

Fossil Fuel Dangers Studied

By WILLIAM T. STRUBLE
Staff Writer

Can combustion processes for fossil fuels be engineered to produce soot of lower hazard to humans?

Are some fossil fuels intrinsically more dangerous in terms of the soot formed when they are burned?

To answer these questions, MIT has received a \$219,846 contract from the Energy Research and Development Administration to increase its efforts in genetic toxicology, using the latest technology in human cell mutation assays.

A multidisciplinary research team in three highly specialized MIT laboratories will carry out the investigation to provide an understanding of the relative advantages and health hazards of the use of fossil fuels—principally coal—as a primary energy source.

In particular, the research will focus on certain chemicals in soot—a group of organic compounds called polycyclic aromatic hydrocarbons (PAH)—many of which are known to cause genetic changes in bacteria. Several compounds of the PAH class are already known to cause cancer in lower animals.

ERDA's Division of Biomedical and Environmental Research is sponsoring the initial phase of this research, and expects to provide continuing support for the program in future years. Support of this research is part of an expanding ERDA program aimed at achieving a better understanding of the environmental and health risks resulting from increased use of coal and other fossil fuels.

The investigation will involve a joint effort of faculty in MIT's Department of Nutrition and Food Science, the Department of Chemical Engineering and the Department of Mechanical Engineering working together under the aegis of the MIT Energy Laboratory and in cooperation with the

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HANGING CURTAINS in Rockwell Cage for commencement is Tony Gedraitis, shade man in Physical Plant. He is standing on an electrical staging and taking the curtain from the block and tackle used to hoist it. Thirty-six curtains, each 22 feet long, are hung at the four walls of Rockwell Cage each year for commencement. Hanging the curtains takes five work days for three men; taking them down, another five work days for four men.

—Photo by Calvin Campbell

Energy Slogan Winners Named

"You can't refuel Mother Nature," submitted by Jennifer Cairns of Melrose, won first prize in the slogan contest sponsored by the Physical Plant energy conservation program at Employees Open House.

More than 200 slogan suggestions were entered in the competition. Announcement of the winners was made last week by the Physical Plant Energy Conservation Committee. Ms. Cairns won a director's chair with an MIT emblem for her entry.

Second prize winner was Rita Couture of Everett who received a pewter pitcher with an MIT seal for submitting "Let's save and reserve, think to conserve." Philip Green of the Physical Plant drafting group won third prize, a pewter bowl with an MIT seal, for his entry, "Be energy wise, economize."

In order to insure objectivity during judging, contestants names were removed from entries. The Energy Conservation Committee has expressed its thanks to all who participated.

1,200 to Graduate At Commencement

Approximately 1,200 seniors and graduate students will be awarded degrees at MIT's 111th commencement Monday morning, June 6.

Chairman of the MIT Corporation, Howard W. Johnson, will preside at the exercises to be held in MIT's Rockwell Cage beginning at 10:30am.

President Jerome B. Wiesner will give the commencement address and will present some 1,400 degrees (a number of graduates receive more than one degree), handing diplomas individually to graduates as their names are called by the deans of their respective schools.

Following commencement a reception for graduates, their families, friends, and faculty members will be held on Kresge Plaza.

Edward O. Vetter, president of the MIT Alumni Association, will be Chief Marshal, leading the academic procession and carrying the MIT mace.

Following Mr. Vetter will be members of the MIT Corporation, the faculty, guests of honor, and the principals. Guests of honor will include the deans of the five academic schools, the Dean of the Graduate School, the Dean for Student Affairs, the Registrar, and Dr. Paul M. Fye, director of Woods Hole Oceanographic Institution. MIT and Woods Hole offer joint programs of graduate study in many fields of oceanography and ocean engineering, leading to jointly conferred doctoral degrees.

Seated with the guests of honor will be the permanent officers of the Class of 1977—David A. Dobos of Columbus, Ohio, president; Bruce R. Ruotolo of Glen Ridge, NJ, vice president, and Douglas J. McLeod of Bellingham, Wash., secretary-treasurer—and Robert W. Mann, Jr., of Marblehead, Mass., president of the Graduate School Council.

In addition to Mr. Johnson and Dr. Wiesner, commencement principals will include Chancellor Paul E. Gray, Dr. James R. Killian, Jr., former chairman and now honorary chairman of the MIT Corporation, Cambridge Mayor Alfred E. Vellucci, and the Rev.

Larry Hill, religious counselor at MIT, who will give the invocation.

Professor Walter A. Rosenblith, provost, will be marshal of the guests of honor, and Professor John Ross, chairman of the faculty, will be marshal of the principals.

On Friday, June 3, commissioning exercises for 13 Army cadets, 14 Navy midshipmen, and five Air Force cadets will be held at 11am in Kresge Auditorium. The tri-service commissioning buffet luncheon will follow the ceremony at 11:45am in the Sala de Puerto Rico. MIT is one of a small number of schools to offer programs in all three major service branches.

Commencement time at MIT is also homecoming time for alumni. As many as 2,200 alumni and family members are expected to participate in some part of the annual alumni day program with about 1,400 alumni and family members returning for class reunions.

Technology Day on Friday, June 10, (formerly called Alumni Day) will highlight the work of some younger faculty members who are engaged in exploration of the fields of management and technological innovation, deep sea mining, the solar system, the environment, and computer music.

Photovoltaic Crop Irrigation To Be Tested

Early this summer, the nation's first crop irrigation system powered by solar photovoltaic cells—cells that convert sunlight directly into electricity—will go into operation on an experimental farm near Mead, Nebraska.

A unit designed by the MIT Lincoln Laboratory in Lexington will use approximately 120,000 solar cells to convert the sun's rays into electricity. This in turn will drive a 10 horsepower pump for irrigating 80 acres of corn and soybeans.

The irrigation experiment will be conducted by Lincoln Laboratory in conjunction with the University of Nebraska-Lincoln campus under sponsorship of the Photovoltaic Conversion Program, within the Division of Solar Energy of the Energy Research and Development Administration (ERDA). The ERDA Program Manager is Dr. Leonard Magid.

This experiment, the largest solar-cell-powered system built to date, will generate up to 25,000 watts peak power. The solar energy power unit will consist of solar cells arranged in two rows 325 feet long by eight feet high. Each row will be tilted to collect the sun's rays.

The solar cells will be connected to batteries in order to provide constant power to the pump motor despite large variations in the sunlight throughout the day. Inverters will convert the direct current (DC) electricity produced by the solar cells into alternating current (AC) required to power the pump motor and other loads.

The system will pump 1000 gallons of water per minute from a reservoir for a period of 12 hours a day during the irrigation season.

After the July-August irrigation

(Continued on page 8)

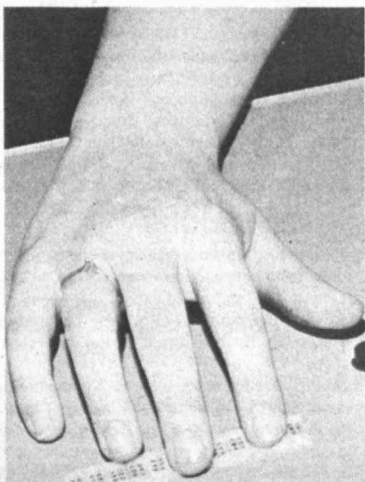
MIT Device Expands Job Horizon for the Blind

Blind since birth, Ann McDaniel, 21, has a chance to become the first sightless long-distance telephone operator—thanks to a device developed by MIT engineers.

Telephone operators use a computer console—shown in the foreground of this photo that appeared in the *Arkansas Gazette*, Little Rock—coupled to a video display. The MIT device has solenoid-operated pins, under Miss McDaniel's right hand (below), that give her in Braille the information a sighted person would read from the video display. An employee of Southwestern Bell Telephone Co., Little Rock, Miss McDaniel began training with the equipment May 20.

The MIT device was developed at the Sensory Aids Evaluation and Development Center and made available through Arkansas Enterprises for the Blind. Dr. Derek Rowell, director of the center, said the Braille display is expected to

expand greatly job opportunities for the blind. Any job that requires entering, manipulating or retrieving data or programs from a remote computer could be filled by a blind person—if a Braille display is used. George Dalrymple of the Sensory Aids Center developed the Braille display.



NSF Plays No Favorites: Husband, Wife Win Awards

By SUSAN E. WALKER
Staff Writer

It's not unusual for two students in the same department at MIT to win National Science Foundation graduate fellowships, but when they are married to each other—that's another story.

The unique couple are David and Judy Thompson, both aeronautics and astronautics majors in the Class of 1977. David graduated in February and Judy will receive her degree in June.

Even though Judy has not yet graduated they are both studying at Caltech this year. Both schools have been very cooperative. Judy is taking both undergraduate and graduate subjects, and MIT is applying her undergraduate credits towards her bachelor's degree. David is a first semester graduate student at Caltech. Both are working towards master's degrees in aeronautics and astronautics.

They have not always planned careers in the same field. David has been interested in aeronautics and astronautics for as long as he can remember. Judy, although interested in a career in

some aspect of engineering when she first came to MIT, didn't decide on aeronautics and astronautics until later on.

"Even though we ended up in the same department, there's really no problem of competition between us," David Thompson said. "We were in a lot of the same classes together, but probably didn't talk about course work any more than any other two students in the department. It's a small department, so everyone was friendly and discussed problem sets, etc., with each other."

It wasn't the small size of their chosen department that brought the Thompsons together, though, for they were married before entering MIT as freshmen. When they met in high school, David Thompson was a year ahead of Judy. He graduated from Dorman Senior High School in Spartanburg, S.C., in 1972, and entered MIT as a freshman in September of that year, when Judy was a senior at Dorman. After the fall term he took a leave of absence, returned to Spartanburg, and worked for a term.

They were married in June, 1973, and moved to Cambridge in September.

Even before they met, however, both were interested in going to MIT. David had applied to several colleges before deciding on MIT. With his impressions of MIT and Cambridge to reinforce her own, Judy applied to MIT early action.

The transition from high school to college, a difficult one for many students, is even more challenging for a newly married couple. In addition to having to adjust to a difficult academic load, the Thompsons had to deal with many household duties that freshmen rarely encounter. They try to divide the cooking, cleaning, laundry and other chores as evenly as possible.

The Thompsons lived in Westgate, MIT's graduate student housing and the only campus housing equipped with apartments suitable for married couples, for one and one half years. Since most of the couples living there were graduate students they met most of their friends in their classes. In the

middle of sophomore year the Thompsons moved to Winchester, Mass., a suburb of Boston, because they both missed the rural atmosphere of their home town.

Understandably, financing two college educations was no small challenge for the Thompsons. In addition to the money David earned by taking a semester off before Judy entered MIT, they both had scholarships. Judy also received financial aid from MIT.

They were also lucky in finding good summer jobs in the same cities, so they didn't have the expense of maintaining two households. Both of them worked at NASA's Langley Research Center in Virginia the summers after their first three years at MIT. They both worked on the space shuttle at the Charles Stark Draper Laboratory in Cambridge during IAP 1976. IAP is MIT's six-week Independent Activities Period between semesters. Last summer the Thompsons worked on the Viking Project at NASA's Jet Propulsion Lab in California.

Since they each won a NSF graduate fellowship this year, the Thompsons should have an easier time financing their graduate educations. The NSF competition is formidable—more than 4,380 applicants competed for the 550 fellowships, which carry a stipend of \$3,900 per year per student for full-time study. David was also awarded the coveted Fannie and John Hertz Foundation Fellowship, but can only accept one of them.

The Thompsons haven't decided yet if they will go on for PhD degrees after they earn their master's degrees in December, 1977. They would eventually like to work for a NASA facility somewhere in the south. Judy plans a career in aerodynamics, while David is primarily interested in space vehicles.

David is the son of Mr. and Mrs. Robert H. Thompson of 188 Midway Drive, Spartanburg, S.C. Judy's parents, Mr. and Mrs. Frank J. Bergmann, also live in Spartanburg.

Stevens Appointed LeBel Professor

Dr. Kenneth N. Stevens, professor of electrical and bioengineering in the Department of Electrical Engineering and Computer Science at MIT, has been appointed to the department's Charles Joseph LeBel Audio Engineering Professorship.

The announcement was made by Dr. Wilbur B. Davenport, professor of engineering and education in the Department of Electrical Engineering and Computer Science, and head of the department, who said, "We are pleased to name Dr. Stevens to this professorship, in recognition of the dedication with which he has pursued his teaching and research in his years at MIT."

The Clarence Joseph LeBel Audio Engineering Professorship was created in 1967-1968 by a bequest from the late Mr. LeBel "for the purpose of establishing a professorship and an instructorship and two scholarships for the promotion of research and instruction in the field of audio engineering." Mr. LeBel, who received the SB and SM degrees from MIT in 1927, was a founder of the Audio Engineering Society, and he served as its president in 1958.

Professor Stevens is recognized for his research in speech communications and acoustics.

He was a staff member of the MIT Acoustics Laboratory from 1952-1954. In 1954 he was appointed assistant professor of electrical communications, and he became associate professor in 1957. After spending a year in Sweden as a Guggenheim fellow, he was made a full professor in 1963.

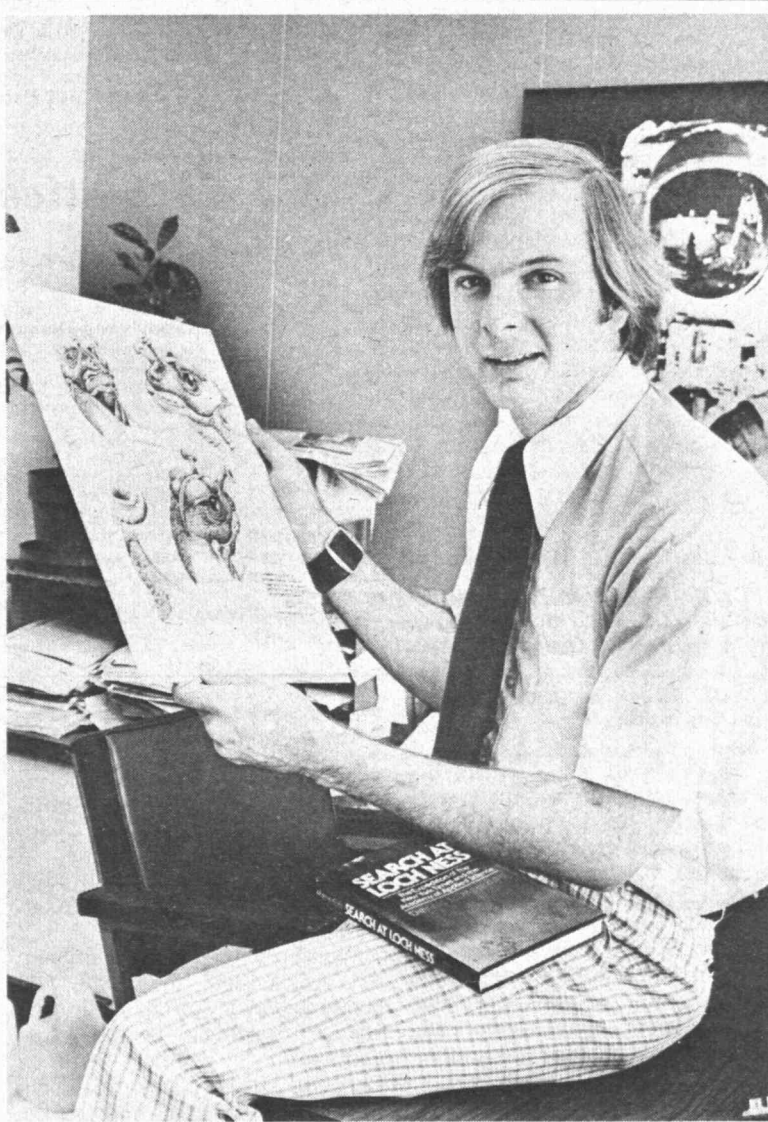
A Fellow of the Acoustical Society of America, Dr. Stevens was its vice-president from 1971-72, and he is currently serving as president. He is also a Fellow of the Institute of Electrical and Electronic Engineers, and a member of the honorary societies Sigma Xi and Eta Kappa Nu. From 1969-1970, he was a visiting professor in the phonetics department of the University College in London.

Dr. Stevens received the BASc degree in 1945 and the MAsC in 1948 from the University of Toronto, and the PhD from MIT in 1952.

He is a resident of Cambridge, Massachusetts.



Dr. Stevens



PORTRAIT OF A MONSTER—Artist's conceptions of the Loch Ness monster are displayed by Dennis Meredith, author of *Search at Loch Ness*, a new book on the expeditions to photograph the legendary beast. Mr. Meredith, managing editor of *Technology Review*, accompanied the 1976 expedition to Loch Ness and will be part of the 1977 expedition this summer. Published by Quadrangle/The New York Times Book Co., the book tells the human and scientific story of the hunt for the controversial monster. The expeditions included MIT's Harold E. "Doc" Edgerton as well as MIT graduates Robert H. Rines, Charles Wyckoff and Martin Klein.

—Photo by Calvin Campbell

ASA's Findings On thursday

(Following is the text of the findings of the executive committee of the Association of Student Activities with respect to the newspaper, thursday, following the hearings held Wednesday, May 18, and Thursday, May 19.)

"The ASA executive committee has made the following decision after careful consideration of the complaint filed by the Dean for Student Affairs Office, acting for members of the community, against thursday.

"1. thursday is hereby censured for the excessive invasion of privacy in its "Consumer Guide to MIT Men" published in the April

The first LeBel professor was Dr. Amar G. Bose, who was appointed in 1969. The most recent appointee was Campbell L. Searle, who held the Professorship from 1971-1973.

28th issue of their paper.

"2. We commend thursday for the recent changes they have made in their publication structure and feel that these changes should be maintained as part of their procedures.

"3. It is strongly recommended that thursday publish a statement of letters written to the paper.

"4. We condemn those immature members of the MIT community who have been anonymously harassing persons connected with this incident.

"5. The ASA deeply regrets the invasion of privacy which has occurred. We feel that an incident of this nature should never recur. Therefore, if any activity is guilty of an invasion of privacy, the ASA shall take extreme action against said activity, up to and including the removal of MIT affiliation."

MIT, University of Tokyo Plan Exchange Program

An exchange program that will permit graduate engineering students to spend one year abroad has been worked out by MIT and the University of Tokyo.

Dr. Alfred A.H. Keil, dean of the MIT School of Engineering, who announced the program, has designated Dr. Koichi Masubuchi, professor of ocean engineering and materials science, as the MIT coordinator for the program.

The program will involve initially two students from each university. The first Japanese students—as yet unselected—will enroll at MIT as special students in September 1977. The first MIT students in the program—also as yet unselected—will spend one year at the engineering school of the University of Tokyo beginning in April 1978.

Each university will make the final selection of the students based on the normal admissions process. The "special student" status means the students are not degree candidates.

Students from MIT must understand the Japanese language well enough to follow the course of study. However, for those mainly interested in research under the

supervision of an academic staff member, the language requirement may be eased.

Students may apply for a fellowship to defray expenses to either an agency in the United States or one in Japan.

MIT students interested in taking part in the program should contact Professor Masubuchi in Rm 5-223, Ext. 3-6820.

FEA Cites MIT Energy Reductions

MIT is one of seven private colleges and universities cited in a recent Federal Energy Administration report for reduction of energy use as a result of self-initiated energy management programs.

Energy Conservation on Campus: Volume II, Case Studies cites MIT for a cost avoidance of \$1,138,000 equal to 22-23 percent of the total energy budget. The report was prepared by the Energy Task Force through a Federal Energy Administration contract with the Association of Physical Plant Administrators of Universities and Colleges.

Professor August L. Hessel-schwerdt, Jr., professor of mechanical engineering, emeritus, in the Department of Mechanical Engineering provided technical support for the report.

Ting on Television

Dr. Samuel C.C. Ting, Thomas Dudley Cabot Professor in the Department of Physics at MIT and co-recipient of the 1976 Nobel Prize in physics, will take part in a two-hour special report on physics and astrophysics to be shown on the Public Broadcasting Service (WGBH Channel 2 in Boston) at 8pm Saturday, May 28.

The program, entitled "The Key to the Universe," is a co-production of the British Broadcasting Corporation and WTTW, Chicago. The program covers breakthroughs achieved this past year by physicists and astrophysicists toward understanding the laws of creation and unraveling the mysteries of how the universe came into being and is sustained. Noted physicists world wide are included in the program.

Erratum

A typographical error occurred in the May 11, 1977 Tech Talk story announcing a \$250,000 grant from Arthur D. Little, Inc., for a research and innovation fund. The beginning of the story should have read:

MIT announced today it has received a \$250,000 grant from Arthur D. Little, Inc., of Cambridge, a company with a long history of support for MIT programs and people.

The grant—\$50,000 a year for five years—will be known as the Arthur D. Little Research and Innovation Fund. Its purpose will be to reflect the commitment of the internationally-known research and development company to the use of technology and management skills for the benefit of society.

MIT Provost Walter A. Rosenblith, who announced the establishment of the fund, said it would "provide the impetus needed to advance new fields of research, as well as development of new research areas at the juncture between traditional disciplines at critical points of their development."

Tech Talk regrets the error.

THE INSTITUTE CALENDAR X3-3270

May 25 through June 5

Seminars and Lectures

Wednesday, May 25

Surgical Treatment of the Hyperlipidemias* — Dr. Robert S. Lees, cardiovascular disease, Director of Arteriosclerosis Center. Seminar arranged by the Clinical Research Center. 9am, Rm E18-408.

Return Migration to the Caribbean* — George Myers, Center for Demographic Studies, Duke University. MIT Migration & Development Seminar. 12:30pm, Rm E53-482.

An Evening with Eleanor Raymond** — Doris Cole, MIT architect. Eleanor Raymond will attend. Committee on the Visual Arts and the Department of Architecture Lecture Series. 7:30pm, Rm 10-340. Hayden Gallery will be open following the lecture.

Thursday, May 26

Some Practical Considerations in Applying Estimation Theory to Navigation System Design* — William S. Widnall, Manager, Dept of Navigation, Guidance and Control, Intermetrics, Inc. Aero/Astro Seminar. 4pm, Rm 37-252. Coffee preceding, Rm 33-222. Note day change.

Friday, May 27

Modal Control of Flexible Systems* — Mark Balas, Draper Laboratory. Aero/Astro Seminar. 4pm, Rm 33-206.

Wednesday, June 1

The Characterization of a Human Serum Factor that Stimulates Replication* — Dr. Charles Scher, pediatrics, Harvard Medical School. Seminar arranged by the Clinical Research Center. 9am, Rm E18-408.

Community Meetings

Wive's Group** — Group leaders: Charlotte Schwartz, sociologist & Myra Rodrigues, social worker, both from Medical Dept; Carol Hulsizer, faculty spouse in residence, Ashdown Hse. Wed, 3-5pm, Stu Ctr West Lng. Babysitting Stu Ctr Rm 473. Cheryl, x3-4911. **May 25:** Greg Smith, UROP Staff Member & Member of MIT Corp will present a slide show titled "Here's Boston."

Summer Art Program** — Sponsored by MIT Student Art Association. Classes start June 13. Registration from May 23 to June 10, 1-5pm, W20-429. Info: x3-7019.

1977 Pre-Retirement Seminar — Thurs, May 26, 9:15-11:15pm. **Institute Benefits.** Non-Staff: Nancy R. Woodman, Assistant to the Director of Personnel Relations, Rm A-166 Lincoln. Staff: Allan J. Urquhart, Benefits Officer, Rm A-254 Lincoln. Info: Benefits Office, x658 Lincoln.

Low Back Problem Exercise Class* — Thurs, 1-2:30pm, Maggie Lettvin, 48 Mass Ave. Bring 3 pillows and an OK from your doctor. \$15/ea class. Info: x3-4138, Mon, 9am-5pm. Last class, May 26, Resuming Sept, '77.

TOPS* — Tech Organization of Professional Secretaries. Meetings Thurs, 12n, Walker Blue Rm.

The Proposition — Performance for seniors and their parents. Sun, June 5, 8pm, Kresge. Tickets are required, avail in UA Office 9am-4pm and thru Members of Class Executive Committee.

Technology Wives Exercise Class** — Marilyn deKleer, instructor. Sponsored by TWO. An hour of serious exercising. Newcomers welcome. Mon, 8pm, Exercise Room, Dupont Gym. Admission, 50¢.

Social Events

An Evening in May** — Formal Dance sponsored by the Class of 1977. Live music. Formal Dress encouraged. Fri, May 27, 9pm-2am, Morss Hall, Walker Memorial. Tickets: \$5/person, available in UA Office 9am-4pm. Price incl 2 drinks.

Senior Clambake — Sat, June 4, 1:30pm, Kresge lower plaza. Admission, \$5. Tickets available in UA Office 9am-4pm.

Movie

The Magician (Bergman)* — Fri, June 3, 7:30 & 9:30pm, Rm 6-120. Donation, \$1.25.

Music

David Breitman, pianist* — Sonatas by Beethoven, Brahms, and Schubert. Wed, May 25, 5:15pm, Rm 14E-109.

Chamber Music Society Concert* — Wed, 5:15pm, Music Library. Info: x3-3210. Free.

Renaissance Vocal Music* — Sponsored by Chamber Music Society. Auditions & rehearsal Sun, 7:30pm, Rm 4-160. Yves, x3-5810.

Dance

"Vis-a-Vis", City Dance Theater* — Sponsored by the MIT Student Art Association. May 26-28, 8:30pm, Kresge Little Theatre. Tickets: \$3 in advance, \$3.50 at door, students, 50¢ off. Info: Art Association, x3-7019, or 354-7338.

Renaissance Dance* — Sponsored by MITSCA. Beginners welcome. Wed, 8pm, Burton dining hall. Info: Beth Parkhurst, 964-1840.

Renaissance Dance Band* — MIT SCA Dancing. Inviting players of recorders or other early instruments. expertise not necessary. Wednesday nights, 8pm, Burton Dining Hall Info: Ron x3-7814.

MIT Folk Dance Club — International: Sun, 7:30-11pm, Sala. **Balkan:** Tues, 7:30-11pm, Stu Ctr Rm 491. **Informal:** Fri, 12n-2pm, Kresge Oval (Bldg 7 Lobby in bad weather). **Israeli:** Thurs, 7:30-11pm, Sala.

MIT Dance Workshop — Sponsoring a number of different projects for second term. Please check Workshop bulletin board, duPont Armory, Bldg W31.

Exhibits

Drawings by Barbara Steen — On exhibition at the Faculty Club, thru May 31.

John Messina: Photographs* — Thru Wed, May 25, Creative Photography Gallery, Bldg W31. Mon-Sat, 10am-6pm, Sun, 12n-8pm.

Sculpture by Nancy Schon — June 2-30, MIT Faculty Club.

Women in American Architecture: A Historical and Contemporary Perspective* — exhibition documents the role women have played in the history and development of American architecture. Sponsored by the Committee on the Visual Arts & the MIT Department of Architecture. Thru Jun 18, Hayden Gallery, Mon thru Sat, 10am-4pm, free.

Strobe Alley* — High speed photographs by Harold E. Edgerton, Institute Professor and Professor of Electrical Measurement, Emeritus. Bldg 4, 4th fl.

MIT Historical Collections* — Permanent exhibition Mon-Fri, 9am-5pm, Bldg N52, 2nd floor. **Bicentennial Exhibits:** Katharine Dexter McCormick, '04; Vannevar Bush, '16; Karl Taylor Compton; Norbert Wiener, and 1876 Exhibit, Bldg 4 corridor. **The New Technology Exhibit** 2nd floor balcony of Lobby 7. **Energy Exhibit** Bldg E40, 1st floor. **Radiation Laboratory Exhibit** main corridor, Bldg 8. **Astrophysics Exhibit, Center for Space Research Exhibit** Main corridor, Bldg 4.

Hart Nautical Museum* — Permanent exhibit of rigged merchant and naval ship models, half models of yachts and engine models. Open daily in Bldg 5, 1st floor.

Canones* — Music Library, Rm 14E-109. Examples of the use of canons from 7 centuries of music.

Graphics by MIT Design Services* — On exhibit in Bldg 7 corridor.

Athletics

Home Schedule* — Saturday, June 4 — Grad Soccer. Honeywell. 2pm, Briggs Field.

Maggie's Self-Designed Fitness Class — Classes 12n-1pm, du Pont fencing & wrestling rms; 5-6pm, du Pont T Club Lng. PE credit course, but all are welcome.

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

*Open to the public

**Open to the MIT community only

***Open to members only

Send notices for June 1 through June 12 to the Calendar Editor, Room 5-111, Ext. 3-3270 before noon Friday, May 27.

ERDA to Fund Fossil Fuel Studies

(Continued from page 1)

Harvard-MIT Program in Health Sciences and Technology.

Principal investigator is Dr. William G. Thilly, a toxicologist specializing in human cell studies and associate professor in the Department of Nutrition and Food Science. Co-investigators with Dr. Thilly are Dr. Ronald A. Hites, associate professor of chemical engineering, and Dr. Jack B. Howard, professor of chemical engineering. Director of the Energy Laboratory is Dr. David C. White, Ford Professor of Engineering.

The organization of the long-term effort is a natural combination of studies in progress augmented by adjustments to the needs for meeting the interdisciplinary goals, Dr. Thilly said.

Reproducible soot samples are produced in MIT's Energy Laboratory, where coal, conventional liquid fuels, and synthetic fuels from coal conversion processes are presently studied under various, specified conditions aiming at increasing the efficiency of energy production. Much of this research area is supervised by Professor Howard.

In MIT's Department of Chemical Engineering, the chemical components of soot will be analyzed, with special emphasis on the potentially hazardous PCAH, under the direction of Professor Hites. This is possible because of the advances achieved in Professor Hites' laboratory in the use of gas chromatographic/mass spectrometric methods for studying complex environmental mixtures. The analytical chemists also are preparing pure PCAH constituents for tests of their effects on human cells in culture.

Dr. Thilly is measuring the ef-

fects of the organic compounds and actual soot samples in a human cell mutation assay. This novel and unique assay, developed in the Toxicology Group within MIT's Department of Nutrition and Food Science, may make it possible to examine very rapidly a large quantity of pure compounds of soot samples for their ability to cause genetic damage (mutations) in human cells.

However, to identify the small number of mutant cells that are present in human cell cultures, it is necessary to screen millions of individual cells. Presently, this is performed by examining the ability of each cell to grow to a large colony on a petri dish. Dr. Thilly has proposed several alternate procedures which may simplify the assay and eventually permit the facile testing of thousands of compounds for genetic hazard to human cells.

One proposed procedure involves passing a column of cells through a laser-equipped sensing device, which detects and counts the tagged mutants differentially from unmutated cells. The instruments used, fast-flow fluorometers, have been under development and improvement at ERDA's Los Alamos and Lawrence Livermore laboratories for several years.

If the screening proves successful, as expected, it could serve as an extremely valuable laboratory procedure for evaluating—in much less time than is now possible—the effects on health of a large number of chemical compounds on human cells.

Contributions to planning the research were made by Dr. Gerald N. Wogan, MIT professor of toxicology, and William A. Peters, research associate in chemical engineering.

Participants in the project include John G. Deluca, Henry Hoppe, and Bruce W. Penman, research assistants in the Department of Nutrition and Food Science, George R. Dubay, research associate in the Department of Clinical Engineering, and John McGrath, research associate in the Department of Mechanical Engineering.

MIT Press Plans Major Art Books

The MIT Press has recently contracted to publish four major titles in the field of art and architecture.

A Sense of the Future: Essays in Natural Philosophy and The Visionary Eye and The Imaginative Mind: Essays in the Philosophy of Art by Jacob Bronowski will be published by The Press in October, 1977, and Spring, 1978. The late Mr. Bronowski wrote *The Ascent of Man* and narrated the companion television series.

The definitive biography of the famous architect Walter Gropius, written by Reginald Isaacs, Charles Dyer Norton Professor of Regional Planning at Harvard, will be published in two volumes with Volume I scheduled for publication in Spring, 1978. The first volume will deal with Gropius's life and draw on personal correspondence. The second volume will concentrate more on his public life and philosophy of art and architecture.

Bauhaus in America, scheduled for publication in 1981, will be the comprehensive history of the art and architecture movement in the US. Writing the book is Hans M. Wingler in cooperation with Lloyd Engelbrecht, Peter Hahn, and Peter Selz. The MIT Press published *The Bauhaus: Weimar, Dessau, Berlin, Chicago* by Hans Wingler in 1969.

City Dance Troupe To Perform Here

"Vis-a-Vis," a revue of choreographed-improvisational works, will be performed by City Dance Theatre (CDT) of Boston at 8:30pm on Thursday through Saturday, May 26-28, in Kresge Little Theatre at MIT.

Sponsored by the MIT Student Art Association, the revue will combine dance, words, music, and visual projections. It marks the culmination of a year's work by Carolyn Brown Termini, Tom Krusinski, and Rylin Malone, the three regular dancers with CDT. The dancers have performed chor-

eographed work for the first time this year. Past performances have been mainly improvisation.

CDT, formed in 1970, is the longest running improvisation dance company in Boston. It performs an average of eight concerts a year at schools and colleges in the Boston area. It made a cross-country summer tour in 1974, giving 60 performances in 21 cities.

Tickets for the performances at MIT will cost \$3 in advance, \$3.50 at the door, with a \$.50 discount for students. For tickets and further information, call 354-7338.



CITY DANCE THEATRE will present "Vis-a-Vis" at 8:30pm on May 26, 27, and 28 in MIT's Kresge Little Theatre. Members of the dance company are (clockwise, beginning from lower right) Carolyn Brown Termini, Rylin Malone, Thomas Krusinski, and Michael Harris.

—Photo by Rosalie Post

Transit Impact Seen Negligible

"Current efforts to promote transit use and carpooling will probably have only a negligible impact on urban travel patterns in the years ahead," according to MIT Professor Alan Altshuler, writing in the May issue of *Technology Review*, MIT's journal of science and technology.

"The automobile accounts today for about 97 percent of all passenger miles of travel in American urban areas, up from 83 percent in 1950. On the basis of numerous studies of travel demand in urban areas and of consumer response to transit improvements, one may estimate that the automotive share will remain at the current level or increase slightly even if no additional highway capacity is constructed over the next several decades," writes Dr. Altshuler.

Dr. Altshuler is a professor in the Departments of Political Science and of Urban Studies and Planning at MIT. He served as Massachusetts Secretary of Transportation and Construction from 1971 to 1975. He played a leading role during this period in bringing about a massive reorientation of Greater Boston's transportation policies away from large highway projects and toward greater emphasis on mass transit. His *Technology Review* article draws upon research which he has carried out at MIT over the past two years for the US Department of Transportation.

Doubling the number of transit vehicle miles operated each day and eliminating all transit fares, Dr. Altshuler writes, would increase transit patronage by 60 to 100 percent. Even the more optimistic estimate, however, would raise the transit share of urban travel only to about 5 percent.

Much of the increased transit ridership, moreover, would consist of people who previously did not make the trips in question. Another significant proportion would consist of people who previously rode as automobile passengers rather than drivers.

Thus, the reduction in automobile traffic would amount to little more than one percent. Stated another way, it would offset several months' normal growth in automobile traffic. The cost of achieving this result in 1975, moreover, would have been roughly a tripling of public expenditure (by all levels of government combined) on mass transit—from about \$3 billion to about \$9 billion.

Two Reasons

Just as the American romance with highways began to pale in the late 1960s, Altshuler believes, the romance with mass transit has recently begun to pale. The reasons are predominantly twofold. First, transit fiscal requirements have been growing rapidly even as the public mood has shifted dramatically toward support for government austerity. Second, there has been a growing recognition that transit improvements have little potential for reducing energy

consumption or air pollution emissions.

"Buses and rapid transit vehicles are energy-efficient, low-pollution conveyances if they move with high average load factors," Dr. Altshuler writes. "Increased service, however, usually means reduced load factors. If doubling transit vehicle mileage generated in fact (as estimated) a 20 to 40 percent increase in patronage, and if half of the new patrons were making new trips or had previously travelled as automobile passengers, then the result would almost surely be an increase in energy consumption and air pollution emissions."

"In consequence of the growing sense of the limits of conventional highway and transit programs," Dr. Altshuler argues, "there has recently been an upsurge of interest in more innovative means of solving the problems of urban transportation." These include the use of special highway lanes for buses and carpools, the provision of dial-a-ride services, regulatory measures to force the development and marketing of improved automobiles, and auto travel disincentives such as gasoline tax increases.

Dr. Altshuler seeks to explain in his article why some of these have found ready acceptance, while others, with equal or greater potential as technical solutions, have been treated as "politically untouchable."

"The central point to bear in mind," Dr. Altshuler writes, "is that the American political system strives to accommodate new demands without disturbing existing policies and behavior patterns. This decision-making approach may be characterized as highly conservative, he notes. At the same time, however, decision-makers recognize that their task "is to manage an extraordinarily dynamic society, which generates a constant stream of new demands and opportunities."

Innovation As A Path

In seeking to reconcile these two divergent orientations, Dr. Altshuler finds, "American politicians are drawn inexorably to the idea of technological innovation as a path to problem-solving with minimal disruption of existing social arrangements and behavior patterns. Where technology is unable to do the job, the system often appears woefully ineffective. In dealing with at least some of the major problems of urban transportation, however, it appears to be within a decade of achieving an unambiguous triumph."

Change strategies tend to be less acceptable politically, Dr. Altshuler believes, to the extent (a) that they inconvenience voters, and (b) that the connection between the public action and the voter inconvenience is clear and immediate.

"With these features of the political system in mind," Dr. Alt-

shuler writes, "we can rank alternative change strategies in urban transportation in order of political acceptability." He concludes that the most acceptable programs tend to be those that involve public exhortation and spending, because these satisfy the public demand for "action" without compelling anyone to change his or her behavior. Unfortunately, such programs tend also to be quite ineffective.

The least acceptable programs tend to be those that would directly regulate consumer behavior or that would increase the prices paid by consumers. Thus, proposals for gas tax increases, gas rationing, increased peak hour highway tolls, and commuter parking restrictions have to date been rejected out of hand by elected officials.

Regulation of the automobile industry, on the other hand, has proven to be much more acceptable. "Elected officials can reasonably hope that voters will vent any resentment they feel about price increases upon the automobile companies. Thus, the officials can get immediate credit for voting on behalf of safety, clean air, and energy conservation. The cost issue can be deferred until the standards come into effect. Then they can attack the companies for their greed in raising prices to cover the cost of the mandated equipment. (Of course, if the companies can meet the standards without raising prices, all the better.)"

Increase Public Spending

"We shouldn't be surprised," Dr. Altshuler concludes, "that it has proven more feasible to increase public spending programs and to stop disruptive highway projects than to manage existing highway systems more effectively or to reshape the market framework within which consumers make their travel decisions. Nor should we be surprised that the most feasible innovations in recent years have been:

—those entailing new or improved services, to be used or not on a purely voluntary basis by consumers, and

—regulatory measures directing the auto manufacturers to produce more energy efficient, safer, less polluting cars."

The first category of innovation, Dr. Altshuler judges, is "unlikely to affect the character of the urban transportation system more than negligibly." The second, however, he finds "to be working, and at quite modest cost to consumers, especially considering that yesterday's alternative was more frequent auto style changes."

"By 1985 the average new American car will probably get twice the gas mileage of its predecessors of the early 1970s, will emit only about 5 percent of the carbon monoxide and hydrocarbons emitted by its predecessors of the mid-1960s, and will include safety features reducing the risk of auto travel to significantly under half the level of the mid-1960s.

"If achieved, these will be remarkable accomplishments. And they will constitute powerful evidence of the ability of private enterprise and modern technology to deal with important societal concerns when given clear public directives."

Frailey to Head Amateur Oarsmen

Jack H. Frailey, director of the Student Financial Aid Office, has been elected president and chief executive officer of the National Association of Amateur Oarsmen (NAAO).

The NAAO is the governing body for the sport of rowing in the United States, covering more than 200 member organizations—including MIT—and some 10,000 participating individuals. Mr. Frailey has been a member of the NAAO board of directors for 13 years and vice president of the organization for the past six years.

Mr. Frailey also has been appointed to the newly formed executive board of the United States Olympic Committee to represent rowing, now the third largest sport in the Olympic Games.



CBS NEWSMAN Dan Rather (right), together with a CBS camera crew, were at MIT last week to film an interview on space colonization with Dr. Gerald K. O'Neill (left), Jerome Clarke Hunsaker Professor of Aeronautics and Astronautics (Visiting) who spent this past year at MIT on leave from Princeton University. The segment will appear as a part of the CBS program "60 Minutes" during this coming Fall TV season.

—Photo by Calvin Campbell

Evans, MacLellan Appointed Lincoln Assistant Directors

Two new assistant directors have been appointed at MIT's Lincoln Laboratory in Lexington, Mass.

Dr. John V. Evans, associate head of the Laboratory's Division 9, Aerospace, and a member of the

Mayor White Names Luscomb 'Grand Bostonian'

Social justice crusader Florence Luscomb, MIT '09, was one of seven persons honored by the City of Boston as Grand Bostonians at an awards presentation and dinner on May 18 at the Parkman House.

Mayor Kevin White said of the seven, "Taken together, their lives form a road map of our times and their achievements explain in individual terms the qualities that Boston is famous for. Each is different. The paths they followed were their own, but the common threads are clear: high aspirations, higher achievements, all the while governed by a constant and profound reverence for the human spirit."

Those honored with Ms. Luscomb were community activist Melnea Cass, former senator and diplomat Henry Cabot Lodge, drama critic Elliot Norton, business leader and philanthropist Sidney Rabb, former governor and senator Leverett Saltonstall, and historian Henry Muir Whitehill.

Ms. Luscomb received the SB degree in architecture in 1909 and until the outbreak of World War I worked as architect in the Cambridge firm, Lois L. Howe and Manning. During this time she also worked on behalf of women's suffrage.

Since World War I she has devoted her energies and talents to women's and civil rights issues. A charter member of NAACP, she has worked on issues ranging from union rights to fighting Senator Joseph McCarthy.

Today Ms. Luscomb is the last of the middle generation of civil rights workers. A resident of a Cambridge commune, she continues to lecture extensively.

Leeds Receives Fulbright-Hays Grant

Elizabeth R. Leeds of Dedham, a doctoral candidate in the Department of Political Science, has won a Fulbright-Hays grant for dissertation research on migration policy in Portugal.

Ms. Leeds is one of some 350 young American students and artists selected for awards this year. The Fulbright-Hays program is part of the US State Department's educational and cultural exchange program. The pre-doctoral competition is conducted by the Institute of International Education.

Lincoln staff since 1960, has been named assistant director with responsibilities for advanced research programs in solid state, data systems, seismology and space research.

Donald C. MacLellan, head of the Laboratory's Division 6, Communications, and a Lincoln staff member since 1957, has been appointed assistant director with responsibilities for the Laboratory's satellite communications and energy programs.

Announcement of the promotions was made by Walter E. Morrow, Jr., Laboratory director.

A native of Manchester, England, and a graduate of the University of Manchester, Dr. Evans was a research fellow at England's Jodrell Bank Experimental Station 1957-60 before joining Lincoln's Division 3, Radio Physics, where



Dr. Evans

he played a key role in development of planetary radar astronomy, as well as coherent ionospheric radar observations, using Lincoln's Millstone Hill Radar in Westford. He became associate group leader at Millstone in 1970, group leader in 1972 and associate head of Division 9, Aerospace, in 1975. He became a member of the Lincoln Steering Committee in 1975. From 1966 to 1967, Dr. Evans was George A. Miller Visiting Professor of Electrical Engineering at the University of Illinois-Urbana.

A native of Boston and a graduate of Boston College, Mr.

MacLellan joined Lincoln as a member of the Systems Engineering Group in 1957 and from 1958 to 1963 worked on design, construction and payload testing for Project Westford. He



Mr. MacLellan

became assistant leader, Space Techniques and Equipment Group, in 1963, helping plan, design and test the LES 1 through 6 communications satellites. He became group leader in 1969 with primary responsibility for LES 7. As assistant head, Division 6, Communications, 1971-72, he served as project leader for LES 8 and 9. He became associate division head in 1972 and division head in 1976. He has been a member of the Laboratory's Steering Committee since 1972.



MEMORIAL CONTRIBUTIONS by family and friends to MIT's Anita Porell Krause Memorial Fund are being applied to the purchase of a dual chamber carbon dioxide incubator for use by MIT Professor Paul Gottlieb (above) and his staff in the Immunology Laboratory of the MIT Center for Cancer Research. The equipment is identified with a plaque inscribed "In Memory of Anita Porell Krause, Class of 1948, from her MIT Friends." The gift allows Dr. Gottlieb and his staff to culture cells from normal and leukemic mice to determine the mechanisms by which cancer-causing agents interfere with this development. Mrs. Krause, of Great Neck, L.I., N.Y., died last December.

—Photo by Calvin Campbell

Sloan School Issues Study On Arbitration

By CHARLES H. BALL
Staff Writer

An MIT study has concluded that the state's controversial "final-offer" arbitration law governing police and firefighter salary negotiations has had no impact on salaries in the three years it has been in effect.

The state Legislature presently is considering whether to extend the law, which took effect on July 1, 1974, and is due to expire on June 30.

The law has been the subject of intense debate. Police and firefighter unions generally favor an extension, while municipal officials oppose it on the grounds that the new arbitration provisions have had a significant inflationary effect on salaries.

The MIT researchers have yet to complete a full analysis of their five-month study, but have issued an abbreviated report because of "the immediacy of the situation." The report covers the findings most closely related to the issues under debate in the Legislature.

"We have found that the dispute settlement provisions of the law have had no effect at all on rates of salary change," said Professors David B. Lipsky and Thomas A. Barocci of MIT's Alfred P. Sloan School of Management. "Our best estimate," they added, "is that salaries would be almost the same if there had never been an addition to the law."

Other major findings, they said, were these:

—The number of police and fire contract negotiation impasses increased significantly after the passage of the final-offer statute.

—Salary changes resulting from arbitration awards were not significantly different from salary changes achieved through other processes such as collective bargaining, mediation or fact-finding.

—The rates of salary increases for police and firefighters in Massachusetts have not differed significantly under the new law from those in other northeast states that use different methods to solve police and firefighter salary disputes.

—Economic, social and environmental factors that might have been expected to be related to police and fire salary changes had no influence

or only a weak influence. These factors included state aid to communities, population growth and unemployment.

"The new law, in short, did not alter the fundamental processes that affect salary change," said Professors Lipsky and Barocci, who headed the research effort. "A very important influence on salary changes was what we call a 'catch-up' effect. That is, the salary increases were higher in towns and cities that were ranked low to begin with. There probably was a compression of salary differentials across the state—the differences tended to diminish. This has been going on elsewhere, too, which would account for the fact that the rates of salary increases have been similar in a number of states."

"We have seen traditional economic and political processes at work since the new law went into effect, rather than a new form of bargaining," they said.

Before the law went into effect, police and firefighters had several options in settling contracts with towns and cities. They could do so on their own through the collective bargaining process, or could declare an impasse and obtain the services of first a mediator and then a fact-finder. The new law retained the mediation and fact-finding services—which are not binding—but provided also that the dispute could go to final-offer arbitration.

Under this form of arbitration, an unusual technique used only in a handful of states, both sides submit their best offers to an arbitrator, who must choose one or the other. This in theory leads the parties to submit final offers that are more realistic than might be the case if they expected the arbitrator to try to arrive at a compromise or split-the-difference solution. If they seek too much, they run the risk of losing the arbitration case to their bargaining opponent.

Another theory is that final-offer arbitration provides incentives for the parties to reach settlements—to negotiate their differences and make concessions—without resorting to arbitration at all.

However, this didn't prove to be the case. According to the study team's report, there were 168 police and fire negotiation impasses in the three-year period preceding passage of the law, and 355 impasses in the first two and one-half years following passage.

"To what extent these changes in the process can be attributed to a 'chilling effect' created by the law itself, to the parties' desire to experiment with a new technique of dispute settlement, or to the tougher economic climate that prevailed after 1974 is problematical," the report states.

The MIT researchers added that the use of final-offer arbitration has declined in each of the years since the law took effect.

"The parties had a new toy at first and weren't sure how it would work," they said. "Some wanted to see how it would work, and tried and went all the way, particularly in the first year. But fewer used it in the second year and even fewer in the third year. They had satisfied their curiosity in the subsequent years and

went back to bargaining along time-worn paths."

The researchers examined data for the period 1973-76, which roughly took into account the two years before the law was passed and the two years since. This data then was used for statistical computations involving the rates of salary increases for police and firefighters in cities and towns throughout the state and the processes through which settlements were reached through collective bargaining, mediation, fact-finding or arbitration.

"We found that the process made no difference, and that there was no significant difference in the rates of salary change for any of four employee groups—firefighters, patrolmen, police sergeants and fire lieutenants," they said.

A "minor exception," they said, was that arbitration did seem to have an impact on the salary changes of fire lieutenants in 1975-76. "Their settlements were higher than one might have expected. The reason probably is that fire lieutenants by number constitute only a small proportion of the work force in a fire department."

Dr. Lipsky is a visiting associate professor at the Sloan School. Dr. Barocci is assistant professor of industrial relations. They were assisted by William Suonen, an assistant professor at Northeastern University, who is a PhD candidate at the Sloan School.

Record Number Of Sophomores Enroll in VI-A

A record number of 73 students will enter the cooperative program in the Department of Electrical Engineering and Computer Science (Course VI-A), according to John A. Tucker, program director.

Participation in the VI-A program, Mr. Tucker said, now stands at more than 12 percent of the student population in the department. Current total enrollment in Course VI-A was 174 students this year.

Course VI-A provides industrial and research experience concurrent with academic work through organized work assignments interwoven with regular studies. Most students enter the program in their sophomore year and receive the SB and SM degrees following their fifth year of study.

The new class of VI-A students was selected from 165 applicants by the 18 companies affiliated with the program. Representatives of the companies conducted nearly 800 interviews with the applicants during a two-day visit in March. From the interviews, the companies rank ordered 102 of the applicants. Final selections were decided through 415 individual conferences with Mr. Tucker.

Enrollment in Course VI-A has risen rapidly since 1970 when Mr. Tucker became its director. That year 39 sophomores applied and 29 were placed. The success of the VI-A program has led to establishment of similar programs in several other departments in the School of Engineering.

Experimental Farm to Test Photovoltaic Crop Irrigation

(Continued from page 1)
season has come to an end, the solar-cell unit will be tested as a power source to drive large fans used for drying grain in storage bins. Two bins, each equipped with a five-horsepower fan, will be used to store and dry the 12,000 bushels of corn expected to be harvested from the 80-acre experimental field.

The importance of developing alternative energy sources for irrigation was indicated by Ronald W. Matlin, assistant manager of the MIT Lincoln Laboratory Photovoltaic Project. He stated that, "Over 35 million acres are irrigated in the United States at an annual cost for fuel in excess of \$500,000,000. Fossil fuel supplies for this irrigation are becoming inadequate in some locations as well as becoming ever more expensive."

He further stated, "At the present average ERDA purchase price of \$15.50 per peak watt, solar cells are much too expensive for use in irrigation and other agricultural applications except on an experimental basis, but systems of this type should become economically viable on a much wider scale when the 1986 ERDA goal of solar cells at 50 cents per watt is

achieved."

This irrigation experiment is the first in a series of field tests to be carried out for ERDA in several different application areas, according to Marvin D. Pope, manager of the Lincoln Laboratory Photovoltaic Project.

"Our objective is to test photovoltaic power systems on a scale large enough to permit a realistic assessment of their technical, institutional, and economic potential," he said. "The results will simplify and expedite the practical use of such systems as suitable solar cells become available."

Obituary

James E. Andrews

James E. Andrews, 51, a carpenter at Lincoln Laboratory died Monday, May 16, in Clearwater, Florida.

Mr. Andrews joined Lincoln Laboratory in 1967 and had been on long-term disability since 1972. He is survived by his wife and several children.



HIGH AND DRY are these employees of Boston Chimney and Tower Co., Salem, working in Tuesday's heat atop the 180-foot chimney at the MIT Central Utilities Plant, Building 42. They won't be dry for long, however, because the insulated jug being hoisted aloft on the rope to the left of the chimney is full of Kool Aid. The workmen are replacing the metal cone on the top of the chimney and repairing the brickwork on the face of the structure. The cone, part of the stack's anti-pollution equipment, was damaged in a recent windstorm.
—Photo by Calvin Campbell

Tennis Lessons

MIT tennis team members Peter Moss and Reid Sheftall will give group tennis lessons, sponsored by the MIT Department of Athletics, for beginning and intermediate players this summer.

Manny Weiss, women's tennis coach, will give private and semi-private instruction.

Classes, limited to ten students, meet for eight one-hour sessions and cost \$15. Members of the MIT community with current Athletic Cards and their immediate family over 13 years old are eligible.

Registration forms are available at the duPont Tennis Courts, Athletic Office, and duPont Equipment Desk. Forms and checks payable to MIT should be returned to the Department of Athletics, Rm W32-109, as soon as possible. Enrollment is on a first-come, first-served basis.

Starting times and dates for group lessons are:

Beginners: noon, 4:15, 5:15, and 6:15pm, Mondays and Wednesdays, starting June 6, July 6, and August 1.

Intermediates: noon, 4:15, 5:15, and 6:15pm, Tuesdays and Thursdays, starting June 7, July 5, and August 2.

Classes will meet at the duPont Tennis Courts or, should it rain, at the Carr Indoor Tennis Center. Students must provide flat-soled tennis shoes, rackets, and bring a can of new tennis balls to the first class.

To arrange for private or semi-private lessons costing \$6/half hour and \$12/hour, call Mr. Weiss on Ext. 3-4919.

MIT Libraries Summer Term Hours

Wednesday, 5:00pm May 25, 1977 through Sunday, September 11, 1977

	Aero & Astro	Archives	Barker	Chemistry RR	Dewey	Humanities	Lindgren	MRL
Sunday	closed	closed	1-6	closed	closed	1-6	closed	closed
Monday	9-5	9-5	9-9	9:30-4:30	8:30-6	8:30-9	9-5	9-5
Tuesday	9-5	9-5	9-9	9:30-4:30	8:30-6	8:30-9	9-5	9-5
Wednesday	9-5	9-5	9-9	9:30-4:30	8:30-9	8:30-9	9-5	9-5
Thursday	9-5	9-5	9-9	9:30-4:30	8:30-6	8:30-9	9-5	9-5
Friday	9-5	9-5	9-6	9:30-4:30	8:30-6	8:30-6	9-5	9-5
Saturday	closed	closed	12-6	closed	9-5	12-5	closed	closed
			Reserve Book Room	Rotch	Rotch Visual Collection	Science	Student Center	Von Hippel Materials Center
Sunday	closed	closed	closed	closed	closed	1-6	24 Hours	closed
Monday	9-6	9-5	12-5	9-5	9-5	8:30-9	24 Hours	8:30-4:30
Tuesday	9-6	9-5	12-5	9-5	9-5	8:30-9	24 Hours	8:30-4:30
Wednesday	9-8	9-5	12-5	9-9	9-5	8:30-9	24 Hours	8:30-4:30
Thursday	9-6	9-5	12-5	9-5	9-5	8:30-9	24 Hours	8:30-4:30
Friday	9-5	9-5	12-5	9-5	9-5	8:30-6	24 Hours	8:30-4:30
Saturday	closed	closed	closed	closed	closed	12-5	24 Hours	closed

Memorial Day Weekend: Saturday, May 28 through Monday, May 30, 1977
Student Center open; ALL OTHER LIBRARIES CLOSED