programs and Policy since 1985, was given the new title of Associate Provost for Institute Life, with a broad charter to build collegiality at MIT. He is focusing on the quality of life at the Institute, addressing, among other issues, the policy aspects and educational programs on how to deal with harassment. Dr. Keyser is the Peter de Florez Professor of Linguistics in the Department of Linguistics and Philosophy.

Professor J. David Litster, who had served as interim Vice President for Research since January 1991, was appointed Vice President and Dean of Research. He continues his supervision of many of the university's major interdisciplinary research centers, as well as the Technology Licensing Office and, as dean, the Whitaker College of Health Sciences and Technology. He is a professor of physics and has served as director of the Francis Bitter National Magnet Laboratory.

New department or academic program heads announced during the past year were:

Rafael L. Bras, Head, Department of Civil Engineering; Phillip L. Clay, Head, Department of Urban Studies and Planning; Stanley B. Kowalski, Director, Bates Linear Accelerator Center; Richard C. Larson, Co-director, Operations Research Center; Ronald M. Latanision, Chair, Council of Primary and Secondary Education; Steven R. Lerman, Director, Center for Educational Computing Initiatives; Kenneth A. Oye, Director, Center for International Studies; Robert P. Redwine, Director, Laboratory for Nuclear Science; Harriet Ritvo, Associate Dean, School of Humanities and Social Science; Richard J. Samuels, Head, Political Science; Yosef Sheffi, Director, Center for Transportation Studies; Merritt Roe Smith, Director, Program in Science, Technology and Society; John B. VanderSande, Associate Dean, School of Engineering; and William C. Wheaton, Director, Center for Real Estate.

Among key changes in the administration during the past year were the appointments of Sarah M. Carothers to Director of Development in the School of Science; Kathleen R. Cibotti as Director of Administrative Systems Development within Information Systems; John C. Crowley as Special Assistant to the President and Director of the MIT Washing-

ton Office; Gregory A. Jackson as MIT's first Director of Academic Computing; and Steven J. Marcus as the Editor in Chief of *Technology Review*. Also announced were the promotions of Stanley G. Hudson to Director of Student Financial Aid, and Donna M. Ticchi as Assistant Dean for Financial Administration within the School of Science.

The honors and achievements of MIT faculty and staff are so numerous that, in this part of the report, I mention only some of the individual efforts and awards which have given such distinction to the Institute.

Under a new program named for the late Margaret L. A. MacVicar, MIT's first dean of undergraduate education—to honor her untiring efforts at MIT and nationally to enhance undergraduate education—six outstanding teachers were named MacVicar Faculty Fellows. This honor is in recognition of their exemplary and sustained contributions to undergraduate education. The first MacVicar Faculty Fellows (about six to eight are to be selected each year, with the program eventually supporting 60 to 80 fellows at one time) are: Professor Harold Abelson of the Department of Electrical Engineering and Computer Science; Professor Edward F. Crawley of the Department of Aeronautics and Astronautics; Professor Daniel S. Kemp of the Department of Chemistry; Professor Arthur P. Mattuck of the Department of Mathematics; Professor John B. Southard of the Department of Earth, Atmospheric, and Planetary Sciences, and Professor Graham C. Walker of the Department of Biology.

Dr. Paul E. Gray, chairman of the MIT Corporation, received one of Japan's highest honors, the Imperial Decoration, Grand Cordon of the Order of the Sacred Treasure, on June 23, 1992. This recognition from the Emperor of Japan was for his efforts over the years to promote friendly relations and mutual understanding between the United States and Japan. Other members of the MIT community who have been similarly honored by Japan include Dr. Jerome B. Wiesner, Institute Professor and president emeritus, professor emeritus Samuel A. Goldblith, former vice president for resource development, and Dr. George H. Buchi, professor emeritus of organic chemistry.

President Bush awarded the National Medal of Science posthumously to Salvador Luria, Institute Professor emeritus and Nobel laureate, who died February 6, 1991. The award was for a lifetime devoted to applying genetics to viruses and bacteria, and for guiding the development of generations of students who have helped create the modern power of molecular biology.

President Emeritus Jerome B. Wiesner received the 1992 Vannevar Bush Award from the National Science Board, the policy-making body of the National Science Foundation. The Bush Award is given in recognition of outstanding contributions in science and technology that are significant to the welfare of mankind and the nation. Dr. Wiesner, a former science advisor to Presidents John F. Kennedy and Lyndon B. Johnson, has played a leading role in fostering public understanding of the risks of the nuclear age and in efforts to reduce those risks.

Two faculty members and a member of the research staff were elected to the National Academy of Engineering: Stanley Backer, professor emeritus and senior lecturer in the Department of Mechanical Engineering; Elisabeth M. Drake, associate director, MIT Energy Laboratory; and Robert S. Langer, Jr., Germeshausen Professor of Chemical and Biomedical Engineering, Department of Chemical Engineering. Their election brought to 106 the MIT membership in the NAE.

Eight faculty members were elected to the National Academy of Sciences: Jerome I. Friedman, Institute Professor and professor of physics; Robert G. Gallager, Fujitsu Professor of Electrical Engineering and codirector of the Laboratory for Information and Decision Systems; Henry W. Kendall, Julius A. Stratton Professor of Physics; Robert S. Langer, Germeshausen Professor of Chemical and Biomedical Engineering; George Lusztig, professor of mathematics; Robert D. MacPherson, professor of mathematics; Richard R. Schrock, Frederick G. Keyes Professor of Chemistry; JoAnne Stubbe, Ellen Swallow Richards Professor of Chemistry and professor of biology. The eight from MIT were the most from any university; their election brought to 96 the number of NAS members from MIT.

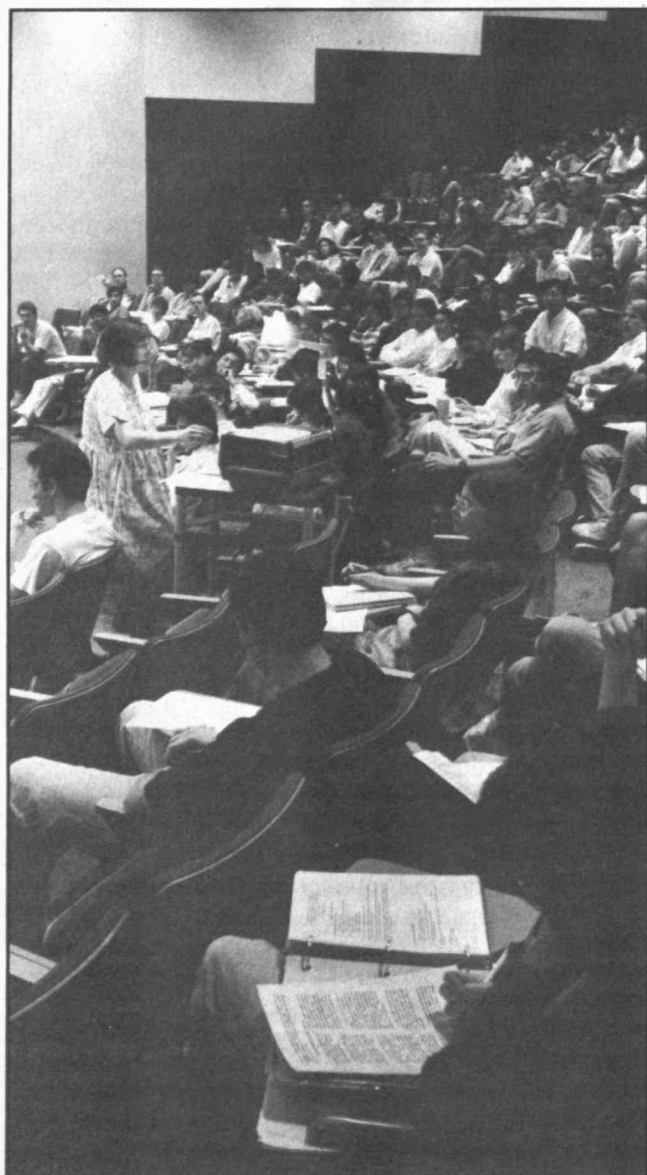
Ten MIT faculty members were elected as Fellows of the American Academy of Arts and Sciences: Professors George S. Boolos (Linguistics and Philosophy); H. Kent Bowen (Materials Science and Engineering); Sylvia T. Ceyer (Chemistry); Sallie W. Chisholm (Civil Engineering); Rudolph Jaenisch (Biology); Paul R. Krugman (Economics); Barbara H. Liskov (Electrical Engineering and Computer Science); Robert D. MacPherson (Mathematics); Robert Stalnaker (Linguistics and Philosophy); and Jack Wisdom (Earth, Atmospheric, and Planetary Sciences). Their election brings to 219 the number of active and emeriti faculty members who are Academy Fellows.

Professor Paul R. Krugman of the Department of Economics received the John Bates Clark Medal, given biannually by the American Economic Association to the economist under 40 who has made the most important contributions to economics. Dr. Krugman has made important contributions in many areas, including both the microeconomics and macroeconomics of international relations.

Professor Peter S. Eagleson, recognized internationally for his work in hydrology and hydroclimatology, was selected as the 1992-93 recipient of the James R. Killian Jr. Faculty Achievement Award, which recognizes extraordinary professional accomplishments and service to MIT. The selection committee's citation noted that Dr. Eagleson has led the extension of hydrology from the local into the regional and global scales.

Dr. Henry Jenkins, assistant professor of literature, was named the 1992 recipient of the Harold E. Edgerton Faculty Achievement Award, given annually to a junior faculty member in recognition of exceptional teaching, research, and scholarship. Professor Jenkins is a leader and founder of a new area of scholarship centered on the relation between the narrative arts and the mass media and their audiences.

Eight faculty members were elected to the National Academy of Sciences ... Ten MIT faculty members were elected as Fellows of the American Academy of Arts and Sciences ...



Bradford F. Herzog

The Institute was saddened this year by the deaths of several longtime friends and colleagues.

Dr. Benjamin L. Averbach, professor of materials science and engineering, emeritus, died of cancer on April 1, 1992, at the age of 73. Dr. Averbach joined MIT in 1945 as a research assistant in what was then called the Department of Metallurgy and received the Sc.D. from MIT in 1947. An active and highly respected consultant with industry, he was involved with the development of new materials with high-fracture toughness for bearings used in high-speed aircraft engines and gears and in advances in magnetic and optical recording.

Yaichi Ayukawa, a Life Member of the MIT Corporation who worked tirelessly to build strong ties between the United States and his native Japan, died of a stroke on November 30, 1991. He was 68. Dr. Ayukawa received his S.M. in food technology from MIT in 1955 and the Ph.D. in food technology and industrial management in 1957. He served two five-year terms on the Corporation and was elected to Life Membership in 1987.

Dr. Alan H. Barrett, professor of physics, emeritus, died of cancer July 3, 1991, at the age of 64. He was widely known for his scientific contributions to the field of radio astronomy and to the radiometric study of the interstellar medium. Professor Barrett was an MIT faculty member from 1961 to his retirement in 1987.

William A. Coolidge, a philanthropist and corporate executive, died on May 24, 1992, at the age of 90. He was elected a term member of the Corporation in 1948 and a Life Member in 1953, becoming a Life Member Emeritus in 1976. He served 14 years as a member of the Executive Committee. In recognition of his contributions to the Institute, one of the new West Campus Houses was named for him in 1977.

Dr. Daniel M. Holland, professor of finance, emeritus, at the Sloan School of Management and a widely known expert on taxation and public finance, died of a heart condition on December 15, 1991. He was 71. Professor Holland was an MIT faculty member from 1958 until his retirement in 1986, when he became an emeritus professor and senior lecturer. He also served as an assistant to the provost from 1986 to 1990.

Dr. Merrie G. Klapp, a research affiliate and former associate professor in urban studies and planning, died December 9, 1991 at the age of 41, of brain cancer. Her intellectual interests spanned the fields of architecture, mechanical engineering, semiotics, communications, environmental policy, and political science. Professor Klapp was appointed an assistant professor in 1982 and in 1989 became an associate professor.

Professor Margaret L. A. MacVicar, the educator and scientist who founded MIT's famous Undergraduate Research Opportunities Program (UROP), died September 30, 1991, after a year-long battle with cancer. She was 47. As MIT's first dean for undergraduate education, the position to which she was appointed in 1985 and held at her death, she headed the Institute's ongoing comprehensive review and restructuring of its undergraduate academic program. Dr. MacVicar came to MIT as a student in the fall of 1961, received the Sc.D. in metallurgy and materials science in 1967, and was appointed to the faculty in the Department of Physics in 1969. Professor MacVicar was known for her outstanding teaching and, in 1973, she was the first recipient of the Class of 1922 Career Development Award, endowed by class alumni to support young faculty members of exceptional promise and unusual devotion to teaching. In 1977, she received the Irwin Sizer Award for the most significant contribution to education at MIT. On the national scene, she provided leadership for a number of groups over the years, including serving as vice president of the Carnegie Institution, as a trustee of the Carnegie Foundation for the Advancement of Technology, and as a member of the Carnegie Council on Policy Studies in Higher Education.

Frank R. Milliken, Life Member Emeritus of the MIT Corporation and former head of the Kennecott Copper Corporation, died of a heart attack on December 4, 1991. He was 77. Mr. Milliken's association with the MIT Corporation began in 1954 when he became a member of the Visiting Committee for Geology and Geophysics. He was elected a member



Brooks Kraft

of the Corporation in 1962, became a Life Member in 1977, and, at his own request, transferred to Life Member Emeritus in 1986.

Dr. John C. Sheehan, professor of chemistry, emeritus, whose chemical synthesis of penicillin at MIT in 1957 led to the development of many tailor-made forms of the drug, died March 28, 1992, of congestive heart failure. He was 76. In 1946, he began a 31-year teaching career at MIT, eventually becoming professor of organic chemistry emeritus and senior lecturer in 1977. He was a scientific advisor to Presidents John Kennedy and Lyndon Johnson from 1961 to 1965, serving on a number of presidential advisory committees.

Robert C. Sprague, founder of the Sprague Electric Company, holder of the S.M. in naval architecture from MIT and a Life Member Emeritus of the MIT Corporation, died on September 27, 1991, at the age of 90. Mr. Sprague was first elected to the MIT Corporation in 1953, becoming a Life Member two years later and Life Member Emeritus in 1975. At various times he served on the executive committee, the membership committee, and the auditing committee, as well as chairing several visiting committees.

Dr. Bertram E. Warren, professor of physics, emeritus, died June 27, 1991, the day before his 89th birthday. He was recognized for his contributions to the science of using x-rays to study the structure of matter. Professor Warren earned three degrees from MIT. While studying for the Sc.D., which he received in 1929, he was appointed an instructor in the Department of Physics and remained a member of the department for his entire career. He became a full professor in 1939 and professor emeritus in 1967.

Edwin C. (Jack) Whitehead, founder of the MIT-affiliated Whitehead Institute for Biomedical Research and a Life Member of the MIT Corporation, died February 2, 1992, of a heart attack. He was 72. In 1982, Mr. Whitehead, a cofounder with his father of Technicon Corporation, a pioneer in scientific and clinical instrumentation, founded the Whitehead Institute, a nonprofit, independent basic research and teaching institution affiliated with MIT in its teaching activities but responsible for its own facilities and finances. In its short history, the Whitehead Institute has become one of the world's most prestigious and productive basic biological research organizations.

Dr. Hurd C. Willett, professor of meteorology, emeritus, renowned for his role in developing five-day weather forecasting techniques and widely known for his attempts at very-long-range forecasting, died on March 26, 1992. He was 89. Professor Willett, who joined the MIT staff in March 1929, specialized in climatic fluctuations and variable solar influences in his long-range forecasting. For several years, the press carried his annual predictions of what the weather would be over the next 12 months.

Dr. Glenn C. Williams, professor of chemical engineering, emeritus, died on July 2, 1991, of an aneurysm. He was 76. Dr. Williams began teaching at MIT in 1940, two years before receiving the Sc.D., and was an authority on missile propulsion. He headed MIT's Torpedo Fuel Laboratory during World War II, work that was recognized with the Navy Ordnance Development Award, and he later served as director of the MIT Fuels Research Laboratory. For many years he was the graduate officer of the Department of Chemical Engineering.

Statistics for the Year

Registration

In 1991-92 student enrollment was 9,541, compared with 9,628 in 1990-91. There were 4,325 undergraduates (4,389 the previous year) and 5,216 graduate students (5,239 the previous year). The international student population was 2,117, representing 9 percent of the undergraduate and 33 percent of the graduate populations. These students were citizens of 103 countries. (Students with permanent residence status are included with US citizens.)

In 1991-92, there were 2,589 women students (1,433 undergraduate and 1,156 graduate) at the Institute, compared with 2,593 (1,451 undergraduate and 1,142 graduate) in 1990-91. In September 1991, 368 first-year women entered MIT, representing 35 percent of the freshman class of 1,053 students.

Degrees awarded by the Institute in 1991-92 included 1,039 bachelor's degrees, 1,137 master's degrees, 31 engineer's degrees, and 514 doctoral degrees—a total of 2,721 (compared with 2,771 in 1990-91).

In 1991-92, there were, as self-reported by students, 2,052 minority students (1,643 undergraduate and 409 graduate) at the Institute, compared with 1,978 (1,582 undergraduate and 396 graduate) in 1990-91. Minority students included 347 African Americans (non-Hispanic), 34 Native Americans, 423 Hispanic Americans, and 1,248 Asian Americans. The first-year class entering in September 1991 included 457 minority students, representing 43 percent of the class.

Degrees Awarded

Degrees awarded by the Institute in 1991-92 included 1,039 bachelor's degrees, 1,137 master's degrees, 31 engineer's degrees, and 514 doctoral degrees—a total of 2,721 (compared with 2,771 in 1990-91).

Student Financial Aid

During the academic year 1991-92, the financial aid program reflected the increased need of undergraduate students. A total of 2,473 students who demonstrated need for assistance (56 percent of the enrollment) received \$28,327,000 in grant aid and \$10,278,000 in student loans from all sources. The total, \$38,605,000, represents a 10 percent increase in aid compared to last year.

Grant assistance to undergraduates was provided by \$8,475,000 in income from the scholarship endowment; \$859,000 in outside gifts; federal grants (including ROTC scholarships) totaling \$3,151,000; and \$2,072,000 in direct grants from non-federal outside sources to needy students. In addition, \$13,769,000 in scholarships from MIT's unrestricted funds was provided to undergraduates, inclusive of the special program of scholarship aid to needy minority group students, which represented \$275,000, and the MIT Opportunity Awards, which accounted for \$928,000. An additional 452 students received grants irrespective of need from outside agencies totaling \$2,088,000. The undergraduate scholarship endowment was increased by the addition of \$6,582,000 in new funds (more than last year's increase), raising the principal of the endowment by 10 percent to \$75,090,000.

Loans totaling \$9,619,000 were made to undergraduates, a 6 percent increase from last year. Of this amount \$1,291,000 came from the Technology Loan Fund, \$2,856,000 from the Perkins Loan Program, and \$5,472,000 from the state-administrated Stafford Guaranteed Loan Programs and other outside sources.

Graduate students obtained \$2,570,000 from the Technology Loan Fund. In addition, \$841,000 was loaned by MIT under the Stafford Guaranteed Student Loan Program. The total, \$3,411,000, represents a 9 percent increase over last year's level. Graduate students obtained \$3,853,000 from outside sources under the Stafford Guaranteed Student Loan Program, 10 percent more than last year, and \$121,000 from federal Supplemental Student Loans. Graduate students also received \$1,536,000 in Perkins Loan funds.

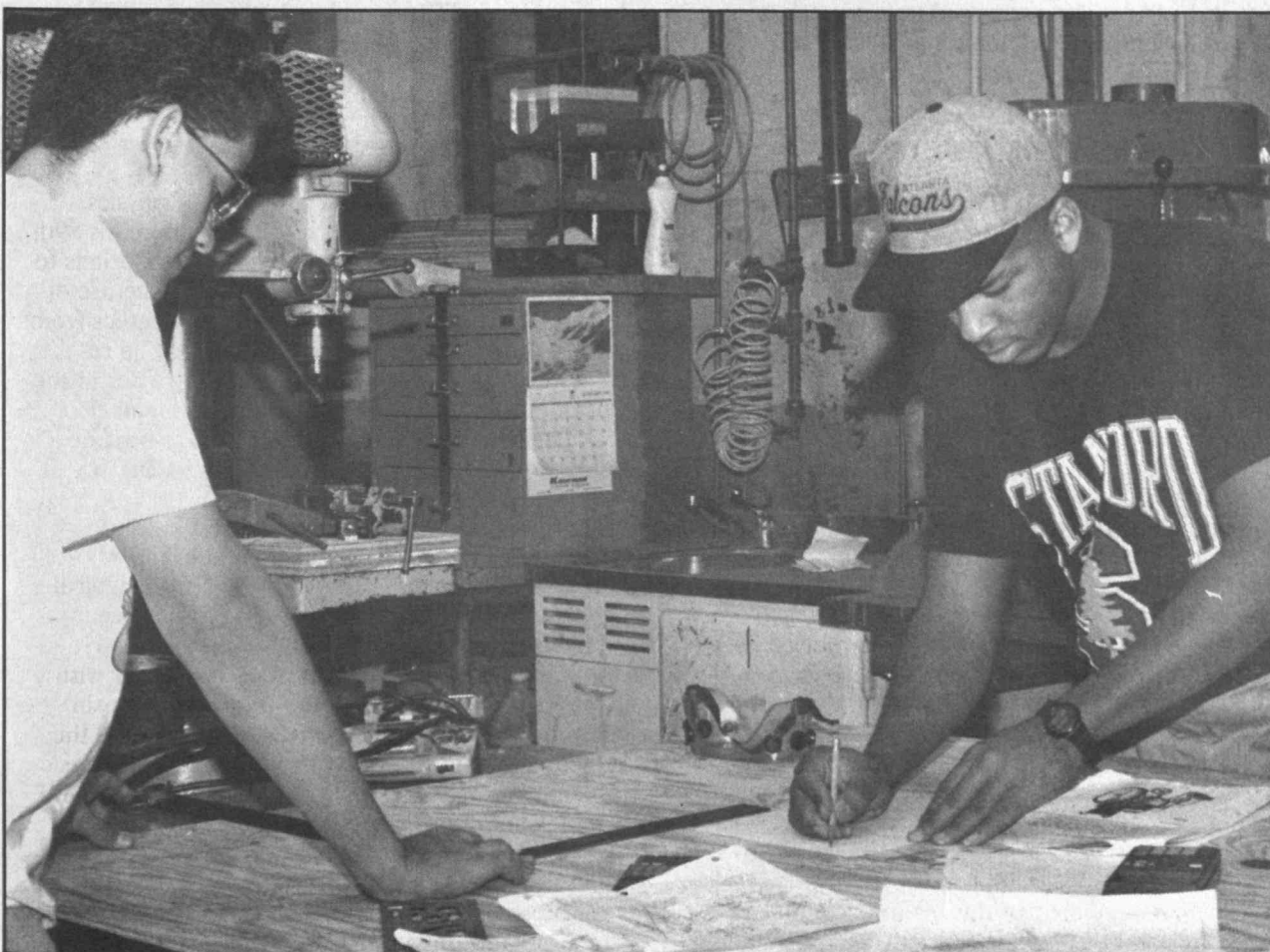
The total amount of loans made to undergraduate and graduate students was \$18,540,000, a 9.2 percent increase over last year.

For the first time in many years, the number of needy undergraduate students receiving aid decreased slightly. The average need, however, increased—reflecting, in part, the higher proportion of students from low income families. This year the percentage of freshmen coming from the lowest national income quartile was 23 percent, the largest proportion ever. In addition, the financial aid program funded the higher need of families as the recession deepened and unemployment increased.

The total need for financial aid for undergraduates was \$41,639,000. The average need for aid rose by 8.3 percent to \$16,765. In the aggregate, the financial aid program required \$19,427,000 from needy students' family resources, and provided \$41,639,000 in aid dollars. As in years past, the aid program accounted for two-thirds of needy students' total costs.



Brooks Kraft



Ruth T. Davis



Bradford F. Herzog

Career Services and Preprofessional Advising

For the second year in a row, the economic climate was not promising for graduating students entering the job market, or for students looking for summer jobs. The number of employers recruiting through the Careers Office totaled 371, a fraction less than last year's figure, which was down 20 percent from 1989-90. Nevertheless, as in previous recessions, MIT job seekers generally fared remarkably well. This was especially true of students in engineering and management. They continued to find good summer jobs and good jobs at graduation. Students in other disciplines felt the bite more sharply. The last two years have been difficult for graduates in architecture and urban studies, and the market has been extremely tight for Ph.D.s in mathematics and physics hoping for jobs in academia.

Salary offers in most fields moved up at less than the inflation rate. Students enjoying the largest gains were S.B.s in chemical engineering, who received offers 7 percent higher than the year before; S.M.s in mechanical engineering, who received offers nearly 8 percent higher; and Ph.D.s in electrical engineering, who found industry willing to make offers 15 percent higher.

There was a jump in the number of MIT applicants to medical school, paralleling an increase in the nation at large. Preliminary data show 131 MIT candidates, up from 119 at the same time last year. This year's candidates included 91 undergraduates, 2 graduate students, and 38 alumni. Of the undergraduates, 44, or very nearly half, were women; the graduate student and alumni candidates were divided exactly (20/20) between men and women. There was the same equal balance between men and women in 1991, when 83 percent of the women were accepted and 77 percent of the men. The increasing number of candidates in the nation at large has increased the odds a bit, but MIT's candidates are again likely to have done well.

Gifts

Gifts, grants, and bequests to MIT from private donors in 1991-92 totaled \$97.1 million. This amount includes cash, securities, and real estate gifts totaling \$89.9 million, and \$7.2 million of equipment gifts. The gifts reported by the Alumni Fund increased by 13.2 percent to a new record of \$17.1 million. This amount was more than twice the total just 10 years ago.

The *Campaign for the future* reached a successful conclusion at fiscal year end. The campaign total of \$710 million exceeded the original goal set five years ago by 29 percent and exceeded the new goal set 28 months ago by \$10 million. During the year, the campaign total of gifts and pledges increased by \$105 million as new pledges increased by more than payments toward outstanding pledges. The major objectives of the Campaign are support for faculty,

student financial aid, academic initiatives throughout the Institute, new and renovated facilities, and unrestricted funds. The success of the Campaign is due in no small measure to the active involvement of so many volunteers and faculty, as well as the dedication and hard work of the staff.

Finances

As reported by the Vice President for Financial Operations and by the Treasurer, the total financial operations of the Institute, including sponsored research, amounted to \$1.08 billion—a decrease of 0.2 percent from 1990-91. Education and general expenses—excluding the direct expenses of departmental and interdepartmental research and the Lincoln Laboratory—amounted to \$509.7 million during 1991-92, compared with \$488.5 million in 1990-91. The direct expenses of departmental and interdepartmental sponsored research on campus increased from \$229.4 million to \$231.5 million, and direct expenses of the Lincoln Laboratory's sponsored research decreased from \$367.7 million to \$342.1 million. Current revenues used to meet the Institute's operating expenses totaled \$1.07 billion, augmented by \$6.8 million in current gifts and \$6.3 million of other fund balances.

At the end of the 1992 fiscal year, the Institute's investments, excluding retirement funds, student notes receivable, and amounts due from educational plant, had a book value of \$1.5 billion and a market value of \$1.95 billion, compared to last year's book value of \$1.4 billion and market value of \$1.77 billion.



David Ludlow

Physical Plant and Campus Environment

Conservation of resources continues to be a major focus at the Institute. During the year, MIT joined the Environmental Protection Agency's Green Lights Program, which is aimed at reducing air pollution caused by emissions from electric-generating plants by reducing the overall demand for electricity. By joining this program, the Institute has committed to installing energy efficient lighting in 90 percent of its buildings, where it is cost effective, over the next five-year period.

In other conservation efforts, several water-saving initiatives were implemented this year, including the elimination of once-through cooling systems and the limited use of water from the Charles River for irrigation purposes. As a result of these and future efforts, the Institute should realize a 25 percent reduction in water usage.

The Campaign for the future reached a successful conclusion at fiscal year end. The campaign total of \$710 million exceeded the original goal set five years ago by 29 percent and exceeded the new goal set 28 months ago by \$10 million.

Progress continues on the construction of the Biology Building. The foundation was completed in late spring and work on the superstructure was underway at year's end. A 6,000 square-foot addition to Haystack Observatory was completed during the year, as was the total renovation of a property at 477-479 Commonwealth Avenue in Boston, which now houses 60 members of the Alpha Phi Sorority. Other major design and construction activities that took place during the year included a continuation of work at the former Cabot Building (Building E56) in the areas that will house the Dibner Institute and Burndy Library, and the permitting and design efforts on the proposed combined-cycle cogeneration project. The actual environmental permit for the cogeneration plant was received early in the spring. Major maintenance activities completed during the year included reconstruction of the concrete plaza surrounding the Compton Building (Building 26) and replacement of the roofing system on Building 1.

Issues associated with ever-increasing regulatory requirements regarding the environment, health, and safety continue to necessitate close monitoring to ensure that the Institute remains in compliance. As a result of recent passage of the Americans with Disabilities Act (ADA), which requires that any employer with 15 or more employees provide reasonable access for handicapped individuals, the Institute has established a committee to identify locations where access is difficult and make recommendations for overcoming the problems.